



Community members conducting a forest resource assessment in Kilwa District. Photo by Steve Ball.

Participatory Forest Resources Assessment: Experiences from Kilwa

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Conducting a Participatory Forest Resources Assessment (PFRA) is a necessary step in introducing participatory forest management (PFM) to an area of forest. However of all the steps involved in developing a forest management plan, assessment of forest resources is the most technical. Even at its most basic it involves computing simple statistics such as the mean which are likely to be beyond the capacity of many members of Village Environment Committees (VECs). At a workshop on PFRA organised by the Forest and Beekeeping Division (FBD) in 2004 it was noticeable how few of the presentations by projects and organisations were truly participatory. Most involved input from community members but then the assessment itself was written by technically adept facilitators. This means that communities do not fully understand how the key numbers in the assessment are obtained. Since these key numbers go on to inform some of the most important aspects of the management and harvesting plans it risks leaving communities in the role of policemen for someone else's policies.

One potential solution is to pursue a mostly qualitative approach to PFRA such as the Threat Reduction Assessment (TRA) which is designed to track impacts of PFM on threats to the forest, e.g. uncontrolled burning. This can be a useful management tool, and because it relies on subjective assessments it is easy for communities to engage in it. However this same subjectivity limits its usefulness. How do you compare TRA results between different forests or different projects facilitated by different people? A strength of TRA is that it directly evaluates management decisions and implementation; have clearing fire-lines reduced incidences of fire? If not then more management attention needs to be focused on the issue. However controlling fires is usually only an intermediate goal on the road to improved forest integrity, enduring biodiversity protection, and enhanced livelihoods security for forest-adjacent communities. Assessing success on these broader aims requires objectivity and for assessors to pin a number on the results, i.e. we need to count and measure things.

However, counting and measuring things is never as easy as one might think. In small forests (< 100 ha) with limited resources of certain types it may be feasible simply to count every single instance of a resource of interest. However, in larger forests there are nearly always too many of the things we are counting, and time and money are both limited, so we must adopt sampling strategies such that we only have to count or measure a small fraction of the total number. Sampling, though, is inherently risky; if you do not obtain a representative sample then the results may be entirely bogus and yet no-one would know it. In conducting PFRAs we are doubly challenged; the sampling strategy must be unbiased but also as simple as possible for communities to both understand and be capable of carrying out themselves. A truly participatory method is one that community members can repeat when they see the need, not when project facilitators need another data set to be able to report back to their donors. Rural communities do not as a rule possess callipers, clinometers, calculators (for generating random numbers), GPS units or compasses, nor are they sufficiently scientifically adept to be able to interpret vague guidelines on the go or easily estimate anything other than the simplest quantities.



Involving communities in data analysis as well as data recording is important. Photo by Steve Ball.

Adopting a simple and unbiased sampling method is crucial, but sample size is also important. Larger sample sizes lead to results that are more likely to be accurate, and this is reflected in tighter confidence limits. These limits are critical to evaluating the usefulness of any statistic but are unfortunately frequently omitted, even in highly technical inventory reports. Methodological explanations instead rely on simple statements such as “a 0.1% sampling intensity was adopted” without any justification as to why this is appropriate.

Choosing a sampling intensity is one of the most important decisions to be made when the quantitative results of a survey are the primary end product. Many pieces of purely scientific research are concerned principally with whether a statistic varies according to different situations, e.g. is basal area higher in primary or secondary forest? However when assessing forest resources in order to inform a management plan it is the actual estimated number of (for example) harvestable trees which is of primary importance. In determining the sampling intensity to be used we then have to trade off time and expense of collecting data with the desired level of accuracy and confidence.

The answers to all these questions are not easy to summarize in a short paper, but we recommend using transects rather than sample plots as they save time; surveyors are collecting data the entire time they are in the forest, while sample plots result in time being lost whilst walking to the plots and then carefully laying them out. (The exception is when establishing permanent sample plots which only need to be marked out once, while transects are much harder to exactly replicate.) You can either measure out 10 m or 20 m ropes and provide them to the community so they can easily determine the correct width, or – if plenty of villagers are involved – show them how to

control distances from the central transect line by linking hands; the human chain only needs to be measured once at the start of the exercise. Communities then need to be trained in walking a straight line by using identifiable points on the horizon. A compass makes this much easier, so consider buying one for each participating community.

When surveying it is not necessary to record every single tree. Community members need to decide which resources they want to focus on managing, and only those resources need to be assessed (we recommend max 6 species or functional groups of species). All other resources should be classed as either super-abundant, and therefore suitable for unrestricted open access, or rare and/or of low importance and their exploitation prohibited under the management plan. Tape measures are cheap, and there are usually enough community members with a sufficient level of numeracy to write down actual Circumferences at Breast Height (CBH) to the nearest centimetre. These can later be grouped into different bands, but it is counter-productive to throw away data at this stage that later might be useful.

The second and equally important step in conducting a participatory forest resource assessment is Participatory Analysis. Taking all the data back to the office and analysing it there is not sufficient. Communities need to see how the data they collected generate the results they will use in guiding their management approach. This requires that some simple analyses be performed in the village with the team who collected the data. Data classes should be constructed to fit use requirements. 20 cm CBH bands make for nice size distribution graphs, but do not directly tell us anything about how many trees can be cut down. We divide our data into three colour bands: red are too small to harvest, green are of harvestable size, while blue



Measuring circumference at breast height of the priority species is an important part of a participatory forest resource assessment.

Photo by Steve Ball.

indicates trees which are especially large (double the harvestable CBH). The sum of green and blue trees can thus be used to calculate a harvesting quota based on the rotation period of the species (note also that the legal minimum size varies by species and is quoted as DBH – diameter at breast height – not CBH). Depending on the reproductive ecology of the species the ‘blue’ trees may be important seed trees (and fulfil other important ecological functions) whose timber maybe of lower quality due to age so ‘green’ trees are better for harvesting. If you set the minimum CBH for qualification into the red band (we use half the harvestable CBH) then you also have some idea of how many younger specimens may mature into harvestable trees over the duration of the management plan.

Thus far this paper has concentrated on assessing timber resources as that is a particular focus of the Mpingo Conservation Project, and we operate in areas where there is still substantial forest cover so few non-timber forest products (NTFPs) are of management concern due to high levels of abundance. However in other areas NTFPs may have a higher priority, and with these it is important to reflect the communities’ own perspectives. Relatively common species which are used for the same purpose can be grouped functionally and surveyed together, but be careful that rare or valuable species are not being unwisely combined with commoner varieties. Quantities of NTFPs

are often best assessed in less scientific terms such as number of head loads or bags of charcoal, as these are far more relevant to the local community.

The final issue to consider when using PFRA results as the basis of quotas and other management decisions is whether to use the mean, or invoke the precautionary principle. Even where sensible informed decisions have been made on the correct sampling intensity to use, any sampling strategy implies a degree of uncertainty about the results. A better approach may be to calculate the lower quartile confidence limit. This will give an estimate of total stocks which if used as the basis for quotas you can be 75% confident the resulting harvesting will not be unsustainable. Such an approach forces one to think more carefully about the time investment as quick and dirty surveys will give much lower results than more attentive ones. The statistics necessary to calculate these lower quartile limits are not too difficult to use in practice, but evaluating which ones are appropriate and establishing a basis for making cost versus benefit trade-off decisions does require a degree of sophistication. We recommend that the FBD seek funding to host a round-table discussion on the merits of different approaches, and then letting the statistical gurus get to work in order to draw up simple guidelines which foresters can use when out in the field.

Identifying priority research areas for Participatory Forest Management

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Traditionally, management of forests in Tanzania has been the responsibility of the central government and local government agencies. However, there has been a realization that both central and local governments have failed to provide adequate protection and management of the forest estate, and the net effect of centralized forest management models has been rampant forest degradation and deforestation. Moreover, in the wake of declining budgets and the retrenchment of civil servants, the government’s capacity to protect forests based on the policing model of management has progressively declined.

In response to these challenges, Participatory Forest Management has been promoted and is strongly supported by the Forest Policy of 1997 and Forest Act of 2002.

The change in the forest management paradigm under the new forest policy and legislation has opened the door to academic research in the forest sector and increasingly, forestry research is beginning to cluster itself around three themes: PFM and forest condition; PFM and livelihoods; and governance. In the past, forestry research tended to be discipline oriented, technically focused, delineated from communities and extractive in nature. A more action

oriented approach to research is now being adopted to assess these three themes. Each of the three themes are reviewed in turn.

PFM and forest condition

In order to maximize local benefits from forest areas under PFM, some knowledge of the local resource base is necessary – and in particular the potential annual sustainable harvest for favoured species or products. Until very recently, the focus has been on deploying technical specialists such as forest inventory technicians, to undertake forest resource assessment as well as growth surveys. These have typically been from Forestry and Beekeeping Division, Sokoine University of Agriculture or the Tanzania Forest Research Institute. While the results produced are usually to an acceptable standard, the process is often flawed, as the process for gathering, analysing and presenting the data is usually dominated by specialists. Community involvement is at best consultative and more often, simply extractive. Reports are written in scientific language and presented in English. In some cases, the reports do not even reach the communities themselves. Experience from Danida-supported projects in Lindi and Kilwa as well as from Kitulangalo forest reserve has shown that local people can be trained to map their forest using modern technology and assess inventory parameters that are necessary in management. Clearly, an