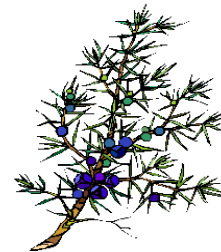


Issues and Challenges in the Non-Timber Forest Products Inventory and Management

(A Term Paper on FPE 710 Non-Timber Forest Products)

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Terms and Definition

Biometrics: the application of statistical methods to the measurement of biological objects.

Challenges: A call to engage in a contest, fight, or competition; An act or statement of defiance; a call to confrontation; A demand for explanation or justification; a calling into question: *a challenge to a theory* (Answer.com, 2008).

Inventory: Record showing the quantity and value of articles in a store (commercial term). An attempt to describe quantity, quality, diameter distribution of forest products and many characteristics of land upon which trees are growing. Synonymous with the term “cruise” used in North America.

Issues: A point or matter of discussion, debate, or dispute; *it is also* A problem being discussed (Answer.com, 2008).

Management: “Forest Management is that branch of forestry whose function is the organization of a forest property for management and maintenance, by ordering in time and places the various operations necessary for the conservation, protection and improvement of the forest on the hand, and the controlled harvesting of the forest on the other”. Primary objective of good management is provision of the maximums benefits to the greatest number of people for all times (Prakesh, 2000) .

Non-timber forest products (NTFPs): NTFPs comprise all goods derived from forests of both plant and animal origin other than timber. NTFPs contribute to household income and subsistence and are of cultural importance in many rural societies. Recently, their role in sustainable development has been emphasized (Dutta, 2007).

Product: any part of a plant or animal that is harvested for human use or consumption.

Resource assessment: an evaluation of some aspect of the resource based on information gathered from a variety of sources. It can include socio-economic issues, market issues, or the quantity and quality of the resource (FAO, 2001).

Sustainable harvest: the harvest which can be removed from the forest in a sustainable manner, generally determined in advance using a yield model and prescribed in management plans.

Abstract

This term paper on “FPE 754 Non-Timber Forest Products” tries to describe the issues and challenges of non-timber forest products inventories and management. This paper is based on literature review and aimed to address the following questions; what are issues and challenges in inventory? What can we do for sustainable management of NTFPs?

Key words: Issues, Challenges, NTFPs, Inventory, Management

1. Background information

Non-timber forest product (NTFP) is defined as “all products derived from biological resources found on forest land, but not including timber or fuelwood”. There are many other terms that have been used for such products such as; minor, special and non-wood all of which emphasizes that the product is not the main objective of forest management. That is that their production is secondary in importance, at least as far as forest managers are concerned, to the production of wood (Wong , 2002).

The definition is generally understood by foresters to include any part or whole plant, animal or fungi collected for human use, though the term has little currency in other disciplines (for instance it is not used by wildlife managers or agronomists). Examples of NTFPs are; fungi, furs, fruit, berries, nuts and seeds, meat, resins, gum, lac, butterflies, leaves, insect larvae, bark, dung, roots, honey etc.

Non-wood forest products consist of goods of biological origin other than wood, derived from forests, other wooded land and trees outside forests (FAO, 2001).

The term NWFPs differs from the commonly used non-timber forest product (NTFP) in excluding all wood while NTFP includes wood for uses other than for timber, although there are still many grey areas.

Increased interest in NTFPs has been prompted by the rediscovery of the role of NTFPs in small-scale livelihoods and has resulted in a rapid rise in interest in NTFPs among conservationists, foresters, protected area managers, social development advisors and indigenous rights groups (Wong , 2002).

The importance of Non Timber Forest Products (NTFP) for sustaining rural livelihoods, furthering rural poverty alleviation, biodiversity conservation, and facilitating rural economic growth is well known. Even with good evidence of the fact, NTFP have not received the sustained and systematic support. With the gradual rise in population, decreasing forest cover

and depletion of resources, management of NTFP sustainably has become a challenge. Similarly, the increasing demand of NTFP globally leads to over exploitation of these resources that further leads to dwindling and adversely affecting the biodiversity and ecology (RCDC 2008).

The Department of Forest and FUGs collect US\$ 15 million yearly revenue from the trading of NTFPs (DOF, 2006). Of the present total contribution by the forestry sector of approximately 15 % to the national GDP, NTFPs are estimated to contribute about 5% in Nepal's GDP (Malla et al, 1995; ANSAB, 1999).

But is there any database on the quantum of NTFP including medicinal plants harvested from the forests? Perhaps the answer is no. The reason is no body is concerned about strengthening of resource base. If the above estimates are correct, then who can give the guarantee that NTFP would contribute that much of economy consistently? How are we concerned about the practices followed for extraction of produces, is it destructive or scientific?

The issues in forestry sector especially on sustainability of forest resources is so challenging that focus of the premium forestry institutions in the globe like International tropical Timber Institution (ITTO) , is being changed. ITTO which focused more on timber management now becomes more conscious about forest resources and its sustainability. Efforts have been made by different research institutions for developing options and indicators for sustainable management of forest and NTFP (RCDC 2008).

Resource assessment of NTFPs in the tropics is relatively new and has received little formal study; consequently methodologies have been developed by individual researchers in response to local circumstances and the peculiarities of the resources under study. Sociologists stress that at the community level that methods need to be devised that can be carried out by the community, are sensitive to informal local knowledge and responsive to community information and management needs. It is argued that the main benefit of participation in such exercises is often awareness raising that the assessment methods used can therefore be simple and need not have a biometric basis.

2. Non-Timber Forest Products of Nepal

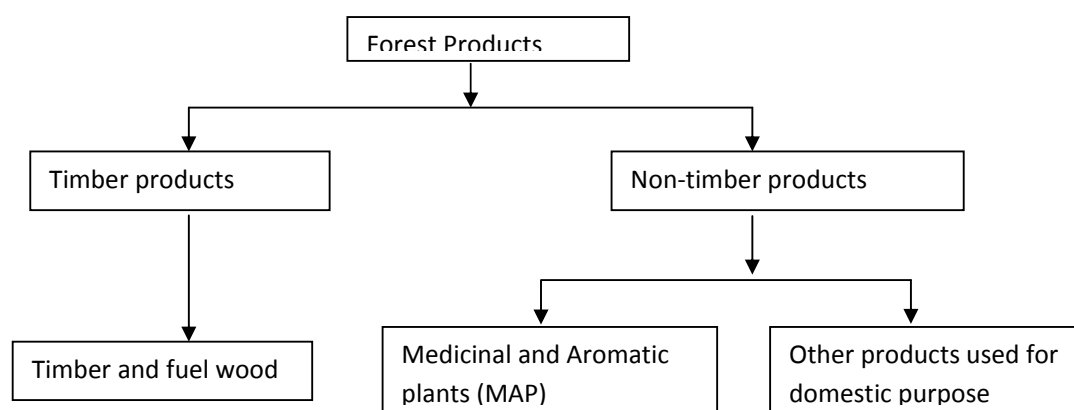
The diverse geography and climate of Nepal has rendered it a unique land of NTFPs. A proper documentation of Nepalese medicinal plants is still lacking. Experts estimate that 700 to 1700 species of MAPs occur in Nepal (Subedi, 1998) however the Department of Plant Resources (DPR) has recorded just 690 species of MAPs. The Medicinal and Aromatic Plant

Data Base of Nepal (MAPDON) has listed 1624 species having ethno botanical importance thus increasing the number of plant species with ethnobotanical values. Parajuli, 2001 mentions that the flora of Nepal contains about 1000 economic plants (14% of the vascular plants of the country) including 440 species of wild food plants, 71 species of fiber yielding plants, 50 species used as fish poison, 30 species of fodder yielding trees. Among these, about 100 species of MAPs are currently exploited for commercial purposes. Edward (1996) has also mentioned about harvesting more than 100 species of NTFPs from mid-hills and high mountains of Nepal that are mostly traded to Indian markets.

In terms of distribution pattern of MAPs, Nepal's tropical region (below 1000 m) holds 49 % of them, subtropical region (1000-2000m) 54 %, temperate region (2000-3000m) 36 %, sub-alpine region (3000-4000m) 18 % and alpine region (above 4000m) holds 7 % (Malla and Shakya, 1995). The high mountains are highly admired for high value (potency) but low volume NTFPs, hence fetching higher prices. However, Nepal has not been able to adequately utilize them. In some rural hilly areas, collection and trade of MAPs contributes up to 50 % of total annual family income of the primary collectors.

General lack of sustainable production practices, inappropriate harvesting and post-harvest practices, product adulteration, in appropriate value addition, poorly organized marketing information system, and lack of standardized production system has hindered international recognition of Nepali NTFPs as major challenges to maximize equitable economic returns. The existing support services such as communication, storage, organization, transportation, and credit facilities are also the added challenges of NTFPs marketing system in Nepal.

The forest products are categorised as below:



3. Forest Inventories in Nepal

First National Level Forest Inventory carried out as a cooperation project between Nepal and USAID during 1963. A systematic rectangular grid of 2.2 miles by 10 miles covering entire country was used at that time. Second inventory was carried out by Land Resource Mapping project (LRMP) during 1978-1979. Third National Level Forest Inventory was started in the early 1990s and the fieldwork was completed in 1998 (Implemented by the Dept. of forest Research and survey with support from Govt. of Finland.) Presently, following steps are being used in Nepal for forest inventories (DFRS, 1999).

1. Aerial Photo interpretation
2. Field Verification
3. Area estimation
4. Determination
5. Random selection of plot location
6. Field work planning
7. Field work : Layout of sample plots in the field
8. Field work : measuring the plot
9. Data analysis
10. Report publication

4. Current CF Inventory Provisions in Nepal

First time Guidelines for inventory of Community Forests was published in September 2000 by Ministry of Forest and soil Conservation. It has revised in 2004. The steps of CF resource inventory are given in annex-i. Different Service providers working in Nepal use their own guidelines. The organizations below are using their one guideline;

1. Livelihood Forestry Project (LFP) has prepared general inventory guidelines for trees and also mentioned the plot size for NTFP of different nature like, grass, shrubs and trees
2. Nepal Swiss Community Forest Projects (NSCFP) prepared participatory Inventory Guidelines for Selected Non-Timber Forest in December 2001 (Paudel, 2002).
3. Rabindranath & Premnath (1997) and Food and Agriculture Organization (FAO) (2001) have given methodologies of inventory for biomass studies.
4. There are many more including FAO resource assessment (focus on NTFPs)

Many variations and apparent contradictions and inconsistencies across the different existing methods none are 'wrong' - different ones can be selected according to need and capacity in each case. Need in CF is for locally appropriate pro-poor and pro-biodiversity resource assessment methods. Forest Inventory in Practice is now emerging issues.

5. Unique features of NTFPs inventory

Forest Inventory is used to identify forest types, condition (regeneration, pole or mature trees) and distribution of diameter and/or height of tree (DOF, 2000). Some characteristics of NTFPs makes their inventory different from other products and benefits. First of all, the high heterogeneity of product has to be mentioned. Each additional species has a different distributional pattern. These factors necessitate that most products have to be quantified in a different way. Sampling methods and methods used for quantification (Visual estimation, measurement of height, length, or girth, measurement of weight, counting etc) are consequently diverse, depending on the product.

An additional feature of NTFP inventory is their seasonal nature. Many products are available only during specific seasons; therefore, their inventory has to be planned accordingly. This creates difficulties if several products are considered, each to be inventoried at different times of the year. If a Forest User Group (FUG) must hire a technician to develop its Operational plan that includes several NTFPs, a contractual agreement must allow involvement at appropriate times.

Often it is requested to develop inventory methodologies that can be combined with the general inventory of the forest, in order to prepare the Operational Plan. Seasonal availability of NTFP products may make it difficult to combine two or more inventories. An additional limitation is the spatial distribution of the products. Often they occur outside the forest area or only in limited specific area, which also introduces difficulties to combine inventories. Last but not least, as already mentioned, varying spatial distribution and abundance of products necessitates different sampling intensities for the assessment, which once more limits the possibilities to combine inventories. Nonetheless, and with due consideration of the imperative of most FUGs to limit their expenses in OP preparation, a lot of attention has been given to the compatibility of methods while developing the present guidelines. Attempts have been made to provide the potential to combine the inventories, with the view for appropriate integration of the management of the selected NTFPs with the management of the forest as a whole.

5.1 Sources of information

Two sets of information may be needed for the inventory one is general information on area and surrounding, growth rates for the whole forest, and more detailed information on those stands that may be partially or wholly harvested in the planning period. The common sources of the data collection are Maps-topographical, geological, soil and vegetation; Aerial photographs and Radar or satellite; Reports from previous inventories; Forest Records (Paudal, 2008).

Framework for NWFP inventory design

Inventory design element	Protocol for:	Relevant target characteristic
Sampling design	Plot number and spatial or temporal pattern	Spatial distribution of population
Plot layout	Size and shape of plot	Life form, e.g. tree, bird, fungi, etc.
Population enumeration	Means of quantifying abundance	Growth form, e.g. clonal, suckering, diffuse or discrete organism
Product quantification	Measurement of product yield	Part of organism exploited, e.g. resin, leaves, stem, meat, etc.

5.2 Types of Inventories

Inventories for Non-timber forest management planning are usually types

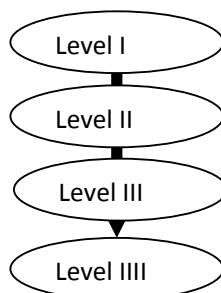
Single Resource Inventory: where the inventory seeks to quantify the abundance and isetribution of single NTFP species.

Single Purpose, Multiple resource inventory: where the inventory looks at more than one resource for the same reason i.e. strategic inventory, for several different NTFPs.

Multi Purpose resource inventory: Where NTFP inventory takes place for other purposes such as timber management or watershed protection.

Inventory Can be done either qualitative or quantitatively. Qualitative inventory, based on the ocular judgment/estimation condition of the resource in assessed as abundant, moderate or poor.

Basic structure of a quantitative inventory design:



Defining the Population: *Area to be explored to study, etc*

Sampling Designing: *Deciding how to locate plots, i.e. by use of systematic or random*

Plot Configuration: *Deciding about plot dimensions, which depends on the characteristic of the resources species*

Enumeration Method: *This methods is depend on the characteristics of the produce*

Why is quantitative resource information needed? (FAO, 2001)

Local level	· determining sustainable harvesting quotas · monitoring the state of the resource · demonstrating sustainability to persuade authorities to allow harvesting
National level	Strategic planning, including: · deciding whether to allow export quotas · considering promotion of resource-based industries
International level	Informing conservation of endangered species, e.g. CITES Note: This usually relies on national level data
Other (usually international)	Fora discussing: · criteria and indicators for sustainable forestry · certification · Convention on Biological Diversity

6. Why Inventory?

Inventory for NTFPs is a rapidly growing field of considerable interest to people working across a wide range of disciplines and varied contexts. There is a growing body of experience of NTFP inventory at three scales (Dutta, 2008):

- National policy formulation;
- Forest management planning and
- As a component of community-based livelihood initiatives.

Many inventories are planned as multi storey inventory assessing not only timber production oriented variables, but also non- timber forest products and a large set of variables with ecological background. Inventories include regional or national assessments, management based inventories, stand or compartment analysis, and cruise. Regional and national assessments are used to determine area, condition, and volume for specific purposes, such as developing resource management policies and programmes. Such surveys usually consist of widely spaced systematically located fixed- sized or variable size plots. The plots may be permanently located to monitor trend and change. Compartment or stand inventories customarily provide information for mgt. planning, land evaluation, and/or assessing silvicultural opportunities, stands are often delineated in aerial photographs, and field visits are made to stands for verification as well as to determine volume, condition and treatment opportunities (Shiva, 1997).

7. Collection and management of NTFPs

7.1 Local People's Access to and Control of Resources

The 1993 Forest Act states that the "District Forest Officer (DFO) may hand over part of a national forest to a user group in the form of a community forest, entitling the group to develop,

conserve, use and manage such forest and, sell and distribute the forest products by independently fixing their prices, according to an operational plan” (HMG, 1993).

About 61% of the total national forest within the DOF are considered to be potential community forests, of which more than 55% is forested and the rest is non-forested. In addition, a portion of alpine grassland can be managed as community forest for NTFPs (DOF, 2006).

7.2 Forest User Groups: Local Level Institutions for the Management of Resources

The legislation recognizes forest user groups (FUGs) as self-governing and autonomous entities and entrusts them with the management, control, utilization and sale of community forest resources in a planned way. The use rights remain with the FUG for an indefinite period of time. The FUG has the rights to exclude others from using the forest. Many forest users expressed a desire to gain formal control of their resources and initiate activities to gain financially from harvesting and processing the NTFPs (Maharjan 1994; Hertog 1995; Edward and Maharjan 1994; Edward 1996a; Karki 1996).

7.3 Existing Collection and Management Practices

Most of the commercially important NTFPs come from the collection in wild from all ecological zones of Nepal, except some species in small areas such as *Zanthoxylum armatum*, *Sapindus mukorossi*, *Ammomum subulatum*, and recently *Swertia chirayita*. These NTFPs are collected from extensive areas of the government owned forests and grasslands except some which are harvested from community forest, private land, national parks, and conservation areas.

Although not primarily meant to benefit the NTFPs in the forest, indigenous protection systems for some forests are in place. There are some very good examples of successful local community systems of resource management. Recently local communities of Humla initiated systems of NTFP focused sustainable forestry and generating biological and socio-economic information required for the management decisions (Subedi 1998). It is found that species cultivated on private land are better managed than the same species on public access land indicating some management knowledge certainly exists.

7.4 Steps for sustainable harvesting of NTFPs

The following steps determine the sustainable harvesting

- i. Identify and demarcate the resource base by ecosystem type (forest, pasture, farmland, rock face). Make a map that shows where each type of ecosystem is located with the estimated number of hectares for each area. Existing map of the area may be available

from the government. Use community knowledge to estimate the location and current condition of the area. For precise measurements, use trained mapmaker.

- ii. Identify the resource supply areas of the product(s). Estimate the supply volume based on current harvesting and trade/use. Identify current or potential threats to the resource base. Conduct group meetings and inquire where and how the products have been collected in the last three years. Rand threats. Gather data over several years, as there can be substantial year to year variations.
- iii. Take sample field inventory to assess the growing stock and condition of target products and the ecosystem. Conduct interviews with collectors to learn their perceptions of the product availability and quality changes.
- iv. Keep community members involved in all data collection and study steps. Use the results of the first three steps to design and implement biological monitoring. The monitoring plan should indicate the area being monitored target species; ecosystem changes; and human activity impacting the species and ecosystem. Sampling areas and growth and yield studies become integral parts of the monitoring plan.
- v. Make a preliminary estimate of a sustainable harvest regiment. Monitor this harvest rate and make adjustments (as necessary) in the biological monitoring plan. Remember that sustainable harvesting involves more than the amount harvested. Sustainability is determined by how and when the plant is harvested and all other impacts on the ecosystem.

7.5 Dimension of the plot for investigation of different vegetation (Rabindranath & Premnath, 1997)

Vegetation type	Size of the plot	No of plot /ha	Remarks
Tree	25mX20m	15 to 20	If variation is high
		10 to 15	If vegetation is uniform
Regenerating trees	5mX5m	20 to 30	Two plots within tree plot if these are already laid
Shrub	5mx 5m	20 to 30	Two plots within tree plot if these are already laid
Herb	1mX1m	40 to 50	4 to 5 plots within tree plot if these are already laid
Grass	4mx4m or 0.5mX0.5m	4to 5 20to 30	Each plot is divided into 12 parts of 1m ² Individual plot

Rabindranath and Premnath also standard method – for academic study of biomass. where sampling intensity and number of plots fixed (10-15% sampling intensity - very high) but number of plots low. HMG much less sampling intensity (0.1% - 01.5% maximum

categorised by forest condition) but more plots. But this have includes herb and grass whereas HMG leaves out herb and grass.

7.6 Comparison: HMGN Guidelines and Recommended Process (Dutta, 2008)

Existing Process	Recommended Process
Nested design (compact sub-plots)	Flexibility of design (circular or rectangular plot & flexibility of scattered sub-plots)
Plot size: 25m X 20m (trees); 10m X 10m (pole) & 5m X 5m (regeneration)	10m X 10m (tree), 5m X 5m (shrub) & 1m X 1m (grass/ herb. Accordingly the circular plot)
Sampling intensity: 0.05 to 1.5%	At least 0.1% (in specific case may be taken higher intensity)
Stratification: basis of stratification is limited (regeneration, species, natural boundary, etc.)	There are many bases of stratification, e.g., flat, undulating, hilly, rocky, river valley, disturbed, undisturbed, vegetation types, etc
Reconnaissance: Not specified clearly	clear cut observation to carry out the reconnaissance, like existing trails, local and commercial plant species, herbarium of unknown species and their photography for further identification, etc.
Instruments: Simple compass, more time taking, more chances of error (closing error)	Use of GPS for boundary and block delineation is quick and easy.

8. Issues and Challenges in NTFP Inventory and management

It is evident that there is a need for increased application of biometric principles in NTFP resource assessment, however it is necessary to first understand the nature of the problem. The following is a short list of the problems encountered by practitioners working with NTFPs (Wong , 2002):

- Difficulties with traditional forestry designs
- Lack of properly tested sampling designs tailored for NTFPs
- Few NTFP mensuration techniques available - or at least not accessible to practitioners
- Little cross-disciplinary exchange of ideas or techniques
- Difficulties, conceptual and practical, in the determination of sustainable yields

The apparent deficiencies in NTFP inventory could be easily solved if it were possible to use traditional forestry methods as these are well described and understood. Unfortunately, this does not appear to be a practical solution as there are certain characteristics of NTFPs that are not easily accommodated in traditional forest inventory. It seems that the simple adoption of forest inventory practice is not going to meet the needs of NTFP inventory.

The main problems, Issues and challenges being:

8.1 Rarity

Many NTFPs are rare which means that only a few plots of a conventional inventory designs will contain the species of interest. This results in very inefficient and costly inventories, which often do not produce the quality of data required (Wong, 2002).

8.2 Clumped distributions

NTFPs often occur in relatively dense patches within the landscape.

8.3 Imperfect detectability

People dealing with trees have rarely come across the problem of searching for an elusive or moving target because trees are generally large and static. Unfortunately, many NTFPs are not so obvious (e.g. truffles and epiphytes) and these require that detectability is considered (Wong , 2002).

8.4 Seasonality

Many NTFPs are seasonal but timber accrues slowly over time consequently forest inventory methods do not cope well with seasonality.

8.5 Mobility

Animals run away, fruit falls off a tree and rolls down a hill but trees are static.

8.6 Resource On few Hands

Most of the methods for determining timber yield from a forest are concerned with the harvesting of entire individuals. For NTFPs often only a small part of the individual is harvested. Thereview suggests that there is little theoretical background for determining harvesting levels for parts of a plant.

The variety of life forms and population distributions of forest products mean that traditional forest inventory techniques cannot be easily adapted and may not always be appropriate for use with NTFPs.

8.7 Insufficient role of District Forest Office

The District Forest Office (DFO) is the government agency for the control and management of NTFPs. However, its function is limited to giving permission and issuing license for collection. Practically there is no supervision or control in collection, nor is any rational basis for allotting plots. The highest bidder usually gets the plot for largescale collection of NTFPs, for which the government receives a royalty. The DFO rangers have difficulties correctly identifying NTFPs because they are often referred to by various local names. Over harvesting and unscientific

collection triggered by the *de-facto* property right arrangement and other economic conditions led to the depletion of these resources even from the protected areas like national parks (Yonzon 1993). Institutional capacity of DFO not adequate – therefore growing backlogs of OP amendment. DFO in fear that if there is excess cutting they will lose job

8.8 Lack of Technical knowledge about harvesting

Current practices or level of skills for NTFP extraction/harvest, production management, and post-harvest operations is not satisfactory. Unlike agricultural crops and timber producing trees, the management knowledge and techniques are not well developed. The species specific information required for *in-situ* as well as *ex-situ* management is generally lacking for most of the species.

Although there was little pressure on species that were collected for local use on a subsistence basis, the pressure on some of the commercial species has already resulted in overharvesting, and in some cases, immature and unscientific harvesting have led to the threat of extinction.

8.9 Not identify the Indigenous knowledge

The indigenous knowledge and traditional skill of limited individuals on harvesting NTFPs at a subsistence use level are not enough or enforceable to apply to the harvesting of commercially demanded species. Need to develop an inventory guideline based on indigenous knowledge and participation of User groups regarding NTFP inventory.

8.10 Lack of Awareness

The support services for organizing, empowering, and transferring knowledge and skills for the sustainable management to NTFP dependent communities is very limited, if not unavailable.

Since the forest and grasslands where NTFPs are collected are considered to be under the government property regime and not under the control of the communities, there is an incentive to harvest as much as possible before someone else gets to it. At the same time, there was little or no awareness for conservation coupled with lack of alternative income generating opportunities that would change the unsustainable practices. While there is a growing recognition of importance of more accurate assessment and sustainable use of non-timber forest products from both governmental and other institutions a number of challenges must be dealt with:

8.11 Confusing with different Names:

There are difficulties in correctly identifying NTFPs because they are often referred to by various local names. Technical capacity of both facilitating organizations and FUG in

designing and implementing assessment and monitoring of all forest resources including NTFP as an integral part of forest management needs to be strengthened and improved.

8.12 Authentication

Many guidelines and methods for the inventory are available, devised separately by INGOs/ NGOs/ projects and DoF. The employee and actors use guidelines under the different projects and no one has known who is authentic for the publication of the guidelines.

8.13 Periodicity of results

How often should be inventory renewed? same inventory often used as 5 yr OP plans revised – for as long as 15 years is till under questionable. if CFUG want to revise OP within 5 yr person - even for small block of forest - must they renew whole inventory? As for case of NTFPs inventory, seasonality critical to be confident- need a few visits across year and for biodiversity registers one visit not enough.

8.14 Timber dominance

Emphasis on high dia timber. NTFPs - getting less priority.

8.15 Traditional strict and expensive bureaucratic model

as seen in Dang: DFO staff managing all – where are the high costs going? DFO staff taking much money on DSA. But only Rich CFUGs can afford to pay ranger. Requires huge funding

8.16 Project support model

NGOs and FECOFUN non-forester staff – selling technical skill in market. Best example in Sankhuwasabha – 14 young FECOFUN CFUG members. Job creation – but CFUG needs money to pay them. And there is a risk that they try to demand too much charge from CFUG – need for CFUG led approach

8.17 Lack of Fund

‘Poor’ CFUGs can’t afford to pay - perceived as nuisance for the resource poor CFUG. About 80% cost (see budgetary norms) can be borne by local group – manpower for enumeration. Local peoples involvement leads to planning activity and bringing out of local knowledge. Capacity building results. Only need is facilitation initiative and technical coordination. Low cost approach would remove dependence on donor dollars

8.18 Current trend of Forest Inventory

Focus of inventory is regulatory rather than developmental / pro-poor. Whole Current Inventory system focus on prescription of 50% of annual increment – ‘annual allowable cut’ –this is kept so minimum controlling ‘production’ – leads to passive approach in FUG. DFO needs policy support to feel more confident to promote more on active forest management – multi-product mix for local needs approach. Could be negotiation of allowable cut as more incentive for active management – why not 100%. Need for location-specific dialogue between technical forester and community

8.19 Biodiversity Issues

Biodiversity objectives not reflected in inventory process – especially habitat protection and species biodiversity – e.g. NTFP and wildlife. But CFUGs, though their protection has led to improvement of biodiversity, leading to multiple product flows (less interest in timber only). Need to incorporate biodiversity assessment

- Need management prescriptions to consider biodiversity promotion based on existing resource.
- Can contribute to biodiversity database and registration system
- In Hills forest should be categorised according to need for inventory (local need, market, biodiversity)
- High altitude CF management issues – e.g. Myagdi – 6-700ha forests with very thin popl density.

8.20 Technical aspects of resource assessment

The fundamental questions that one should be able to answer while planning sustainable management of NTFP at operational level are: what is the existing growing stock and the productivity of NTFPs? What is sustainable amount of that can be prescribed for harvesting? What specific sustainable harvesting techniques in terms of seasons, methods and tools are appropriate for each of the products in question? In Nepal, its limited documented knowledge on species as well as ecosystem level is a major constraint to seek appropriate answers to these questions. Due to the heterogeneity of the products and different distributional pattern of the NTFPs sampling methods and methods used for quantification are consequently diverse, depending on the product. Similarly, many products are available only during specific seasons; therefore their inventory has to be planned accordingly. The traditional knowledge based on the immediate and lifelong experience of the farmers is key factor to the

utility and accuracy of an inventory. Therefore, participatory approach which involves the combination of the technical knowledge of technician and valuable traditional knowledge of the users should be followed during NTFP inventory. Every NTFP requires different inventory methods, but it cannot be expected to find specific guidelines for each product. Therefore, very often solutions will rely upon the creativity of the technicians and users, to develop for themselves procedures for the assessment of the growing stock and allowable harvest of a given product. Whatever methodology is developed, it is important to make conservative estimates as a starting point, and to adjust these according to the development of the resource. Therefore, periodic monitoring is another key factor in the management of NTFPs.

- validity of sampling intensity adopted,
- not recognizing the products from thinning and other intermediate cuttings, blocking and stratification,
- There is a lack of properly researched NTFP-specific sampling designs.
- There is little guidance available on development of appropriate NTFP measurement (mensuration) techniques.
- There has been little or no application to NTFPs of sampling designs tailored to monitoring needs.
- practice of nested-design prescribed by CFGI, 2004,
- Inaccurate survey of area of Community Forests, etc.
- The present inventory guideline has little been related with the management objectives of a particular area of forest. Therefore, inventory and management guidelines should be separate.
- Difference between *forest inventory* and *resource assessment*

8.21 Socio-economic issues

Inventory not directly relevant to local needs: poverty in the local level is one of the cause of over exploitation of resources. (Shrestha, 1994).

8.22 Single formula and inconsistency Issues

Single formula based recommendation of allowable cuts is not appropriate (It will be better addressed by a series of local species growth tables for each physiographical zone) inconsistency observed in stratification of forest, plot size, plot shape, sampling intensity,

annual allowable cut, annual increment prescribed by HMG/NARMSAP, NSCFP and LFP guidelines

8.23 Lack of Research and its dissemination

There is little research in these sector, the recommendation provided by researcher are in locker's file.

8.24 Institutional capability Issues

- Lack of a strong theoretical basis to NTFP resource management.
- There has been little application of novel sampling strategies to NTFPs.
- There has been little cross-disciplinary exchange of ideas and methods suitable for use with NTFPs.
- There is no service that provides effective communication of advice to field workers and communities.
- Inventory mandatory for OP preparation – used for monitoring

8.25 Issues at policy

At the other hand Policies and operational management of NTFP across the country is not also conducive in the context of sustainability of resources (RCDC 2008). Different states have different policies in the context of management of NTFP. When the whole country is talking about conservation and sustainable management of forest resources, Forest Departments should play a vital role in regulating the extraction practices of NTFP though the ownership rights is with others.

9. Ways for an improved inventory and management process

9.1 Research

- Wider applicability of this method in field in the form of action research is further recommended.
- The rare, critical, endangered or threatened species of NTFPs as well as of other species when encountered, special provision of management should be prescribed for those species, and this may necessitate not to follow strictly the prescriptions of the inventory

9.2 Separate guidelines

Optimizing an inventory for a single species is at least conceptually straightforward and it should be possible to develop efficient designs for a range of different types of population distributions and product types based on current best practice.

- Separate guidelines for important species of NTFPs, and also according to different parts used of the species.
- Biomass and yield tables should be prepared for important species.

9.3 Biodiversity consideration

- Biodiversity documentation and subsequent registration process should be established at grass root level through seasonal and periodical inventorying

9.4 Training and awareness program

- Train local resource persons after providing them package training.
- Training to forestry officials needed.
- Curriculum at IOF and forestry colleges need incorporation of NTFP inventory

User friendly option should be provided, provided the resource condition is kept intact and DFO approves it.

9.5 Determination of Sustainable Harvest Levels

This is an key issue, it will make little difference if inventories provide better data if there is no conceptual basis from which to calculate optimal harvesting regimes (Wong , 2002). An alternative approach has been developed for forecasting fruit yields for understorey shrubs based on correlations with antecedent weather conditions and forest condition. Another development is the suggestions that population viability modeling may be a useful way to consider sustainability issues for species where range contraction is taking place . There is a need to test assumptions, evaluate and build on these and others ideas to place NTFP management on a sustainable footing.

9.6 Integrating Local and Scientific Knowledge

People's participation in inventory/ local resource person development. In many cases, local ecological knowledge has been shown to provide important insights into sustainable harvesting practices and there is a need to evaluate and use this information (Yadav 2007). There are several approaches that could perhaps be developed to tackle this problem. The use

of a formal representation of indigenous knowledge for agriculture has been demonstrated to provide a means of storing and examining such information. Local knowledge can also be used to build conceptual models for use as a platform for decision-making as in FLORES.

9.7 Security of inventory, records and events, result

Only in exceptional circumstances, should original field data be copied by hand. If owing to rain, the original field sheet is damaged, a copy must be made immediately. An independent person against the original must check the copy and the two copies attached together. Field forms must be numbered to provide an unambiguous identity and stored in files. Immediately after data collection in the field data should be transferred to the computing centre. The record of events provides an account of general experience gained, especially on the rate of progress and duration at different stages. The inventoried data is presented in the form of results

9.8 More advance knowledge:

Diversity of product and life forms of NTFP makes assessment complex, and requires special considerations in designing site and product specific methods. There is a need to take advantage of knowledge regarding harvesting, assessment and management of NTFP that is fragmented across organizations and people.

9.9 Need of Species Assessment:

Only limited information is available at species level for most of the commercial NTFP and even more limited knowledge exists at ecosystem level. The species specific information is generally lacking for most of the species.

An understanding of the distribution pattern (e.g. clumps, rare, uniform distribution) of the resource will influence the choice of sampling design (i.e. plot distribution). The life form of the resource (e.g. motility, growth form, life cycle) should inform the choice and size of sampling unit (i.e. plot configuration), and the nature of the harvested product (e.g. root, fruit, gall bladder, feather) should determine what is actually measured within the sampling unit or plot (i.e. mensurational technique).

Strategies of NTFPs management (Subedi, 1997)

Management options for improving production of the wild NTFPs

1. No management
2. Controlled harvesting
3. Rotational harvesting
4. Fixed quantity of NTFPs Harvesting
5. Selective harvesting
6. Intensive management.

7. Domestication and cultivation of NTFPs
8. Sustainable harvesting and reducing the losses and wastage
9. Strengthening CFUGs
- 10 Establishing local processing units
- 11 Marketing through co-operatives

10 Conclusions

The diverse geography and climate of Nepal has rendered it a unique land of NTFPs. Some characteristics of NTFPs make their inventory different from other products and benefits. The main challenges in NTFPs inventory and management is due to its unique characteristics, habitat, and seasonal variability. We need to more our effort on NTFPs sector. Lack of sufficient fund, few researches, litter data and information dissemination, inconsistency in published NTFPs inventory guidelines, and lack of technical input from government side are the main issues in NTFPs sector of Nepal. Co-ordination among all concern actors, and bottom –up approach of policy can make NTFPs management more sustainable. It should be better if we open one separate division for management of Non-Timber Forest Products in the Forest Department.

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Annex I

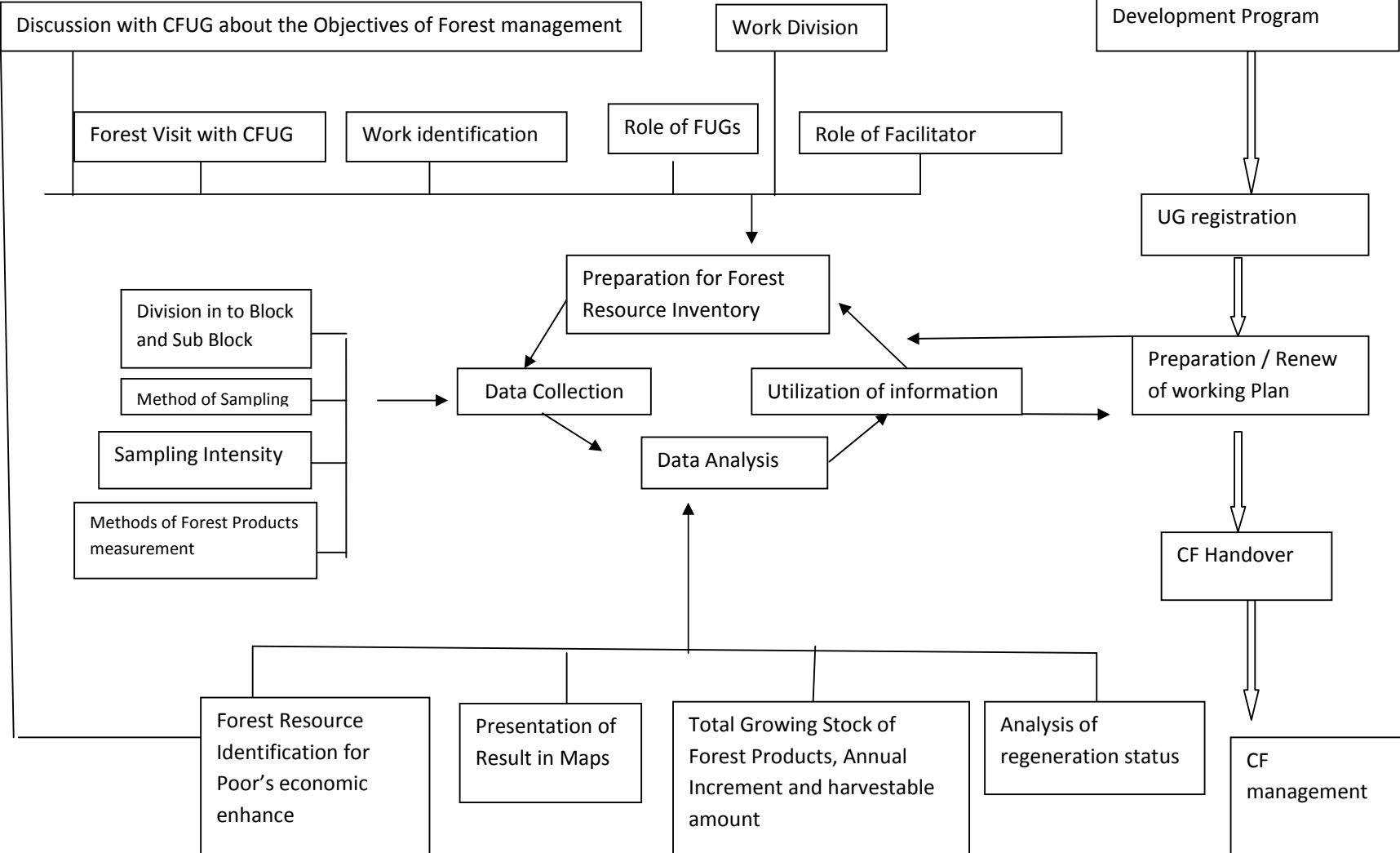


Figure: Steps of Community Forestry Resource Inventory, Source: DOF, 2004