STEP V: APPRAISAL OF POTENTIAL AGROFORESTRY INTERVENTIONS

Duration: four and a half days

Introduction

Step IV was concerned implicitly with 'appraisal' in that infeasible, unfundable or unwanted options raised and informally discussed during these steps will already have been abandoned. Although a few proposals were rejected during appraisal, this step is not a formal appraisal of a wide range of options as recommended by planning text books. Instead, we assume that the interventions identified in Step IV are in principle acceptable to local people, and that what now has to be done is to assess the suitability of the interventions for various kinds of household, their compatibility with local institutions, their acceptability by Government departments, their complementarity and interactions as part of an agroforestry strategy, and the priority for their implementation.

In appraising activities it is important to remember that if people are to undertake a new activity then they usually have to change what they are already doing. Labour, time, capital and land may have to be reallocated or acquired from elsewhere. People, whether farmers, extension agents or research personnel, will only allocate their resources for new activities if they believe the benefits to be gained from so doing are worthwhile – in other words, if the expected increase in benefits outweighs the opportunity costs.

These considerations mean that for each intervention being appraised, we must be aware of: who might undertake it (men, women, households, schools, labour cooperation group, VIDCO, Agritex, Forestry Commission etc); what scale of change from present activities is required; what additional resources would be required and from what source.

The intended procedure at Shurugwi was for the training team to appraise the proposed agroforestry interventions during a workshop; for survey groups to return to VIDCO areas for informal discussions on the proposals with selected farmers and officials; and finally for a short list of appraised interventions to be discussed more formally in VIDCO meetings. This procedure follows the rapid appraisal phases described in Step III: 'generative', 'detailing' and 'assessment'.

Objectives and Outputs

By the end of this step we should have, for each agroforestry intervention:

* **identified its purpose and those who would be responsible for implementation (e.g. household, community group, government extension or research agency, NGO etc);**
* **assessed resource requirements including capital and recurrent costs, labour requirements, and the need for external resources;**
* **assessed the activity's social or policy acceptability or feasibility;**
* **assessed the environmental and social riskiness of the activity;**
* **continued formal and informal discussions with relevant people and institutions;**
* **assessed whether the agroforestry activity is a compatible component of an agroforestry strategy for the area;**
* **examined the research and extension requirements of each intervention.**

List of Activities

1. Workshop

2. Informal Discussions with Local People

3. Public Meetings

Activity 1. Appraisal Workshop

The aim of this activity is to appraise and modify the proposals for agroforestry interventions that have been made during Step IV (Examples IV(1) and (2)). .The activity is carried out by four groups – technical, research, extension and socio-economic.

After a plenary session to explain the method, the training team divides into the four groups. Each considers the interventions from the perspective of the interest group it represents. Thus the technical group represent technical experts, the research group named research agencies, the extension group extension agencies and the fourth group represented farmers.

Several issues requiring discussion have been identified below. However, each group must set its own agenda, its priorities and, if necessary, add to its brief.

Each group should negotiate with the other interest groups. For example, the extension group needs to be satisfied that the research group is taking into account research-extension and research-farmer links. Likewise the research group itself must be satisfied with research-extension links.

At the end of its discussion each group produces a written appraisal report. This should appraise the interventions, note where agreement has been reached with other groups, and where conflict remains. These reports are presented in plenary session (Examples V(1), V(2), V(3), V(4)). The brief for each appraisal group is given below.

Technical Group

This group should consider the following when appraising the potential agroforestry interventions:

* resource requirements, e.g. land, labour, capital, planting material, technical knowledge;

* environmental implications, including soil erosion, hydrology, microclimate, pests, weeds and diseases;

* technical feasibility;

* non-agroforestry alternatives, i.e. opportunity costs;

* priority for implementation.

Research Group

Research proposals drawn up for each intervention in Step IV should be consulted, and appraised in relation to the following:

* research priorities;

* level of research and proposals for research monitoring;

* research agency/extension links, and research agency/farmer links;

* research resource requirements;

* environmental impacts;

* non-agroforestry alternatives;

* technical feasibility.

Extension Group

For each intervention or package of interventions this group should consider the following:

* agency responsible for implementation;
* resource requirements;
* policy acceptability;
* acceptability to farmers and social riskiness;
* compatibility of the intervention with current extension strategy;
* research-extension links.

Farmers' Interests Group

For each intervention or package of interventions this group should consider the following:

* resource requirements, costs and benefits;
* social acceptability;
* appropriateness to different categories of farmer;
* social riskiness;
* research and extension links with farmers;
* local institutions and social issues;
* policy and planning issues.

Example V(1) - Activity 1

Report from the Technical Appraisal Group on Proposed Agroforestry Interventions

Introduction

This group listed all the proposed on-farm and communal lands agroforestry interventions, combining proposals where necessary, to yield a total of 8 on-farm and 4 communal land interventions.

1. On-farm Interventions

The potential on-farm interventions include:

1. Live fences.
2. Intercropping *Acacia albida* and/or other multi-purpose trees.
3. Woodlots.
4. Fruit trees.
5. Fodder banks (cut-and-carry and grazing fodder banks were merged).
6. Barrier hedges. This includes contour planting for bund-stabilisation.
7. Planted fallow and green manuring. These were merged because of similarity of function.
8. Household nurseries.

The technical group considered all 8 on-farm interventions were important and technically feasible. However, lack of time meant that only two were appraised in detail - live fences, and woodlots. This choice does not reflect the priority for implementation - for example, fodder banks should probably have a higher priority than live fences. The editors have not completed the appraisal, as we intend the examples used to be an accurate reflection of the work achieved during the training programme.

a. Appraisal of live fences

Resource requirements

Land is not a problem because of the small area required. Planting material should include thorny species, e.g. *Acacia spp, Dichrostachys cinerea, Erythrina abyssinica, Bougainvillea spectabilis, Sisal sisal*. Costs are affordable by most households. Labour requirement will depend on length of live fence, and can be provided by the household without affecting farming activities if establishment is undertaken on "chisi" days. Capital will also be minimal except when barbed wire is used. Local knowledge is available on live fence establishment and maintenance.

Example V(1) – Activity 1

Report from the Technical Appraisal Group on Proposed Agroforestry Interventions Cont'd

Environmental implications

Positive effects on soil fertility if species used can be pruned and utilised as green manure. Live fences can also reduce soil erosion, and ameliorate microclimates to the benefit of humans and livestock. Live fences may compete with crops if too close, tall or wide. Live fences could be a source of fodder.

Technical feasibility and priority

Simple to establish and manage with low resource inputs. Adoptable by all categories of household. Given high priority in view of its multipurpose function including security, supply of fodder, fibre, green manure, fuelwood, fencing posts and boundary demarcation.

Alternative non-agroforestry intervention

Apart from dead fences (woody or grass or both) other alternatives are various forms of wire which do not compete with crops but are very expensive, require replacement periodically, and do not produce the fertility, erosion control, green manure, microclimatic or fodder benefits of live fences.

Complementarity to other agroforestry interventions

This intervention complements fodder banks and green manuring.

b. Appraisal of Woodlots

Resource requirements

Land could be allocated on contour bunds, on fallows (with reservations), along field boundaries and in inter-field areas. Planting material of recommended species (exotic and indigenous) could be obtained from village or VIDCO nurseries or from nearest school or Forestry Commission. Establishment of these is a pre-condition for success. Labour may be a limiting factor, except for leading farmers, especially during the establishment phase. Capital costs comprise cost of seedlings, fencing, additional working tools, manuring, pesticides. The intervention would therefore tend to be more relevant to leading farmers. Technical knowhow is available on *Eucalyptus* spp., much less so for indigenous and other exotic species.

Environmental implications

Can check soil erosion if correct choice of species is made and if proper management techniques are adopted to encourage ground vegetation cover.

Technical feasibility and priority

The intervention is feasible for all farmer categories but scale may have to vary. It is of high priority in view of the shortage of wood.

Alternative non-agroforestry interventions

There are no affordable substitutes for firewood or poles.

Complementarity

Can complement other agroforestry interventions in terms of soil fertility maintenance, fodder production (depending on species), windbreaks and shelter belts, and barrier hedges for erosion control.

2. Communal Land Interventions

Potential agroforestry interventions on communal land include nurseries, woodlots, woodland management and enrichment planting, and fodder banks.

a. Appraisal of nurseries

Resources

Land should be selected where there is permanent water supply and flat terrain. Labour might be provided through a variety of communal institutions, for example WADCO, VIDCO, Farmer Group, School. For the Ward nursery, a worker has to be employed. Capital will be required for purchases such as planting materials, and wire for protection. Recurrent costs include pesticides, fertiliser, payment of labour. Total capital and recurrent costs (see Step V) were considered to be obtainable by a communal institution. Seeds could be obtained from local collections and through the Forestry Commission and Agritex.

Technical knowledge

Training is needed for at least a few farmers. Forestry Commission and Agritex might assist.

Example V(1) - Activity 1

Report from the Technical Appraisal Group on Proposed Agroforestry Interventions Cont'd

Environmental implications

Pollution from pesticides and the introduction of pests, diseases and noxious weeds during seed importation or local procurement are potential negative impacts.

Technical feasibility

This intervention is feasible and important for production of planting material to support other interventions such as fodder banks, woodlots and enrichment planting. The levels of nurseries recommended are VIDCO, farmers group and school, as these are more likely to succeed owing to greater sense of ownership, cheap labour and promotion of self reliance among members.

Non-agroforestry interventions

Seedlings might be procured from other outside nurseries but this would entail higher costs of seedlings and transport, and offer a limited range of available seedlings.

b. Appraisal of communal woodlots

Resource requirements and technical knowledge

Similar to nurseries.

Environmental implications

Reduction of soil erosion rates, and the enhancement of soil fertility depending on species used. Woodlots should be correctly sited to avoid adverse effects on ground water table and streamflow.

Technical feasibility and priority

Important and feasible. However, it would be difficult to manage a woodlot and share its products under communal tenure. The effect on ground cover (grass etc) required as forage is crucial.

Non-agroforestry interventions

The alternative sources of fuelwood are crop residues and cow dung, use of which can adversely affect soil fertility. Others are kerosene which is expensive, and natural woodland, which is in need of protection.

Complementarity

Will increase fodder supply if browse species are used. Will also complement the intervention on woodland management and enrichment planting.

c. Appraisal of woodland management and enrichment planting

The woodland management component of this intervention was not recommended for early implementation because of its complexity and the associated requirements for better technical and socio-economic information, and for more research. However, the enrichment planting component was regarded as a useful starting point for the more complex programme, and therefore worthy of early implementation.

Resources required

Land is available in the main grazing area and on poorly stocked sites within woodlands. Indigenous species are to be used and these can be collected locally. Techniques for germination and field establishment will however require investigation. Labour should be available from the community for all operations. Funds will be required for fencing, seed collection and seedling production.

Technical knowledge

Should be available with Forestry Commission and Agritex.

Environmental implications

Good potential for on-site conservation of indigenous species and rehabilitation of degraded woodland.

Technical feasibility

Feasible if carried out on a small scale on selected sites, but the protection of newly established areas has to be effective. Protection would provide an opportunity for existing woodland to grow above browsing height and thus initiate in a simple way the early stage of the more complex management programme.

Example V(1) - Activity 1

Report from the Technical Appraisal Group on Proposed Agroforestry Interventions Cont'd

Non-agroforestry interventions

The alternative is to allow the woodland to regenerate naturally. This is not satisfactory, in view of slow rate of regeneration, poor stocking/ structure, high rate of deforestation, and appreciable land degradation of the *miombo* woodland. The intervention is considered therefore to be a top priority.

d. Appraisal of fodder banks

Resources

The design indicated that this intervention will be sited on the *makuvi* (vleis) but did not specify further. The technical group recommends that the siting should be on the *margin*. Planting materials included exotic and indigenous species. Labour will be provided by the community. Capital cost will comprise cost of planting materials, manure and fencing.

Environmental implications

May have positive effect on fertility depending on the species. May also prevent and control erosion. Will have adverse effect on the hydrology depending on siting and density of trees.

Technical feasibility and priority

Planting of trees on vleis has the attendant danger of silting them up. Although the intervention appears technically feasible the danger to water tables should be carefully borne in mind. Besides there is also a problem of management and utilisation owing to communal ownership. Equitable sharing of fodder to all categories of farmers will be difficult. The leading farmer will have advantage over others because of his greater access to labour, transport and cash. For these reasons, the intervention is not recommended.

Non-agroforestry alternative

More research is needed to determine the role the vleis play as the key grazing resource and their response to different management systems other than grazing.

Example V(2) - Activity 1

Report from the Research Appraisal Group on Proposed Agroforestry Interventions

1. On-farm Interventions

a. Introduction

This group appraised three of the proposed On-farm Interventions in detail - Green Manure and Fodder Banks, and Barrier Hedges (Example IV(1)). The proposal was to plant shrubs and trees along contour bunds and field boundaries for the Green Manure and Fodder Banks, and on eroded contour bunds or between contour bunds in the case of Barrier Hedges. This group felt that the capital cost of protecting linear plantings with diamond mesh wire would be excessive even for better off farmers. These interventions might be adoptable, however, in cases where homefields are already fenced effectively. Other interventions considered in less detail by the Research Appraisal Group included Contour Planting, Live Fences, Windbreaks and Fruit Trees.

b. A Research Strategy for On-farm Interventions

(i) General Objectives

The group outlined a research strategy for the development of the above interventions. The general objectives were to:

* improve knowledge of indigenous species and agroforestry systems;
* improve knowledge of exotic species and agroforestry systems and integrate these where appropriate with local practice;
* test the interventions on-farm using realistic levels of inputs, management and labour, but with some control by researchers;
* investigate the interventions in Natural Regions IV and V, in line with the priorities of the Ministry of Lands, Agriculture and Rural Resettlement;
* integrate the agronomic and forestry investigations and species trials with a socio-economic study of the acceptability of the intervention to various categories of farmer;
* integrate the research into an extension strategy by promoting the development of a network of farmer-experimenters;

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Example V(2) - Activity 1

Report from the Research Appraisal Group on Proposed Agroforestry Interventions Cont'd

* evolve a variety of technical options (rather than a single inflexible package) for extension by Agritex.

(ii) Specific Objectives

Research into **Fodder Banks** should provide information on:

* production per unit area compared with animals' needs, and in relation to input requirements, bearing in mind the target group is middle-to-leading farmers;
* establishment methods;
* nutritional value and palatability over the season;
* interactions between shrubs/trees and arable crops;
* the appropriateness of various management options - cut-and-carry, direct browsing, response to browsing and cutting, storage, time of use and so on.

Answers required from research into **Green Manuring** interventions are:

* production per unit area in relation to the input requirements, bearing in mind the target-group is middle-to-poor farmers;
* nutrient content over time, decomposition rates, immobilisation properties and effects on crop yield of the mulch;
* interactions of the shrubs/trees with arable crops;
* management requirements, including establishment and pruning.

Studies of **Barrier Hedges** should aim to show the effects of:

* interactions between the woody plants and arable crops, root studies being particularly relevant;
* hedges on soil fertility;
* hedges on soil erosion rates.

Investigations of **Fruit Trees, Planting on Contours, Live Fencing** and **Windbreak** establishment should attempt to:

* identify suitable exotic and indigenous species;
* investigate methods of propagation and sources of planting material;
* monitor current on-farm practices using rapid appraisal methods - contour planting, live fencing, windbreaks and orchards - and feed findings and questions back into research;
* establish a network of farmer-experimenters.

(iii) Identification of Suitable Species

Successful development of each of these interventions relies on the identification of suitable exotic and indigenous species. Experience from Malawi shows the following procedure to be rapid and effective, with a preliminary identification of likely species after 18 months:

Step 1: seed germination trials to screen out poorly-germinating species, including pre-germination treatment requirements;

Step 2: seedling survival trials;

Step 3: planting on a range of soil types, possibly along catenas; monitoring of growth and survival rates, noting fungal and insect problems at six monthly intervals;

Step 4: plant sufficient replicates so that management treatments can be tested later.

The Forestry Commission is the institution most likely to undertake the screening.

(iv) Integration of Findings

For each of these proposed interventions it is expected that studies of their acceptability to farmers, and their socio-economic and environmental impacts will be integrated with the technical and on-farm research.

(v) Research Resources

It is envisaged that a network of volunteer farmer-experimenters will be built up. They would use inputs supplied by researchers. Other resource requirements of the research include:

Example V(2) - Activity 1

Report from the Research Appraisal Group on Proposed Agroforestry Interventions Cont'd

- for literature research, support from ICRAF plus one researcher working for three months;
- for screening trials, research station facilities for two years;
- for on-farm trials and socio-economic studies: one agronomist, one social scientist, each for three years; planting material, fencing, fertilisers, and other inputs: funds for paying farmers;
- farmer-experimenters: the same agronomist and social scientist identified above, extension workers, and inputs.

(vi) Research-Extension Linkages

The main means of integrating research results into an extension strategy for these on-farm interventions is through the inclusion of farmer-experimenters in the research process, so that the research output is extension-oriented.

The source of research questions is a crucial issue. In this case they derived from the Analysis of Form of Production and the Natural Resource Assessment. In other instances they could originate from Agritex's extension work, perhaps assisted by rapid appraisal methods incorporated more formally into Agritex's programme.

2. Communal Interventions

The Research Appraisal Group at Shurugwi restricted comments on potential communal interventions to Nurseries, Woodlots and Upland Woodland Management Example IV(2)).

a. Research strategy for the Communal Nurseries

- rapid screening of indigenous and exotic species by the Forestry Commission;
- nurseries established by the Forestry Commission, 2 or 3 per district perhaps, using indigenous and exotic species;
- monitoring of germination and survival rates, disease and insect problems in the Commission's nurseries;
- recommendations for specific local conditions;
- linkages established between Forestry Commission, Agritex and NGOs;
- Communal Nurseries established, using research experience, by Schools, Association of Women's Clubs, VIDCOs, WADCOs;
- technical, economic and institutional experiences of these various kinds of Communal Nursery monitored and fed back as questions and information into research.

b. Research Strategy for Communal Woodlots

From their appraisal of the **Communal Woodlots**, the Research Appraisal Group devised the following research strategy:

- further rapid appraisal work to assess feasibility and acceptability, paying particular attention to institutional aspects (Forestry Commission, Research and Specialist Services, VIDCO and WADCO);
- review of existing knowledge (Forestry Commission, Research and Specialist Services);
- rapid screening of indigenous and exotic species by the Forestry Commission as described above (Forestry Commission);
- researcher-managed trials under communal area conditions;
- demonstration, extension and implementation of tested systems (Agritex/Forestry Commission);
- establishment of monitored "community-experimenter" networks (Agritex/Forestry Commission);
- development of extension recommendations (Agritex/Forestry Commission).

c. Research Strategy for the Development of an Upland Woodland Management Scheme

- further rapid appraisal work to assess feasibility and acceptability, again paying particular attention to institutional problems and possibilities (Forestry Commission, Research and Specialist Services);
- the use of comparative surveys and formal experiments (Research

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Example V(2) - Activity 1

Report from the Research Appraisal Group on Proposed Agroforestry Interventions Cont'd

and Specialist Services, Forestry Commission) to assess:

- relationships between woodland structure and the type and quantity of resource produced (browse, grass, posts, poles, fuelwood, etc);
- seasonal variations in quantity and quality of browse and grass;
- possibilities of manipulating woody structure and species composition to improve the supply of grass and/or browse;

* implementation of pilot schemes (Forestry Commission, Agritex, NGOs) in woodland management to examine:
  - enrichment planting - methods of planting and protection, and survival rates;
  - methods of protecting existing woodland - "tree policemen", movable fences, herding etc;
  - thinning and selective clearance;
  - growth and harvesting rates;
  - production of woodland resources under various management practices;
  - fodder preferences of livestock;
  - issues concerning local institutions, organisation and management, and local political economy.

Example V(3) - Activity 1

Report from the Extension Appraisal Group on Proposed Agroforestry Interventions

a. Present Circumstances

Agritex is the national agency responsible for agricultural extension. All of the interventions covered therefore fall within the bounds of Agritex responsibility.

The majority of agriculturalists in Zimbabwe have been taught that all trees must be removed from arable lands to maximise arable production; and that trees should be selectively cleared from pastures to increase grass production. Agroforestry is further discouraged by formal conventions such as the requirement that Master Farmer trainees remove all trees from their fields. It is people trained in this way and operating within this institutional system that we are now expecting to promote agroforestry.

The agencies responsible for agroforestry-type extension at present are primarily the Forestry Commission and Agritex. Extension contact with farmers is the responsibility of the local Agritex Extension Worker, who receives technical support from Agritex as well as the Forestry Commission. However, Forest Rangers, who are responsible at district level for technical support for Agritex's Extension Workers, are too few in number to provide an effective service. Extension workers in their turn not only have a full programme of arable and livestock extension, but in addition tend to be biased by their training and by past policy which did not favour agroforestry.

In Midlands Province, Agritex does not carry out agroforestry extension. Forestry extension is limited to advice on the planting of eucalyptus in woodlots, and to a lesser extent, the planting of fruit trees. There has been very little research carried out on agroforestry in Zimbabwe. This lacuna of research and extension means that little can at present be offered to farmers. Nevertheless, there are agroforestry interventions carried out by farmers in the absence of formal technical advice. Many farmers intercrop fruit trees (particularly guavas or peaches) with maize, beans or other vegetables. Some make use of existing live trees for fencing, or in a more limited way, plant live fences. A very few have planted rows of eucalyptus trees as windbreaks, or speak of planted fruit trees providing the same function. Other farmers are carrying out activities which, with suitable extension, could lead to the practice of agroforestry. The use of contour structures and the areas above and below them for grazing and browsing purposes is one such

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Example V(3) - Activity 1

Report from the Extension Appraisal Group on Proposed Agroforestry Interventions Cont'd

activity; green manuring through intercropping *Nyemba* (cow peas) with maize or sunflowers, is another.

Conventional agroforestry extension promotion can be carried out for practices where information is already available, or as research and rapid appraisal produces new information. Practices currently available for such promotion are orchard planting, live fence planting and woodlot/windbreak planting. However these areas too need further research, e.g. the potential for intercropping crops with trees in the period whilst the trees are being established (*taungya*), and trials of trees which could serve both as windbreaks and in woodlots.

In general, Agritex messages need to be made appropriate for the differing resource access levels of differing categories of farmers. For instance, for farmers without cattle, fodder bank production is not required, whilst green manure is.

b. Improving Agroforestry Extension

There was no systematic assessment by the Extension Appraisal Group of the proposed on-farm interventions. The emphasis was instead on measures for improving current extension practices.

Normally Agritex passes on to farmers technical recommendations developed on research stations. However, Agritex itself recognises that technical messages derived in this way are inappropriate for most peasant farmers. Therefore Agritex is trying to develop an improved rapid appraisal capacity by training AEO's to carry out diagnostic work with farmers. There are a number of key areas in farmers' production systems where rapid appraisal methods would be valuable. Three such areas are soil conservation, soil fertility and fodder production.

(i) Supplements and alternatives to current soil conservation recommendations

Mechanical conservation measures have been used for the prevention of erosion in Zimbabwe's communal areas for the last fifty years. The high labour and draught power costs, the tendency for diverted water to initiate gullies, and the continuing sheet erosion between contour bunds all suggest that supplementary, if not replacement, soil conservation methods are long overdue. One possibility is to plant trees or low barrier hedges (serving also green manure or fodder bank purposes) on the top of contours. Fodder grasses could also be planted on the ridges and extended beyond the ridges as barrier strips. However, the most effective way of reducing rates of erosion is through improved soil cover, to which agroforestry can best contribute by providing mulch from cut foliage.

Rapid appraisal work by Agritex staff could be used to discover the farmers' ideas for soil conservation measures. Interventions could be tested by demonstration trials or by encouraging farmers with different types of resource access to act as farmer experimenters. Rapid appraisal work of this nature would provide a valuable supplement to formal research.

(ii) Soil fertility enhancement

In current fertilisation recommendations, organic manure is only considered as a supplement or partial replacement for inorganic fertiliser. This means that the full benefits and irreplaceable functions of organic manure are not being taken into account.

In Shurugwi the naturally infertile sandy loams (*jecha*) present two main problems depending on their location:

- if freely draining, the soils are prone to leaching and erosion;
- if underlain by an impermeable layer the soils may be prone to waterlogging or compacting and crusting.

The role of manure in coping with these problems needs to be better understood. If farmers have sufficient draught power to be able to manure 0.4 ha or more of arable land annually, they will base their crop rotations on a 4-5 year cycle of manuring.

All farmers bulk cattle manure using ant heap, goat manure, maize and groundnut stover, cut grass and leaf litter. However, households with no or few animals, without scotch carts and with insufficient labour for the demanding activities of digging, carting and spreading manure/ antheap, are unable to use sufficient organic manure to maintain soil fertility.

Additional interventions which can be tried using demonstration trials and farmer-experimenters are green manuring, and possibly combined with this a form of conservation tillage. Other options are the use of green manure intercrops or barrier hedges which are nitrogen-fixing and not overly competitive with maize. *Acacia albida* might be used for the former option, pigeon peas for either.

The opportunity costs of such fertility enhancement measures are currently unknown and thus rapid appraisal of this issue is needed.

Example V(3) - Activity 1

Report from the Extension Appraisal Group on Proposed Agroforestry Interventions Cont'd

(iii) Fodder production

Many communal areas, not least Shurugwi, have grazing areas which are totally inadequate for the maintenance of sufficient livestock to serve households' draught power, organic manure and transport needs. Farmers are therefore having to increase forage production. In Shurugwi many richer farmers are beginning to leave some of their arable land fallow in order to provide additional fodder. Already in some VIDCO areas the majority of grazing is provided within and between arable fields and not from the communal grazing areas.

For this reason farmers support the idea of intensifying grass and ground legume production on and above or below contours. The concept of growing and managing trees as fodder banks is however alien to them, and so again rapid appraisal could be valuable.

c. Communal Interventions

The proposed interventions included Communal Woodlots, Fodder Banks, and Nurseries (Table 4.2). Each was appraised under these headings: agency responsible, compatibility with policy, acceptability to farmers, and compatibility with existing extension practices.

Communal Woodlots are being provided by Forestry Commission, Agritex and NGOs. The policy of the Commission has been to train local organisations in *Eucalyptus* woodlot establishment and management, and it has run courses for, among others, the Association of Women's Clubs and the National Farmers Association. The Commission has recognised that this is a way of using its small extension staff effectively.

In terms of compatibility with existing policy, *Eucalyptus* woodlots are already promoted. However, their acceptability to farmers is limited by the inferiority of *Eucalyptus* as fuelwood, poor survival, high costs of protection, high labour requirements for weeding and the negative effects on neighbouring crops. Some of these problems could be met by use of other tree species.

Communal Fodder Banks were proposed for establishment within *vleis* (*makuvi*). Institutions involved would be Agritex, with technical support from the Forestry Commission, Department of Research and Specialist Services and probably the University of Zimbabwe, as well as NGOs and Local Government, including VIDCOs and WADCOs, together with Farmers Groups, Women's Clubs and so on.

The proposed Fodder Banks are incompatible with current land use policy and legislation in that cultivation of *makuvi* is prohibited. However, the technical justification of the prohibition (soil and water conservation) is questionable and requires further investigation.

The acceptability of fodder banks to farmers will depend upon the:

* productivity of the fodder bank compared with that of the grass it replaces;
* nutritional value at critical seasons compared with natural grass;
* costs of production, including labour costs, and the time of peak labour requirements;
* solution of institutional problems, including organisation and management, equity of costs and benefits.

Communal Nurseries are already established at District Level by the Forestry Commission, and the Commission and Agritex both support group (and private) nurseries. There is therefore no problem of compatibility with existing policy or practice. The acceptability to farmers, however, would be enhanced by the use of a wider variety of species as discussed for Communal Woodlots above. There is also a need for more financial support, and for better linkages between the Commission's District level nurseries and the smaller local nurseries.

Example V(4) - Activity 1

Report from the Farmers' Interests Appraisal Group on Proposed Agroforestry Interventions

1. On-farm Interventions

a. General comments

Fodder banks:

Most appropriate for leading farmers and to a lesser extent middle farmers. However, cost of establishment on contours in mainfields would be comparatively high because of fencing requirements.

Thus farmers could not be expected to adopt the practice without more information on productivity.

Green manure banks and intercropping

These are most appropriate for poorer farmers, but they would not be able to afford protective fencing. Thus the intercropping of herbaceous legumes (e.g. cow peas) might be a better alternative for them.

For middle and leading farmers, fodder is probably more important than green manure.

Planted fallow

Only worthwhile for middle farmers with largish land allocations plus labour and capital constraints who could use planted fallow for browse and soil fertility restoration. Leading farmers do not usually have fallow land.

Woodlots

Woodlots are appropriate for all farmers in homefield areas because of the need for initial protection. Leading farmers could also afford to protect a woodlot (doubling as a windbreak) near a mainfield.

Fruit trees

Useful for all farmers on non-arable homestead areas. Economic returns too low to provide an alternative to cropping in fields, except possibly for citrus.

b. Need for extension

The following extension advice would be needed:

* establishment methods (planting material, nursery establishment and maintenance, transplanting);
* species selection, e.g. for woodlots, fodder banks, live fences;
* biological and other pest control;
* specific benefits (i.e. in terms of expected production) of fodder banks, green manure banks, woodlots/windbreaks and so on.

If this information cannot be provided by the extension agency then it is required from research agencies.

c. Social riskiness

Leading farmers are particularly likely to be prepared to try interventions which do not require them to give up arable land. Middle farmers are likely to be similarly inclined, but to a lesser extent. Poorer farmers are less likely to have the means to undertake some of these interventions, although planting trees in their homefield area is already something many of them do.

Altogether this means that the most acceptable niches to all farmers are likely to be in the non-arable parts of their homefield area, along contour ridges, and in non-cultivated parts of their mainfield area.

If farmers are to be persuaded to use any of their actual cropping area for planting trees the potential benefits as compared with cropping would need to be convincingly demonstrated.

These notes are expanded in the attached tables. ▶

Example V(4) - Activity 1

Appraisal of On-farm Agroforestry Interventions
By Farmers' Interest Appraisal Group

Intervention	Resource Requirements	Capital Affordability	Appropriateness
Grazing fodder banks:			
Leading farmers	Land not used for arable cultivation, eg contours between fields, homefield boundaries. Labour: establishment of fencing Fencing Seedlings	Homefields are already fenced therefore no fencing cost. Mainfield (if not fenced) - farmers could fence one contour at a time until the bank established (fence then moves).	Farmers are already cutting and carrying maize stover, but in the drought of 1987 were forced to buy supplementary feeds.
Middle farmers	-- do --	If homefields fenced farmers can plant fodder here with minimal cost. However if homefields not fenced, the capital cost may be prohibitive. If homefields fenced, farmers may be able to fence a small section of contour at a time.	More appropriate for middle farmers with more cattle and who have sufficient capital to afford fencing. Also appropriate for farmers with homefields already fenced.
Poorer farmers	-- do --	Fencing costs will be prohibitive.	Farmers require minimal or no fodder, and cannot afford intervention anyway, so it is not appropriate.
Note: Technical information required on fodder bank yields and amount of land required to feed one animal/month.			
Cut-and-carry fodder banks:			
Leading, Middle and Poorer Farmers	Same as grazing fodder banks except for labour requirement which is higher because of cutting and carrying	Same as in grazing fodder bank	Same as in grazing fodder bank

Example V(4) - Activity 1

Appraisal of On-farm Agroforestry Interventions By Farmers' Interest Appraisal Group Cont'd

Intervention	Resource Requirements	Capital Affordability	Appropriateness
Green manuring:			
Leading farmers	Land: contours, field boundaries	Fencing costs not worth investment as manure production sufficient.	Not generally appropriate as these farmers have cattle manure and fodder production is a higher priority.
Middle farmers	-- do --	Affordable if farmers have fenced homefield areas.	Only appropriate if farmers have few cattle and a fenced homefield, so the need for manure is high and costs relatively low.
Poorer farmers	-- do --	Cannot afford fencing costs.	Appropriate if costs are lowered.
Planted fallow:			
Leading farmers	Land: part of field	Capital costs not high.	Unlikely to be appropriate as leading farmers tend to be short of land relative to their access to labour, capital, cash, dung and draught power.
Middle farmers	-- do --	Probably affordable.	Appropriate if land area too large for available labour, dung, draught or commercial fertiliser.
Poorer farmers	-- do --	Possibly affordable.	-- do --

Example V(4) - Activity 1

Appraisal of On-farm Agroforestry Interventions By Farmers' Interest Appraisal Group Cont'd

Intervention	Resource Requirements	Capital Affordability	Appropriateness
Intercropping:			
Leading farmers	Land: part of field	Affordable	Depends on need for arable land, and effect of inter-cropping on maize output. Intercropping (of trees) may be a less efficient means of fertility maintenance than current methods.
Middle farmers	-- do --	-- do --	Crop legumes probably best.
Poorer farmers	-- do --	-- do --	-- do --
Contour Planting:			
Leading, Middle and Poorer farmers	Land: only contours Labour Demand: Minimal labour required for establishment and management Inputs: Seedlings	Very low input required	Very appropriate since are already an important source of firewood.
Woodlots/windbreaks:			
Leading farmers	Land: Near boundaries of home-field and mainfield; fallow land Labour Demand: Establishment and management Inputs: Fencing during establishment Seedlings	Farmers can afford to protect them. Planting near homefield areas lands already protected.	Very appropriate especially as regards pole supply.

Example V(4) - Activity 1

Appraisal of On-farm Agroforestry Interventions
By Farmers' Interest Appraisal Group Cont'd

Intervention	Resource Requirements	Capital Affordability	Appropriateness
Middle farmers	-- do --	Likely to plant near home-field boundary.	Appropriate if farmers have fenced land available.
Poorer farmers	-- do --	Fencing not affordable - will need to take their chances. Good nursery extension will assist towards woodlot establishment.	Appropriate but will need extension on tree establishment
Note: There is an obvious need for extension advice for planting methods and appropriate species.			
Fruit Trees: Leading farmers	Land: Homestead Boundaries of homefield mainfield Contour bunds Labour: for establishment, watering and protecting against animals and frost Inputs: seedlings, compost manure/fertiliser/humus	Affordable if not arable land.	Appropriate for non-arable areas. Returns for planting in the field do not justify (except possibly citrus).
Middle farmers	-- do --	-- do --	-- do --
Poorer farmers	-- do --	-- do --	-- do --

Example V(4) - Activity 1

Report from the Farmers' Interests Appraisal Group on Proposed Agroforestry Interventions Cont'd

2. Communal Interventions

a. Nurseries

All farmers want nurseries. A major problem in establishing them is the provision of institutional support for supervision and management. Some farmers doubt that indigenous trees can be established and managed, so that research and extension advice is needed.

b. Fodder banks

Most enthusiasm for fodder banks is from leading and middle farmers who own more cattle. Problems would be in use of key resource areas (riverine strips, *makuvi*) and the fear that it is a "new thing".

c. Woodlots

Generally acceptable, the problems of woodlots lie in fencing, technical advice, choice of tree species, and establishment and management methods.

d. Woodland management

General agreement among people that communal woodlands need protection and management, but the potential local political conflicts make it a difficult intervention. Extensive community participation would be required and specific projects would have to be tailored towards local social situations.

e. Research and extension links with farmers

(1) Nurseries: technical advice needed on planting and management of various species.
(2) Fodder banks: species selection, establishment methods and quantities of fodder that can be expected. General advice on *makuvi* use.
(3) Woodlots: advice on choice of species for different uses and establishment of management methods.
(4) Woodland management: extensive social and technical research still required.

f. Policy, planning and implementation issues

(1) Natural resources restrictions on *makuvi* and riverine strips.
(2) The formal institutions, VIDCO and WADCO, are often not the most appropriate for planning and implementation. For widespread acceptance extension and groundwork are required at a level lower than the VIDCO.

Activity 2. Informal Discussions with Local People

During the appraisal stage it is necessary to return to the survey areas to discuss specific issues with farmers individually or in small groups. The aim is to collect opinions on the feasibility of particular aspects of the proposed interventions, and their acceptability to the various socio-economic categories of farmer. It is of course necessary to take account of the particular biases of the individuals involved, and avoid over-generalising their views, but this can be an opportunity to test the suitability of interventions for specific groups, such as the poorest, female-headed households and women in general.

The opinions of officials and government technical staff should also be sought at this stage. They can provide local knowledge, official views, technical knowledge and expertise which the training team may lack.

These kinds of consultation were insufficient during the Shurugwi programme for three reasons. First because of the difficulty of meeting farmers over the Easter period (which coincided with this step). Secondly, some team members were reluctant to discuss proposed interventions with farmers because of the fear of misleading them into expecting funds and implementation. Finally, some members of the team felt it was wrong to take up any more of the farmers' time. No consensus was reached, and only one out of three survey groups held an appraisal meeting with a group of farmers (Example V(5)). It did become clear, however, that farmers wanted to hear from the training team about practical technical possibilities, and were dissatisfied with evasive or over-

generalised answers to specific questions. On balance, the Shurugwi experience suggests full and detailed appraisal consultations with farmers should be carried out provided the real likelihood of funding and technical support and the nature of any other follow-up activities are made clear.

Activity 3. Public Meeting(s)

A vital step in the appraisal process should be to have farmers themselves appraise the proposed agroforestry interventions at a public meeting. Such a meeting might be held in circumstances where funding and follow-up activities are likely. Alternatively, there may be no such expectation. When funding and follow-up are expected, the aim of the meeting would be to describe the interventions in detail, discuss implementation priorities and scheduling, identify responsibilities and responsible persons, discuss modifications, and identify if possible potential conflicts and factional interests. Our impression, gained from the experience of offering funds for a small community project in Shurugwi (Example V(5)), is that personal and factional interests tend to displace community ones as hypothetical proposals change into funded possibilities, and the training team must be even more cautious than previously in detecting and allowing for bias. The question of when the existence of funds should be revealed to farmers is highly contentious: if announced at the outset factional competition is likely to result. If the existence of funds is kept secret until near the end, as in the Shurugwi exercise, people's stated opinions change when the possibility of material benefits is revealed.

In circumstances where funding and follow-up activities are unlikely, this should have been made clear from the outset of the training exercise. Our impression was that farmers may be satisfied with the discussion of their opportunities and constraints, and the swapping of technical information with the training team.

Example V(5) – Activity 2

Discussion of Some Proposed Agroforestry Interventions at a Farmers' Group Meeting at Matamba VIDCO Meeting House

(7 women	Isaac Makoni
(4 men	Roslyn Prinsley
Ward Councillor	Bernard Rosina
	Nick Abel

1. Woodland Management Scheme

Nick suggested and described the woodland management scheme (Example IV(2)). This proposal required the subdivision of a tract of communal woodland into blocks. Each would be protected at different times in a rotational sequence from browsing and cutting to allow regrowth. Stems would however be thinned selectively. The feasibility of the proposal would depend, among other things, upon the prior establishment of a communal fodder bank and woodlot to supply the feed and fuel no longer available from the woodland block then under protection.

After explaining the proposal with a diagram, Nick asked:

"Can I have your comments/would protection be preferable by wire or people?"

The scheme was accepted in principle but serious concern raised by farmers over possibilities for protection.

Nick said that animals would be kraaled at night. He asked if farmers thought some animals could wear bells, and 1 or 2 'wood guards' employed. The farmers were amused at the use of bells for every cow but Nick said that only 1 or 2 animals in each herd require a bell. He suggested that protection was only needed in the dry season because in the wet season, animals would prefer to graze rather than browse.

He suggested the use of a smaller fence and rehabilitation of smaller areas at one time as an alternative to the protection of a larger block of woodland.

The farmers pondered over this and referred to the Ward Councillor.

He thought it a good idea but could not understand how it differed from a rotational grazing scheme.

Nick said that we were concerned with trees rather than grass, that the

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Example V(5) - Activity 2

Discussion of Some Proposed Agroforestry Interventions at a Farmers' Group Meeting at Matamba VIDCO Meeting House Cont'd

rotation here is much longer, but that a rotational grazing scheme and the woodland management scheme could be run together, and using the same fences for both would make it cheaper. The Councillor asked whether it was practical to keep moving the fence and wondered how the trees would be protected after the fence was moved. Nick explained that the fence would only be moved when enough shoots had grown sufficiently tall to prevent animals browsing the leaders.

The farmers protested that human beings are a bigger problem than animals. They will not be detered by wire and will cut down protected trees when they need them. Nick suggested that people are only destructive because they are desperate for wood. Therefore before there can be any woodland protection, alternative sources of wood must be supplied by woodlots.

The Councillor agreed with the farmers *but* described how in some areas the people have accepted protection laws and in these once deforested areas forests are growing. He encouraged his community to follow the example of these other areas.

Nick wondered whether if the whole community agreed together that protection laws are good if it would be more difficult for any one person to break these laws. The meeting agreed that this was so.

Nick reiterated the timing of the scheme:

Year 1	Nursery establishment	
2)	Fodder bank establishment	) woodlot
3)	in *makuvi*	) establishment
4)		
5)	protection	
6)		
etc		

2. Fodder Banks

Nick suggested that fodder banks could be planted in makuvi because that is where moisture is found in the dry season. He said that a mixture of fodder grasses and trees could be planted. He suggested Gliricidia sepium as an evergreen fodder tree which could also be used for firewood. He reiterated that success of the scheme would depend on community needs, acceptance and management.

The farmers were very keen on fodder banks but insisted that the problems of protection applied here too and asked where fencing would come from.

Nick asked whether it would be possible to employ a guard rather than buy wire fencing because for the price of wire you could employ a guard for a long time. The farmers protested that one person could not protect the fodder bank. However, they enthusiastically agreed that if they had wire they would start a fodder bank next month!

Nick suggested that wire is not essential but that perhaps a rota of farmers could be formed to protect the fodder banks during the dry season. He reminded them that protection would probably not be necessary in the wet season. The farmers agreed that this would be possible for a limited number of people to implement but the idea must be heard from a traditional leader or the Ward Councillor to obtain maximum consensus from the community. Without agreement from all the project would not succeed. The Councillor said that he would do what the majority wished. Roslyn asked why all people would not agree to a fodder bank if it provides wood and fodder.

The farmers responded that many people are ignorant and don't like change.
Roslyn suggested starting with a small group and small project to show by example how useful a fodder bank could be. They agreed to this idea. The Councillor encouraged them to set such an example to the more ignorant farmers.

The farmers asked for more information because they felt they did not have enough.

Nick said that fodder banks in *makuvi* would be intended to provide more fodder of a higher quality in the dry season than is currently available.

He explained that, in addition, if some grazing land was planted with woodlots, pressure would be taken off the woodlands and woodland degradation would be reduced. This would be better for future generations. He warned them that if they did none of these things the woodlands would continue to decline.

3. Nurseries

In a previous discussion with the same farmers they had expressed a strong desire to plant trees and nurseries of indigenous species. Isaac asked them now how they would go about planting indigenous trees. The farmers responded that if they were given seeds and provided with technical advice on *how* to raise indigenous tree species then they would plant nurseries in each village almost immediately.

Example V(5) - Activity 2

Discussion of Some Proposed Agroforestry Interventions at a Farmers' Group Meeting at Matamba VIDCO Meeting House Cont'd

Isaac observed that there are 25 species of local trees which have been successfully raised from seed and that this information could be made available to the farmers. He asked them where they would start a nursery. They responded that only a small space was required which was near water and moist soil. They asked where they would get seeds from. Isaac said that although they could buy exotic seeds, they could gather indigenous seeds themselves from grazing areas.

The Councillor asked which indigenous species Isaac would plant. Isaac replied that for firewood, poles and fodder some of the following could be planted - Mudombo, Munanga, Mupumbu, Musuma, Muchakata, Muwonde, Mubondo. He agreed that Forestry Commission could provide technical assistance in obtaining and planting seeds.

Isaac asked them how they would protect a nursery. The farmers replied that they could use muunga (*Acacia*) brushwood if no wire fencing was available. They suggested that nursery establishment should be organised and managed at VIDCO level by keen VIDCO members, or at school level.

4. Orchards

Isaac asked if farmers would be interested in planting orchards. The farmers said this would depend on whether he was suggesting orchards containing muchakata (*Parinari curatellifolia*), which was in plentiful supply or other fruit trees. Isaac replied that he was also referring to mangoes and other exotics.

The farmers responded that they knew how to plant fruit trees but that they required good planting stock. Isaac asked them at what level they would prefer to plant orchards - individual, communal or school? They suggested first at village level and then at VIDCO level but that schools would have other interests.

Isaac asked who would care for the orchard if it was managed at village level. The farmers responded that the village people would care for and provide protection for the orchard. Roslyn asked why the farmers found no problem with protection of an orchard but saw protection of fodder banks and woodlots as a problem. They responded that the difference was in the size.

Roslyn asked them what size orchard they were speaking of. They said that a 1 acre orchard could be fenced with muunga.

Roslyn then asked them if they were given a choice between a 1 acre orchard, a 1 acre fodder bank and a 1 acre woodlot, which would they choose? The farmers responded that all were needed badly but that most people would choose orchards of mangoes even if poles were needed. They felt that if the more ignorant farmers become accustomed to the idea of growing fruit trees then the acceptance of planting and protection of other trees would follow.

Roslyn then explained that money was available for a project involving trees and asked them what it should be used for. They responded that a nursery for gum trees would be very useful. Isaac suggested that they could plant fruit trees and gum trees in the nursery.

The farmers responded that they needed poles more than they needed fruits - lack of poles comprise the most serious problem. They said that communal woodlots are required where they can harvest poles for themselves because poles from Government woodlots are too expensive.

The Ward Councillor suggested a second meeting with all VIDCO Chairmen and other interested farmers for the following day where they could discuss the project further.

Follow-up meeting

It was decided that one nursery in each of the 3 villages where we had been working should be planted. It should be planted with various species - fruit trees, trees for poles or fodder etc depending on the needs of the village.

Follow up to training exercise - Frank Matose of the Forestry Commission of Zimbabwe points to *Parkinsonia aculata* seedling from nursery (as above) on field boundary