ANNEX V

PROVISIONAL METHODOLOGY FOR THE ASSESSMENT OF TREES OUTSIDE FORESTS (TOF) IN UGANDA.

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EXECUTIVE SUMMARY

Trees outside forest reserves are characterized by relatively small sizes, multiplicity of ownership and by diverse character of individual woodlots scattered over the country.

Little data currently exist on forests outside forest reserves. Until very recently, only some preliminary case studies have been made on this aspect. This is partly due to the methodological difficulties involved, as most all trees outside forests consist of a mixture of many different species of which no volume or yield tables are available and on which very little is known about their age. Also, very few private owners would be willing to allow destructive sampling methodologies to be used to obtain data on tree volumes in their woodlots.

Despite their contribution to third world economies, trees outside forests(TOF) have been and continue to be grossly underestimated. This is reflected in the value attached to them in the current National Forestry statistics. It has long been assumed that local demands are sustained by products from forest estates. However, in the recent past, data are becoming available which indicate that the majority of wood used in rural areas is obtained locally outside forest reserves.

Planners, administrators, and politicians seem to lack meaningful and reliable information on key issues of TOF (increment, recruitment, regeneration, standing stock, harvesting, and extraction). In the context of the ongoing efforts in Uganda to improve forest management, it is important to understand the key issues relating to the role, current and potential, of TOF and to identify measures to enhance their contribution.

This paper presents an overview of the importance of TOF, the current availability of information on TOF, available methodologies of data collection, past efforts of data collection and suggests a suitable methodology for data collection on TOF.

Advances in contemporary forest management require data and information on a new dimension, namely the socio-economic factors. By focusing on this aspect, the proposed methodology, we hope will fill the important information gaps that have been neglected by previous methodologies.

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Introduction

1.1 Role of Trees Outside Forests

Trees outside forests (TOF) refer to scattered trees of stocking level less than 20% and small forests or plantations less than 0.5 ha. These are trees that have been selectively left to grow as remnants of the original forests or planted on farmland, range land, built areas and homesteads, along the roads and rivers They occur singly, in groups, lines and in woodlots. Trees outside forests and woodlands constitute one of the largest woody resources in the world. It has long been assumed that products from forest estates sustain local demands. However, recent data indicate that much of wood used in rural areas is obtained locally outside forest reserves and despite the dwindling forests, the number of trees outside forests has been increasing steadily. Since 1989, tree cover on agricultural land in Uganda has increased from 23% to 28% (Kaboggoza et al. 1998). In Kenya, one third of the total biomass is on farmland and rangeland (FAO 2000).

With continuing deforestation, the importance of these trees including biodiversity will also increase. Trees are important for maintenance of the environment, biological diversity, carbon sequestration, economic development and sustenance of human welfare. Although forests are a major source of trees, those found outside forestlands play significant ecological and economic functions. It is now widely recognised that trees outside forests play an important role in sustaining the livelihood of a large majority of human populations in the world.

Trees found outside forestlands may be categorised on the basis of their occurrence in the different farming systems. TOF play different roles in different farming systems. Agrosilvicultural and silvopastoral farming systems have trees as an integral component. The agro-silvicultural farming system involves the integration of trees with food crops, the major focus being food crop production. In the bimodal highland areas of Uganda and the lake Victoria basin this form of farming system is commonly practised due to the presence of two rainy seasons and relatively low competition from cattle grazing. Trees producing timber, fruits, fodder, firewood, medicine or any other forest product(s) are integrated on the farms that are often privately owned.

On the other hand, silvopastoral-farming system involves a combination of woody plants with grasses and other herbaceous fodder plants. The activities include selective protection and management of naturally occurring trees and shrubs of particular value for fodder, poles, fruits, fuelwood and resins. Trees may also be planted with existing grasses, either dispersed as individuals, in clumps, lines or blocks to provide these products. This farming system is more common in the unimodal plateau areas of Northern and Eastern Uganda where cattle keeping are more widespread. In such areas, tree planting tends to be restricted to the protected area of the homestead. There is also the purely pastoral system that is mainly in Mbarara, Moroto and Kotido districts.

In urban areas trees are planted for their aesthetic value, shade and fruits in house compounds, along roads and in town gardens.

The significant role TOF play in sustaining the livelihood of rural populations and maintaining

ecological balance has for long been ignored. Consequently, the contributions of TOF have not been reflected in the national accounting system. There is instead a false impression that rural populations depend mainly on forested areas as a major source of timber and other products. Much concern has therefore been focussed on the disappearing forest cover mostly on gazetted land. Since TOF are increasingly becoming an important factor in the livelihood of many people in rural Africa, there is a need to collect reliable data to facilitate their incorporation into the national accounting system. Such information about TOF can also be used to develop appropriate land use plans and management of tree resources outside forests.

While broad indications of the role of trees outside forests and a listing of species found under the different systems are available, quantitative information remains inadequate. There is inadequate information on the extent to which trees are integrated into the farming system under different agro ecosystems. There is limited knowledge on the role of on farm trees and tree products in different livelihood systems and how this role evolves as farm households respond to the pressures of change on their systems.

1.2 Who requires what information?

Data collection is among the top priorities for efficient forest management in the new millennium as a way of ensuring systematic monitoring and decision-making. In the context of the ongoing efforts to improve forest management, it is important to understand the key issues relating to the potential and current role of TOF and to identify measures to enhance their contribution. This is critical in view of the on going decentralization process in Uganda in which the district and local level administration is expected to for forest management. The district authorities will therefore require information on the diversity of woody species on farm, the quantity and quality of woody biomass outside forest areas (species, volume and stocking levels). Such information is needed for sustainable management of tree resources outside forests and the determination of land use patterns at local, district and landscape levels. This information is required preparation of natural resource management plans for the communities.

Information on TOF is also required by farmers and local communities, resource managers (e.g. foresters, environment, officers), and resource users (sawmillers, charcoal burners and firewood dealers) in order to determine the level of investment needed in the forest products sector. Information on TOF is essential for environmental planning and management. For instance, there is a need to know how TOF is helping to reduce the rate of deforestation and contributing to environmental stability through erosion control, climatic amelioration, and carbon sequestration. District planners would like to know what is the contribution of TOF to poverty reduction and household survival?

District authorities and local resource managers would like to know what motivates people to plant trees or tender naturally regenerating trees on their farm and rangelands. The motivation to plant trees may be attributed to several factors. Firstly, the population may be planting trees due to economic considerations. The ever-decreasing forest cover and corresponding scarcity of forest products have motivated farmers to grow trees. In agrosilvicultural farming system zones of Uganda, TOF have a potential to make a significant contribution to household income, employment and production of wood and wood products. For example, in Masaka and Kabale districts, tree farming is very profitable and provides alternative opportunities to growing food and cash crops.

This is due to the fact that increasing population has created a higher demand for forest products.

There are diverse cultural and socio-economic factors that influence on-farm tree planting and management of naturally growing trees at both farm and landscape levels. For example, there is a need to know the role of age, gender, cultural norms and practices, level of economic development and land tenure systems on tree planting. Resource managers need this information in order to determine the target groups and develop strategies for sustainable management and utilisation of tree resources outside forests.

There is a significant portion of the community who are planting trees due to their increased awareness of the role of trees outside forests in the protecting the environment. For example, district environmental officers require information on the role of TOF on protection of water catchment areas, reduction of soil erosion, stabilisation of slopes, sinking of atmospheric carbon and amelioration of climate.

Various stakeholders (farmers, land owners, industrialists, forest managers and environmentalists at the local, district and national levels and policy makers require different types of technical information about TOF. For example, farmers would like to plant fast growing, multipurpose tree species with high economic value. They would like to know the availability of planting material and how to manage such trees and woodlots. Farmers would like to know about suitable agroforestry tree species for inter-cropping with agricultural crops. Although trees on farms compete with agricultural crops for water, light, nutrients, and space, however, little is known about the appropriate tree-crop combination to be maintained on farms and the effect of growing certain tree species alongside the agricultural crops.

Environmental officers would like to know about suitable trees for environmental protection e.g. reduction of soil erosion, stabilisation of slopes and amelioration of climate. They would also like to know the negative impacts of trees on the environment. For example it is alleged that eucalyptus trees and other exotic species reduce water yield, causes drying up of farmlands, degrades soil, and has allopathic effects on other vegetation.

The industrialists and local district and national level planners need technical information on standing volume and acreage under tree cover in their areas of operation in order to determine if TOF make a significant contribution to wood production at district and national levels. In addition, they need to know the stumpage value of TOF. Marketing of wood and other products from trees outside forests requires knowledge of the different uses that these resources can be put to. This calls for the study of the physical and mechanical properties of those trees with high economic potential. It is very important that farmers know the value of trees on their farms. Without this information, the timber merchants would buy trees from farmers very cheaply. Though the nature, form and amount of information required at each of the aforementioned level may differ, all levels do require information in order to make objective decisions about sustainable land use.

1.3. Present availability of information

Information on TOF is scarce. There are few institutions that collect data on TOF. This may be attributed to the lack of appropriate methodology to collect such information. The National Biomass Study located in the Forestry Department, Ministry of Lands, Water and Environment

(Uganda) has started collecting useful information on TOF. Sample plots have been established throughout the country to collect this information. The Biometrics Unit in the same department also occasionally collects information on TOF. Other institutions that may have information on TOF include, the Ministry of Agriculture, Animal Industry and Fisheries, Research Institutions such as ICRAF and FORI, Universities such as Makerere, the Forestry Department and other Agricultural Research Institutes under the National Agricultural Research Organization (NARO)

1.4 Past efforts to collect information on TOF

Though Information on TOF is very important for a variety of management and research needs, little comprehensive data currently exists on them. This is because there are few methodologies that can gather this sort of information accurately. Much of the available information has been obtained through a combination of methodologies (National Biomass study), PRAs (CARE, ICRAF). Although these methodologies provide some information regarding TOF, given the level of planning at local level, a more comprehensive approach needs to be developed. More efforts are needed especially in estimating the standing volume, MAI, growing stock and socio-economic attributes influencing TOF.

Preliminary case studies have been carried out on this aspect. This is partly due to the methodological difficulties involved, trees outside forests consist of a mixture of different species of which no volume or yield tables are available and of which little is known about their age. Also, very few private owners are willing to allow destructive sampling methodologies to be used to obtain data on tree volumes in their woodlots. Surveys should be carried out periodically and should be designed to meet established standards of reliability and should be reported in standard units and tables.

1.5 Some of the organizations currently holding some data/information about TOF

1.5.1 The AFRENA/ACRAF Project.

These have identified nine land-use/farming systems in Uganda using both biophysical and Socio-economic factors. In each of the land-use systems, the existing types of trees and the potential ones are documented. These farming systems are:

I	The intensive banana-coffee Lake shore system
Ii	The Western banana-coffee-cattle system
Iii	The forest Savannah mosaic-coffee system
Iv	The medium altitude intensive banana-coffee system
V	The Sebei annual food crops montane system
Vi	The Kigezi annual food crops montane system
Vii	The Rwenzori foothills cassava system
Viii	The Northern and Eastern cereals-cotton-cattle system
Ix	The West-Nile cereals-Cassava-tobacco system.

Source: Agroforestry potentials for the land use systems in the bimodal highlands of East Africa (Uganda) No. 4, 1988

1.5.2 The Development Through Conservation (DTC) Project/ Care International

Since 1988, 'The Development Through Conservation' (DTC) project of CARE International based in Ikumba Kabale (around Bwindi Impenetrable National Park) has identified which trees exist, where and what uses they are put to. Below is an example of medicinal plants in the area.

LOCAL NAME	BOTANICAL NAME	LIFE FORM	ABUNDANCE IN FOREST	ABUNDANCE IN VILLAGE
Omwiha	Ocotea usambarensis	tree	F	-
Rukukota	Riper guineensis	climber	F	-
Nyakibazi	Rytiginia kigezensis	tree	O	-
Omuhanga	Maesa lanceolata	tree	O	A
Omuyovu	Entandrophgragma SP	tree	F	R
Omujeesi	Hagenia absyssinica	tree	F	R
Omukarara	indet.	Climber	O	-
Omuguruka	Measopsis eminii	tree	O	-
Omuna	Seriostachys	climber	A	R
Omushasha	Macaranga SP	tree	F	O
Kitikye'ihamba	Indet.	Shrub	F	-
Isubyo	Indet.	Climber	F	-
Kitinwa	Indet.	Creeper	-	A
Omumara	Indet.	Climber	-	R
Ekizimyamurir o	Crassocephalum SP	climber	R	A

A= Abundant F= Frequent O= Occasional R= Rare

Source: People and plants working paper 5 Dec 1996.

1.5.3. The National Biomass Study

In 1996, the National Biomass Study of the Forestry Department conducted several surveys using remote sensing, aerial photography and ground surveys. Below is an example of the tree/vegetation cover classification in Uganda

Land cover (Use) Class	Area (KM^2)	Protected Area (KM^2)
Deciduous Plantations (eucalyptus)	190	60
Conifer Plantations (pines, cypress	160	130
Tropical High Forest (fully stocked	6,500	130
Tropical High Forest (degraded	2,750	900
Woodland	39,750	8,600
Bush	14,310	3,000
Grassland (incl. improved pasture)	51,070	11,700
Wetlands (papyrus, reeds, floats	4,830	300
Small-scale farmland	83,990	1,900
Large-scale, Uniform farmland	860	10
Built-up areas	360	20
Open water.	36,910	150
Impediments (bare rock, etc)	40	10
TOTAL	**241,540**	**30,980**

Source; National Biomass study, 1996

The National Biomass study unit has established a firm framework for continuos dynamic monitoring of land cover/land use and woody Biomass in the country. Up to 6,000 field plots have been established in a regular grid covering the whole country in 1995-98. Re-measurement of the plots started to in 1999. The results from these measurements are still awaited.

1.5.4. ICRAF

ICRAF has developed a database on a CD-ROM containing more than 1,000 tree species. This database contains firsthand specific information about agroforestry trees. This shows tree characteristics, uses and services, pests and diseases.

There are some discrepancies in the available information and some data are quite old. There are still information gaps in the available statistics on TOF especially on the resource base, supply and demand of products from TOF, socio-economic factors and the costs and benefits involved. TOF are usually subject to rapid changes such that some of the current methodologies do not respond to these rapid changes. Advances in contemporary forest management require data and information on a new dimension, namely the socio-economic factors. This is completely missing and what is available and could be utilized is not properly arranged.

Data on increment, recruitment, regeneration, standing stock (for both wood and non-wood

products), harvesting and extraction are all non-existent. With the exception of a few recent studies and surveys by the National Biomass study, CARE, ICRAF and few other organizations, data on volume of supply, demand consumption and products from TOF are missing. Due to the presence of several stakeholders, data and information collection, operating independently of each other and using different techniques, there is a problem of standards hence rending compatibility, collation and comparisons very difficult. There are also variances in the methods of data collection, compilation, storage and retrieval.

2. *Review of available methodologies*

Several methods are currently used to obtain reliable data on woodlots and woodlands outside forest reserves.

2.1. Visual Estimates.

Field officers often use the visual estimate method. Data on these forests can be collected as an extra (routine) activity or on request. Estimates are based on personal judgement but are sometimes strengthened by the opinions of the farmers or local leaders who normally rely on the number of trees, number of seedlings planted etc. Personality can influence this rather subjective recording: a friendly local forest officer is liable to over-estimate, while many will tend to indicate values using subjective judgements/standards.

2.2 The Interview Method

Forest personnel who assess forest resources subjectively and objectively use the interview method. The latter means organizing actual measurements of the forest areas with special tools using various statistical procedures.

Areas are calculated for an assortment of geometric forms using triangles and rectangles, tapes, compasses and calculators. This method is reliable because the measurements are objective.

No one knows the farm better than the farmer. Therefore, the farmer's statements carry much weight. However, knowledge of the local units of measurement is essential to convert these into acceptable scientific units.

2.3. Rapid Appraisals

Rapid appraisals have been used in ICRAF including inventory of MPTs. PRAs can also be used to compare cultural influences on MPT use. In order to carry out rapid appraisal a combination of several sampling methods have been used ICRAF. For instance purposive sampling is used in initial stages to identify specific areas where the survey will be carried out. Within this frame, cluster sampling is then used (e.g. villages, communities, soil catena) to narrow down the sample size. Random sampling is then used within the cluster to identify specific individual farmers. In some cases sample classification e.g. based on farm size, resource ownership, gender has been done to ensure that different types of farmers are represented in the sample.

In rapid appraisal, data analysis is mainly descriptive, thus sample size and other statistical considerations are not rigorous. The main objective of these studies is to capture as much of the variations as possible to allow one to describe all the identified trees.

Sources of information include; interviews with a small number of individual farmers from each cluster, group discussion with local leaders and farmers, discussions with key informants such as government and NGO officials and local leaders. Field observations are important for the characterization and acquisition of data on features such as morphology and phenology, spatial arrangements, tree densities and landscape niches. Secondary data is crucial in the characterization of both physical and macro environmental features.

In the case of group discussions a combination of sampling procedures can be used. For instance, purposive sampling is used to ensure that different types of farmers are included in the group discussions. Random sampling is used where farmers join the group, limits the type of information obtained. Medium sized groups of about 10–15 people seem to work fairly well. Special effort should be made to ensure that the sample includes women farmers in order to ensure a more representative sample.

In terms of survey tools, checklists, unstructured questionnaires and other similar formats can be used. An experienced multidisciplinary team or knowledgeable persons should carry out fieldwork. Attention must be paid to avoid irrelevant questions, so we recommend small interviewing teams of about 4 – 6 persons. Interview procedures should be flexible to ensure that all relevant information is captured.

2.4. Field surveys

These are applicable in TOF inventory in general and specific species surveys. Sampling procedures used are similar to PRAs but are more rigorous to ensure that the persons interviewed are representative of the main population. In the field, the sample size in relation to the study area is larger. In other words statistical summary on frequencies average, correlation, and so on are carried out on the primary data collected in the field unlike in rapid appraisal, where statistical analysis is based mainly on secondary sources.

The main sources of information are individual farmers interviews supplemented with group interviews and key informants. Ensuring that the sample size is adequate is always difficult when the population variation cannot be predicted. In most cases however, small samples (about 30) are adequate. If there is a large number, or significant differences are expected among different farmer groups, then population classification is done and larger samples required.

Data analysis is mainly quantitative. The type of analysis done compares the different uses of various trees by different households and how the trees vary with landscape niches or functions. Tree ecological adaptation and distribution, can be assessed by comparing tree with specific ecology as opposed to having a wide ecological spectrum. It is also possible to analyze co-relations between household e.g. farm size and tree management practices. In such surveys, enumeration can be used, but in most cases a structured questionnaire is recommended. If experienced researchers are involved in the fieldwork, unstructured questionnaires could be adequate.

2.5. Sample plots

These plots are usually randomly selected and measurements are periodically taken. The choice of the size and shape of the sub-plot. which also determines the method of marking it, is important because of the problem of inclusion or omission of border trees.

This method has many drawbacks that create several sources of errors, such as procedures for selecting the sub-plot location, border bias, and shape of the sub-plot.

2.6. Aerial photography

Aerial data collection has always been a problem in developing countries because of shifting cultivation and lack of adequate knowledge and tools. Lack of tittles to the land for most farmers, which would encourage them to know their areas better and more accurately contributes greatly to this problem.

2.7. Remote sensing

Remote sensing has been defined in various ways by different authors. In almost all definitions an important aspect is the detection or measurement of physical properties of an object without having physical contact with it. This covers a wide range of possibilities, including use of sound waves, light waves.

Remote sensing results are an important data source and are also used for monitoring and updating procedures. In forestry and agriculture, remote sensing refers to the collection of data about the earth's surface by a distant detector, which makes use of energy of electromagnetic waves. The detected properties of the earth's surface give information in pictorial or digital form. There are two basic methods analyzing remotely sensed data, namely through visual or digital interpretation. Digital interpretation is done with the assistance of a computer, while visual interpretation requires only human resources and the same equipment used for conventional interpretation and mapping from aerial photographs. The choice of the method is influenced by a number of factors, including resources, types of data available, required level of detail and available labour force.

Intensive fieldwork and efficient sampling procedures are essential to ensure the validity and accuracy of remotely sensed data.

Remote sensing has been applied in several resource surveys in Africa; e.g.

I Savannah vegetation and coverage in Kenya.
II Desertification in Sudan.
III Fuelwood resources and land degradation in Sudan.
IV Forestry landuse and soil erosion in Ethiopia.
V Agricultural estimates in sub-Saharan developing countries.
VI Biomass study in Uganda.

2.8. GIS – Geo-information system

GIS is a set of tools for collecting, storing, retrieving, transforming and displaying spatial data from the real world for a particular set of purposes (Burrough, 1986). GIS technology offers a very powerful tool for effectively handling very large data sets that are relevant to environment and natural resources and for easily transforming these data into useful information for decision-makers.

Most GIS systems have several characteristics in common; data entry and editing, data

manipulation, data display and modeling. GIS systems provide planners with a readily accessible source of objective earth science related facts and an inexpensive, rapid and flexible tool for combining these facts with various products to create decision alternatives (van Driel 1975; Star and Estes, 1989).

2.9. Suggested methodologies for data collection on trees outside forests

Trees outside forests are continually changing due to human activities (such as harvesting and planting) and natural occurrences (such as wild bush fires and other natural disasters). It is therefore important to regularly update the available data and information to take account of these changes.

To allow for accurate and efficient data collection on these trees, periodic assessments have to be carried out. These assessments should not cover only the tree vegetation but also a wide range of biophysical and Socio-economic features. For this purpose, techniques that offer new and innovative approaches for improving the efficiency and accuracy of these assessments are in demand. People-centered techniques such as rural appraisals that use both biophysical and socio-economic approaches to provide a hybrid of data and information to facilitate planning and management of these trees are suitable.

The integration of both biophysical and socio-economic approaches could be facilitated by proper site specific data collection, where both biophysical and socio-economic data are collected for the same plot/location using similar scales and are directly cross-checked.

Although remote sensing and GIS systems may fulfill this need, their affordability and applicability at the local level may not be guaranteed.

Assessment of TOF should be done using both participatory rural appraisal (PRA) methods and conventional methods for tree measurements. PRA tools can be used to obtain socio-economic information affecting TOF while conventional methods for tree measurements can be used to capture standing volume and acreage under tree cover in a particular district.

3.0. Sample Selection – Multistage Sampling Design

Sampling will be based on sub-county, parish and village administrative boundaries in each district. The sampling will be based on administrative boundaries for the sake of simplicity.
Stage 1: Sample 1/3 of the sub counties. Assuming a district has 10 sub counties this will be 1/3 x 10 = 3 sub counties.
Stage 2: sample 1/3 of the parishes. Assuming there are 18 parishes in the 3 sub-counties chosen i.e. 6 per parish then 1/3 x 18 = 6 parishes will be sampled.
Stage 3: Sample 1/3 of the villages. Supposing there are 36 villages in the chosen parishes i.e. 6 per parish, then 1/3 x 36 = 12 villages will be our samples.

Secondary data on the parishes and villages selected for the study will be reviewed. Such data is normally contained in annual reports, government statistics, and maps. Where available, satellite images will yield very useful data on TOFs and may also be used. The purpose of this exercise is to provide an initial overview of the study area and to yield information on the natural resource base, local farming systems, resource use patterns and social and customary behavior of the communities. This information will be used to plan the PRA exercises. Check lists to be used in

the field will be made and continually updated throughout the field exercise.

In addition, The National Biomass Study defined 13 land cover/land use classes for stratification of the project areas up to the Parish level. The National Biomass maps will be used to determine the area of the parish or sub-county understudy. Having sampled at the village level and determined the number of trees in a village and consequently in the parish, the number of trees or volume of trees per hectare can therefore be calculated for a given parish or sub-county.

4.0 The PRA Field Exercises

PRA exercises provide the opportunity for local communities to collect and analyze both qualitative and quantitative data together with the research team of three people from the district forest office, district environment office and from district agricultural office. Some of the useful tools in PRA are:
Group discussions
Semi-structured interviews with focus groups
Stock surveys of selected farms in the village.

PRAs in a district have always been conducted in the districts by the Environment and Forest Officers. These are part of the Environment and Production committee in districts at both LC III and LC V level. The District Production Co-ordinator should be the contact for researchers as he can direct all other officers in the district production line.

4.1 Group discussions

During group discussions, the following PRA tools may be employed:

i. Village Sketch Map and farm sketches to collect spatial data.
ii. Transect lines i.e. lines through a community are established to capture diversity in ecosystems and land use.
iii. Time trends and lines used to collect historical data.
iv. Seasonal Calendars will be used to establish regular cycles or patterns of activities and occurrences over 12 months.
v. Vein diagrams

4.2 Description of the tools

4.2.1 Village Sketch Map.

A group of community representatives together with the PRA team will draw a sketch map of the village. The map will give information on soils, topography, vegetation, water availability and infrastructure. It should also identify areas with specific problems or potentials for the growing of TOF. This information will help us find out the relationship between the natural resource base and TOF. Different groups within the community may highlight different issues by drawing different maps. The village sketch map could highlight:

- Location of wood lots in the village
- Location of households with trees in the village
- Pattern of planting trees in the village – roadside planting, boundary tree planting, compound trees etc

- Location of households without trees.

4.2.2. Transect Line

This is a cross section or line of greatest diversity through a village. Its aim is to capture the greatest diversity of ecosystems land use patterns within the village. The transect line should cover all major ecological and production zones and should assure maximum representation of topographical, resource and socio-economic variation of the community. If the community is large and highly variable, more than one transect may be needed (National Environment Secretariat Kenya et al 1990). The transect may be selected from the sketch map or through discussion with local leaders.

The transect adds detail to the information collected during the drawing of the village sketch map. During the transect walk, the PRA team interviews people encountered along the transect line and makes direct observation. Relevant measurements of trees may be done during this exercise. Soil samples for laboratory analysis may also be collected if found relevant. At the end of the exercise, the field notes are compiled and a transect chart is constructed.

4.2.3. Time Lines, Trends and Seasonal Calendars for Time Related Data

Time related information is needed for documentation of relevant history of farming and tree planting in the area dating back to as far back as the people can remember. Examples are:
When did tree planting begin in the area and why?
What species were introduced, why and when?
What tree species have disappeared, why and when?
Use of tree species in the past
Whether trees have increased or decreased over time
Whether population has increased or decreased over time
How soil and climatic conditions have varied over time.

The time line is a list of key events in the history of the community. Constructing time line aims at finding out significant events in the history of the community that could have had an impact on people's attitudes to tree planting and management. It helps to identify past trends, events, problems and achievements relating to TOF. Time line will also help us to know what solutions were used in the past to solve relevant problems.

Time trends on the other hand help us understand people's perception of significant changes in the community over time. The time trend will help us highlight changes in, for example, rainfall availability, productivity, soil loss, soil fertility, tree planting, and population, grazing land availability, deforestation, food production and other aspects of resource availability and use over time. This will help us identify the problems and opportunities to consider in the adoption and management of trees.

4.2.4. Seasonal Calendar

These attempts to establish regular cycles or patterns of activities and occurrences within a community over 12 to 18 months. It presents diverse information in a common time frame. The seasonal calendar will help us determine whether there are periods of excessive environmental

problems or opportunities over the course of the normal year. It can help us determine labor availability, variations in cash flow and times of disease.

4.2.5. Vein Diagrams (Institutional analysis)

The purpose of collecting data on institutions is to find out which institutions have activities influencing tree planting or natural resource management (appendix iv).

4.2.6. Semi-structured Interviews with Focus Groups

During the group discussions with focus groups in the village the information required by the various stakeholders (farmers/land owners, industries, forest managers at the local, district and national levels and policy makers) would be solicited by the PRA team.

Note that not all the sampling tools may be used. Application should only be where appropriate.

Checklists for Semi structured Interviews:
The following is a sample of the checklist that can be used during the semi-structured interviews with the focus groups:

4.2.7. Economic Issues

What is the contribution of TOF to the households?
What employment opportunities do TOF provide to the society?
What is the cost of growing/maintaining TOF?
What's their contribution towards wood and wood products?
What are the alternatives to the benefits of TOF and what is their relative profitability?
Can TOF make a significant contribution to wood production at the district and national levels?
How marketable are the wood and other products from trees outside forests.

4.2.8. Social issues

Who grows the trees and who owns the trees?
What are the access rules to TOF resources
What social factors are relevant to TOF and to what extent? Is it wealth, gender, land holding, tenure, education and age of farmers in that particular district?
What TOF are used for (e.g. firewood, charcoal, timber, poles, shade and windbreak)

4.2.9. Environmental issues

What role do TOF play in protecting the environment?
What trees do you grow to control soil erosion?
What trees do you grow to improve soil fertility?
What trees are destroying the environment?

4.2.10. Technical Issues

How often do forest extension agents visit the village?
What kind of technical information do forest extension agents give to the farmers (choice of species, availability of planting materials, managing trees and woodlots, management of pests and disease)?
What tree species are commonly planted and why?
When are they planted and where?

4.2.11. Stock surveys of selected farms in the village

Using the village map drawn by the community, the households in the village would be categorized as follows:
Number of households with more than 50 trees on their land holding
Number of households with more than 20 but less than 50 trees on their landholding
Number of households with less than 20 trees on their land holding
Ten percent of the households in each category would then be randomly selected and a detailed farm sketch carried out. The farm sketch will be used to show:
Location of trees on the farms
Different tree species and their location on the farm
Cropping patterns and their relevance to TOF

Household farm interview

A semi-structured questionnaire would then be conducted in order to obtain Socio- economic information about the farmer.

In addition, measurement of all trees on these farms would be carried out and the data used for assessment of:

- Number of Trees on the farm
- Tree Standing Volume
- Acreage under Tree Cover
- Dominant Tree Species on the farm

From these measurements the tree stocking level per village will be calculated. The data for the various villages will then used to estimate the stocking for the parish, sub-county and district.

Note that the questions can be modified depending on what will be requested for. The questionnaire can be more detailed so as to capture as much information as possible.

5.0 How to use the information?

The primary users are the farmers, revenue collectors, sub-county and district officials. At the district they will use the information to prepare investment and management plans.

Stakeholders (farmers/land owners, industries, forest managers at the local, district and national

levels and policy makers) may use the social and biophysical data collected for:
Writing Village Resource Management Plans (VRMP) with a focus on TOF.
Writing a Monitoring and Evaluation plan with a focus on TOF. Repeat data collection and analysis every five years to monitor any changes in the resource base.

6.0 Technical viability of the methodology proposed

The proposed methodology is simple and not expensive if local researchers are trained to collect data. According to the proposed pilot study (see Table 2), the total cost will be Ush 8,437,000 if done by 2 Kampala based people with one driver and 4 district staff for 50 field days/nights. Most of this money is for fuel and per diem for the Kampala staff. If it is done by the district staff the cost will be about 7,670,000 – per diem and fuel 8,437,000 – (60,000 + 1,250,000 + 120,000 + 4,800,000 + 767,000) = 1,440,000 of which 1,000,000 is for fuel costs. This figure for fuel can be reduced to a half if the PRA staff use motor bicycles or bicycles. The time required will be less for the district authorities because activities like introduction to district authorities will be eliminated with time.

Note that the local people can be trained to do the job. This will keep the costs as low as possible.

7.0 Resources needed:

Stationary: flipcharts, *reams* of paper, markers, pens and pencils, local materials such as seeds, diameter tapes and water bottles.

Four people who should be trained in participatory rural appraisal methodology. These could be the agricultural officer, the forest officer or the environment officer and one other person.

8.0 Follow up action

Proposal for Pilot testing of proposed methodology for assessment of trees outside forests (less than 0.5 ha)

9.0 Sampling

Sampling of the district is based on administrative boundaries. The sampling size is 1/3 of each unit at each level and the sampling process is as follows assuming that a district has 10 sub counties:
Stage 1: Sampling from the district: 1/3 x 10 = 3 sub-counties
Stage 2: Sampling from the sub counties assuming each sub county is made up of 6 parishes: 1/3 x 3 x 6 = 6 parishes.
Stage 3: Sampling from the parishes assuming each parish is made up of 6 villages: 1/3 x 6 x 6 = 12 villages per district will be investigated.

10. Assumptions:

Two people who will be travelling from Kampala will conduct the pilot study. They will work up with 4 people from the district (The District Production Co-ordinator, District Forest Officer, District Environment Officer and the District Agricultural Officer). This is only for the pilot study. If the methodology is to be used by the district staff, the 4 people from the district are sufficient. Resource persons: 2 Officers, 1 Driver, and 4 people from the district.

The proposed pilot district is Masaka. This is because Masaka is a district that has less trees per capita and the people have began tree planting assisted by some organizations.

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ANNEX VI.

A REVIEW OF THE METHODOLOGIES FOR ASSESSING NON-WOOD FOREST PRODUCTS (NWFP) AND THEIR APPLICATION IN UGANDA

(By D. L. N. Hafashimana, W.S. Gombya-Ssembajjwe and G. Abigaba[7])

ABSTRACT

Non-wood forest products (NWFP) play a significant role in the socio-economic well being of people, especially rural communities, thereby directly or indirectly contributing to the national economy of Uganda. Their uses vary from food, fodder, medicine, construction, craft materials and cultural products. The high variation is also exhibited in their usage and extraction methods; species and parts used for different purposes sometimes varying from area to area and socio-cultural settings. This level of diversity necessitates a similarly diverse expertise for effective coverage. This expertise is insufficient in most developing countries.

Owing to the fact that most consumption and use of NWFP occurs in-situ or at household level with very little entering the monetary economy, their statistics often escape the national planning process with their contribution at best underestimated. This further leads to less interest in them with very little if any effort or resources being allocated towards understanding them better.

This report discusses the major NWFP used in Uganda based on the existing information on their availability, uses and methods that have been used in collecting such data. Coverage is also given to data available from other countries on the same subject that may be of relevance to the Ugandan situation. In elucidating the existing data and methods of data collection, deficiencies in the data are also identified.

A pilot study covering the missing data is proposed to collect such data and to recommend methods. This would lead to a more comprehensive study covering the whole country and all NWFP, using the standard methodology developed and tested during the pilot phase, to generate data needed for national planning.

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