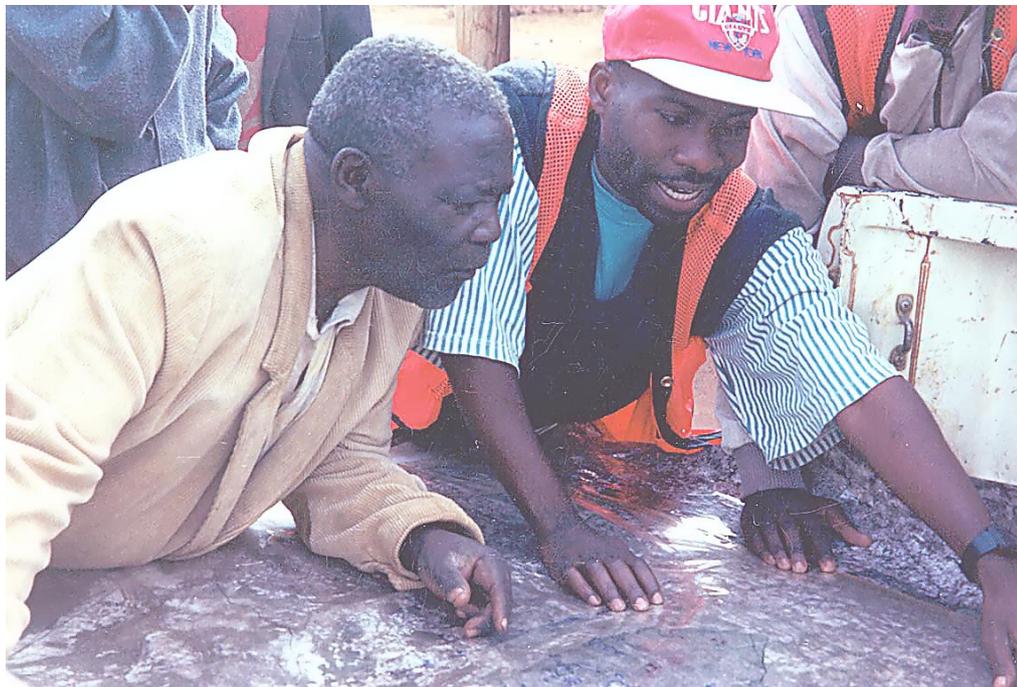


**GUIDE TO LOW-COST PRACTICAL
FOREST RESOURCES INVENTORY
IN THE CONTEXT OF
PARTICIPATORY MANAGEMENT OF
DRY TROPICAL FORESTS OF AFRICA**

A compilation by Cecilia Polansky
Specializing in applied forest inventory
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PREFACE

This manual is geared to help foresters and project managers working in forests where local communities are being allowed to jointly and legally assist in managing the resources. The inventory methods described are meant to fit into a broader workplan for the management project, a workplan that results in the writing of, and agreement on, a management plan for the forest. Emphasis is on combining a technical process (numbers-based inventory with computer analysis of results) with a social one (dependence on local informants for user group information and collaboration).

The methods described have evolved from inventories conducted in Benin (PGRN, under the leadership of Mahouna Tchiwanou), Niger (USAID/FLUP/PUSF), and Zambia (USAID Zambia PO no. 611-0231-0-00-0033-00), with further input from Guinea Republic (PEGRN under Winrock International) and Senegal (Wula Nafaa under International Resources Group).

Certain aspects of the first, baseline inventory are common to any place. For one thing, there is the necessity for Forest Departments and community members surrounding the forests to combine their respective expertise to achieve some assurance of future forest product availability. For another, certain measurement methods are accepted everywhere in the world and Africa is not to be excluded from this membership, although certain adaptations may be necessary.

The manual assumes that the goals of the manager are to arrive at some general description of the current types and quantities of trees and other important populations in the forest, to incorporate village-generated information into inventory results, and to develop a technically-defensible guide for calculating the number of harvestable stems per year within a sustainable workplan.

For assistance with developing the recommendations made in this manual, Cooperative League of the United States of America field facilitators are recognized for the time they took from full agricultural work schedules to coordinate with village resource informants in villages around Chiulukire Local Forest, Nyamphande Community Natural Resource Management Area, and the Forêt Classée de Toui-Kilibo. These include Sam Simute, Charles Muchotsa, and Jeston Kalangwe. CLUSA – Natural Resource Management Programme Coordinator John Heermans, who was the first to use formalized organization of villagers under CLUSA at Guesselbodi, Niger, in the early 1980s, distilled the participatory assessment tools of Annex 1 and oversaw activities. Thanks go to the Forestry Department of Zambia's Eastern Province under the leadership of Bwalya Chendauka, and their field agents under Eleman Mwanza – especially Felix Kapamba, Enock Mawiya, Lotti Katebe, and Geoffrey Mkandawire -- who have provided ready participation, technical competence, and exemplary interaction with village informants. Zambian, Guinéen, Beninese, Nigérien, and other Forestry Departments are to be recognized for providing venues to conduct participatory assessments and inventories in gazetted and open forests. We are equally thankful to the resource informants themselves for confirming to us their abundant knowledge and understanding of forest resources and their ecology.

Cecilia Polansky

February 2006

GUIDE TO LOW-COST, PRACTICAL FOREST RESOURCES INVENTORY in DRY TROPICAL AFRICA

Introduction	1
<i>The objectives that justify doing inventories</i>	2
<hr/>	
1. OVERVIEW AND PREPARATIONS.....	5
1.1. MAKING DATA COLLECTION AND PRESENTATION PARTICIPATORY	5
<i>The Participatory Resource Assessment first</i>	5
<i>Timing counts.....</i>	8
<i>Train field crew all together</i>	10
<i>Design field sheet for mandatory participation.....</i>	10
1.2. RELATIONSHIP BETWEEN THE GOVERNMENT FOREST DEPARTMENT, PROJECT, AND VILLAGES	11
<i>Use the PRA process and the inventory to dispel misunderstandings about the management program.....</i>	11
<i>When illegal activities are discovered.....</i>	11
<i>Include foresters from the beginning.....</i>	12
1.3. TO PAY OR NOT TO PAY	12
2. TECHNICAL ASPECTS	14
2.1. CONCEPTUALIZATION BEFORE FIELDWORK	14
<i>Recall the objectives of a forest inventory.....</i>	15
<i>Stratification is a given.....</i>	17
<i>Ordering maps and photography or imagery; desktop GIS.....</i>	18
<i>Sampling scheme based on terrain and time</i>	22
<i>Calculation of number of plots to sample.....</i>	25
<i>Permanent plots.....</i>	26
<i>Getting field crews together.....</i>	26
<i>What will be done with the data</i>	27
2.2. PREPARATION FOR FIELDWORK	29
<i>Write the inventory field plan</i>	29
<i>Conduct training in consistent map and equipment use.....</i>	29
<i>Pretesting a form to fill out.....</i>	31
<i>Logistics.....</i>	32
2.3. FIELD EXECUTION	33
<i>Quality control.....</i>	33
<i>Data verification and organization</i>	34
2.4. DATA ENTRY	34

2.5. PRESENTATION OF RESULTS	36
<i>Tables and graphs; statistics</i>	36
<i>Maps</i>	39
2.6. USING PRA AND INVENTORY RESULTS TO CALCULATE ANNUAL ALLOWABLE HARVEST	44
<i>Methods using no projections</i>	44
<i>Methods using projections of future trees</i>	48
3. ECONOMIC ISSUES	50
3.1. COSTS AND BENEFITS OF DOING INVENTORY	50
<i>A first inventory</i>	50
<i>Subsequent inventories</i>	52
3.2. USING INVENTORY TABLES FOR ECONOMIC ANALYSES	52
<i>Projecting revenues and Revenue sharing</i>	

REFERENCES CITED	56
APPENDIX 1. SAMPLE PARTICIPATORY FIELD INVENTORY SHEET	57
APPENDIX 2. ADDRESSES FOR SPOT IMAGERY, FAO FORESTRY, CENTRE TECHNIQUE FORESTIER TROPICAL, FAO, AND OTHER INTERNATIONAL FORESTRY ORGANIZATIONS	58
APPENDIX 3. GPS AND COMPASS USED COMPLEMENTARILY	59
APPENDIX 4. PROPER USE OF THE COMPASS WHEN WORKING OFF OLD TOPOGRAPHIC MAPS	61
APPENDIX 5. FORMULAS FOR ALLOCATION OF SAMPLE PLOTS	62
APPENDIX 6. TYPICAL COSTS OF EXECUTING THE FIRST INVENTORY, INCLUDING PRELIMINARY ASSESSMENT	64

ANNEX 1. PARTICIPATORY TOOLS USED IN A NATURAL RESOURCE MANAGEMENT PROJECT, WITH INSTRUCTIONS ON WRITE-UP AND PRESENTATION

ANNEX 2. PROPOSED TIMELINE FOR A JFM PROJECT INVENTORY, BASED ON THIS MANUAL

GUIDE TO LOW-COST PRACTICAL FOREST RESOURCES INVENTORY IN THE CONTEXT OF PARTICIPATORY MANAGEMENT OF DRY TROPICAL FORESTS OF AFRICA

Introduction

A forest inventory is a challenging undertaking. Because there is a statistical component, it has a mystery to it that threatens gut feelings; because it involves so much fieldwork, it guarantees a certain amount of physical discomfort and rigorous training. Then there are the hours of data entry and analysis that require careful organization. To face this challenge can lead to actually enjoying the exercise, because a well-planned analysis can lead to useful information and inspire creativity. This manual is meant to help dry tropical natural resource managers meet the challenge by proposing a simple and participatory process, and to present possible ways to fit inventory and its various components into their NRM workplans.

TWO MAJOR ASSUMPTIONS APPLY TO ADVICE IN THIS MANUAL:

(1) The participating government forest department is not being phased out of management activity and is supposed to be a part of the “participatory” approach.

There are some projects whose total focus is to reduce or eliminate forestry department involvement, thus eliminating most technical aspects. This discussion will be too heavy for such projects.

(2) The project coordinator, village structure, or forest department has decided that an inventory is indeed a needed and useful undertaking. The decision to carry out a plot-based inventory should be nyet in areas with no prospect for eventual improved commercial value. Areas with minimal value may benefit more from simple management plans based on “better land use practices” and “general guidelines” than inventory-prescribed harvest plans.

The manual has two parts: a presentation of various conceptual, technical, and economic issues related to comanaged forest inventory in dry tropical forests of Africa (as opposed to rainforests); and a set of proposed guidelines for conducting inventories in such forests at the outset of participatory management projects. Points presented are based on visits to and experiences in some of these forests in western and south-eastern Africa. Inventory is put into the context of the whole process of developing a management plan for a forest. This includes thinking about the process in advance so that all the players can be prepared for their roles from conceptualization to data presentation and use, and for all the steps in-between.

The technical section describes adaptations of classic inventory procedures so that they make more sense in the African context. Adaptations include building project field-based programs around available personnel, time, and knowledge. They strive to reconcile the numbers-based study of forest resources with the development of trust between a sometimes-paramilitary government Forest Department and subsistence forest users.

From the economic point of view, costs in time, remotely-sensed data, equipment, and personnel will be considered. Forests slated for joint management are often without management plans and have been so since their establishment decades ago; as a result, there may be a high initial input to get updates on the current condition of such forests and their infrastructure – the “baseline studies”. (This is in contrast to the USA, where formerly private, logged forests, when acquired by government for the public domain, often require high initial inputs not to update information but to upgrade the land to economically viable status.) But updating forest information should not have to entail spending hundreds of thousands of dollars on missions by outside specialists, money that could be better spent on longer-lasting large-scale remote sensing, localized specific trainings, equipment, and infrastructure upgrades. By now, after 30 years of education in Western and Eastern countries, many African foresters are either very skilled at some of the technical aspects of forest inventory (particularly at mapping), or at least capable of adapting western methods to their own respective countries.

The objectives that justify doing inventories

INVENTORY RANGING FROM SIMPLE TO COMPLEX:

Just about every place is covered by outdated government-published topographic maps showing the basic elements, sometimes even the vegetation, of the forest at some point in history. Given that so many reserved forests are 10 000 hectares or more in size, and that the scale of the maps is 1:50 000 or smaller, these maps can be a valid base for long-term and regional management planning that will occur, even if they are only used to reference aerial photography or imagery. They are still valuable for siting major topographical features, watercourse locations, and historical village sites.

If forest vegetation is shown on the topo map, it is based on aerial photography available at the time the map was made; the map therefore provides a valid historical record. Often, legal (gazetted, national, local) forest boundaries are drawn on the maps, although these may be inaccurate; frequently the boundaries described on legal papers don't correspond with the villagers' personal knowledge of boundary locations. Updating legal descriptions makes part of the first participatory inventory exercise.

It is conceivable that a management plan can be written for a forest without doing a formal (statistical) inventory of the vegetation. Even such a situation, however, requires updating the topographic maps through a *minimum survey* of current

- forest stand areas and compositions,
- road and village locations, and
- evidence of economically important resources within the boundaries.

If such a survey is not done, the management plan will have limited credibility and it will become obvious that the sought-after participation has not occurred. After all, management is about economic and/or ecological well-being over the long term, and there has to be some basis against which to measure changes that result from human intervention or nonintervention.

At the other extreme, you can have a very labor-intensive inventory that engages highly-trained field crews with expensive equipment doing two field plots per day and staying in hotels during the work week. Such may be the case for a national inventory on a 10-year cycle such as the US Forest Inventory and Analysis, or for a 100% census of sawtrees just before a commercial

harvest. The write-ups may be elaborate, heavy on statistics, and addressed to a wide range of potential users of the data.

The model most appropriate to the jointly managed forests is closer to the minimum survey end of the scale than to the more elaborate expensive end. However, no matter how simple the inventory, it is a challenge to present results of data collection and analysis in a way that people can understand and use it.

In this context of coming into a forest to be jointly managed for the first time, the justifications for doing the first inventories can be found in the following objectives.

SOCIAL OBJECTIVES:

- ✓ Dispel suspicions that users have harbored about new management laws:
The whole notion of co-management is relatively new: many new laws have been adopted in the last decade to accommodate it, but relatively few forests have been testing grounds for the idea. Both foresters and project personnel involved in the pilot forests can be suspected of trying to “take away” the resource and make it inaccessible to traditional users. Including these users on the field team can show them first-hand the good intentions being carried out, *as long as the inventory fieldwork does not lead directly to arrests for illegal activities during the process*. It should be stated, however, that it is difficult to extract information on the locations of all pockets of valuable timber, as they are seen to belong to specific users and have been mentally earmarked already as “money in the bank”.
- ✓ Establish communication about local uses of land and vegetation: Even if local names for trees, soils, grasses, and landforms have been published, you will have an updated or possibly corrected version applicable to the forest at hand by verifying these with local members of the inventory crew; sometimes the books are wrong or don’t apply locally. You will also get a first-hand perception of the best uses of each species and of each landform, plus site indicator species information. (These are items that should be deliberately recorded on the field sheets, as elaborated later in this document.) Getting this information is a process of **listening** that engages members of user groups and makes for better relations with them. When they see you write the information and do something with it, communication is enhanced.
- ✓ Enable foresters to do forestry instead of repression: While building field capabilities and communications with local forest users, doing field inventory work is always preferred to confronting villagers who are just trying to make a living or who may even be armed. For most foresters, botanizing and using a compass are actually enjoyable. This improves the morale of field agents often stuck with “dirty work” or no work at all.

TECHNICAL OBJECTIVES:

- ✓ Update topographic map features: In particular, drivable roads, villages, and specific economically-exploited resources can be identified using current names and languages, located, and mapped. This map will be the template for operational and occupational maps used in the long-term plan. Fieldwork for getting this information is planned at the same time as the vegetation inventory.
- ✓ Update forest stand map as a basis for comparison with past and in future: Sometimes a map of the forest composition has been drawn decades ago and is no longer valid. Aerial

photography or satellite imagery should be ordered at the beginning of a project so that one can draw current “type lines” around forest **stands** that appear homogeneous in texture and color to the eye. These type lines become a basis for data collection and descriptions of the state of the forest. Data from a current inventory are a “snapshot” that shows what has been modified since forest classification. The ensemble of tables, figures, and maps also provides a “baseline” for monitoring future change due to climate and management. Permanent plots can serve as means to monitor change when globally-recognized guidelines are used. The closest government forestry office should be involved with this whole procedure and contribute to its completion.

- ✓ Collect data that can be put into descriptive tables, figures, and maps for a management plan: In representative homogeneous stands, data are collected on sample plots to make tables of species and diameters that describe all the hectares, measured or unmeasured. Analysis of the data results in tables and graphs showing the quantity of sawtimber, nontimber products, and regeneration present in the forest at time of inventory.
- ✓ Use the data for determination of annual allowable harvest of trees required by different user groups: Looking critically at the numbers of stems in smaller size classes, in combination with the numbers of people in user groups depending on these trees, will assist in determining the annual allowable offtake. The numbers of trees that people in specific user groups need each year to sustain their livelihood is part of the information collected during a preliminary villager resource assessment, as described in Annex 1. This information is compared with the numbers of trees that are in the forest at the time of inventory. The question is asked: “How long do these trees have to last to sustain the current level of population and uses?” This is the basis of planning the field part of management and economic activities that are included in a long-term plan.

The question is asked: “How long do these trees have to last to sustain the current level of population and uses?” The village resource assessment and the inventory can answer the question.

MARKETING OBJECTIVES:

- ✓ Use tabular data for market studies and growth predictions: Once inventory data are presented in tables of species and sizes with economic values attached to them, they can be used to calculate economic values and quantities of forest products now and in the future. These figures can be used in several documents required by lenders during the establishment of forest product cooperatives: the market study (which must describe availability of raw materials), the business plan (which shows WHERE the raw materials will come from), and the financial plan (which describes how equity and debt capital will be secured) (Gregersen et al. 1995). Computer programs exist that predict growth of forests based on initial input of stand data.
- ✓ Use tabular data to calculate cost and benefit of different scenarios of exploitation of a given forest product: In a more sophisticated application, inventory tables of numbers of stems per hectare could be used to evaluate different scenarios of exploiting given numbers of trees per year to support user group livelihoods.

1. OVERVIEW AND PREPARATIONS

1. MAKING DATA COLLECTION AND PRESENTATION PARTICIPATORY
2. RELATIONSHIP WITH GOVERNMENT FOREST DEPARTMENT
3. TO PAY OR NOT TO PAY

1.1. MAKING DATA COLLECTION AND PRESENTATION PARTICIPATORY

Data collected and analyzed need to be useful both to foresters and to user groups. This means getting away from collecting information on sawtimber exclusively.

The Participatory Resource Assessment first

The so-called PRA (or Rapid Rural Appraisal, Village Resource Assessment, socio-economic study, or Méthode Accélérée d'Evaluation Participative) should be carried out as early as possible in the program -- as soon as sufficient rapport is established -- so that resource-based issues around the forest can be discovered and addressed. A suggested timeline is presented in the following heading. An estimate of the inputs, which amount to person-days and office supplies, is described in **Appendix 6**.

The preliminary PRA study should be designed so that villagers name and rank the most important trees and plants for different forest products. Once the most important species are known, they can receive special attention during the inventory and even have their own table or column to be filled out on the field sheets with their own variables. Village occupation information will combined with preferred species information allows calculation of the minimum number of trees that are needed each year to sustain a given livelihood.



A classic tree-ranking exercise with women

In **Annex 1** is a summarized PRA procedure including “tools” used in Zambia. There are other examples out there, with some tools producing results that are more informative than others. Following is a list of the tools that seemed most informative in identifying potential subjects of inventory and in writing management proposals.

- The species ranking exercise by product or user group, especially honey, charcoal, firewood, sawtimber, fodder, allows user-specific maps to be drawn and areas of shortages to be identified.

- The village information sheet summarizes numbers of people in each type of occupation, numbers of literate people, and other population information. These paint a current picture of the need for functional literacy training and of the relative importance of forest-based livelihoods.
- Information on numbers of different types of livestock, combined with highest-ranked forage species counted in the inventory, allows the formulation of a policy on grazing.
- The stated distances traveled to get firewood can indicate the relative importance of conserving and using the public resource to the women
- Sketch mapping can be indispensable for updating the topographic map *if a template is supplied to participants*. The template is a basic tracing of streams and hills from the topographic map, and participants then provide updates of names of villages, hills, watercourses, bowés, and other land features. If a template is not provided, the scales and orientation of features will be hard or impossible to reconcile on the topo map.



Sketch mapping is fun and creative, but real updated names and locations are needed; using a topo map template to fill in with informants works better.

A section of the topo map showing streams, old roads, principal hills, and old villages should be scanned and enlarged to 1:10,000 scale for the area where the sketch map is being made.

Then the informants can place all they know about forest boundaries, names, and locations on that enlargement. If a GIS is being used for forest mapping, entering updated information this way becomes easier and more reliable.

The results of the PRA are written up in a summary report of who ranked what and where. Maps heavy on symbols will be appreciated by those who gave the information and by those who held back alike; the maps show you have used the information and interpreted it, and will inspire others to speak up lest they be left out.

Maps give a global view of the forest that allows user groups to see what they know already, that the forest is used by many people for many resources. By showing the entire boundary and the summarized recorded information, the map can help individual user groups “see” where potential conflicts, physical barriers, and overlaps occur as a cohesive management plan is developed. As soon as possible after the PRA is completed, the information should be

- **synthesized** for the forest as a whole, using tables where appropriate
- **mapped** with emphasis on symbolic representation of rankings and village profile information
- **presented** by Forest Department and project personnel back to chiefs and villages.

The following Village Forest Resource Assessment took 6 field facilitators and 3 village informants about 30 days to complete.

VILLAGE FOREST RESOURCE ASSESSMENTS: TABLE OF CONTENTS	
MPHOMWA HILLS LOCAL FOREST	
<u>INTRODUCTION</u>	1
<u>DESCRIPTION OF VILLAGES INVOLVED IN THE ASSESSMENTS</u>	2
A. VILLAGES GROUPED INTO RESOURCE MANAGEMENT AREAS	2
<u>DESCRIPTION OF THE FOREST AND SURROUNDINGS</u>	3
A. VEGETATION, SOILS, TOPOGRAPHY, AND ECOLOGY	3
B. CLIMATE	3
C. GENERAL DESCRIPTION OF THE FOREST QUALITY, PAST AND PRESENT	3
<u>HISTORICAL, SOCIAL, AND ECONOMIC INFORMATION</u>	5
A. SETTLEMENT HISTORY BY VRMA	5
B. HIERARCHY FOR GRIEVANCES AND PRONOUNCEMENTS	8
C. CONFLICTS WITH EACH OTHER AND WITH FOREST DEPT.	9
D. SEASONAL TIMELINE OF VILLAGE ACTIVITIES	10
E. VILLAGE POPULATIONS, LITERACY, RELIGION, AND ETHNICITY	12
F. VILLAGE OCCUPATIONS	14
G. LIVESTOCK POPULATIONS	14
H. RATE OF USE OF FOREST PRODUCTS	14
I. DEFINITION OF "GOOD" AND "BAD" FOREST	14
<u>TABLES OF TREE SPECIES RANKED BY PRODUCT</u>	17
1. SAWNTIMBER TREES	17
2. CONSTRUCTION POLES	18
3. FIREWOOD	20
4. CHARCOAL	21
5. TOOL HANDLES	22
6. BARKHIVE TREES	22
7. HONEY (BEE FORAGE) TREES	22
8. FRUIT TREES	23
9. MEDICINE TREES: diarrhea	24
10. MEDICINE TREES: coughing	24
11. MEDICINE TREES: sexually transmitted diseases	25
12. MEDICINE TREES: MANY USES	26
13. MUSHROOMS	27
14. BROOMS	28
15. CATERPILLAR/ INSECTS	28

Corrections and further updates can be made while presenting the interpreted results, which should happen within a few weeks of the fieldwork. At the presentation, the next step – the numbers inventory – is announced. The objectives and method of the coming inventory can be described and arrangements can then be made for villagers to find appropriate sawyers and other resource informants to join the field crew.

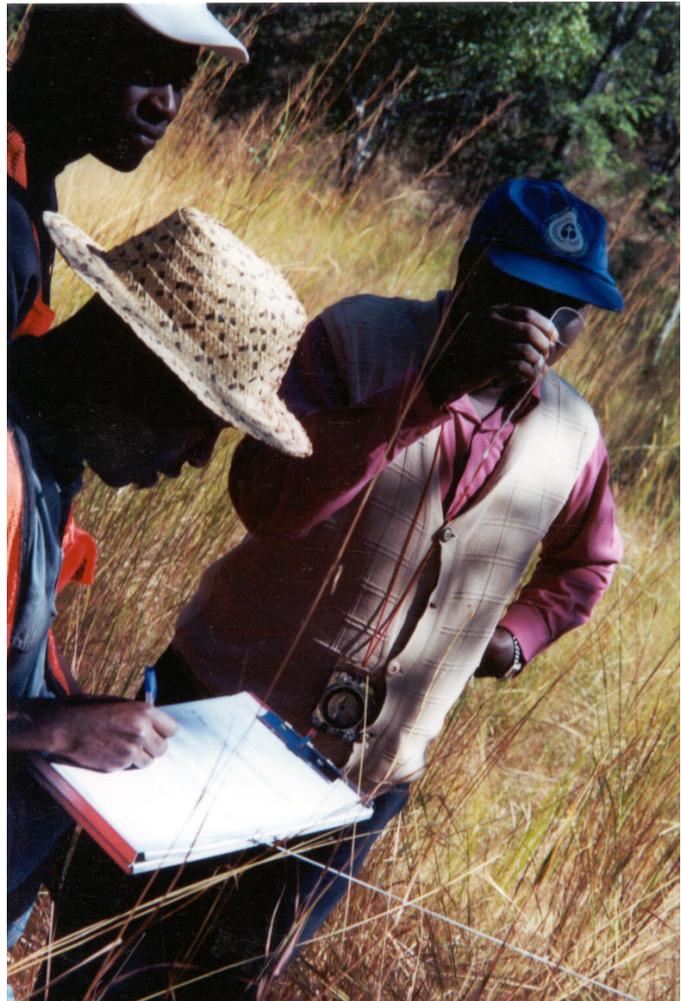
Timing counts

Both foresters and villagers have their yearly, seasonal sets of activities. Farmers are typically unavailable from a few weeks before rains start while they prepare the ground, until a few weeks after the rains finish and the crops are all in. Foresters might have other project obligations during parts of the year. It will take persistent communication and inclusion of foresters in project planning to assure availability of all who should be on the numbers-oriented inventory crew when it is time to do it. The best scenario is to detach a forester specifically for the field work, and enlist certain people from villages around the forest that will be free at an appropriate time.

Daily rains, tall dense grass, wildlife migration, heavy fire season, and crop harvest time are all obstacles to continuous tree measuring work. Planning around these seasonal occurrences will reduce frustration and show that you appreciate and understand the lives of the villagers.

Technical training with equipment use can occur in one- or two- week increments well before the main body of work. Then a minimum two-month timeframe should be allowed for field testing the method and the data form, making adjustments, and doing the actual fieldwork. Depending on terrain and vegetation, it is also acceptable to do the testing and adjustment phase before rains set in, and then do the actual fieldwork after rains have stopped or in the following dry season when grass has been burned off.

The following table, emphasizing a forest management component, gives an example of where inventory can fit in to accommodate two years' activities in a project dealing with both agriculture and forestry.



Train field crew all together

When training in how to operate technical equipment is held, it is okay to involve only those who are going to operate the equipment. That way you can concentrate on their specific needs and spend time practicing.

When it comes to practicing field plot execution, members of the team that come from participating villages should also be involved. The village members will need to see how to make themselves understood to the foresters as they write and listen, and the foresters will need to practice listening and recording the information given by informants to be recorded on the field sheet. It will require only a couple of days of practice to get a rhythm comfortable to both sides.

Design field sheet for mandatory participation

One way to ensure that listening and communicating are practiced is to design field sheets so that village member input is required to complete it. This can be accomplished by adding in blank lines for site potential, local name for soil and vegetation type, and non-timber forest product information; and by adding extra columns for indigenous uses of, and sawproducts in, trees counted on sample plots. (An example of such a field sheet used in Zambia is shown in **Appendix 1**.)

Nontimber forest products that are measurable or countable should have been mentioned in the PRA or socio-economic study done before the numbers-oriented inventory. In fact, the inventory method and field sheet should not be finalized until the study has been reviewed.

The most obvious, and perhaps the most necessary, field crew inclusion is the local sawyer – pitsawyer or otherwise. One objective of forest inventories is usually to obtain an estimate of sawtimber, either to justify a timber operation or to justify a conservation or plantation program. Using the advice of a local sawyer is the only logical alternative to local volume tables that so often do not exist anyway, or whose construction would be too costly in time.

Local sawyers with experience know very well what can be obtained from a tree of given size; they can predict the volume using actual product names and dimensions, and these should be recorded. Their “data” are just as valid if not more so, since they know the market and can correct for defect and crookedness on the spot. A 1996 analysis of sawyer predictions compared to actual yield found no statistical difference between the two, in two species studied; a third species was less predictable because of its greater variability in volume per diameter and height (Polansky 1996). Another analysis showed a very high correlation between the product volumes given by the sawyers and the calculation of volume on the stump using a standard formula for the volume of a log (Polansky 2001). If cubic meters per hectare are desired in the final estimates for the forest, sawyers’ dimensions can be converted later in the office.

For other nontimber forest products, possible methods of measuring and recording can be decided with local users. The way they use the tree to make their product will indicate to the data recorder which features are most important to record.

For wildlife surveys or pasture studies combined with tree counts, transects and nested plots can be used. It is obvious that local residents are the best-placed to name the species and describe their abundance and quality based on what is found in the field.

1.2. RELATIONSHIP BETWEEN THE GOVERNMENT FOREST DEPARTMENT, PROJECT, AND VILLAGES

Use the PRA process and the inventory to dispel misunderstandings about the management program

At the beginning of a management project, rumors may fly about the land and its resources being taken away from current users. Suspicions toward both project personnel and Forest Department will abound. By involving both the foresters and those living around the forest from the start, and by working from a logical workplan with sufficient time built in, both the preliminary and numbers-oriented assessments will help to dispel many misconceptions. The processes of assessing the forest resources together and agreeing to resolve shortages and conflicts by eventually writing a long-term plan will improve credibility and thus cooperation as people see it happening with their own eyes. It will be a replacement of the common view of Forest Department agents as police trying to catch illegal exploitants for their own gain.

The success of the concept of conserving enough of the resources in the forest for use by future generations depends on everyone subscribing to that goal. It will take time and patience for everyone to be convinced that all the players know and are practicing that concept. The inventory is the snapshot that provides evidence of what exists and what lacks in which places; it is like a mosaic of the forest describing things that people already know about their areas. Future inventories could then confirm whether future users have been considered.

Both foresters and village users will see that the inventory is also non-judgmental (objective): it coincides with amnesty for past illegal activities, and it does not have as one of its objectives to determine where new ones are occurring, although such things will be discovered by accident.

At the same time, there is a common misunderstanding that if the forest is now to be put under management, then it is necessary to quickly stake claims for remaining arable land before it is put off limits. The solution to this is to make informational campaigns a part of the very beginning of the project. In these campaigns, it is necessary to state clearly that further incursion into gazetted forest must be stopped or else the fines that are allowed by law will be levied by the Forest Department (Heermans 1999). It only takes one or two fines to be applied before people realize that the intent is serious. It may well be that the management plan will eventually allow cultivation inside the forest with strict conditions and/or rentals attached, but this is something that villages and government must decide in concert with each other.

This point is brought up because there is a good chance that a forest inventory will discover the establishment of new fields on some of the better forest land inside the boundary being surveyed. Then it will be time to act firmly but nonjudgmentally.

When illegal activities are discovered

As mentioned, fieldwork often uncovers illegal activities going on in the forest: unpermitted charcoal burning, field clearing, large-scale firewood cutting, bamboo harvest, lumber production, sand hauling.... These are opportunities for the foresters on the crew to talk to those who are in violation and explain the “new system”. There is always some procedure available to foresters for such events; often it is simply to send the offenders to a central office where the proper fine or permit can be paid for. If the foresters are working **unarmed**, the citing of such violations should be taken as simple protections of the remaining resources until people decide how to exploit them appropriately. It can be a simple glitch in the daily program if the infraction is small, but if a large operation is discovered, it can involve a big chunk of time.

For this reason, it may be best to assign major enforcement actions to third parties not involved in the inventory. Otherwise, it will be hard to maintain the communications necessary during data recording.

Include foresters from the beginning

From the beginning informational and assessment meetings, the forest agents can ease the suspicions of participating villagers by being present and by speaking with them. As mentioned, seeing foresters in the new light of listening to forest users’ perceptions of the resources, and hearing them willingly and frankly answer questions, will aid in the plan-writing process. Chances are these participating foresters will be at a local level (department, provincial, cantonnement, prefectural...) rather than from the central offices. This works better logistically anyway. In addition, higher-level foresters do not have as great a need to have friendly relations as the lower-level ones.

By the same token, the Forest Department should get to the point where it can plan and execute its own inventories, so any coaching it can receive in these steps -- as well as in computer analysis and mapping – would be to their advantage.

1.3. TO PAY OR NOT TO PAY

Should village resource informants and foresters be paid stipends for inventory work or not? This issue is debatable. Nonpayment can be justified: the work is targeted to produce benefits to locals in the future; shouldn’t they be willing to do the work on their own behalf at no charge? But it is clear that even a small stipend motivates both foresters and village informants to produce excellent work. Besides, one would never consider not paying project or government foresters for working on the same inventory, even though they too are working for the good of their country.

Lower-level field agents have very low salaries but because they have special training they do expect to make up for it with extra compensation for being out in the field all day. Moreover, in small villages where cash is hard to come by, even a small amount is greatly appreciated by farmers and it goes a long way.

The fieldwork may be taking farmers away from other important activities, depending on the time of year. In addition, it was already noted above that the inventory field sheets could not be completed without village informant input. Therefore, it is my view that a reasonable stipend for each day worked by each forester and each village informant should be paid. This does not mean that exorbitant per diems should be expected, using unrealistic standards; but it means that all food, transportation, and lodging needs should be met, with a small extra incentive added to assure quality work in a compressed project timeframe.

**RECOMMENDATIONS TO ENSURE
VILLAGE MEMBER PARTICIPATION
IN FOREST INVENTORY**

- *When designing the inventory plots and field form, keep the Preliminary Resource Assessment or socio-economic report open on the table to refer to resources named by participants in that exercise.*
- *Design the inventory field form so that it requires input from local sawyers and artisans to be completed.*
- *Consider using field crew members from each successive subregion of the forest being measured.*
- *On field plots, ask informants to name the use potential of each land type and the indicator species for soils; use this information for management plan recommendations.*
- *Use informants' names for plants, landforms, and soils to update published reference materials used.*
- *Ask informants to lead you to important points that should not be ignored when planning areawide management actions; they should be registered with GPS:*
 - *sacred woods*
 - *forest boundary markers*
 - *historic or prehistoric sites*
 - *mineral extraction sites*