STEP III: FORM OF PRODUCTION AND NATURAL RESOURCES – SURVEY AND ANALYSIS

Duration: Sixteen days

Introduction

The aim of this step is to generate and analyse information on the form of production and the natural resources of the study area.

The order of the survey activities (Figure 2) is designed to lead to a progressive improvement in the depth and accuracy of the information.

*(i) The first stage of the survey is a generative one. The training team is divided into survey groups. Group members use their experience, and the historical and background information from Step I, to formulate questions for farmers in group meetings and individual interviews. In the meetings and interviews issues, themes and resource information are **generated** in response to the questions;*

*(ii) In the **detailing** stage of the survey (Figure 2), this initial information is followed up in further interviews, informal discussions and resource survey work;*

*(iii) More formal natural resource survey techniques are then used to **correlate** and **assess** (Figure 2) the resource information collected and analysed in the generative and detailing stages. The questions asked in natural resource survey activities are generated by the research with farmers in groups or individual interviews (Figure 3).*

Through this process the relevance and reliability of information is improved through cross-checking and its focusing on key areas and issues.

As explained in the earlier discussion of methodological issues, triangulation of human sources and of techniques is an important tool in the rapid improvement of the quality of information. Triangulation helps ensure the survey groups are conscious of the range of farmer categories and interest groups that exist at the local level and that representatives from all of these are included in the survey.

To conclude the survey step the form of production and natural resource information is analysed and then synthesised from information collated on completion of each activity.

Form of Production

The form of production of an area is the aggregate of farmers' production systems. It consists of two elements:

(i) a set of production activities and the resources and management methods required to sustain them;

(ii) the relations of production, comprising the flows of production resources, outputs and information, the forms of these resource exchanges and the power relationships involved.

An analysis of the form of production provides a means of identifying different categories of farmer, each characterised by a general level of resource access, production output and household security. Relationships between these categories should also be revealed, for example, through land tenure, labour and livestock transactions, and degrees of influence on local institutions. This analysis enables the researcher to appreciate the role and relative importance of a particular resource, such as fuelwood, browse or manure, within the production strategies of different types of household. On this basis the utility to respective categories of

proposed agroforestry interventions can be predicted. At a more abstract level, the form of production is a concept which integrates social, economic, political and environmental processes, permitting and promoting interdisciplinarity.

The Role of Natural Resources

Step III aims to provide an understanding of the role of natural resources within the form of production (Figure 2). Interviews and meetings elicit farmers' perceptions of the demand for resources, their access and management, and constraints and opportunities for their use (Figure 3).

The issues raised during Step II (Review of Historical and Background Information) are introduced to farmers in the generative phase of Step III for their comments and expansion (Figure 2, Step III). These preliminary meetings are also used to generate further themes for discussion. The farmers' own classifications of resources are discussed in the generative and detailing phases to gain an understanding of the criteria they employ and their priorities. Activities that combine discussion and field work are also employed to further the links between the social and environmental investigations (Figure 2, Step III).

In these ways natural resource issues become focused and the farmer's perception of constraints and opportunities, within the context of the form of production, emerges (Figure 3).

The assessment phase follows. It aims to describe, using conventional resource assessment methods (such as soil and vegetation survey (Figure 2)), the resources and processes identified by the farmer and to validate the farmer's own description and classification. This phase is used to obtain technical information in the conventional form needed to establish communication between researchers and farmers. It is also a means of correlating ("triangulating") the farmers' information. The important difference between this approach and conventional resource assessments is not the assessment methods used, but the way in which information from farmers determines the type of resource data collected and the way it is subsequently used.

Objectives and Outputs

By the end of the form of production and natural resource survey and analysis, understanding should have been gained of:

* **a classification of farmers based on variations in household resource access, production outputs and income levels;**
* **how the resource endowment of different categories of household influences the nature of their production activities;**
* **the strategies farmers use to overcome specific resource constraints;**
* **a classification of selected natural resources and their uses;**
* **the farmer's perception of the constraints and opportunities associated with the natural resources;**
* **correlations between land types and land use, including categories of woodland resources;**
* **how the production, management and consumption of woodland resources forms part of household production systems;**
* **what conflicts occur over access to resources and how successful different groups are in securing access;**
* **how local institutions attempt to manage and regulate access to woodland resources, and their level of effectiveness;**
* **the effectiveness of external agencies, e.g. extension**

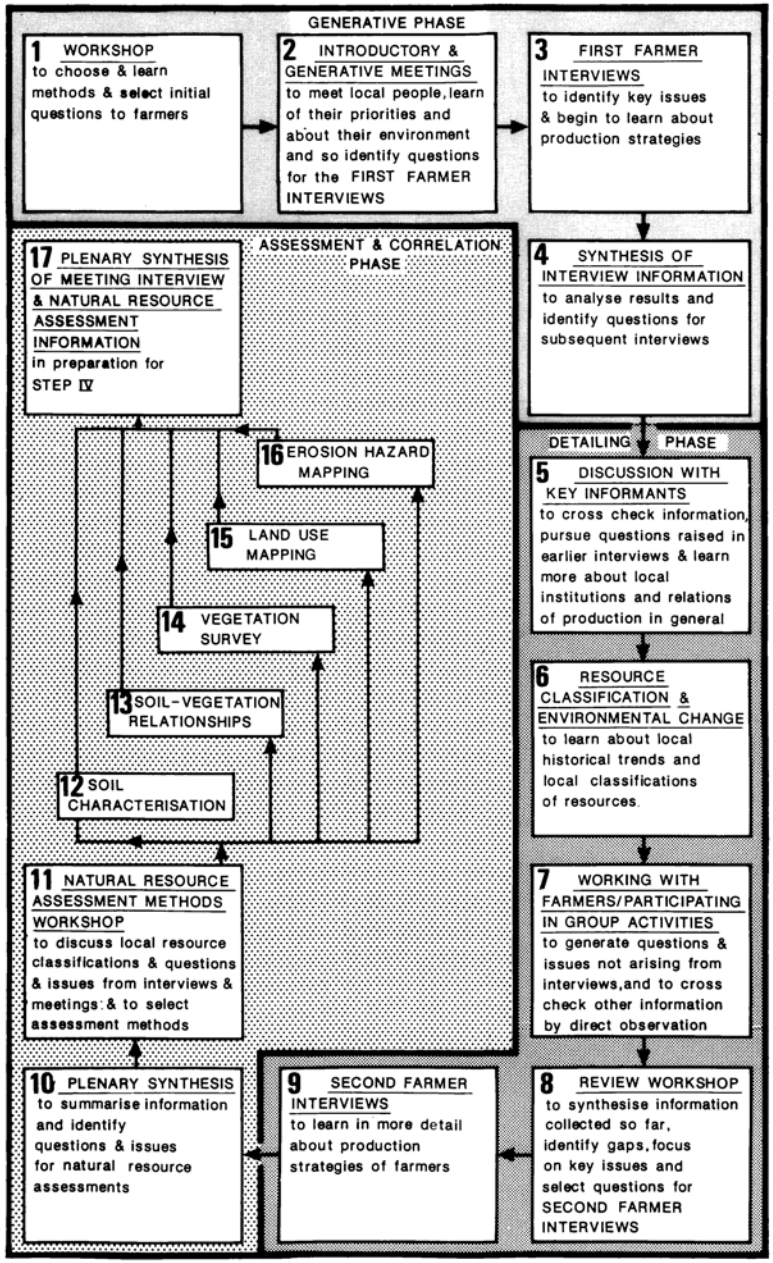
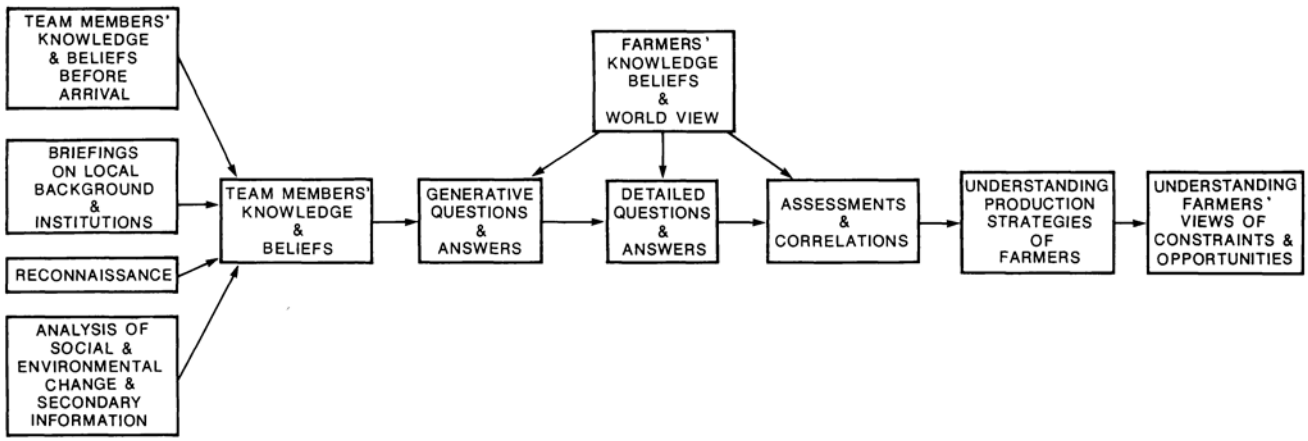


Figure 2
Step III, Activities 1–17: Form of Production and Natural Resource Survey and Analysis

Figure 3
Synthesis of Views of Farmers and Training Team



agencies, in providing appropriate advice on specified resource constraints and production issues (including agroforestry).

List of Activities

Generative:
Activity 1 - Workshop on rapid appraisal methods of researching with farmers
Activity 2 - Introductory and generative meetings
Activity 3 - First interviews
Activity 4 - Summarising interview information

Detailing:
Activity 5 - Informal discussions with key informants
Activity 6 - Resource classification and environmental change
Activity 7 - Working with farmers/participating in group activities
Activity 8 - Workshop
Activity 9 - Second farmer interviews
Activity 10 - Plenary synthesis of meetings and interviews

Assessing:
Activity 11 - Natural resource assessment methods workshop
Activity 12 - Soil characterisation
Activity 13 - Soil-vegetation relationships
Activity 14 - Vegetation survey
Activity 15 - Land use mapping
Activity 16 - Erosion hazard mapping
Activity 17 - Plenary synthesis of meeting, interview and natural resource survey information

Activity 1. Workshop on Rapid Appraisal Methods of Researching with Farmers

(i) Introduction

The aim of this activity is to prepare for:

(i) the introductory meetings of survey groups with local people (in our case from the VIDCO areas or farmer group areas in which the survey groups were working);

(ii) the first informant farmer interviews which sub-groups of 2-3 people will be conducting.

Figure 3 illustrates the process by which team members learn to understand farmers' views of their constraints and opportunities. Discussing this is a useful opening for the workshop.

(ii) Literature on RRA

The references listed below were handed to the participants in the Shurugwi training course. Notes on key features of RRA and research methods were extracted from these references and listed next.

References

Box, L. (1987) **Experimenting cultivators: A methodology for adaptive agricultural research.** Overseas Development Institute, Agricultural Administration Unit, Discussion Paper 23.

Chambers, R. (1987) **Notes and reflections on the workshop on farmers and agricultural research: Complementary methods.** Institute of Development Studies, University of Sussex.

Farrington, J. and Martin, A. (1987) **Farmer participatory research: A review of concepts and practices.** Overseas Development Institute, Agricultural Administration Unit, Discussion Paper No. 19.

Khon Kaen University (1987) **Proceedings from the 1985 International Conference on Rapid Rural Appraisal.** Khon Kaen, Thailand, Rural Systems Research and Farming Systems Research Projects.

Institute of Development Studies Conference (July 1987):
Lightfoot, C. and Thrupp, L.A. **Research Methods**

Edwards, R. and Kean, S. **Informal Research and Development**
Norman, D. **Using farmer groups**
Mathema and Verma, **Team interaction.**

Raintree, J.B. (1987) The state of the art of agroforestry diagnosis and design, **Agroforestry Systems,** 5, 219-50.

Raintree, J.B. and Rocheleau, D.E. (1987) Case study example of the D & D learning process. **D & D User's Guide: An Introduction to Agroforestry Diagnosis and Design.** ICRAF: Nairobi.

Wilson, K. (ed.) **Seminars with farmers:**
(i) Mapanzure, Runde Communal Area, March 1987
(ii) Mutoti, Mazvihwa Communal Area, March 1987.

(iii) Key features of RRA

These features of RRA were discussed and used in the workshop:

* RRA is an iterative process. In this methodology two iterations are involved:

  1. Survey
  2. Identification and appraisal of potential interventions.

* RRA emphasises rapid and progressive learning by researchers through interaction with farmers.

* Interdisciplinarity

* A flexible approach is required in the scheduling of activities and choice of methods.

* Central to RRA is an intense period of fieldwork.

* Plenary sessions are needed to analyse what has been done, to agree on what has been learned and on what is still unclear.

* Need for timeliness.

* RRA is **not** designed to produce the last word on particular resource issues or general development problems.

* An RRA frequently results in as many new questions as answers.

(iv) Research methods: Lightfoot and Thrupp (1987). See also Farrington and Martin (1987).

These aspects of applied research were covered in the workshop:

* Chain of interviews: links from farmers to local interest groups and institutions to government agencies.

* Ethnohistories (see also Box, Louk **Experimenting Cultivators** and his reference to 'key questions').

* Informal and semi-structured interviews.

* Formal surveys and in-depth interviews.

* Group discussions.

* Implications of research for gender and community.

Cross cutting the use and potential of methods are two other dimensions (see Chambers, 1987).

(i) biases and balance of gender and person (see case study in Farrington and Martin, 1987);

(ii) quality of interaction between farmers and scientists (see two case studies of group meetings, Wilson, 1987).

'Only when scientists have more freedom of

movement and of action, and can use complementary methods in support of and in collaboration with, resource poor farmers, will they be able to serve them best: and that only when resource-poor farmers receive such encouragement and support will they in turn be able to raise production and reduce risk more effectively' (Chambers, 1987, p. 11).

(v) Brainstorming sessions

Two "brainstorming" sessions were held during the workshop – the "Do's" and "Don'ts" of:

(i) Working in teams;
(ii) Conducting meetings and interviews with farmers.

These sessions are a way of introducing survey group members to each other, and they require group members to agree on basic principles for working with each other and farmers. Approximately half an hour is required per session and another for each plenary.

The examples given below from the Shurugwi course were compiled in plenary from the outputs of the three survey groups.

(vi) Establishment of questions and procedures for introductory and generative meetings

During the workshop survey groups decide on the generative questions to put to farmers at the introductory meetings. These are discussed in a plenary presentation. Each group may arrive at a different format for recording questions and answers. For example, in the Shurugwi programme two groups used table formats, the third used a check list of key questions, recording the meeting verbatim, and structuring the results afterwards. Thus variation is the result of participants following their own ideas, in keeping with the participatory philosophy of the programme. One advantage of this is that participants consider and evaluate a range of approaches, each with particular benefits and problems. However, it is crucially important that data from different survey groups proves compatible during later syntheses. It is therefore recommended that a standard format is employed, built during a plenary session from the best features of the various methods developed by the sub-groups.

Example III(3) shows a table format used in Shurugwi for direct recording of answers to questions put at an Introductory and Generative Meeting.

Example III(1) – Activity 1

Working in Teams – Do's and Dont's

Synthesis of Brainstorming Sessions

DO:

- Agree on objectives and methods for meetings and tasks and reach mutually agreed decisions and conclusions
- Be prepared to listen to others
- Be resourceful and flexible
- Participate and share
- Be considerate
- Deal positively and quickly with conflict
- Have an agreed mode of operation

DON'T:

- Shout at or embarrass each other
- Personalise issues
- Be arrogant, obsessive, dogmatic or domineering
- Be late
- Conceal information
- Be complacent, indifferent or passive
- Interrupt rudely or have sub-discussions within a group

Example III(2) - Activity 1

Meetings and Interviews with Farmers - Do's and Dont's

Synthesis of Group Brainstorming Sessions

DO:

- Follow local greetings and etiquette
- Adopt a clearly agreed but flexible procedure beforehand and explain this to farmers as well as the objectives and the role of the interpreters
- Be patient and polite
- Create an open and relaxed atmosphere to encourage participation and dialogue
- Use observation to support your understanding
- Be supportive of each other
- Be aware of conflict and gender issues
- Use appropriate language
- Start slowly and build up
- Explain the purpose of any equipment and get consent to use it

DON'T:

- Be authoritarian or condescending, i.e. a 'chef'
- Allow individuals to dominate a conversation
- Be afraid to ask probing questions in interviews
- Ask leading or very controversial/sensitive questions in group meetings
- Make false promises
- Conflict with or embarrass each other or farmers
- Try to teach farmers
- Align ourselves with factions
- Be rude or careless

(vii) Training on informant interviewing

RRA relies on semi-structured interviews not formal questionnaires. There is a need in such interviews to establish rapport with the interviewee and at different times both to follow and steer the flow of the conversation, rather than asking questions in a formal and stilted manner. Answers to questions or statements made by respondents should not always be passively accepted by the interviewers. Some probing is required as well as checking where possible by direct observation. These points mean that some interview training for course participants is required in the workshop. One method of doing this would be through role play followed by trainees practicing on each other.

Activity 2. Introductory and Generative Meetings

The meetings held in the Shurugwi exercise were designated VIDCO area meetings, although in fact attendance was usually limited to people from the areas of the farmer groups from which informant households were drawn. The meetings have two aims:

(i) to introduce the survey team members to local people. This introduction needs to include a clear explanation of the purpose of the training exercise, what the outputs will be and how farmers might contribute and benefit. These points should all have been explained to and agreed with farmer group leaders in the setting up phase of the training course;

(ii) to ask questions which generate further questions, identify key issues, and obtain preliminary information on natural resources. Asking generative questions means that the survey group members are immediately exposed to farmers' own classification of resources, the way they use them and their major concerns. This information thus helps to open the training course participants from the outset to the perspective farmers have of their world. The relative success of the meetings

influences the nature of the first informal farmer interviews that follow.

Other points to note about the conduct of meetings are:

(i) Prior decisions have to be made on who will speak for the survey group. In our Shurugwi exercise only a third of the members of each survey group were Shona speaking. If they had been the sole speakers, the flow of the meetings would have been improved. If non-Shona speakers had played a role, they would have required an interpreter.

(ii) For non-Shona speakers to understand what is happening there are three options:

(a) one interpreter translates publicly, so that Shona and English are alternated. The flow is impeded but note-taking is improved;

(b) Shona speakers in the survey group other than the overall spokesperson provide simultaneous translations for non-Shona speakers sitting alongside them. Speech flow is improved, but the background whispering of the translations is distracting, and note-taking more difficult;

(c) the Shona speakers transcribe what is being said and provide a translation afterwards for non-Shona speakers.

All of these methods were used by survey groups. On balance two groups favoured (b) as it encouraged less inhibited audience participation, and one group used (a) as they could take better notes.

An example of the write-up of one of the Shurugwi introductory and generative meetings is shown below (Example III(3)).

An introductory VIDCO area meeting in Shurugwi

Example III(3) - Activity 2

Group 3: Introductory and Generative Meeting (Mavedzenge VIDCO Area)

Preamble:

* To introduce the survey group, our objectives and what we are going to be doing and how.
* Gain local interest and confidence.
* Establish general baseline environmental data for the VIDCO.
* Identify range of opinions and identify some key informants.
* Meet farmers selected for generative and detailed interviews.

Proposed Questions:

* What type of crops are grown?
* What are the names of the soils they are grown on?
* Which soil type does crop X do best on? (develop crop/soil matrix)
* Describe soil type X, Y, Z.
  Checklist: drainage, colour, texture, fertility and management
* Where do you find these soil types, position in landscape/ slope (catena)?
* What land use is connected with these soils? (develop soil/ land use matrix)
* For each land use/soil type which trees are found?
* What are the uses of these trees? (develop tree matrix)
* Trees at home? Uses/selectively left/planted.
* Trees in fields?
* Older people - Long back where did you get firewood from and now where do you get it?
* Plantations: Do you have any here, names? where? how big? how old? who controls?
* Has any individual planted trees? Who? Where? What?
* Opportunity for questions from the VIDCO:
  expectations
  contradictions.

Example III(3) - Activity 2

Group 3: Results of Introductory and Generative Meeting (Mavedzenge VIDCO Area)

Notes on Meeting

There was misunderstanding about the meeting time and the selection of households. Meeting started at 11.00 am.

Attendance at start - 19 females, 23 males, total 42 adults.

Attendance increased with late arrivals to 33 females and 30 males, total 63 adults

Age range - 75% aged 45 yrs+

The meeting began with a prayer, followed by talks by Agritex and VIDCO representatives.

Questions & Answers: 50 mins.

Questions and comments by the gathering (answers to survey group questions are on next page):

- What is the possibility of getting soil tests done to assess fertiliser requirements?
- how to protect gum tree plantation?
- more woodlots are wanted.

Agritex closes meeting - prayer: Time 12.09

Team Assessment

Good participation, got more information than expected; the speed of answers led to difficulties with translation/transcription.

General Observations

Some answers affected by presence of Agritex/Natural Resources Board, e.g. gardens in vleis; fertiliser use; early domination of floor by a few individuals, but general consensus apparent; no-one looked bored.

Example III(3) – Activity 2

Group 3: Results of Introductory and Generative Meeting (Mavedzenge VIDCO Area) Cont'd

SOILS	LANDSCAPE	TEXTURE	COLOUR	MANAGEMENT	WATER
Musheche	Toplands Crest Plains –	Light sandy non-sticky	Whitish	Apply a lot of fertiliser/ manure	Doesn't hold water
Jehechehe	Bottom slopes sandy	Light coarse	Whitish	Apply a lot of fertiliser/ manure	Doesn't hold water
Norubvuka	Vlei plains	Sandy loam slightly sticky	Darkish	Less fertiliser needed	Holds water
Chidhaka	Vlei footslopes	Clay sticky	Grey	Fertile	Holds water during wet season but cracks in dry season

Notes:

1. Gombo = virgin soils
2. Rotation – maize, rapoko, groundnuts
3. Difficulty of ploughing increases along the sequence musheche, jehechehe, norubvuka, chidhaka.

Group 3: Results of Introductory and Generative Meeting (Mavedzenge VIDCO Area) Cont'd

SOILS	CROPS	NATURAL VEGETATION*	LANDUSE	TREE USES
Musheche	Maize Rapoko Bambara nuts Groundnuts	Musasa Mushuku Muchakata Mutondo Mutamba Mutohwe Musekesa	Arable and natural wood-land strips	)Fruit trees))Fuelwood))Construction))Rope/string)
Jehechehe	Maize Rapoko Bambara nuts Groundnuts Bullrush millet	Mushuku Mushuku	"	
Norubvuka	Maize Rice Groundnuts	Mukuti Muchakata Musekesa Muvonde Mushave	"	Fruit trees, thatching grass fuelwood and construction
Chidhaka	Vegetables Grazing	Acacia spp Mupfute Mopani	Grazing	Fencing Brushwood Construction

* See glossary of tree names at end of Guidelines.

Activity 3. First Farmer Interviews

Two major decisions have to be taken regarding the first farmer interviews:

(i) what range of farmers or households should be included?

(ii) what type of questions should be asked and in what format?

(i) As already stated, the selection of informant households needs to be undertaken in advance of the training course. The method used in the Shurugwi exercise proved in principle appropriate. Farmer group leaders were approached before the course and asked to choose eight farmer households from their areas who would be prepared to be interviewed. Leaders were asked to select farmers according to the following criteria:

* socio-economic range;
* household structure (e.g. female headed household, household where both husband and wife

Example III(3) - Activity 2

Group 3: Results of Introductory and Generative Meeting (Mavedzenge VIDCO Area) Cont'd

TREES AT HOMESTEAD (H); FIELDS (F)

TREES*	H/F	PLANTINGS (*)/ **CUTTINGS (C)**	USES **FRUIT (F)/ SHADE (S)**	TREES **PROMOTE CROP GROWTH**
Mango	H	*	FS	
Guava	H	*	FS	
Apple	H	*	FS	
Lemon	H	*	FS	
Orange	H	*	FS	
Naartjies	H	*	FS	
Mulberry	H	*	FS	
Avocado	H	*	FS	
Paw Paw	H	*	FS	
Gum trees	HF	*	Constr.	
Mubvumira	H	*C	S	
Mugan'acha	H	*C	S	
Muchakata	HF	*C	FS	*
Muwonde	HF	-	FS	*
Mutohwe	HF	*	FS	
Mutamba	HF	-	F(S)	
Mununguru	H	-	F	
Musumha	HF	-	FS	
Mushuku	HF	*	FS	
Dzvirin'gombe	F	-	F	
Mupfura	F	*C	FS	*
Mutsubvu	F	-	FS	

Fuelwood:

In the old days people used Mubhondo (*Combretum molle*); Mutondo (*Julbernadia*); Mukuti (*Syzigium* spp.); Mupfuti (*Brachystegia boehmii*); Musasa (*B. spiciformis*). Used to have woodpiles then.

Nowadays people use any tree, and there are no woodpiles.

Trees in fields: Fruit trees don't suppress crops.

Plantation: Pre 1980 - government plantation managed by Sabhuku (a "traditional" leader). Supply of seed depends on management of plantation.

Since 1986 the VIDCO has been involved in plantation management.

* See tree name glossary at end of Guidelines.

live at home, household where male head is a migrant worker);
* members/non-members of farmer groups;
* arable soil types.

The criteria need to be clear and simple. In the Shurugwi exercise we wanted a range of farmers, selection of which was influenced by the prior experience of some trainers. Categories included farmers who sell crops every year, those who sell in good seasons and those who rarely sell anything. We also wanted a range of household structures and households whose fields were located on different soil types. In practice we were insufficiently clear about the criteria for poorer farmers: that they should be families with few or no cattle, and in most cases not be members of farmer groups. To ensure that we had farmers in this category we had to increase the number of informant households after the initial selection by the farmer group leaders. It should be noted that selecting a reasonable representation of types of households is assisted both by the experience of training team members and by discussion of the subject with local leaders. Selection of households should not occur publicly if any of the criteria being used are sensitive - for instance, wealth.

(ii) After the introductory and generative meetings the team must decide how the first farmer interviews should be conducted. In the first farmer interviews on the Shurugwi course, information was collected on production systems, resource access and the utilisation and production of woodland resources. Table formats, as illustrated, were used by most survey groups (example III(4)). These allowed interviewers to summarise information as they collected it. The intention was too that the format would encourage a conversational flow, rather than a rigid question-and-answer relationship.

Finally, interviewers need to be trained in the art of triangulation within interviews - checking on information that is given by probing further and, where feasible, through direct observation.

Activity 4. Summarising Interview Information

An important requirement of RRA is the collation of information immediately after it has been collected into a manageable format. This facilitates the use of the information in the activities to follow. It also ensures the information can be referred to when the final synthesis of survey material is carried out.

In Activity 4, survey groups summarise the information collected so far, and identify questions and issues for discussion in subsequent interviews. Results are discussed in a plenary session. Example III(5) shows the summary sheets used by one survey group, and III(6) gives the actual results of an interview summary by another survey group using a different format. These formats were not incompatible, but lack of standardisation can pose problems later.

First farmer meeting (note tree used as shade)

Example III(4) - Activity 3

Group 3: Format for First Farmer Interviews
(Mavedzenge VIDCO Area)

ARABLE LAND TYPES

Household _____ Category _____ Farmer Group? _____

	Homefield	Mainfields	Garden
Area/location			
Soils			
Fertiliser/ manure			
Crops(s) grown			
Inputs (seed)			
Crop/nutrient management			
Crop rotation			
General Comments/Observations/Historical Changes in activity since previous season?			
Grazing areas			

Example III(5) - Activity 4

Group 2: Format for Summarising First Farmer Interviews (Makandire VIDCO Area)

(1) Household Resources

Household _____ Category _____

HOUSEHOLD LABOUR	LIVESTOCK	OUTPUT AND MARKETING	INVESTMENT IN AGRICULTURE
No. of permanent labourers during season?	Draught power: own, hired, borrowed? grazing area?	Crop output? Crops marketed past 2 seasons?	Sources? (e.g. remittances, crop sales, veg/fruit
No. of temporary workers (e.g. school children?)	Supplementary feed? Water?	Buyer - local, GMB? Prices? Profits?	sales. Other income earning activities).
Location of household head?			
Hire of labour (permanent & temporary)?			

GENERAL COMMENTS

Exchange of resources/cooperation/communal resources?

Example III(5) – Activity 4

Group 2: Format for Summarising First Farmer Interviews (Makandire VIDCO Area)

(iii) Woodland Production

Household _____ Category _____

	Trees on Farm	Woodlot
When planted		
Species		
Numbers		
Methods of planting		
Use		
Income		

Example III(5) - Activity 4

Group 2: Format for Summarising First Farmer Interviews
(Makandire VIDCO Area)

(ii) Woodland Utilisation

Household _____ Category _____

Location	Homestead	Arable Areas	Grazing Areas	Woodlot	Other
Species					
Use					
Frequency of collection/ purchase?					
Labour					

Summary Sheet for First Farmer Interview
(Mavedzenge VIDCO Area)

Mrs. A.

Land

Moved to their home in 1959.
Paid £38 for their homestead & field.

Land Use

	Homefield	*Mainfield*	*Garden*
Soils:	Jecha well drained	Nhorubvuka quickly absorbs water: prone to waterlogging.	Nhorubvuka
Fertility Management:	put manure and antheap on in 1982	1984/85 antheap on one contour 1986/87 manure on part of one contour	compost in 1977 Manure in 1987/88
Crops:	sunflowers watermelons sweet potatoes nyemba beans	sunflowers/ nyemba intercrop nyemba watermelons	maize vegetables

Inputs: All seed from 1986/87 (incl. maize R215)

Output: 1986/87: 20 bags maize – all consumed at home.

Woodland change: Now difficult to get wood for poles and fuel as there are fewer big trees now; only shrubs.

Woodland production: homestead

Exotic fruits: guavas, peaches, mangoes, apples, mulberry
Others: cypress, eucalyptus, mututi (live fence), mukondo
Management: protect trees when young; mulch; protect against lightning; digging and watering around plants; straightening of young plants.

Summary Sheet for First Farmer Interview (Mavedzenge VIDCO Area) Cont'd

Mrs. A.

Household structure (Labour)	*Draught power*	*Agricultural investment*
Husband - does not contribute to agricultural labour (works intermittently for DDF).	2 head of cattle: 1 bull and 1 cow	Maize and sunflower seed from previous season.
Permanent labour: herself and one son	1 bull combined with 1 ox of relatives for the draught power of both families. Her son herds the animals.	Outstanding loan of $108 from 1985/86.
Temp: 2 school-children and one daughter-in-law	3 goats	[1986/87: used $110 from previous season's maize sales - $200 of loan repaid].

Woodland Utilisation

Major uses

Firewood:	Mutondo, musasa, mususu. Now difficult to get; obtained from grazing area or near main field. Collects twice a week.
Construction poles: (note: permit req. from District Council)	Mukcarati, muzeze, mususu, mutondo, musasa (affected by borers). Collected from grazing area every year for repairing the cattle pen.
Bark rope:	Mupfuti, mutondo - collected when they collect for construction or firewood.
Fencing: (no permit req.)	Thorny trees - muunga, mupumbu, muchecheni, mupangare: carried out every year.
Browse:	Mutondo, mususa - the early leaves.
Fruits:	5 exotic and 7 indigenous species grown in homefield area.
Trees in fields:	Mushuku (crops do poorly under these) and mushavi (crops do well - low branches lopped).
Medicinal:	Mutamba - unripe fruit juice used for treating cataracts in eyes of cattle.

Activity 5. Informal Discussions with Key Informants

Informal discussions with selected informants are a way of checking information emerging from the generative interviews. In addition they enable survey groups to build up a more complete picture of both the form of production and natural resources, concentrating on issues arising from the generative phase. Discussions can be either planned or opportunistic. Examples of the former are discussions with:

(i) VIDCO and farmer leaders about the management of woodland resources and the institutions responsible;

(ii) local agricultural extension or forestry staff to understand current extension practices and messages;

(iii) traditional village heads to understand their present role and with older members of the community about historical trends, both social and environmental.

Examples III(7), (8) and (9) illustrate the kinds of historical and institutional information obtained in this way.

Examples III(7) - Activity 5

Key Informant Interview: Mr M., born 1921

Local History

Pre-colonial: The local people lived in the hills fearing raids by Lobengula's armies. Farming was in the hills, where finger millet (*rukweza*) was grown and in the *vleis* (*makuvi*). Local people used to make hoes from chrome they had mined. They farmed the vleis using a *mipanje* ridging system.

The Rozvi were the original inhabitants. They were removed by the Shona Chiefs. These were Gare and Nhema who came from Swaziland originally. When Gare arrived in Chibi he fell ill and his colleagues returned to Swaziland. He was admitted to the Chibi family and given a wife. Gare settled at Bongwe in Shurugwi. Nhema arrived later and requested an area from Masiviza. He wanted Svika hill but the Rozvi were still settled there. Gare and Mavedzenge went to fight the Rozvi and Nhema soon settled there. When Gare and Masiviza came the land was empty; they just marked the trees to stake their claim to land. Gare used to own the land from Bongwe to Chorowande to the Tokwe river. He is the descendent of Gare's people. The land gradually became more settled as people moved in to marry the sons of Gare.

Early colonial period: 1910-1940

- There were serious droughts in the early 1920's. The year of the locusts came in the early 1930's. The mine at Selukwe was opened in the 1920's - they took the elders to work there who knew how to mine chrome. The informant worked in the mine in 1935-6, he was pulling trolleys underground for 25/- a month. He bought his first cattle then for 10/- each.

- During the droughts of this period (e.g. 1937) the people here did not suffer. The *huridza* (agricultural "barons") had surplus maize and they sold it to people from Gutu, Chivi and all districts around in exchange for cattle. 2 bags maize = 1 head of cattle.

- The lines (consolidated settlements) came in 1932. The demonstrators Malamsi and Mulambo ordered people to live in the lines, as if in a compound. Before that settlements were scattered.

- Before the lines the fields were given by the chiefs. After that they were iven the new fields with contours by the agricultural demonstrators. The *sabhuku* (village head) would get 10-12 acres, others 6-8 acres and bachelors 1 acre. Women were no longer given fields.

Colonial history after 1940

- The European farms were mostly created at the time of Hilter's war 1939-45. After that African people were expelled and made to join the "lines"*. It was at this time that the land became very crowded. People arrived from many areas - Chivi, Buhera etc.

* "lines" = linear settlements imposed by the colonial government following land use zoning.

(i)

(ii)

Key informants, often (i) women's groups and (ii) elders of the community

Examples III(7) - Activity 5

Key Informant Interview: Mr M., born 1921 Cont'd

- People were stopped from farming vleis at the time of the contours. (Some years after the "lines" (1932)). The people could no longer be allowed to have rice. The demonstrators said that the farming of vleis caused erosion but the people did not notice any as there was a lot of grass and many big trees.

- Destocking (stock cards) came first after this. The Europeans came to take their cattle.

- 1947: Kenya drought: they bought yellow maize from the mills and later planted it.

Production system changes

Pre-colonial:
Hill farming (*rukweza*); vlei farming - ridge system - *shezha* (sweet potato) and rice. Few cattle.

Early colonial - up to 1932:
Vlei farming - rice, "Karanga" maize, *rukweza* etc. Also some dryland fields with coming of plough. Cattle increased, but grazing plentiful and scattered. Important cattle-grain exchange at regional level. Fertility maintained through manure, *churu* (antheap).

Later colonial - present:
Wetland cultivation banned. Arable and grazing divided. Grazing land gradually reduced due to increasing population. Crops - maize (increasing), plus millets. Reduced cattle holdings after destocking. Fewer *humwe* (cooperative work parties). Fertility a real problem - increasing fertiliser use.

Environmental change

Early period - Erosion was very rare. There was a lot of grass and trees to hold the soil. The grass was abundant because the rains were plentiful.

Later period - Increasing population resulted in reduction of woodland cover and so more erosion. The contours halted some erosion but if they are poorly kept it increases. The lines and concentrated settlement caused erosion and more paths.

Local institutional history

- The rain has reduced because the *mitoro* (rain-making ceremony) is not held properly these days. They no longer send *nyusas* (Mwari cult messengers) to Zame as they did before (Mwari is the High God). The Marangwe people hold the *mitoro* in this area under a big *muchakata* (*Parinari curatellifolia*) tree.

- There used to be a *jiri* (sacred forest) at Chatokwe and locally. In the Jiri forest if you pick up the *mushuku* (*Uapaca krihiana* fruit) first from the ground and it is already bitten you must drop it and not say a word. If you pick it up you will lose your way in the forest. The *jiri* is the home of the *vadzimu* (ancestral spirits) and the *mushuku* fruit their food. The area is a graveyard of the ancestors - either the Rozvi or the descendants of the Gare people. You must not cut trees there but you can collect dead wood or browse cattle, but with respect.

- he large trees were destroyed around the time of the "lines". Later restrictions were imposed by the government (Europeans) and then the VIDCO's.

- The elders protected certain trees. They were not allowed to be cut. These were: *Mubvumira, Mupfura, Muonde, Musuma, Mushavi, Muchakata*. If you were found cutting you would be taken to the Chief's court. They were protected because they are fruit tres. *Mubvumira* is protected because it is found on rocky hills - the places where the ancestors stay.

- The big trees were protected because the *vadzimu* rested there in forests.

- Now the elders' rules have been replaced by the new police, but they have never seen the police so the young people do not fear cutting and the young trees do not grow up into the big trees as they once did.

Example III(8) - Activity 5

Key Informant Interview with Mr N., VIDCO Committee Member and "Tree Policeman"

Introduction

We specifically interviewed Mr. N. because we heard from one of the farmers that he was the VIDCO's 'Tree Policeman' and we wanted to learn more from him of this role. He is also a VIDCO committee member. We tracked him down in a roadworking gang ('Food for Work') and he was pleased to take some time off and sit and talk to us in the shade.

Training

Background

He told us that he had been elected by the villagers from VIDCO 3 to attend an Agritex course with 4 representatives from the other VIDCOs in Ward 3. The purpose of the course was to train one person from each VIDCO to look after/conserve trees and boreholes in their area. The Ward Councillor attended the course to help the 5 trainees understand it. Teachers on the course were from Agritex, Forestry Commission and the Water Division.

What did he learn?

* Villagers in every village should plant exotic fruit trees and eucalyptus.
* Wild fruit trees, e.g. Mutohwe (*Azanza*) should not be cut down because their fruits can be eaten by cattle herders.
* Clearing the land of trees causes erosion.
* Trees should not be cut down at random but care should be taken in cutting appropriate trees.

His duties

He started his duty as 'tree policeman' in 1984.

Helping to assess needs for wood and its availability

e.g. A village member wants to build a kraal. Mr. N. meets with the whole village to determine whether the member really needs a kraal. If Mr. N. disagrees with the Village Council then 2 villagers accompany him to the applicant's house to confirm a decision.

The decision is based upon:

* the need for a kraal
* the availability of construction wood.

In case of illegal tree cutting

If someone is caught cutting down a tree illegally then Mr. N. takes him to the VIDCO where he receives a fine. The size of the tree cut down determines the size of the fine.

e.g. large - Mushuku (*Uapaca*) - $60 fine
small - Mutamba (*Strychnos*) - $20 fine

In each village, there are 2 elected members whose job it is to help him find villagers breaking the tree-cutting laws. They report the crime to Mr. N. who then books the criminal.

Although there is no punishment for taking tree parts for medicine, it is forbidden to take fibre without permission. During a drought it is prohibited to cut leaves for fodder at all - whether or not permission is asked.

How to decide which trees are available

* Trees which coppice/regenerate, e.g. Muunga (*Acacia*) can be cut more readily than those which don't.
* For firewood a sick tree is usually sought.
* For poles: villagers are asked to select one tree each from varied spots but NEVER to clear one whole area. Small trees are preferred to large ones for poles because the removal of large ones results in a greater change. However, it is preferred to take a few stems from a many-stemmed large tree than to cut down several one-stemmed trees.
* Poles from Mupangare (*Dichrostachys*) which is in short supply last 5 years, while poles from Mususu (*Terminalia*) last only 2 years. A request for poles will consider the local infestation by termites. Mususu is very short-lasting when there are lots of termites but Mupangare is much more resistant. In such a case, Mr. N. may suggest mixing Mususu and Mupangare poles for building a kraal.
* In times of tree scarcity, trees can be requested from another village or a resettlement area.

Implementation of cutting laws

* Fines deter many people from cutting illegally and many people understand the importance of tree conservation so cause no problems.
* Some more ignorant people try to beat him up if he tries to stop them cutting down trees.

Example III(8) – Activity 5

Key Informant Interview with Mr N., VIDCO Committee Member and "Tree Policeman" Cont'd

Tree Planting

In Tongogara there are no trees. Mr. N. would like to recommend that Mupangare seeds should be collected and planted in the treeless areas. Tongogara villagers should ask the District Council for a plot of land to fence off for planting of indigenous trees.

Comments by Interviewers

This interview illustrates the utility of "triangulation" – his perceptions of his role and effectiveness differed strongly from those of other key informants. Mr. N. said fines deter people from illegal tree-cutting, but Mr S. (schoolteacher) said there is a lot of tree-stealing because fines aren't enforced. Mrs G. (VIDCO committee member) said she can only think of one fine being imposed since 1982, although should said many people were caught and rebuked, but not fined. She also said only a small number of people request permission to cut, compared with those who 'steal' trees. Mr. P.N., acting chairman of the VIDCO, said he hadn't heard that Mr. N. was the "tree policeman".

These differences indicate a need for further investigation of the tree policeman's status and effectiveness.

Example III(9) – Activity 5

Summary of Information from Key Informants, Matamba VIDCO (VIDCO 3)

Names of Key Informants

Mr. N. – 'Tree Policeman'/Youth Representative on VIDCO
Mrs. G. – VIDCO Member
Mr. S. – School teacher/old traditional leader (sabhuku)
Mr. C. – Medicine man/old traditional leader (sabhuku)
Mr. P.N. – Acting VIDCO Chairman
Mrs. C. – VIDCO member/active in women's group
Mr. M. – Sabhuku

Political structure of VIDCO 3

VIDCO 3 is divided into 5 villages – Changunduma, Matamba, Tobayo, Dera and Kangengoni.

(i) The VIDCO committee consists of:

1 chairman
1 secretary
1 youth representative
1 women's representative
2 'ordinary' members

On the committee there is one representative from each village and an extra one from Tubayo.

(ii) Each village also has a Party committee and elects to it its own Party Chairman who is not a member of the VIDCO committee. In some matters, however (e.g. over tree cutting and land purchase), a village member must submit a request to the Village Party Committee which will report and discuss the issue with the VIDCO.

(iii) In addition, the old traditional leaders (sabhuku) of each village are still respected as such by older village members. Within some villages, conflict exists between the new party chairman and sabhuku. In some cases, sabhuku are seen as collaborators against independence, while the Party Chairman is normally someone who was active in the war. The VIDCO 3 power structure is further confused because the Village Development Committee has not yet established its role.

Table I shows leading political figures in VIDCO 3.

Example III(9) - Activity 5

Summary of Information from Key Informants, Matamba VIDCO (VIDCO 3) Cont'd

Table I

Village	Party Chairman	Sabhuku	VIDCO Member
Changunduma	Mr. P.C.	Mr. M.C.	Mrs. A.C.
Matamba	Mr. J.M.	Mr. A.M.	Mr. P.N.
Tubayo	Mr. E.N.	Mr. S.	Mr. N. Mrs. G.
Dera		Mr. D.	Mr. P.M.
Kangengoni	Mr. C.T.	Mr. K.	Mrs. R.

Each village has a party committee and a party chair who is elected by the village.

Community Projects

There are several women's group projects in bread making, soap making and sewing of uniforms - all are sold for cash. There have been attempts at planting of Eucalyptus woodlots but due to lack of cohesiveness of individuals in the VIDCO these have been unsuccessful. In VIDCO 3 there are no community projects. However the VIDCO is currently proposing three projects:

(i) gum tree plantation in Matamba grazing area;
(ii) dam in Tubayo in vlei;
(iii) fencing of the VIDCO grazing area.

Mr. S. thought that there was not a good prospect for community action in tree planting because of the lack of concern and understanding that most people had for the disappearance of trees and the future. e.g. One of the reasons for no communal woodlots being planted was that people steal the wood.

Labour Sharing/Hire

Work parties have existed since early colonial times at least, and still operate today. If one was behind in work, an invitation to the community to come and help would be responded to, and the farmer being assisted would be expected to provide the food and drink for the day. The Seventh Day Adventists in the community commonly call upon the congregation to help each other.

Task sharing between households is common, up to 10-15 households may cooperate, usually friends or relatives. At the village level, group projects have included gully reclamation; while at VIDCO level 'Food for Work' programmes exist mainly during drought years mainly for road building.

Land Share/Hire

Past: There used to be illegal selling of land before independence, e.g. Mrs. X. bought land from someone who left for 15 pounds in 1967.

Present: If land is not being used by the family it is allocated to, (e.g. if the family has left the area, or do not have enough money for inputs) another farmer can arrange to use it, but will be expected to pay the "land tax" which is due to the District Council (further info required).

Land is often lent for 1-2 years. Some people were of the opinion that the VIDCO *should* reallocate land from those with idle/plentiful land to those who are in need. Others said that if a farmer has impoverished land, he sometimes goes to another communal land area, and the abandoned land reverts to the VIDCO.

If parents die, eldest son inherits all land and house by custom and it is up to him to share it with siblings.

Livestock Lending/Hiring

Past: Prior to centralisation, people lived in extended family units and family members were able to borrow livestock for ploughing. Poorer families with no cattle were lent enough beasts to plough and kept them until they produced the same number of offspring. The offspring would be kept and the borrowed beasts returned.

Present: Some hire and pay, others lend to relatives and friends who feed and look after the stock. If a woman's husband dies, his male relatives claim the cattle if there is no boy child. The relatives may or may not help the cattleless widow with ploughing etc.

Women's Groups

One successful and active women's group exists - they all live close to the Matamba Meeting Hall. They make and sell school uniforms, bread and soap. However, in other villages there are no formal groups and it is not clear why not, the only suggestion being no formal meeting place. Even so, the women here do gather in small informal groups of 3-4 or so to talk. One informant suggested that important functions of women's groups should be to grow vegetables or keep fowl, but not to plant woodlots. Although she agreed that firewood was a problem for women in particular - too far to walk and scarce - she considered that

▶

Example III(9) - Activity 5

Summary of Information from Key Informants, Matamba VIDCO (VIDCO 3) Cont'd

the village council should be responsible for woodlots.

One reason may be the difficulty in obtaining funds to set up a project. Women in a Women's Group usually have to supply funds themselves in order to start up a project which has been approved.

Female-Headed Households

If husband works in town then the female head of household often has labour problems during the rains. In particular, she can't plough. Sometimes friends help out.

In most cases where the husband dies, the wife loses the cattle to his male relatives unless she has a son. Often they don't contribute to her ploughing. She feels that this is wrong but unless laws to the contrary came from Provincial or District Council level such customs will not change.

Role of the Traditional Leaders

Past: The sabhuku was the traditional leader at the village level, above whom was a 'small chief' (*sadhunu*, or ward head) and then a 'big chief'. The *sabhuku* was responsible for land allocation in the village, and would arbitrate in land disputes. If there was an issue that could not be resolved by the sabhuku, it would be passed on the line of command of the chiefs. If it was still unresolved, then the matter would be referred to the civil court. *Sabhuku* used to have all of the land, and people paid the sabhuku for land. The buyer's name was written in a book, and taken to the Sadhunu (Ward Head) and there was a charge for a stamp.

Present: After independence the present structures of elected local government were set up, to replace the sabhukus and chiefs. At the village level, the Party Chairperson is responsible for organising meetings and is a link between the people and the VIDCOs. The present role of the sabhukus varies from area to area. In some areas they are now VIDCO members, but in other areas they are now powerless. We spoke to two such individuals, who are not in the VIDCO, and are bitter about their loss of power. They said that tree cutting byelaws are not being effectively enforced by the VIDCOs and suggested that in this area particularly there is a gap in power structures. They claim that since independence, tree cutting has increased enormously and that people come from as far away as Tongogara with scotch carts to cut wood for sale. The members of the new structure tend to be younger, and may have had experience in the 'Struggle'. Although the sabhuku's role is much diminished, often complaints from the villagers go to the sabhuku but he then refers the issue to the VIDCO.

Present: VIDCO writes a letter to the Sadhunu before proceeding with community projects.

Grazing Areas

Normally cattle spend January-April in the communal grazing area and then return to the arable areas for grazing. This year, however, forage ran out in the communal grazing area after 2 months, so cattle were returned to arable areas for 1 month before going back to the communal grazing area. The decision to move cattle in or out of the communal grazing area is made by the village committee. If crops are eaten by cattle then fines are imposed, or compensation agreed. VIDCO 3 wants an Agritex grazing scheme to keep cattle from other VIDCOs out. VIDCO 3 also wants paddocks for introduction of short duration grazing to provide more grass (and therefore better cattle prices) and to save labour in herding. Agritex have been approached for help but the scheme must be authorised first by the VIDCO, then by the WADCO, and then the District Council.

Tree Cutting

Cutting down of fruit trees has always been forbidden by traditional laws. Council byelaws prohibit any tree-cutting without permission. Written permission must be sought from a VIDCO committee member through a petition to the Village Council and permission from the village chair. A tree 'policeman' is supposed to enforce these laws but many people are not even aware of his existence although he does catch a number of illegal tree cutters. When someone is caught cutting a tree down illegally he is supposed to receive a fine, but usually he is not fined because he has good reasons for cutting down the trees. Stricter enforcement of fines may reduce illegal tree cutting as maybe would a full-time paid tree 'policeman'. However, people still need wood and there is an acute shortage of firewood and construction wood. On the other hand, people won't plant and look after communal woodlots while they can easily 'steal' wood from the communal woodland. Even if a tree policeman was paid and fines enforced, outsiders may still get away with illegal tree cutting. One key informant suggested that the government should supply rural electrification so that people wouldn't need to cut down trees for firewood.

Note: See interview with Mr. N. for detailed tree cutting information.

Example III(9) - Activity 5

Summary of Information from Key Informants, Matamba VIDCO (VIDCO 3) Cont'd

Tree Planting

Although there is depletion of indigenous fruit trees in the woodland, farmers much prefer to plant an exotic tree (oranges or mangoes) than an indigenous tree. It was suggested that there is more malnutrition today as a result of the depletion of fruit trees. Some farmers would like to plant more trees but lack the knowhow and resources. One of the key informants, a traditional healer/farmer has planted 400 gum trees on an abandoned field and thought that this practice was spreading in the south of Shurugwi. He was also planting tree species of medicinal use at home to avoid travelling too far for medicines (Afzelia quanzenzis and Kigelia africana).

It was noted by another informant that gum trees are inferior to indigenous trees for firewood but a vast majority of people cannot accept the need to plant indigenous trees.

Example III(9) - Activity 5

Issues and Questions Arising from Key Informants - To Follow Up

Tree Cutting

* Confusion concerning Mr. N.'s role as tree policeman - how effective?
* Is a tree guard the answer? Paid vs volunteer?
* Perceptions of tree loss and scope for community action - are enough people worried? Why/why not?
* Insufficient back-up from higher authorities in enforcing tree cutting byelaws.
* Since independence there has been increased tree cutting, some of which includes cutting for wood sale to neighbouring areas by young people.
* Is the loss of power of sabhukus leading to anarchy with respect to tree cutting - new leaders unable to enforce rules?
* To what extent at village-level is there agreement on rules for cutting -and can this be built on (problem of outsider 'stealing')?

Tree Planting

* *Training* is required for villagers in planting and caring for trees.
* At present, no one plants trees on contours but they are often left there if growing naturally - scope for planting?
* People's preference for fruit - indigenous vs exotic?
* Consider growing indigenous trees from other areas with medicinal (or alternative) value.
* Planting trees on abandoned, wasted land?

Communal Schemes

* Find out more about planning for 3 proposed projects
  - Dam
  - Gum woodlot
  - Grazing scheme
* If grazing scheme implemented, could include woodland protection - does community want?
* Probe further on potential for women's groups to carry out forestry projects.
* Could traditional leaders still have a role in implementation and management of community projects? Conflicts with new institutions?

Tree Regeneration

* Centralisation led to tree loss. Therefore it may be possible to assess growth rates from abandoned arable land, e.g. Mr Sitlatlha knows of such sites in Dera and Kanengoni.
* Some say there are few young trees because people cut them and others because goats do - check on this.

Erosion

* Contours *may* promote gully formation.

Activity 6. Resource Classification and Environmental Change

This activity is an extension of Activity 5 in that it uses key informants to combine social and environmental survey and to understand historical trends.

One of the best methods is to walk a transect across the survey area in the company of one or two well-informed locals who can discuss both environmental and historical aspects (Conway, 1985: 29). The route of the transect should be selected to cross a range of land use types, land units, vegetation types and soils, ideally following a catenary sequence. The route can be chosen using aerial photographs and/or previous field observations. In addition to taking field notes and questioning accompanying informants, local people encountered on the route may provide useful information and opinions. Example III(10) shows the results of a transect undertaken by one survey subgroup. This demonstrates how such an exercise can link discussion and field observation of natural resources, as well as provide a preliminary reconnaissance for the natural resource assessment phase.

Aerial photo being used to plan route for walking transect

A well-informed local volunteers to walk the transect

Activity 7. Working with Farmers/Participating in Group Activities

One of the best ways to learn about farmers' activities is to accompany and assist them in their work. This may be arranged in the pre-survey stage in some form of reciprocal agreement. For example, the survey groups may provide 1-2 hours of labour in return for farmers' time given for interview. Alternatively the arrangement may be more informal or spontaneous. The exercise is valuable in generating questions and issues which may not arise in a more structured interview, and in checking farmers' information by observation. Examples of activities include herding, wood collection, harvesting or weeding.

Experience in Shurugwi has shown it is necessary to make prior arrangements with farmers if the intention is to accompany them in other than household chores. Farmers tend to make plans to stay at the home for

interview purposes and so may sacrifice valuable labour time and give little opportunity for assistance. The reciprocal agreement may compensate for time loss or at least make more efficient use of time.

Activity 8. Review Workshop

The purpose of this workshop is (i) to review and synthesise the information collected so far; (ii) to further focus the issues that arose during the generative phase; (iii) to identify gaps in factual information; and (iv) to prepare questions for the second informant interviews. Exchange of information between survey groups will also be of value at this stage to compare and contrast data and issues specific to VIDCO areas, and to ensure that all groups are using compatible methods.

Although data synthesis should follow each activity as a continuous process, an overall review is considered necessary before preparing questions for the second farmer interviews that follow.

Activity 9. Second Farmer Interviews

The dates of the interviews should be arranged beforehand, probably at the end of the first interviews. Informants should be visited by the same survey group members who visited them previously.

The approach in these interviews will depend on the outcome of the first informant interview. Where the first interviews had more of a generative role, there will be a lack of factual information about the form of production and resource classification which needs to be gathered in these second interviews. However, where the first interviews progressed into detailed information on the form of production and natural resource interview, these second interviews will become assessment interviews.

Whether a detailed or assessment interview is conducted will be determined in the workshop in Activity 8, as will the questions and themes.

If assessment interviews are held some synthesis and preliminary discussion of the form of production and

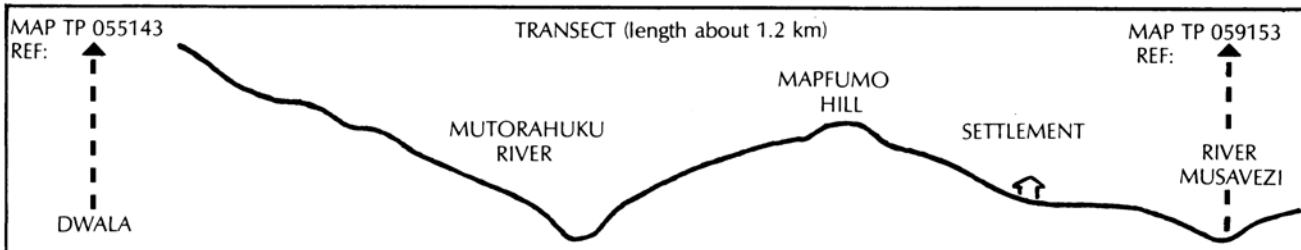
A view of the transect route from a kopje through miombo woodland and arable land

natural resource information will need to have taken place. The aim of the interviews is to present some of this synthesised information back to the informant farmers for their comments. Emphasis should be on exploring their views and validating the information rather than gathering additional data. Tentative proposals for agroforestry interventions could be discussed and early responses gauged.

Example III(11) shows a Second Farmer Interview summary sheet.

Discussion and field observation of tree crop interactions

Example III(10) - Activity 6



LAND USE	Grazing	Arable	Grazing	Grazing vlei	Bush Fallow	Grazing Browse F'wood	Fallow land	Crop	Settlement cropping & fruit trees	Gardens Kraals Brick-making	Grazing
SOILS	Chidhaka & Norubvuka (waterlogged)		Stony, boulders	Norubvuka Chidhaka waterlogged	High water table	Rocky Rocky		Nutrient deficiency		Norubvuka	Mucheche (chidhaka) Nhokure Grass indicator
VEGN	Miombo		Miombo Mixed Large Ficus	Few shrubs Musekesa Mususu	Masambara Mubondo Mubvumura Manwahuti	Mususu Muchecheni Muchukata Mumaradzi Tuzvidzembwa		Digitaria spp Natal Red Top C. dactylon		Shrubs: Muzeze Musumadombo Chijuja Muchako chiyana	Muduru
HISTORICAL			Ruins - old home site	Cultivated with rice until 1943			Buriel site. Large trees removed		Lines 1932	Pre-1930s farmed rice/ maize/ millet. Gardens post-1933	Siltation of pools. Flow always seasonal
L'STOCK				Vlei grazing			Dry season grazing, browsing			Garden residues used for livestock feed	
COMMENTS	Norubvuka soil: Dry year - plough early and it yields well. Wet year - waterlogs but still performs well if nutrients applied			Fallowed: - lack of seed - no draught power - "laziness"	Eroded along pathway Granite outcrops	Important patch for fuelwood & grazing - cutting prohibited - "sacred" area Trees on contours for owner to utilise		Ficus spp. in field - effects: Wet year - waterlogging Dry year - conserves water Average year - no impact. Roots 23 cm. Leaf litter - garden		Shortage of Acacia for garden fencing. 1 tonne wood = $25-30 to make 40,000 bricks Mutondo, Mubondho from resettlement Erosion	

Scientists helping farmers' group plough, in preparation to plant fruit tree seedlings

Scientists helping farmer harvest groundnuts during interview

Example III(11) - Activity 9

Second Farmer Interview Summary Sheet
(Mavedzenge VIDCO Area)

Mrs K. - 19/3/88

Home area

Planted spp.	*D.O.P.*	*Location*	*Uses*						
			Fe	*Fw*	*P*	*Fr*	*M*	*Br*	*Other*
Cypress (13)	1987/88	along fenceline			✓				
Gum trees (15)	1986/87	" "			✓				
Mulberry (2)	>1959	near home				✓		✓	
Guava (11)	1963	" "				✓		✓	
Lemon (1)	1971	" "				✓			
Mangoes (7)	seedlings	" "				✓			
Apples (15)	Feb 1988	" "				✓			
Mukondo (2)	1987	" "							prevent lightning
Mutiti (?)	1985	" "	✓						
Ipwadzagudo (1)	1985	" "	✓						
Unplanted spp.									
Muzeze		along boundary	✓		✓				
Musekesa		near lower boundary		✓	✓				
Musasa		near boundaries and in a run-off course	✓	✓	✓				
Mususu		near/along boundary	✓	✓	✓				yokes
Musvanyoka (*Cassia*)		mainly on antheap							
Mutondo		near boundary		✓	✓				
Muchakata		near boundary		✓		✓			
Mushozhowa		near boundary			✓				
Mudziyavashe		near boundary		✓	✓				
Mubvumanopa		near boundary			✓		✓		
Muzhumwi		near boundary				✓			
Mutamba		edge of field				✓			
Mubhondo		edge of field		✓	✓				
Mutzvombsusho			✓		✓	✓			
Mukamasani			✓	✓	✓		✓		
Mupendashambo									
Mupangare									
Muskmadombo									garden fencing
Muhwezha				✓	✓	✓			
Munhuhwambwa				✓	✓		✓		
Musumu				✓		✓			
Munhudugwa							✓		
Mugan'acha				✓	✓	✓			
Musvadzambudzi									

Example III(11) - Activity 9

Second Farmer Interview Summary Sheet
(Mavedzenge VIDCO Area) Cont'd

Tree Interaction - Crops

Species	*Location*	*Effects*
Mushuku	In mainfield	Crops grow well underneath, but the tree does not add fertility to the soil.
Musasa) Mutondo) Mukarati)	Between fields	Provide browse for cattle. Leaves can be added to compost, but trees do not benefit crops if left in fields.

Livestock (browse)

Browse spp.	*Location*	*Seasonal Importance* *Period*	*Comments*
Mutondo	Fields & g.a.	Sept.	Most important when young leaves come out.
Musasa	Fields & g.a.	Sept.	Most important when young leaves come out.
Guava	Home area	Oct. & Nov.	Have young leaves in these months
Mulberry	Home area	Sept.	Period of new leaves, when other grazing is short.

Drought livestock strategy

Drinking:	Holes (mufuta) dug in the river sand to enable the cattle to reach water.
Fodder:	Animals obtained some forage from vleis where there was still a little grass. Maize stover given to animals in mornings and evenings. No food purchased.

Manuring

Manure:	Last used in 1986/87 on part of contour. Bulked up with antheap, grass and maize stover.
Antheap:	(*churu*) also added to fields. Some in 1986/87 and in 1984/85.
Compost:	(incl. Musasa leaf litter) used in garden.
Green Manure:	Mrs K. was intercropping *nyemba* (cowpeas) with sunflowers so that the nyemba leaves would act as a green manure to replace some of the N removed by the sunflowers.

Example III(11) - Activity 9

Second Farmer Interview Summary Sheet
(Mavedzenge VIDCO Area) Cont'd

Questions:	*Ideas*
Soil fertility:	Use manure, antheap
Conservation:	Dig and when necessary repair contour ridges
Management of trees:	(a) In grazing area: People should only cut trees when given permission (b) In plantations: These should be protected by the government
Further planting of trees:	Trees like *mutohwe, mushuku, mugan'acha,* which grow easily from seeds and are useful, can be planted. *Mutiti* can also be planted as a live fence.
Information required:	Other uses of fruit trees.

Scientists accompany farmer to her field and make detailed observations of trees and their locations

All tree uses are considered - such as the wood used to construct the Kraal shown here

Activity 10. Plenary Synthesis of Meetings and Interviews

The final activity in the detailed phase will be a review and synthesis of information which incorporates the additional information from Activity 9. Survey groups should summarise the information they have, and, in a plenary presentation, outline what information they feel needs validating and further detailing through natural resource surveys.

Activity 11. Natural Resource Assessment Methods Workshop

The aim of this workshop is to discuss methods of natural resource assessment and classification which can be used to gain more information about the main issues arising from previous activities.

The range of natural resource issues should be focused and selection of techniques made considering available time and resources, capabilities of participants as well as equipment requirements. In Shurugwi the results of earlier activities suggested the need for soil characterisation (Activity 12), an analysis of soil-vegetation associations (Activity 13), vegetation survey (Activity 14), land use mapping (Activity 15), and erosion hazard mapping (Activity 16). These may not arise as key issues in rapid appraisals in other communal areas.

Activity 12. Soil Characterisation

In the Step II activities participants reviewed background information and environmental trends using secondary data and aerial photographs. This review raised issues which were further explored in discussions with farmers. Earlier in Step III farmers identified and described major soil types, their distribution and associated use and management.

In this activity the farmers' classification and perception of soil opportunities and constraints will be assessed using recognised field techniques of soil/site description and soil sampling. This activity enables us to validate what farmers have told us and to some extent quantify the constraints and opportunities they have exposed. Soil characterisation can be undertaken using a range of techniques depending on which variables are to be investigated. This in turn is determined by what issues arise in the generative activities. The approach taken will also depend on the availability of information from previous soils work in the area. In Shurugwi this was limited to the 1:1 million National Provisional Soil Map.

In soil characterisation both physical and chemical assessments can be made.

Physical Assessment

Physical assessment of the soil involves profile description of modal soil types. The aim is to describe the soil types identified by the farmer using conventional terminology and in particular to note those physical characteristics that influence soil management.

The range of soils occurring within the study area has been discussed with farmers and observed during interview and transect activities. In addition, the associated land units and land uses have been observed on aerial photographs. A soil pit is dug in each soil type identified by farmers. These pits must be representative of the modal soil types described by farmers and so should be located with their assistance. Observed catenary sequences and aerial photograph land units can also be used in the selection of pit sites.

It is recommended that soil profile and site description should follow standard procedures and formats as set out in FAO Guidelines for Soil Profile Description or national soil survey texts. Relationships between soils and land units/position on slope or potential 'agroforestry niches' should be explored.

The table below shows the major soil types in Shurugwi Ward 3 and their observed properties.

Although standard soil profile and site description will

Example III(12) - Activity 12

Soil Characterisation

Soil (Local Name)	Physical Characteristics	Chemical Characteristics	Associated Vegetation	Limitations and Management
Jehechehe (Jecha, Mucheche)	Yellowish brown/ brown medium-coarse sand to sandy loam becoming coarser, more gravelly and more orange/yellow with depth. Parent material appears from 80-180 cm. Excessively drained but water table over granite at 95 cm in one instance. Distinct A horizon but diffuse boundary between subsoil horizons.	Strongly-slightly acid. Organic matter content and percentage total nitrogen very low. Available phosphorus deficient-acutely deficient. Exchangeable potassium deficient. Infertile.	*Brachystegia spiciformis* *Pavetta schumanniana* *Albizzia amara* *Combretum molle* *Peltophorum africanum* *Dichrostachys cinerea* *Julbernardia globiflora* *Paranari curatellifolia* *Burkea africana*	Inherently infertile. Coarse sandy texture means soil is subject to leaching and has low AWC, low organic matter content makes soil structurally unstable, unable to retain nutrients and moisture. Manure and antheap applied.
Rusenya	Greyish yellow over light yellow sand; uniform profile; mottled with gravels at 70 cm and >1m deep.	Strong-medium acid; very low organic matter, acutely deficient available phosphorus and deficient exchangeable potassium. Infertile.	*Brachystegia* spp.	Inherently infertile low organic matter, low AWC, excessively drained. Requires manure and antheap.
Norubvuka	Brown medium sandy loam. Temporary water table over granite at depth creates favourable moisture characteristics. Distinct A horizon. Greyer than Jehechehe.	Strongly-medium acid. Very low % organic carbon and % total nitrogen. Acutely deficient available phosphorus and marginal exchangeable potassium. Infertile.	Mfuti mumikuti	Inherently infertile but favourable moisture characteristics. Low organic matter and low AWC. Early ploughing to conserve moisture. Manure applied.

Example III(12) - Activity 12

Soil Characterisation Cont'd

Soil (Local Name)	Physical Characteristics	Chemical Characteristics	Associated Vegetation	Limitations and Management
Chidhaka	Brown medium sandy loam relatively organic rich topsoil over yellowish brown coarse sandy clay subject to seasonal water-logging, mottled >1m deep.	Topsoil medium acid, subsoil alkaline; organic matter relatively higher in topsoil but marginal - adequate in subsoil.	*Terminalia* spp. *Acacia* *Piliostigma thonningii*	Infertile but not subject to leaching. Good AWC but seasonally waterlogged. Plough early. Manure added but not anthill.
Chinamwa	Dark grey medium sandy loam over dark grey sandy clay. Poorly drained, mottling and high water table. Vlei position.	Strongly acid throughout; low organic matter (low % organic carbon and % total nitrogen) acutely deficient available phosphorus and marginal exchangeable potassium. Infertile.	Grass	Infertile and low organic matter but high AWC, poorly drained. Response to fertiliser should be good.
Chimhamhari	Olive/yellowish brown medium sand, over brown impermeable sandy clay pan at 30-50 cm. Impermeable pan causes ponding of water in wet season and hardens in dry season to form compact layer.	Strong-medium acid topsoil, alkaline subsoil; low organic matter throughout profile; acutely deficient available phosphorus, deficient exchangeable potassium. Infertile.	*Brachystegia* spp. *Albizzia amara* *Acacia karoo* *Dichrostachys cinerea* *Ficus* spp.	Infertile and low organic matter, alkaline subsoil. Impermeable clay pan subject to compaction.
Chivobvu	Medium sandy loam over coarse sandy clay loam over coarse sandy clay reddish brown throughout. Parent material at 62 cm. Stony throughout and shallow in crest position.	Medium acid throughout low organic matter, acutely deficient available phosphorus marginal-adequate exchangeable potassium.	*Lannea discolor* *Terminalia* spp. *Crotallaria* spp. *Piliostigma thonningii* *Scleracarya caffra* *Brachystegia bohemii*	Infertile with low organic matter but high AWC. Shallow and stony. Response to fertiliser should be good.

cover most physical variables, it may be necessary to assess additional characteristics. These will be determined by the issues that have arisen from the earlier activities. For example, where soil moisture availability is limiting, available water capacity assessments may be undertaken. Similarly, some information on infiltration rates or bulk density may be required.

Chemical Assessment

Soil sampling

From discussions with farmers in Shurugwi the constraints of soil fertility arose as an issue in the generative/ detailing activities. Soil sampling for analysis was therefore undertaken to gain some impression of nutrient status. In other circumstances other chemical conditions such as toxicity, salinity or nutrient deficiency may be explored. Soil sampling for analysis is rarely a feasible component of rapid appraisal as results are often not available in time to influence recommendations. However, in the Shurugwi exercise the facility for speedy analysis was available and the results particularly useful, given the lack of baseline information on soils in Shurugwi. Where sampling is feasible, representative soils can be sampled using techniques discussed in the research report. Interpretation of results must be done with care and the soil management history always considered.

Range and distribution

As mentioned, an assessment of soil distribution in terms of position on slope or associated land unit should accompany soil characterisation. This can be explored further by assessing the extent of soil types and their variability using auger observations. Some boundary delineation may be possible and reference to any earlier distinction of land units on aerial photographs should be made at this point.

It was not the intention in the Shurugwi exercise to prepare a soil map. Although this might be considered appropriate to other investigations, there is a danger that mapping is carried out for its own sake rather than for any contribution a map might make to the development of agroforestry interventions.

Activity 13. Soil-Vegetation Relationships

In this activity relationships between soil and natural vegetation are explored. The intention is to investigate links between soil and vegetation distribution and explore the role of certain tree species in fertility maintenance, both issues having arisen during generative and detailed discussions and observations.

In Shurugwi this activity consisted of the detailed study of the effects of two particular species on the maize crop and soil beneath their canopies as compared to outside the canopy. The method employed is described in the research report.

Investigations within this activity are determined by issues arising out of the earlier stages, and by what is considered practical within the time available and disciplinary composition of the team.

Any studies undertaken in this activity should be directly relevant to the identification of potential agroforestry interventions. For example, the soil and site requirements of certain species might be determined, or as in Shurugwi, the positive effects of certain tree species on crop growth.

Activity 14. Vegetation Survey

In the generative and detailed stages the role of trees in arable and communal areas, their preferred uses and their distribution were discussed. Changes in woodland cover and composition were also explored by discussions with farmers, review of secondary information and from aerial photographs.

In this activity the intention is to investigate present tree species composition and distribution, woodland structure and use in an attempt to quantify and validate the information derived from farmers.

Example III(13) - Activity 14

Vegetation Survey Form

VIDCO: Mankadire Transect No: 4 Transect Location: To river Length: 100m

Species: *Brachystegia spiciformis*

C = Mainstem cut < 30 cm from ground level
P = Mainstem cut > 30 cm from ground level
L = Lopped (branches cut)
N = Not cut

Height Class (m)
I = 0 - 0.5
II = 0.51 - 2.0
III = 2.1 - 3.0
IV = 3.1 - 6.0
V = 6.1+

Stem Diameter (cm)				
0 - 2.0	2.1 - 5.0	5.1 - 15.0	15.1 - 30.0	30+
CIN, CIN, CIN, CIIN	CIIIN, NIII, CIIIL, CIVN, CIIN, CIIN	NIII, CIVL, CIVL	PIVL	

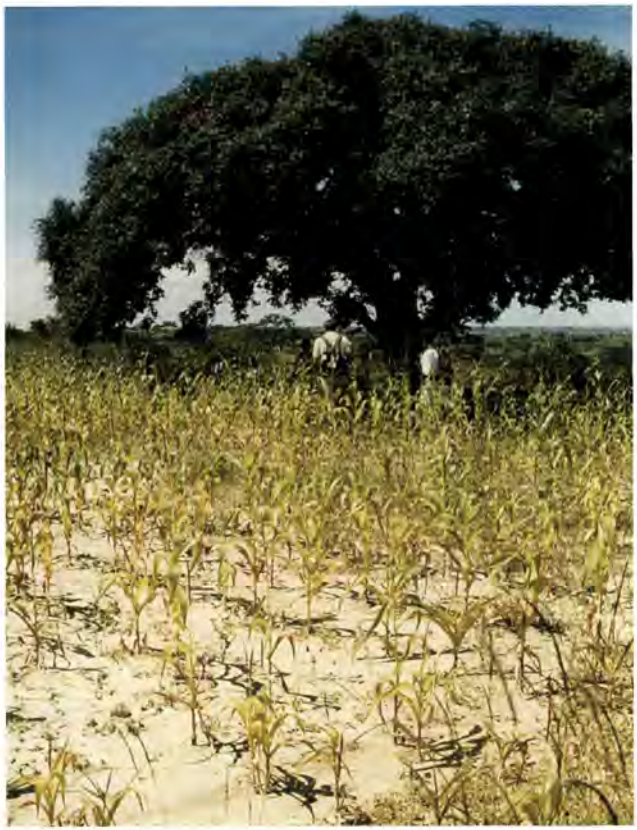
Explanation

The description for each stem is separated by a comma, e.g.:

(a) 'CIIIN,' is a single uncut stem growing from a mainstem which was itself cut below 30 cm above ground level. The diameter amd height of the coppiced mainstem are not recorded. The uncut regrowth is between 2.1 m and 3.0 m tall, and between 2.1 cm and 5.0 cm in diameter. Other stems growing from the coppiced mainstem are recorded separately.

(b) 'NIII,' describes a single uncut stem, between 2.1 m and 3.0 m tall, and between 5.1 cm and 15 cm in diameter.

(c) 'PIVL' has a mainstem cut more than 30 cm above ground level. The diameter (15.1 cm - 30 cm) measurement is taken on this mainstem. The height measurement - (3.1 m - 6.0 m) is the top height of the whole plant. At least one branch has been lopped.



The effects of trees on crop growth and soil characteristics were investigated.

Transects

Belt transects can be used to collect information on vegetation. In Shurugwi they were selected to run through a range of vegetation types including dense kopje vegetation, degraded woodland, and along contour ridges. The dimensions of the transects should be selected according to the heterogeneity of the vegetation and the purpose of the study. In general, a longer narrower transect copes better with spatial heterogeneity than a shorter and wider one of the same area. The number of transects undertaken is in theory determined by the level of precision required, but in practice will be set by the time available. The range of measurements taken within each transect depends on the purpose of the study.

In Shurugwi transects 100 m to 150 m long were placed in different woodland types by each subgroup. Depending on the density of different sized trees, larger stems were usually recorded within a 3 m, and smaller stems within a 50 cm strip. Woodland structure was assessed in terms of stem frequency by diameter and height for each species, and woodland use by the frequency of coppicing, pollarding and lopping by species and stem diameter. And index of volume was calculated, and a small investigation of regeneration carried out. A specimen survey form is shown below (Example III(13)).

Activity 15. Land Use Mapping

The aim of mapping land use was to show the proportion and distribution of the arable and communal areas and to identify land use units or 'niches' which might be exploited for agroforestry interventions.

This exercise was undertaken using aerial photographs as stereo pairs and mosaics, and field observations for definition of land use classes and ground truthing. The map is shown in the research report.

Activity 16. Erosion Hazard Mapping

In Shurugwi soil erosion arose as an issue in the review of secondary information and environmental trends and in discussions with farmers.

Soil erosion hazard can be quantified and mapped using the Soil Loss Estimation Model for Southern Africa (SLEMSA). The methodology employed at Shurugwi is explained in detail in the research report.

SLEMSA is useful as a tool for estimating gross soil loss values but more importantly for demonstrating the

Participating scientists investigating the composition and regeneration of dwindling miambo woodland

relative hazards under different conditions of vegetation cover, land use, slope length and gradient. Superimposition of the erosion hazard map over the land use map can reveal relationships between land use patterns and erosion hazard. During the formulation of interventions, the model is useful in assessing the effects on erosion rate of shortening slope-lengths by putting grass-and-tree strips between existing bunds, and of improving groun cover. It should be noted that tree canopy *per se* has little beneficial effect on erosion rate.

Alternative methods for assessing erosion can be used. These include the use of aerial photographs to determine the extent of gullying, sheet and streambank erosion. The disadvantages of this are that the identification and distinction of erosion features on aerial photographs is difficult for the untrained eye and does require ground truthing. Although there are no erosion rate predictions, a good picture of current erosion status can be obtained and again related to land use. This approach and SLEMSA can be complementary methods.

Activity 17. Plenary Synthesis of Meeting, Interview and Natural Resource Survey Information

The last phase of Step III is the final stage of the survey iteration and involves a synthesis of all the outputs of Steps II and III. This provides the initial inputs into the following step of identification of potential agroforestry interventions. A full account of methods, results and findings is given in the research report.

This activity assumes there has been continuous analysis and synthesis throughout Steps II and III in the form of summaries of subgroup information and workshop review sessions held to compare and discuss the range of subgroup information. This is essential before a final synthesis can be accomplished.

In Shurugwi an initial synthesis was undertaken within subgroups in brainstorming sessions which produced either flow diagrams, tables or matrices showing interaction between resources (Example III(14)).

Since the aim is to combine and synthesise information from the survey subgroups into an accessible and manageable form, the degree of standardisation between groups is an important consideration. Standardisation of format and method should be agreed prior to survey. This was achieved to some extent by the Shurugwi subgroups and the use of summary tables and matrix formats facilitated the synthesis. For the purposes of training, different group approaches and formats may

help to demonstrate the range of methodologies that can be employed. However the value of some standardisation for the synthesis stage is established.

The method used for synthesis will be determined by the kind of information collected, the extent to which this has already been summarised and the degree of standardisation between subgroups. In Shurugwi synthesis was undertaken by three subgroups looking at soils, vegetation and socio-economic information.

Socio-economic Information

The aim of this synthesis is to combine socio-economic information collected from each household and prepare it in a form which is accessible for the following step. In Shurugwi initial synthesis had resulted in the completion of summary tables and a preliminary farmer classification. The intention at this phase was to combine the farmer category classifications developed by each subgroup. In Shurugwi this was achieved by identifying seven criteria on the basis of which each household could be allocated to one of three categories, poor, middle or leading.

The criteria employed were: land holding; labour; draught power; input levels; sources of investment; level of production output and sales; and degree of household security.

The result of this synthesis was a summary description of each farmer category. Following this a further summary was prepared of the resource constraints and opportunities affecting each category. Summaries of these are shown in Examples III(15) and (16).

Soils

In Shurugwi a preliminary correlation between farmers' descriptions and field observations had already been undertaken by each survey group. It was the aim of this synthesis to compare and correlate the soil information from the survey subgroup areas and prepare a final soil legend in which all soil types are represented (Example III(12)). At this stage any analytical information received should be used to complete the soil characterisation summary.

The first stage in correlation was undertaken in the field. A team of soil scientists representing each subgroup visited the soil pits in the three VIDCO areas to compare soil types and local soil terminology. This enabled the team to identify a range of six soil types, three common to more than one VIDCO.

A soil correlation table was drawn up (Example III(17)), which summarises information on the range and variability of soil properties and management. Finally, this exercise should aim to summarise the particular management constraints and opportunities associated with the range of soil types observed since an understanding of these will form the basis for some agroforestry intervention proposals in the next step. The soils information is now available in an accessible form for Step IV (Example III(18)).

Soil-Vegetation Relationships

In the Shurugwi course this aspect was covered by both the soil and vegetation specialist groups. In addition the soils group were able to reach conclusions using each subgroup's analysis of maize cob measurements from the tree-crop interface studies (see research report).

Vegetation Survey

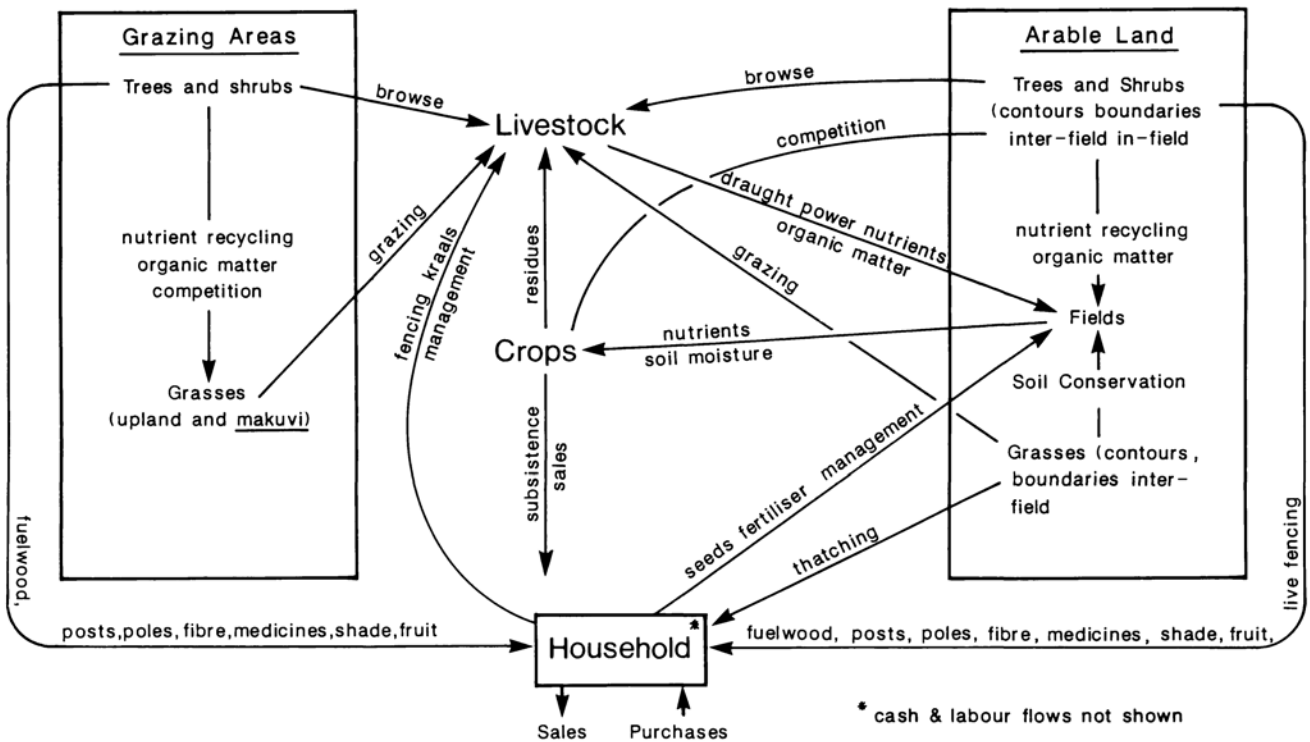
Analysis of the vegetation survey data showed the present structure and species composition of vegetation in the grazing areas and on farms. It also showed current patterns of use. This information was later drawn upon in proposing interventions (Step IV). A sample of the results is shown in Example III(18).

Tree Uses and Locations

Group meetings, interviews and the vegetation surveys on contour bunds and field boundaries produced information on the uses and locations of trees. The results are given in Examples III(19) to (21).

Example III (14) - Activity 17

Interactions Among Resources



Example III(15) - Activity 17

Summary Description of Farmer Categories

FARMER CATEGORY	ARABLE LAND HOLDING	LABOUR	DRAUGHT POWER	FERTILITY MANAGE-MENT	INPUTS (1987/88)	SOURCES OF INVESTMENT INTO AGRICULTURE	PRODUCTION OUTPUT AND SALES
LEADING FARMERS	+3.5 ha (Ave: 4.6 ha) Have greatest ability to acquire more land through purchase or borrowing. Main crop: maize, grown in a rotation based on the use of manure - field manured: maize maize g'nuts rapoko.	Minimum of 3 full-time people, inc. min. 1 hired labourer. Also signif-icant use of part-time labour during peak periods (school children, other relatives, and/or temporary hired).	Self-sufficient Average no. of cattle at home = 13. Some earn income from hiring out draught power. During drought these farmers had to buy supplementary feed to keep their animals alive.	*Organic:* Manure, bulked with antheap, maize (& g'nut) stover, grass and compost. 0.8 - 1 ha manured annually. Field manured every 4-5 yrs. *Inorganic:* Range of use from 11-32 bags of compound D and AN. Ave: 18.6 bags. All maize is fertilised.	Min. 50 kg hybrid maize seed purchased annually.	If leading farmer is a *woman*, husband is remitting money for seed and monthly wage(s) of hired labourer(s). Other inputs obtained from crop sales. If farmer is a *man*, major source of income is crop sales, & veg/ fruit/broiler sales, and partial remit-tances from sons/kin. Farmers have used *AFC loans* in period 1983-87, but most are no longer doing so Farmers now more likely to use *cash groups*.	*1986/87:* Maize sales range: 15-65 bags. Ave. maize sale 4-5 bags. Possibly addit-ional sales of rapoko and groundnuts. Other agric-ultural income: broilers, vegetables, fruit.

Example III(15) - Activity 17

Summary Description of Farmer Categories Cont'd

FARMER CATEGORY	ARABLE LAND HOLDING	LABOUR	DRAUGHT POWER	FERTILITY MANAGE-MENT	INPUTS (1987/88)	SOURCES OF INVESTMENT INTO AGRICULTURE	PRODUCTION OUTPUT AND SALES
MIDDLE FARMERS	Ave: 2.5 ha (Range: 0.5 - 7 ha). Main crop: maize, a manure-based rotation used on some fields only.	2 full-time people, (incl. for a few a hired labourer). Sufficient part-time labour (children and/or temporary hired workers) available for peak periods.	Ave. cattle owned = 8. Some farmers are hiring draught power.	*Organic*: Manure bulked with antheap, stover, etc applied to 0.2 - 0.4 ha. *Inorganic*: Low and declining usage. Range: 0-16 bags. Most: 2 or less bags.	Maize seed. Average usage of hybrid seed: 28 kg. Range: 15-80 kg.	*Women farmers*: Are receiving regular or irregular remittances. *Other sources*: Crop or vege sales, sewing/ knitting. *Men farmers*: Some remit-tances for seed and draught power, or no remit-tances. *Other sources*: Crop sales. Decreasing use of credit loans because of indebtedness.	1986/87: Maize sales range: 0-20 bags. Ave: 7 bags. Farmers sell mainly only in good seasons - leads to a fluctuating cash situation which leads to fluctuations particularly in amount of inorganic fertiliser used.

Example III(15) - Activity 17

Summary Description of Farmer Categories Cont'd

FARMER CATEGORY	ARABLE LAND HOLDING	LABOUR	DRAUGHT POWER	FERTILITY MANAGEMENT	INPUTS (1987/88)	SOURCES OF INVESTMENT INTO AGRICULTURE	PRODUCTION OUTPUT AND SALES
POOR FARMERS	Ave: 2.0 ha Range: 1-3.2 ha. Main crop: maize, but not grown in any especial rotation.	1-2 full-time. Part-time labour varies depending on no. of children. Families cannot afford to hire labour.	Ave. cattle owned: 2 head. Draught power options: combine one animal with a relative's; share relative's cattle; use donkeys; hire.	*Organic:* maize stover compost combined with antheap and manure (incl. goats), if available. Applied to 0.2-0.4 ha, but often irregularly (perhaps once every 2 years). Constraints include shortage of cattle to produce manure, Scotch carts to transport it and labour. *Inorganic* Range: 0-6 bags. If fertiliser is used, often it is only AN topdressing that is applied.	Hybrid maize seed: Most buy some, although this year a few bought none, reusing last season's hybrid seed.	Income for maize seed from relatives (no migrant husbands) or from other income source (e.g. piecework, beer brewing, carving, veg. sales), generally non-agricultural. *Loans:* None used - farmers have had bad experiences if they have used them in the past.	Usually only sell in a good season and then under 15 bags.

Example III(16) - Activity 17

Constraints, Opportunities and Access to Woodland Resources in relation to Farmer Category

	Leading	Middle	Poor
Main constraints	Fodder Land area	Fodder Fertility	Fertility Draught power Cash Labour
Main opportunities	Cash Labour Draught power	As for leading farmers, but less	More likely to pick up off-farm income earning activities to provide cash. Tend to have more fallow land.
Access to woodland resources	Good Labour & Scotch carts available. Cash for purchase	Fluctuating labour. Less cash to buy wood	Poor No spare cash or labour. No Scotch cart. Less land than other categories, but tendency for some to lie fallow due to input shortages.

Example III(17) - Activity 17

Soils Correlation Table

SOIL TYPE	COMMON FEATURES	VARIATIONS	FARMER COMMENTS
SANDY SOILS			
DRY			
Jecha Jehechehe Rusenya	Arable and grazing areas Distinct grey-brown loamy sand topsoil Coarse grained brown to orange brown sandy subsoils matrix becoming heavier with depth. Sand Particles become coarser with depth Exessively drained Subject to capping in grazing areas - sheet and gully erosion common	Texture - medium or coarse grained Depth to weathering parent material Amount, size and distribution of gravels Stone line occurrence Subsoil color - Rusenya paler than Jehechehe	Rusenya identified as less fertile Jecha sometimes referred to as coarse gravelly form of Jehechehe Reserve anthill application to these poorer/coarser sandy soils.
MOIST			
Norubvuka	Sandy soils, greyer than Jehechehe with higher moisture content either because of impermeable granite layer creating a perched water table or because of finer textures Less gravelly than dry sandy soils	Depth to granite variable Perched water table variable	Early ploughing to conserve moisture Described as being darker than Jehechehe
Chivombvu	Red soil with clay subsoil Sandy/fine sandy topsoils which are capped and erodible Generally gravelly in the area with large amount of large quartz stones on surface	Position on slope, observed on crest and lower slope Amount of stones in subsoil Depth to parent material Chivombvu observed elsewhere in country not so gravelly Clay content increases going down the catena	Fertile Good water holding capacity but only in wet years. This advantage lost when shallow and stony.

Example III(17) - Activity 17

Soils Correlation Table Cont'd

SOIL TYPE	COMMON FEATURES	VARIATIONS	FARMER COMMENTS
SOILS WITH CLAY SUBSOILS			
Chidhaka	Occurring at bottom of slope, poorly drained. Typically should have dark organic topsoil (sometimes buried) over heavy grey/ yellow subsoil of mottled clay	Description covers a variety of soil types in vleis/ lower slopes Ploughed early Add manure but no anthill	Fertile Used for making pots Lower positions only
Chinamwa	Refers to clay subsoil horizon (used for making pots) Found towards bottom of slope.	Topsoil variable Drainage variable depending on slope position	Not extensive
Chimhamhari	Similar to above but with a clay pan restricting drainage Prone to compaction Sandy topsoils	Depth to clay pan	Not extensive

Example III(18) - Activity 17

Synthesised Information on Soils

SOIL TYPE	CHARACTERISTICS & SLOPE POSITION	VEGETATION ASSOCIATION	LAND USE	FERTILITY IMPROVEMENT
1. *JECHA*				
(a) Coarse Texture	Poor fertility Poor water holding capacity Light in colour Sandy texture on surface Gravel with increasing depth Good drainage Acidic Deep profiles found on crest and middle part of catena	*Brachystegia spiciformis* *Pavetta schumanniana* *Albizia* *Combretum molle* *Peltophorum africanum* *Dichrostachys cinerea* Mandira grass *Julbernardia globiflora* Muchakata - (*Parinari curatellifolia*)	Grazing Arable	Fertiliser Antheap Kraal manure Green manuring Compost
(b) Finer texture	Fair fertility Better WHC Good drainage Acidic Yellowish red colour (Grey near the river) found on middle and lower part of catena	*Combretum collinum* *Albizia* *Terminalia* spp. *Peltophorum africanum*	Grazing Arable	Fertiliser Antheap Kraal manure Compost Green manuring
2. *CHIDHAKA*				
Sandy clay loam top soil over-lying a heavy clay subsoil	Buried A horizon Good WHC Medium permeability Poor drainage Acidic dark top soil found on lower part of catena and vleis	*Acacia* *Terminalia* *Piliostigma* *Combretum* *Acacia karoo*	Grazing Arable	

Example III(18) - Activity 17

Synthesised Information on Soils Cont'd

SOIL TYPE	CHARACTERISTICS & SLOPE POSITION	VEGETATION ASSOCIATION	LAND USE	FERTILITY IMPROVEMENT
3. *CHIMHAMHARI*				
Sandy top soil overlying clay pan at 35cm	Prone to compaction Relatively impermeable subsoil	*Ficus* spp. *Brachystegia* *Acacia*	Grazing Arable	
depth	Lower position in catena	Sedges Grasses Weeds *Albizia amara* *Acacia karoo* *Dichrostachys cinerea*		
4. *NHORUBVUKA*				
Loamy sand	Fair fertility Well drained Acidic	Cultivated site *Brachystegia boehmii*	Arable	Less fertiliser Early planting to conserve moisture
5. *CHIVOBVU*				
Sandy clay loam top soil overlying sandy clay	Good fertility Acidic WHC good except where stoniness is high and depth shallow Good drainage Heavier texture in lower position of catena	*Lannea discolor* *Terminalia* spp. *Crotalaria* spp. *Piliostigma thonirgii* *Sclerocarya caffra* *Brachystegia boehmii*		Fertiliser Kraal manure Grazing Arable Compost

Example III(19) - Activity 17

Vegetation Transect Summary

Structure and Use of Communal Woodland in Shurugwi
(for species compositon see Examples III(19), (20), (21))

Frequency of stem by diameter and height class

		Number of stems/ha in each diameter class					
		0-2 cm	2-5 cm	5-15 cm	15-30 cm	30+ cm	Totals
Number of stems/ha in each height class	0-0.5 m	8978.2	60.2	15.8	0	0	9054.3
	0.5-2 m	1686.9	839.1	71.3	3.1	0	2600.6
	2-3 m	47.6	393.3	182.3	3.1	0	626.5
	3-6 m	0	157.0	294.9	22.2	0	474.1
	6 m+	0	0	0	9.5	0	9.5
	Totals	10712.8	1449.8	564.5	38.0	0	12765.2

Note: Arithmetic discrepancies are due to rounding.

Example III(19) - Activity 17

Vegetation Transect Summary Cont'd

Structure and Use of Communal Woodland in Shurugwi
(for species compositon see Examples III(19), (20), (21))

Use of stems by diameter class

Use class*		Number of stems/ha in each diameter class 0-2 cm	2-5 cm	5-15 cm	15-30 cm	Totals
n	obs.**	5889.4	388.6	69.7	6.3	6354.2
	exp.**	5338.5	722.5	281.3	11.8	
l	obs.	649.3	141.1	69.7	0	860.3
	exp.	722.7	97.8	38.0	1.6	
c	obs.	3302.6	409.1	109.4	0	3821.2
	exp.	3210.4	434.4	169.1	7.1	
p	obs.	120.5	38.0	23.7	4.7	187.1
	exp.	157.2	21.2	8.2	0.3	
cn	obs.	663.5	361.7	149.0	0	1174.3
	exp.	986.6	133.5	51.9	2.1	
cl	obs.	72.9	71.3	117.3	0	261.7
	exp.	219.8	29.7	11.5	0.4	
pl	obs.	14.2	39.6	25.3	12.6	92
	exp.	77.2	10.4	4.0	0.1	
	Totals	10712.8	1449.8	564.5	23.7	12750.9

* Use class:
- n = stem not used
- l = lopped
- c = main stem cut less than 50 cm above ground
- p = main stem cut more than 50 cm above ground
- cn = main stem cut less than 50 cm above ground, no other use
- cl = main stem cut less than 50 cm above ground, regrowth lopped
- pl = main stem cut more than 50 cm above ground, regrowth lopped
- pn: no stems found in this category

**obs. = number of stems recorded in a category
exp. = number of stems expected in a category if users not selecting by diameter or height class

Note: Arithmetic discrepancies are due to rounding.

Example III(19) - Activity 17

Vegetation Transect Summary Cont'd

Structure and Use of Communal Woodland in Shurugwi
(for species compositon see Examples III(19), (20), (21))

Use of stems by height class

Stem height		Number of stems per ha. in each use class							
		n	l	c	p	cn	cl	pl	Totals
0-0.5 m	obs.**	5205.4	493.8	2869.4	115.8	307.9	47.5	14.2	9054.3
	exp.**	4512.0	610.8	2713.4	132.9	833.9	185.8	65.3	
0.5-2 m	obs.	974.3	287.1	628.2	57.0	507.8	93.6	49.1	2597.5
	exp.	1294.4	175.2	778.4	38.1	239.2	53.3	18.7	
2-3 m	obs.	139.5	44.4	156.9	4.7	203.0	69.7	4.7	623.3
	exp.	310.6	42.0	186.7	9.1	57.4	12.7	4.4	
3-6 m	obs.	34.8	34.9	166.5	4.7	155.4	50.7	23.7	471.0
	exp.	234.7	31.7	141.1	6.9	43.3	9.6	3.3	
6 m+	obs.	0	0	0	4.7	0	0	0	4.7
	exp.	2.3	0.3	1.4	0	0.4	0	0	
Totals		6354.2	860.3	3821.2	187.1	1174.3	261.7	92.0	12750.9

* Use class:
- n = stem not used
- l = lopped
- c = main stem cut less than 50 cm above ground
- p = main stem cut more than 50 cm above ground
- cn = main stem cut less than 50 cm above ground, no other use
- cl = main stem cut less than 50 cm above ground, regrowth lopped
- pl = main stem cut more than 50 cm above ground, regrowth lopped
- pn: no stems found in this category

** obs. = number of stems recorded in a category
exp. = number of stems expected in a category if users not selecting by diameter or height class

Note: Arithmetic discrepancies are due to rounding.

Example III(20) - Activity 17

Indigenous Tree Species by Land Use Locations

	Home Field				Main Field			
Species	Home-stead	Near field	Boun-dary	Cont-our	With-in	Cont-our	Boun-dary	Graz-ing
Acacia karoo					X	X		X
Acacia nilotica								X
Acacia polyacantha								X
Acacia rehmanniana								X
Albizia amara			X			X		X
Albizia antunesiania								X
Antidesma venosum			X			X		X
Azanza garckeana		X	X		X			
Brachystegia boehmii								X
Brachystegia glaucescens								X
Brachystegia spiciformis	X		X					X
Bridelia mollis			X			X		X
Burkea africana								X
Carissa bispinosa			X					X
Carissa edulis								X
Cassia abbreviata								X
Cassia singueana			X			X		X
Combretum hereroense								X
Combretum molle			X			X		X
Combretum zeyheri								X
Cussonia arborea								X
Dichrostachys cinerea			X		X	X		X
Diospyros lycoides			X					
Dovyalis caffra					X			
Erythrina abyssinica		X						
Euclea divinorum								X
Euphorbia matabelensis								X
Ficus natalensis					X			
Ficus sur (Syn. capensis)					X			
Ficus sycomorus								
Flacourtia indica	X							
Gardenia spatulifolia								X
Gardenia volkensii								X
Grewia monticola								X
Julbernardia globiflora	X						X	X
Kirkia acuminata								X
Lannea discolor					X			X
Lopholaena coriifolia								X
Maytenus senegalensis			X					X
Monotes glaber								

Example III(20) - Activity 17

Indigenous Tree Species by Land Use Locations Cont'd

	Home Field				Main Field			
Species	Home-stead	Near field	Boun-dary	Cont-our	With-in	Cont-our	Boun-dary	Graz-ing
Ochna schweinfurthianna								X
Ozoroa paniculosa							X	
Parinari curatellifolia					X			X
Piliostigma thonningii	X	X	X			X		X
Pouzolizia hypoleuca								X
Pseudo. maporuneifolia						X		X
Pterocarpus angolensis								X
Pterocarpus rotundiflolius								X
Rhus chirindensis			X			X		
Rhus lancea			X			X		
Ricinus communis	X							
Rubiaceae								X
Sclerocarya caffra			X					
Securinega virosa			X					
Syzygium guineense								X
Strychnos cocculoides		X	X					X
Swartzia madagascariensis								X
Terminalia sericea		X	X		X	X		
Uapaca kirkiana					X			
Vangueria randii								X
Vangueriopsis lanciflora								X
Vernonia colorata								X
Xeromphis obovata								
Ximenia caffra								X
Ziziphus mucronata						X		X

Example III(21) - Activity 17

Uses of Indigenous Tree Species

Species	Uses							
	Const ruct'	Fuel	Fruit	Medi-cine	rowse	Live Fence	Fence Posts	Others
Acacia karoo					X			
Acacia nilotica	X	X			X			Shade
Acacia polyacantha								
Acacia rehmanniana	X	X					X	
Acacia sieberiana								Handles, Yokes
Albizia amara								Conservation
Albizia antunesiania	X	X						
Antidesma venosum								Conservation, Shade
Azanza garckeana		X	X					
Brachystegia boehmii		X						Fibre
Brachystegia glaucescens		X						Fibre
Brachystegia spiciformis	X	X			X	X		Fibre, Shade
Bridelia mollis								
Burkea africana	X		X			X		Attracts edible caterpillars
Carissa bispinosa								
Carissa edulis								
Cassia abbreviata		X						
Cassia singueana						X		
Combretum hereroense								
Combretum molle	X	X		X	X			Fibre, artifacts
Combretum zeyheri								
Cussonia arborea					X			
Dichrostachys cinerea	X	X			X			
Diospyros lycioides							X	
Dovyalis caffra			X	X				
Erythrina abyssinica		X		X				Ornamental, intercropping
Euclea divinorum								
Euphorbia matabelensis								
Ficus natalensis			X		X			Shade
Ficus capensis		X	X		X			Shade
Ficus sycomorus								
Flacourtia indica			X					
Gardenia spatulifolia	X	X		X			X	Handles, Yokes
Gardenia volkensii								
Grewia monticola							X	
Julbernardia globiflora	X	X		X	X	X	X	Fibre, Conservation
Kirkia acuminata	X	X			X			
Lannea discolor	X		X				X	
Lopholaena coriifolia								

Example III(21) - Activity 17

Uses of Indigenous Tree Species Cont'd

Species	Uses							
	Const ruct'	Fuel	Fruit	Medi-cine	Browse	Live Fence	Fence Posts	Others
Maytenus senegalensis							X	
Monotes glaber							X	
Ochna schweinfurthianna							X	
Ozoroa paniculosa								
Parinari curatellifolia	X	X	X	X	X			Shade, Conservation
Peltophorum africanum	X	X			X			Shade
Piliostigma thonningii	X	X	X		X			Tool Handles, Ornamental
Pouzolizia hypoleuca				X				
Pseudo. maporuneifolia								
Pterocarpus angolensis								
Pterocarpus rotundiflolius								
Rhus chirindensis								
Rhus lancea								
Ricinus communis								
Rubiaceae								
Sclerocarya caffra		X	X	X	X			Shade
Securinega virosa								
Syzygium guineense	X							
Strychnos cocculoides	X						X	
Swartzia madagascariensis							X	
Terminalia sericea	X						X	
Uapaca kirkiana		X	X					
Vangueria randii								
Vangueriopsis lanciflora								
Vernonia colorata								
Xeromphis obovata								
Ximenia caffra			X	X				
Ziziphus mucronata	X		X	X				

Example III(22) - Activity 17

Planted Trees: Uses and Locations

Species	Location				Uses									
	Homestead	Near field	Boundary	Main field	Fruit	Medicine	Poles	Fuelwood	Construct'	Browse	Shade	Live Fence	Other	Notes
Mango	X	X	X		X						X			Farmers
Peaches	X		X		X									want
Guava	X	X	X		X	X								planting
Manihot glaziovii	X													materials and
Oranges			X		X									information
Lemon		X	X		X									on planting
Grapes	X				X									techniques
**Uapaca kirkiana*				X	X									
**Flacourtia indica*	X				X									
**Azanza garckeana*				X	X			X						
Vangueria spp.				X	X									
Lannea edulis				X	X									
Julbernadia globiflora	X							X			X			
**Terminalia sericea*				X				X			X			
**Ficus sur*	X				X			X		X	X			
Pawpaw	X				X									
Naartjies	X		X		X								Windbreak	
Mulberry		X			X									
Apple		X												
Leucaena			X							X	X			
Eucalyptus			X				X	X	X					
Melia azedarach	X							X			X			
Castor bean	X					X							Oil	
Banana	X				X									
Cypress			X				X							
Kirkia abyssinica		X				X						X		
Grass (Ipwadzagudo)		X										X		

* indigenous species

Example III(22) - Activity 17

Planted Trees: Uses and Locations Cont'd

Species	Location				Uses									
	Home-stead	Near field	Boun-dary	Main field	Fruit	Medi-cine	Poles	Fuel-wood	Const ruct'	Browse	Shade	Live Fence	Other	Notes
Mexican apple	X				X									
Avocado	X				X									
Kigelia africana				X	X									
Afzelia quanzensis				X		X								
*Kirkia acuminata			X					X	X					
*Sclerocarya caffra				X	X									
*Rhus lancea		X			X									

Land Use and Erosion Hazard Maps

Other products of Step III that required synthesis in the Shurugwi course are the land use and erosion hazard maps. By superimposition of these two it was possible to determine relationships between land use patterns and degree of erosion hazard. The proportion of low, medium and high erosion hazard map units within each land use type was assessed in an exercise to determine which land use type was at more risk from erosion and would therefore benefit most from agroforestry practices promoting conservation (see research report). The land use mapping, also shown in the research report, identified and indicated the extent of the various 'niches' potentially available for agroforestry interventions. These are listed in Example III(23).

Example III(23) - Activity 17

List of Agroforestry Niches

Arable Zone:	Field boundaries On contour bunds Within fields Drainage lines Sacred areas *Makuvi* (hydromorphic grasslands, *vleis*) Riverine Strips *Chikomo* (inselbergs)
Main Grazing Zone:	Sacred hills *Makuvi* Riverine strips *Chikomo* Hills Other upland grazing