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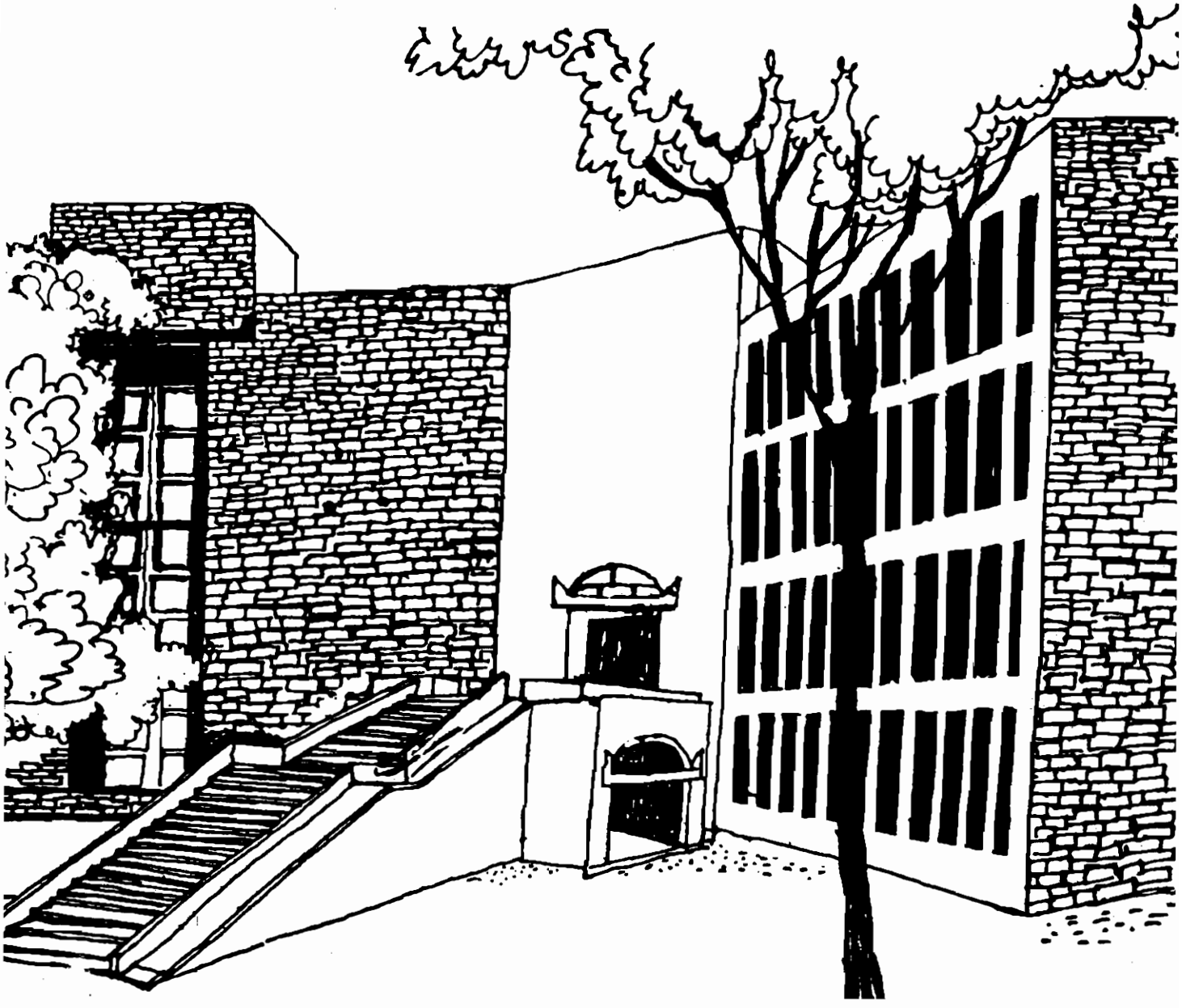

DEVELOPING AND SUSTAINING NONTIMBER FOREST PRODUCTS: SOME POLICY ISSUES AND CONCERNS WITH SPECIAL REFERANCE TO INDIA

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INTRODUCTION

Forest management is a complex process of decision making. Bio-physical ecological cycles, patterns of growth, and successional dynamics of plant and animal communities must be harmonized with cultural, economic and political objectives to maximize certain benefits and outputs. A professional forest manager adjusts management strategies, silvicultural options, regeneration practices, and economic analysis techniques to meet the objectives of the forest owner/s. Since most forests in the world are primarily owned by the state, governments set all objectives based on national demands. As a result, in the past policy-makers, forest economists and foresters have viewed forests primarily as a source of national revenue with timber as the dominant product. This view however is undergoing a radical change. Awareness is now growing of the greater significance of forest values and services other than revenue, of forestry products other than timber, collectively referred to as **nontimber forest products** or NTFPs; and of local needs for these products and services[1].

Communities living in and around forests continue to rely directly upon this wide variety of forest products and services for their daily subsistence needs as well as for economic, religious and cultural sustenance. Most of these forest products have been traditionally collected, processed, consumed and traded by people living in and around forested areas for generations. Ethnobotanical studies demonstrate that tribals and other people with strong ties to the forest can identify hundreds of productive species and how they are used. For example, in India over 3,000 plant species produce economically significant products. They are truly the people's products, and their use and trade are integral components of local economies and culture. As local people's resource and livelihood needs come to the forefront, the forest management strategies will increasingly need to revolve around producing a wide variety of nontimber products and services.

In addition to their religious and cultural functions, forestry outputs can be classified into three general categories of products and services as shown in Figure 1: (1) timber, (2) nontimber, and (3) environmental(see Figure 1). Since these outputs may be jointly produced from the same patch of forest, an air-tight classification is difficult to develop, and they are bound to overlap. In general

timber refers to sawnlogs or 'roundwood' processed into lumber, veneer, plywood, furniture, etc., and poles and pulpwood. Nontimber forest products in the broadest sense include all other tangible outputs including fuel and fodder biomass, bamboo, cane, grasses, fibre, oils, tannins and dyes, gums, resins, medicinal plants, bark, leaves, flowers, fruits, tubers, mushrooms, seeds, mammals, birds, reptiles, fish, and insects[2]. These were previously known as "minor forest products", a term which seriously under-emphasizes their major significance. Environmental outputs are basically intangible in nature and are required for maintaining local or global environmental services[3]; these include soil and water conservation, amelioration of the microclimate, flood control, conservation of biodiversity, sequestering and storing carbon, nutrient cycling, and religious, scenic or outdoor recreation benefits (Hyde et al 1991).

[insert Figure 1 around here]

In the past, studies on timber have preoccupied the scientific forestry literature. Although there are exhaustive ethnobotanical studies which list a wide variety of products, studies of economically useful plants, and scattered regional profiles of NTFP trade, there seems to be a singular lack of hard scientific data on the economics of NTFP management, trade and marketing, on the application of silvicultural regimes to favor different products in simultaneous species mixtures in different forest types, on biological production figures for most NTFP species, and on traditional harvesting and utilization patterns, and the impacts of commercialization and changing patterns of use on NTFP activities. There are a number of possible explanations for why NTFPs have been practically ignored by many foresters, economists, and policymakers. NTFPs were frequently viewed as secondary byproducts of the timber production process and were therefore undervalued by foresters. Furthermore many of these byproducts did not enter into the market economy, and were therefore ignored by economists as well. Botanists and anthropologists usually confined their interest to descriptions of the variety and local uses of long lists of species.

The historical approach taken whenever a nontimber product became obviously valuable has been to nationalize the use of the product, in effect upgrading the product from a "minor" to "major" status, isolating it from the mixture of other nontimber forest products with which it may have been associated. Management strategies have usually involved the creation of a specific working circle focused on the individual product, which has then been contracted either to independent merchant-contractors, or to state corporations, often ensuring that forest communities remain at the lowest rung of the operation as daily wage laborers employed as collectors. Most development activities aimed at

NTFPs in the past have failed to understand many of the features which make them attractive in the first place. These efforts have invariably focused on single products, tried to elevate them to the level of a primary source of income, often attempted to grow the product in a monoculture out of the forest, and usually neglected traditional patterns of collection and employment - often at the expense of the women and low income groups who originally benefitted from NTFPs.

Need for Management of NTFPs

It is now increasingly felt that management and development of NTFP resources is essential for various reasons:

First, managing forests for nontimber forest products (NTFPs) may be more sustainable from ecological, economic and social perspectives. In contrast to timber harvesting regimes, many NTFP activities involve the non-destructive harvesting of annually renewable plant parts. Provided extraction rates do not exceed the maximum sustainable yield (MSY), harvesting forests primarily for NTFPs may be relatively benign and ecologically sustainable activity. Tribal communities have been involved in NTFP utilization for centuries. The nature-managed forests for production of NTFPs implies a greater biodiversity of both plant and animal species, and thereby increasing the chances for their preservation too.

Second, NTFPs are vitally important for livelihood to a large and poor population in tropical countries. For example nearly 500 million people living in and around forests in India rely on NTFPs for their sustenance (World Resources Institute 1990)[4]; and, they provide a good amount of supplemental incomes to these people. Also since NTFPs involve a large variety of seasonal products, returns are periodic and relatively continuous, when compared to long rotation timber crops, which helps the cashflow problems of the people. For example, in West Midnapore district in West Bengal many village communities derive as much as 17% of their annual household incomes from NTFPs (Malhotra et al 1991). Other estimates suggest that some 35% of the income of a tribal households in India comes from sale of NTFPs[5]. Moreover, there lies a large scope for increasing the employment opportunities for these people by processing NTFPs locally. For example small-scale forest based enterprises, many of them based on NTFPs, provide up to 50% of income for 20 to 30% of the rural labor force in India (Campbell, 1988). Interestingly enough, the large potential for increasing the NTFP-based processing industries exists in the country. For example, nearly 328 families of flowering plants of NTFPs (with 21000 species) out of 425 families in the whole world occur in India (Tewari

1991); and, over 50% of forest revenues and 70% of forest export incomes accrue from NTFPs (Gupta and Guleria 1982).

Third, in addition to subsistence and income generating potential, NTFPs also provide food security to large low-income populations, particularly during droughts or famines (FAO 1989) and generate more equitable distribution of forestry benefits, within communities and families. This is particularly true for women who are the major collectors of NTFPs. It has been also noted that women have a much better record of reinvesting incomes into families than men[6].

The major problem with NTFPs is the scanty literature spread across a number of institutions and difficult to access. In the last few years since 1988, when the International Timber Organization (ITTO) called for the rigorous study of nontimber forest products, there has been a spurt of interest; and, several studies have brought out various concerns for policy makers. For example, some studies have looked at valuation issues (Peters et al 1989, de Beer and McDermot 1989, Schwartzman 1989, Padoch and de Jong 1989, Campbell 1988, Malhotra et al, 1991). Wickens (1991) has reviewed the issues related to the development of NTFPs. Richards (1992) has raised serious concerns about the viability of commercializing NTFPs as "eco-protection enterprises". May (1991) has studied the role of institutions in the NTFP markets in Brazilian Amazon. Campbell (1991 a,b) has analyzed problems of value addition and organizational management in Southeast and Farcast Asia. In India pioneering work has been done by Gupta and Guleria (1982), and more recently a number of site specific studies have been undertaken through the Joint Forest Management research network, including the very thorough study in the Jamboni range by Malhotra et al (1991). In addition, several case studies in NTFP management in Southeast and Farcast Asia are available and many are in the offing stage.

Although several studies on NTFPs are now coming up and dealing with various issues of NTFP management, a comprehensive understanding of policy issues and concerns is lacking. Knowledge of these policy issues and concerns is hence essential for developing future policies and guidelines for developing the NTFP-based forest management. This knowledge would be an useful input to both policymakers in government sector and forest economists and foresters in general. In this paper an attempt is made to highlight some of the broad policy issues and concerns related to NTFPs exploitation and their management with special reference to India. For convenience, four broad areas of importance are treated: (1) valuation issues, (ii) value addition issues, (iii) benefit sharing and government intervention issues, and, (iv) sociocultural and extraction management issues. All of these

issues are intricately interwoven and discussion of one is impossible without the other. Finally some guidelines are suggested for the development and management NTFPs in general.

VALUATION ISSUES

The valuation of non timber forest products is an essential step in determining the relative importance and potential of different products and their uses. Valuation involves addressing the following types of questions:

(i) What is the economic value of NTFPs in the local, state and national forest economy and why is it useful to assign economic value to them?

(ii) What methods should be used to determine economic values of NTFPs and what sort of problems arise in doing so?

(iii) Is the concept of economic value sufficient to capture the potential usefulness of NTPFs to the society at large?

The economic value of NTFPs in the local, state and national forest economies is now being estimated around the globe. Until recently the economic value of NTFPs has been assumed to mirror their label as "minor forest products". As mentioned earlier this may have been the result of pre-occupation with timber based revenues, and because of the fact that large proportion of NTFPs did not enter the formal markets[7]. It is, however, now becoming increasingly clear worldwide that the contribution of NTFPs to forestry sector in most countries is significant and is more than what has been presumed in the past. For example, in the Indian forest economy NTFPs occupy as large a place as timber as evident from the following (based on Gupta and Guleria 1982 unless otherwise stated):

> About 40% of revenues and 55% of employment in the Indian forestry sector is attributed to NTFPs.
>
> Growth of revenues from NTFPs has been faster than from timber in the past. For example, compound growth rates in revenues from NTFPs and timber during the 1968/69-1976/77 period were respectively 15.1 and 10.8% -- the former being 40% higher than the latter.

- Export earnings from NTFPs on the average account for about 60-70% of the total export earnings from forest products. In fact, the proportion of NTFPs in total export earnings from forestry products has been rising, along with rising exports of NTFPs in quantity terms.

- Further, current production of most NTFPs is only about 60% of the potential production. In the case of non-edible fibers and flowers, current production is only 7 and 12% of the potential production[8].

- During 1983-87 period, the value added from NTFPs, in the 1980-81 prices, to the forestry output was about 75% (based on data from Central Statistical Organization, 1990).

- The carrying capacity of India's forest in regard to grazing is estimated to be about 31 million cattle units -- that is some 730 kilogram fodder per cattle unit/year is available to adequately sustain the animal. Putting this resource service in terms of money the figures come around Rs 22 billion (Lal, 1989).

- Based on the study of 10 forest protection committees under Joint Forest Management (JFM) Program, it was found that the income from NTFPs ranges from Rs.234 to Rs.5569 per hectare with a mean of Rs. 2299 as opposed to income of Rs 1600 from sale of timber per hectare annual yield as estimated by Forest Department (Malhotra et al 1991).

- In Madhya Pradesh, the NTFPs which are primarily collected by tribal women are worth more than $700 million annually (World Watch 1991).

The significance of NTFPs in other economies of the world is also not less. For example, in 1976 the NTFPs comprised some 86% of both production and value of total forest produce in the Republic of Korea (computed from FAO, 1989, p.51). In the Northwest Frontier Province of Pakistan, every year about 35 tons of black dried mushrooms, in addition to several other NTFPs such as honey, herbs, etc., are harvested which are worth more than 1 million US dollars; in addition to this income, some 70 thousand persons are employed during the season in collection of various NTFPs such as

mushrooms, honey, leaves of dwarf palm, mulberry leaves etc (Iqbal 1991). Olsson (1991) confirms the significant value of NTFPs in subsistence and sociocultural life of peoples in the south pacific country of Vanuatu. Similarly Rattan exports from Indonesia are worth some US$ 90 million per year (Cornelius, 1984). Interesting to note that the total exports of NTFPs from Indonesia have increased from US$ 28 million in 1973 to US$ 200 million in 1982--an increase of 614% (Gillis 1986). According to estimates by World Watch (1991), Southeast Asia's rattan trade is worth more than $ 3 billion a year.

In Sudan, fuelwood is used by some 75% of the population and accounts for 82% the total energy consumption in the country (Badi et al 1980). In Nigeria, Okafor (1979) reported that the income earned per day from palm wine production exceeded the Nigerian daily minimum wage (2.3 Naira/day). A recent study by Medelsohn and Balick quoted in June 92 issue of International Society for Ecological Economics (ISSE) suggests that the medicinal use of forest products yields higher value to society than timber or prime plantations in Belize. Similarly in the coniferous forests of Canada, there grows a variety of berries and edible fungi which contribute greatly to the tribals' food balance sheet (Peirse 1968). Forests also contribute greatly to the household diet; for example some 300 million cultivators worldwide depend upon the forests for food; and, millions in Southeast Asia are dependent upon fish supplies supported by forest vegetation, and so on (FAO 1989). According to World Watch (1991), Brazil earned about $20 million from export of palm heart and brazil nuts and exports of honey from forest bees are estimated to be several times more than the value of timber produced in Tanzania. Several other studies have also confirmed the large scale income and employment generating potential of NTFPs across different regions of the world (IDRC 1980, Weinstcock 1983, Connelly 1985, Endicott 1980, FAO 1989, Lasschuit and Van Erd 1983). Peters et al (1989) have showed that a hectare of Amazonian forest managed for NTFPs can perennially yield better economic returns than a comparable area from which only timber is extracted.

Thus, as more evidence on NTFPs' contribution to the economy is being gathered worldwide, the need for more accurate valuation of NTFPs is also being felt so that resource managers and policy analysts can assess alternative uses of forests. By understanding the current and potential economic values and magnitudes of timber and nontimber forest products, foresters and local communities can decide upon the most appropriate mix of these products (Godoy 1992)[9]. Also, appropriately valued NTFPs can enable foresters to claim scarce public resources with justification from public budget.

However, economic valuation of NTFPs becomes difficult for several reasons. For example, large proportion of NTFPs still does not enter into the market and is locally consumed by producers/collectors. NTFPs are collected by a large numbers of people, especially women and children, during different seasons and often as part of another activity like fuelwood gathering or fodder collection. Furthermore different products are collected from different parts of the village-forest ecosystem, making it difficult to develop values on the basis of clearly demarcated area. Accurate knowledge about NTFP extraction rates, and use patterns which vary with time, species, location, and socioeconomic conditions of the producers, is very limited and difficult to collect with accuracy.

In the past, inadequate attention has been given to NTFP valuation work. Some serious work has just begun, though confronted by some major problems. There are three major problems with current efforts in the valuation of NTFPs as pointed out by Godoy and Lubowski (1992). One, based on the past reviews of studies, mostly from Latin America, they have found a large variation in the values of NTFPs, ranging from zero to US$ 420/ha/annum. Even after factoring in differences due to ecological and climatic conditions, one of the major causes for this variation was the difference in methodologies applied by researchers. This variation leads to non-comparability of results across studies. Two, the NTFP valuation studies in the past have ignored the value of animals or wildlife; the complete valuation of NTFPs must consider hence both fauna and flora of the forest. Three, very little is known about the future values of NTFPs and their sustainability as data on sustainable extraction rates of different products over time are a very difficult thing to obtain. Also, without good inventory data on growth rates, distribution and density of different components of the forest ecosystem along with matching data on extraction rates (the flow) per unit of area, it is almost impossible to decide whether a given practice is sustainable in the long run or not[10].

The net economic value V_i of NTFPs is estimated as equal to the total value of NTFP items (price P_i times quantity Q_i) minus their total costs C_i of extraction, or

$$V_i = \Sigma P_i Q_i - C_i \qquad \ldots. (1)$$

where i = 1,...,N NTFP items. Thus, estimation of net values requires (1) knowledge of NTFP prices P_i, (2) their quantities or extraction rates Q_i,[11] and (iii) quantities and prices of inputs such as labor and capital used for extraction so as to estimate the cost of production or collection C_i. Since price for a given NTFP item is location-specific and varies with place and country, the economic values would automatically be changing, and to a great extent depend upon the degree of market development for

that particular NTFP item. When market prices of NTFPs are not available, they have to be imputed using the opportunity cost principle[12].

Recent work on the use of participatory rural appraisal (PRA) methodologies to assess NTFP use and assign values is summarized in two Field Methods Manuals edited by Poffenberger et al (1992 [a] and [b]). This involves community members actively in the process of measuring and valuing NTFPs. It also introduces a number of methods to indicate relative value, or priority ranking of different products used predominantly within the household or village which remain non-monetized, and those with a clear market value.

We know that the notion of economic value basically comes from the neoclassical model of exchange in which price is determined by the interaction of demand and supply; here, price just reflects scarcity in terms of what is available and what is wanted. Thus, one major bottleneck in using current price as indicator of economic value is that it cannot reflect potential uses of the NTFPs which can arise in the future should patterns of consumption, tastes and preferences of consumers, and technology to harness NTFPs change. For example, up until recently the useful value of NTFPs coming from Neem tree (**Azardirachta indica**) was not understood by Western multinational companies (Wahlberg 1990); as a result the Neem NTFPs prices were much lower and quantities harvested were locally consumed. But recent scientific experiments have revealed, what local users already knew, that Neem NTFPs can have several medicinal and other insecticidal uses[13]. This is likely to increase demand for and the price of Neem-based NTFPs in the future[14].

Similarly some 30 different nontimber forest products from Amazona have foreign commercial potential (Clay 1989); but many NTFPs, possibly in hundreds and which are locally consumed, are not known to science and potential consumers (Browder 1992). In the Amazon forest of Brazil, only 200 out of 30,000 plant species have been assessed for their potential role in the industry (Mors and Rizzini 1966)[15].

The same is true for many other plant species whose uses and benefits are still unknown or under-appreciated. An intensive study of plant species and their potential usefulness is the need of the hour. Perhaps, to begin with a detailed inventory should be prepared. The growing interest in finding plants with potentially important chemical compounds for medicinal purposes will uncover many new NTFPs. The new knowledge about the uses of NTFPs would finally enhance their demand as well as prices. Therefore the current economic value may simply understate the potential usefulness of

NTFPs. In some cases the reverse may also be true as some NTFPs may lose their market value in the face of product substitution.

Whether current economic value alone should be used for allocation of scarce resources is also a debatable question as this may not reflect the indirect benefits/costs and hence their full worth to the society at large. The indirect benefits from NTFPs are of greater significance in a poorer country like India where a large population subsists on NTFPs (Jodha 1986). Also NTFPs works as an insurance against any famine or crop failures. One alternative for capturing the indirect benefits/costs of NTFPs could be to apply the social benefit-cost analysis (SBCA). This would involve arriving at some estimates of potential benefits to society under different hypothetical scenarios of prices, extraction rates, and input use patterns which might reflect possible future changes in consumption patterns and technology to harness NTFPs and their derivatives.

Although the above social value used in a dynamic sense is a much better concept, compared to current direct economic value, to evaluate the usefulness of NTFPs, it is fraught with dangers of commoditization and intergenerational inequity[16]. Perhaps villagers in developing countries undervalue forests for lack of knowledge about the NTFP and environmental services or fears of taxation etc (Bawa 1992). It is hence important to emphasize that the ecological functions of NTFPs in maintenance of flora and fauna, wildlife, and other parts of the ecosystem also need to be considered while valuing them. This is particularly important if the resource in question is in a potential danger of extinction and under this situation it will be an irreversible loss. Thus current value alone is not sufficient but potential values of NTFP which also take care of their ecological function need to be estimated so as to accord greater efforts for forest protection in order to conserve biodiversity of NTFPs. Perhaps, an alternative concept may be required which would strike a balance between economics and ecology to derive a just valuation of NTFPs.

VALUE ADDITION ISSUES

NTFPs are collected by the rural poors mostly by indigenous tribals who live in or near forest, providing both subsistence and income. The welfare of these communities depends to a great extent upon what prices they can receive for NTFPs. Since NTFPs are transported in raw form to distant market/ collection points, transportation cost becomes expensive which reduces net price to NTFP collectors. Also most NTFP collectors have very little knowledge of and access to improved processing and packaging technologies, this gives high margins to middlemen (Poffenberger et al 1990). Value addition at the local level or within natural setting of people would hence likely to give higher net

price to local collectors and likely to be more successful from cultural viewpoint of indigenous population[17].

It is generally argued that the contribution of NTFPs to the local economy can be enhanced by making value addition to locally produced/collected NTFPs through forest-based small scale enterprises (FBSSE). Processing adds a considerable value to the raw NTFPs. For example, from the West Bengal experience it has been noted that sal leaves gain in value when stitched into plates and pressed with polytene inserts by a factor of ten; in the absence of value addition, the villages sell raw products at 5 to 20% of the market price (Poffenberger et al, 1990, p.27). Cashman (1987) found that palm oil processing--a small-scale enterprise among various income earning activities such as selling cola nut, fruits, vegetables, meat and fish, palm oil, maize, locust bean processing, and soap making was the most profitable activity in Southwestern Nigeria. In addition many NTFPs show promise of large amount of foreign exchange earning through value addition. For example, the value of rattan re-exported from Hong Kong was found to be 17 times higher than the price of raw rattan exported from Indonesia (Business News 10/21/1981). The FBSSEs are thus considered to be better for value addition for their efficient handling of collection, processing and marketing of NTFPs, as opposed to the large-scale enterprises which in general do not meet the efficiency criteria.

In the collection and processing of NTFPs, the large scale enterprises do not have comparative advantages due to their high private cost of collection and processing; and, at the same time they do cause large environmental costs to the society as well (Campbell 1991 [a]). This is because the NTFP resources are scattered and hard to reach, thus mass extraction and transfer costs are high and extraction of NTFPs is less likely to be on sustainable basis. The FBSSEs are run by local indigenous people who gather or collect NTFPs, as part of their livelihood strategies, ensuring the extraction of NTFPs on sustainable basis. The major objective of FBSSEs is hence to provide a steady or supplemental income and help meet subsistence needs of the indigenous people over the long run. In contrast, large enterprises are interested in short-run profit maximization and may have less or no concerns for the sustainable extraction of NTFPs. Although theoretically one can argue that, if people are involved in the decision-making process and have clear tenurial and usuary rights, the large companies may be sustainable. But it is less likely to happen because of their minimum scale of output required to break-even and the greater propensity to move in and out of the market. The minimum scale of output which requires some minimum raw-materials of NTFPs to break-even; of this minimum size of output itself is very large when compared with the total supplies of NTFPs--the fact which dwindles supplies of NTFPs very fast and may destroy the renewing capacity of forests.

Their large mobility potential also mitigates against sustainable production. As opposed to large organizations, NTFP-gatherers may be less inclined to move to other occupations and can operate with small outputs to extract NTFPs without destroying the long-run renewable capacity of forests. For example, indigenous rattan collectors in Indonesia have been collecting and processing raw rattan out of dense local rainforests for hundreds of years to feed growing nontimber industry in Indonesia (Campbell, 1991 [a], p.88). Similarly sal-leaf pluckers in West Bengal and Madhya Pradesh are assessed to know the art of sustainable leaf plucking and a study has found it a sustainable practice indeed (Deb 1990). It has been also observed that women are more concerned about the sustainability of leaf production than men; for example, women are found to pluck leaves only, not to break twigs, so as to preserve the leaf renewal capacity of tree[18].

Small-scale enterprises are also found to be more efficient in serving local markets, in particular when certain market infrastructures such as roads and other fast communication channels are absent. Under these circumstances, small-scale enterprises are found to be doing well as they have cheaper means of accessing market information and can quickly respond to the demand signals received from the immediate larger processing or manufacturing units. For example, small-scale splint and veneer producing enterprises in southern India provide a reliable supply of intermediate goods to thousands of small match making enterprises scattered within the region. The sal leaf plate making household industry in West Bengal is mainly run by women and is found to be meeting demand very cost-effectively (Dutta and Adhikari 1991); and, of the total income from NTFPs to households, about 40% is attributed to sale of sal leaf plates (computed from data from Malhotra and Poffenberger, 1989, p.41). The wood carvers and rattan craftspersons in Central Java are able to claim a large market share which large mechanized furniture factories could not do (Campbell, 1991 [a], p.88). This, however, does not mean that FBSSEs have a competitive advantage over large scale enterprises all the time and everywhere, or that processing will necessarily be more profitable than merely collecting and selling raw materials. For example, the traditional umbrella making industry in Indonesia has become less viable against cheaper, factory-produced plastic substitutes from Taiwan over several decades. Many NTFPs have been marginalized by chemical and synthetic substitutes, and this potential threat may exist for any NTFP item.

Case studies from India, Indonesia and Latin American and African countries on NTFP-based activities, in general, reveal that FBSSEs have some common characteristics and constraints. The common characteristics are that they are small in size and based in the household; they are frequently

seasonal in nature providing important labor employment opportunities and supplementary incomes; they are labor-intensive and based on simple technologies. In addition, they have low-capital requirements and provide direct benefits to the local economy; and, perhaps most importantly, they are accessible to low income and socially disadvantaged groups and are most often managed by women (Campbell 1991 [a]; FAO 1987). Like common characteristics, they face some common constraints too. Knowledge of these constraints is necessary to improve the functioning of these FBSSEs to make value addition more amenable to the welfare of local rural people. Broadly speaking, these constraints can be classified into six categories (Campbell 1991 [a]; FAO 1987): (1) diminishing supplies of NTFPs; (2) problems with access to institutional finance and lack of tax incentives; (3) highly risky market environments and poor infrastructural support systems; (4) income-sharing problems; (5) poor management capabilities, (6) poor availability of appropriate technology and skills. The knowledge of these constraints is equally desirable for improving the functioning of FBSSEs so as to make value addition more amenable to the welfare of local rural people.

As the demand for the forest-based products is rapidly rising, the pressure on increasingly degraded forests in terms of extraction of NTFPs is also increasing despite the untapped large production potential of NTFPs. This raises serious questions regarding sustainability, particularly when an informal and part time activity is given the status of a more formal, market oriented enterprise, competing with major forest products. For example, the Indian match industry is increasingly finding it difficult to meet raw-material demand as pressure for meeting fuelwood needs is also severe. Similarly, rattan collectors in Indonesia find themselves helpless in fighting against large timber extracting companies which destroy the NTFP resource base. The long-run survival of FBSSEs depends on well-balanced management plans which limit removals to the annual increment and regeneration strategies which increase production rates. NTFPs must make up one component of any strategy to maximize benefits from forest management for local communities. To the extent that a mixture of low intensity timber extraction can be combined with NTFP management, the over all economic package may be optimized, and risk more evenly shared.

The other problem faced by FBSSEs is the problem of access to institutional finance and lack of tax incentives. Although investment requirements for these enterprises is small, the rural poors have very few assets to keep as collateral--a prerequisite for getting loans from any institutional sources of finance. Tax incentives are also an important policy instrument to promote small-scale enterprises. Wherever easy access to finance has been made available and tax incentives are given results have

been successful. For example, the small scale sector of match industry in India has been very successful on account of the government's tax incentive policies.

Markets faced by small-scale enterprises are often small and uncertain. FBSSEs need to be diversified, or swings in market demand can destroy their existence for they have very little risk-bearing capacity. Despite instability in demand, they face competition from international markets and the manufacturing sector in terms of innovating and producing substitutes. Adaptability to new market situations and diversification of activities is therefore essential for improving the risk-taking capacity of these enterprises. For example, due to its adaptability the carved wooden furniture industry in Indonesia has been able to recognize new demands and new designs and has survived. On the other had, the traditional umbrella and clog industries in Indonesia has given way to plastic substitutes. Most FBSSEs depend upon government for infrastructural support and perhaps survival to a great extent. For example, the Indian match industry has benefitted a lot from the government support, whereas Indonesian furniture handicrafts from rattan and wood have gained from easy access to loans and worker training facilities.

Income sharing within FBSSEs depends upon who owns them. For example, ownership of medium match factories in India is concentrated in the hands of 18 families who hire women and underaged children at wage levels well below those given to adult males (Campbell 1991 [a]); and, lack of institutional support from government simply forces this exploitation to continue. Generally, the NTFP gatherers' share in the consumer's rupee is very small; large shares go to the first or second stage processors in urban areas. Under these circumstances it becomes questionable whether FBSSEs are the appropriate organizations to increase the well-being of the rural poors. Ownership alone is not sufficient to explain the lopsided income-sharing; instead the large numbers of intermediaries who charge high market margins reduce the share of NTFP-collectors in the consumer's rupee. The share of NTFP-gatherers in the total market value of NTFP can be increased by checking the exploitation by intermediaries and by increasing extraction management efficiency through improved harvesting, storage, transport, processing, and manufacturing of NTFPs (Wickens 1991).

The poor management capabilities of FBSSEs generally results into their failure, upto 80% of small enterprises go out of business within five years due to poor management (FAO 1987). The major reason for failure is that most times FBBSEs are run by one person as owner-cum-manager who has to deal single handedly with all activities ranging from creation of enterprise, identification and procurement of inputs, organization of production, finding markets and then marketing, planning future

course of action, etc. In a nutshell, he has to fulfill the jobs of both manager and workers. Unlike large organization, the FBSSEs do not have hard market data and planning very much rests on intuition and casual understanding of market factors. Furthermore, management problems vary with the size country, culture, etc.

A variety of technology is needed for FBSSEs depending upon the type of production: craft, cottage, and small manufacturing (El-Namaki, 1987). The technology needed for craft production is simple tools while cottage and small manufacturing need comparatively higher level of technological sophistication. The other interesting feature of technology is that a large number of FBSSEs (up to 10 workers) do not use any machines, whether powered or non-powered (FAO 1987). As a result the labor productivity in these industries is very low, this fact in the long run impedes the growth of FBSSEs. Thus, there is a need for development of appropriate technology and related human skills required for running FBSSEs.

Apart from processing possibilities, a better understanding is needed of the marketing chains which govern the NTFP trade and the value added at each link. The role of collection agents, contractors, middlemen, transporters, wholesalers and retailers needs to be analyzed for each NTFP in order to determine points of entry where value added could be enhanced at a local level. There is very little work done in this respect hence much efforts are required in this direction.

As NTFPs are given more commercial emphasis, as markets are expanded and efforts made to increase local processing capacity to try and capture the value-added benefits, the pressure on the resource base increases, and traditional patterns of management, income distribution and the division of labor can be disrupted (Campbell, 1991 [a] and [b]). In Karnataka studies by the Indian Social Studies Trust showed how increased commercialization of one product and improved technologies applied to another both negatively affected the predominant user group in each case: women. As men saw greater value attached and felt attracted by new, more mechanized technology, women were marginalized (Campbell, 1991 [b]). A similar story can be heard from Raigarh village of West Bengal, India (Ramakrishna Mission Lokashiksha Parishad 1992). About 6-7 years ago the NTFP collection was a low-key activity, mainly done by women in the Raigarh village. But, after the introduction of joint forest management program under Ford Foundation there has been a change of roles; that is, since NTFP collection has now become a major activity for some families, men have taken over women's employment.

It is therefore extremely important that local communities, non-governmental organizations (NGOs) and forest departments intending to support the management of forests for nontimber forest products and the development of enterprises based on these products undertake active research to understand the ecological functions of these products, the nature of their traditional management and access to resources, the current trade, the potential for value-addition through small-scale processing, storage, and marketing activities, access to credit and finance, entrepreneurial and technical training and the impacts of increased extraction and commercialization, and on women's priorities.

BENEFIT SHARING AND GOVERNMENT INTERVENTION ISSUES

NTFPs offer considerable potential to supplement incomes and improve livelihoods for the large rural population, many of them indigenous tribal people who are dependent upon these products. But there are serious issues that need to be considered relating to equitable access to the resources in the first place and to the opportunities for obtaining the greatest benefit in the collection-processing-marketing stages. In practice the success of NTFP based activities depends upon the clarity of policies and legal instruments which enable them and the type of institutions created to manage them. People need to have clearly drafted rights to all stages of NTFP based processes, which resolve the complex of uncertainty about historical and nastier rights versus new rights to these resources. And these rights need to be communicated to local people, and implementing field officers of relevant government departments so that there is no room for ambiguity. The charge of institutions in carrying out new tasks as result of new legalization process hence becomes crucial. Recent state level resolutions supporting joint forest management treat access to and management of NTFPs differently; NTFPs and timbers are raised through community based institutions. Some 10 provinces have adopted the JFM program so far.

A very good example of an inappropriate policy and institutional response can be seen in the government intervention in the Indian NTFP industry. In order to fully tap the production and employment of the forestry sector in India, the Government of India (GOI) set up the Forest Development Corporations (FDCs) in 1976, on the recommendation of National Commission on Agriculture (NCA). One of the major objective of the FDCs was to help tribal NTFP collectors by eliminating the large profit margins pocketed by local middlemen and pass these benefits to tribal people in terms of better wages and working conditions. Invariably, in each state one such FDC was set up. In addition, several government supported co-operatives were also established. But the functioning of these was detrimental to the interest of tribals and these organizations were not at all

cost effective. As a result, tribals received as little as 10% to 40% of the sale price in the nearest NTFP market (Chambers et al, 1990, p.152).

Furthermore some states went ahead with the nationalization of many NTFP products while others acquired monopoly rights to them[19]. For example, Madhya Pradesh nationalized timber, bamboo, khair, sal seeds, harra, gums, tendu leaves, etc. The effect of nationalization was to make tribals sell their produce to the Forest Department exclusively or their agent contractors appointed formally and informally by them. The people employed in the FDCs and Forest Department were not necessarily selected based on their concerns for tribal welfare[20]. Tribals identified the government intervention as threat to their survival and cultural identity. This accentuated tribal feelings of conflict against the Forest Department, leading to covert noncooperation and sometimes overt aggression against officials of Forest Department[21].

The overall effect of government intervention was not conducive to enhancing tribal welfare beyond the level of collectors. The government did experience increased revenues. Production levels of some of NTFPs before and after nationalization are given in Table 1. Large declines occurred in most NTFP production levels, ranging from 2% to 70% of the prenationalized production level, as evident from Table 1. In some cases, production simply stagnated.

Chambers et. al (1990) argue that nationalization, among other factors, was the primary reason for this decline in the production of NTFPs in India. In spite of its good intentions nationalization became a disincentive to NTFP gatherers/collectors as summarized below (Chambers et. al., 1990, p.149):

> "Nationalization reduces the number of legal buyers, chokes the free flow of goods, and delays payments to gatherers, as government agencies find it difficult to make prompt payment. This results in contractors entering from the back door, but they must now operate with higher margins required to cover uncertain and delayed payments by government agencies, as well as to make the police and other authorities ignore their illegal activities. This all reduces tribals' collection and incomes."

Other example of well-intentioned government intervention is banning rattan exports from Borneo, Indonesia. The effects of this ban has been phenomenal on the smallholder palm cultivators.

The ban depressed the farmgate prices of raw rattan by about 40% and people have switched to alternative crops, finally reducing rural incomes (Safran and Godoy, 1992).

It is worthwhile to note the good intentions of government in introducing interventions in the NTFP industry. In India it was primarily done to safeguard the tribals against the exploitation by middlemen. In Indonesia, it is primarily done in expectation of raising foreign exchange earnings by promoting domestic processing. But things did not work out the way choices of policy instrument were made. We cannot however argue that government intervention is always bad. In fact, it may be required many a time and there are some positive effects associated with it. For example some positive socioeconomic effects of government intervention in India, though they never outweighed the economic losses, were in terms of raising local awareness of tribals about the NTFP markets and values. Large tribal population started understanding the economic value of their labor. The NTFPs which they once sold for a pinch of sal were sold after intervention at premium prices. The Indian government also introduced Agmark-grading of NTFPs, the forest which brought quality consciousness to tribals. Thus it was a very good educative experience for tribals.

Perhaps, there is a need fo less and less government intervention in the NTFP business and trade as well, like every other sector. Government's role could be limited to providing clear policies and enabling legislation, infrastructural and technical support and law and order services. Government may provide price supports for NTFPs but let the tree market work like that in the agriculture sector. With or without government interventions, conflicts over decreasing NTFP resources are already increasing and mechanisms need to be evolved to help all stakeholders address these conflicts.

SOCIOCULTURAL AND EXTRACTION MANAGEMENT ISSUES

A large number of NTFP gatherers are tribal populations who have a distinct culture different from the mainstream. Forests have been an integral part of tribal lifestyles, and some groups and individuals still possess a vast store of indigenous knowledge concerning NTFPs. Historically when forests were in abundance and operational restrictions were less and markets for NTFPs were non-existent, NTFPs may have been primarily harvested for subsistence and barter trade. However, new uses of NTFP are being discovered, the pressure on forests for extraction has been increasing and rapid monetization is taking place. Furthermore, ownership and access to NTFPs has been gradually eroded from local communities, making it easier to overexploit a resource that has become completely open in access.

Within this new changing scenario tribal populations and other rural people have to learn to respond to new market forces to which they have not been accustomed. The lack of these skills creates room for their exploitation through middlemen, contractors, police, bureaucrats, etc. Sociocultural factors have considerable influence on the way in which tribals and other groups respond to new economic situations/opportunities. For example, ethnicity has been found to play an important role in deciding the role of tribal person in NTFP trade in Indonesia (Campbell, 1991, p.91). In East Kalimantan in Indonesia, Dayaks and Kenya tribal people collect rattan--a NTFP--while Buges and Muslims are small-scale businessmen who sell rattan to Chinese exporters/processors. Like ethnicity, gender also plays an important role in the collection of NTFPs; for example tribal women form the major proportion of NTFP collecting labor force in India (Kaur 1990, Khare 1990) and because of the prevalent gender bias in the society they are not entrusted with managerial responsibilities in FBSSEs. Women along with children bear the brunt of mismanagement as they are the poorest participants in this business.

It is true that rapid monetization of NTFPs has improved profits from this trade but has also caused harm to environment as well due to indiscriminate extraction practices. Human resource plays important role in extraction of NTFPs. Many unsustainable extraction practices persist due to sheer ignorance and lack of training in this respect to the people who extract NTFPs. For example, prices of chironji seeds (***Buchanania lanzan/latifolia***) or Cuddapah almond, used as substitute for almond in various delicacies, have increased more than 150 times or so within a span of five years in India. Many tribals hence prematurely harvest Chironji fruits and overexploiting them to the extent that natural regeneration is now being hampered, specially in the province of Madhya Pradesh. Similarly the faulty procedure of collecting Mahua flowers (as the collectors break the apical twigs which affect flowering in the following year) in one of the village studies in the West Bengal was found to do considerable damage to the natural resource stock (Ramakrishna Mission Lokashiksha Parishad 1992)[22]. In Central India, Mahua forests are burnt repeatedly in order to harvest petals--this kills the regeneration. As a result, young Mahua trees are getting scarce and some suggest that it would be extinct by 2200 AD (Wastelands News, 1992, p.2).

Similarly indiscriminate collection of raw materials from forests for the incense sticks (agarbatti) industry in the southern province of India-- Karnataka--has virtually created environmental chaos in some areas. Two examples out of many in the state are extensive loss of gulmavu (***Machilus macarantha***) trees in Coorg and Malanad districts due to departing of the trees and of species like ***Ailanthus malabarica*** (halmaddi) and ***Borewellia serrota*** due to unscientific exploitation

(Parameswarappa, 1992). Similarly, indiscriminate felling of and collection of NTFPs from uppage trees in Karnataka are resulting into tremendous losses and very soon cross the disaster line. Examples of this sort abound elsewhere in the world.

What is needed is the systematic extraction of NTFPs without affecting the sustainability of production. That is, a balance between the extraction (ER) and regeneration rates (RR) has to be struck so as to maintain flow of production from the given stock of forest resources of the country, i.e,

$$ER \rightleftharpoons RR \Rightarrow \text{Sustainable Productivity}$$

Since use and significance of NTFP is highly dependent upon the local economic, ecological and sociocultural traditions (Wickens 1991), sustainability cannot be ensured without taking into account the socio-economic aspects into management of NTFPs and for that matter the whole forestry sector. The cultural traditions of tribals are found most of the time eco-friendly but necessarily always; there are multiple reasons for ensuring the maintenance of this cultural traditions (Kerr 1991). Case studies are required to bring out such location-specific and cultural details.

In some quarters, it is also proposed that joint management of NTFPs and timber can ensure sustainable extraction rates of both timber and nontimber products (Caldecott 1988); utilization of forests only for wood production is expected to seriously diminish many other nontimber and environmental values of the tropical moist forest (Davidson 1985). Hypotheses of this sort need to be examined and tested. Some experiments in this regard under the joint forest management programs in India have shown promising results (Anonymous 1992). Extraction management would also be influenced by the stage of economic development. Godoy et al (1992) hypothesize that as economies develop and grow the value of NTFP/ha increases, people's knowledge of plants animals in the forest decreases, non-local demand for NTFP increases leading to unsustainable extraction of NTFPs.

CONCLUSIONS AND GUIDELINES FOR DEVELOPMENT OF NTFPs

Nontimber forest products constitute a significant proportion of revenues from the forestry sector and provide incomes and subsistence to large indigenous tribal populations in the tropical countries. The economic significance of NTFPs therefore deserves more attention from policymakers, economists, and foresters, etc. We cannot afford to continue to neglect nontimber forest products and their place in developmental framework of local communities or the nation. Some of the implications

for NTFP based forest management, in terms of policy, research and suggested operational guidelines are summarized below:

In order to study the economic significance of NTFPs, their economic value has to be determined. Besides highlighting their economic importance, the valuation of NTFPs will help resource managers and policymakers decide between alternative uses of forests. Several problems arise in doing so since a very large number of NTFPs is bartered in many economies and very little is known about their extraction rates. The sustainability of the economic value of NTFPs is another area to be examined, as the economic value of NTFPs alone is not sufficient to indicate the potential usefulness of NTFPs and their ecological functions. A new concept of value is needed to strike a balance between economic and ecological benefits and services of NTFPs.

Since most NTFPs are collected by indigenous tribal people whose economic standard of living is very low, one way to increase incomes would be to set up a village level forest-based processing and manufacturing enterprises so that benefits of NTFPs stay with the people in the region. If the past studies are a guideline, then forest-based small-scale enterprises (FBSSEs) are best suited to this purpose. However, there can be exceptions in particular where there are well-developed infrastructures such as transport and communication, the large scale enterprises have also flourished well. FBSSEs face several similar kinds of constraints across different countries. These include dwindling supplies of raw materials, uneasy access to institutional finance, highly risky market environments, poor management capabilities, and poor availability of appropriate technology and skills. The strengthening of FBSSEs would require releasing of these constraints.

The legal rights of NTFP collectors and local forest communities need to be clearly understood by all parties, and NTFP collection activities should be based on transparent contractual arrangements. As custodian of the current rights of NTFP collectors, Governments in various countries have often intervened in the past. There the nature of institutional mechanisms evolved for NTFP management is very critical in determining the success of intervention. In the case of India, results of government intervention have been just the opposite of expectations, due to incorrect institutional choices. Moreover, NTFP-gatherers have objected to government intervention which has choked the free flow of NTFPs and put local people at the mercy of government officers. The government's role could perhaps be more effective as

a facilitator, providing infrastructure, technical and price supports, and law and order services. The freedom of economic decision making should be left to the people, not with the government. There may be a valuable role for non-governments organizations to help communities evolve the capacity to take on some of the activities which the government has monopolized.

Sociocultural issues play an important role in ascertaining the success of FBSSEs and sustainability of the NTFP resource base. Factors like ethnicity and social mores have played important roles in making some organizations more successful than others. Policymakers should be made aware of the nature of historical and cultural patterns of NTFP use and their implications. Similarly extraction practices need to be studied scientifically. The sustainable extraction of NTFPs is not easy to calculate, and yet it is pre-requisite for NTFP based development. In order to ensure this, much more information is needed on current rates of extraction and on productivity rates for different products. Indiscriminant extraction practices have already resulted in depletion of natural regeneration and local extermination of species in some cases.

Given the considerable potential of NTFPs to contribute to local livelihoods and the renewed emphasis they are receiving in recent years, there is a real need-intensive research effort on at least three fronts:

A. Field level research.

B. Synthesis and collection of information on NTFPs from as many already published sources as possible, and their dissemination in the form of practical guidelines for NTFP identification, regeneration, extraction management, collection, processing, storage and marketing.

C. Training on technical issues including silviculture, extraction management, processing and marketing issues.

All this should go simultaneously as the outputs from the field research and analyzed results from existing sources are available, they can be used as inputs for training purposes. From the field research perspective a number of ecological, economic, institutional and common property issues need

to be addressed using both rapid participatory appraisal-type methodologies as well as long term ethnographic and rigorous statistical surveys and sampling. Some areas for research include but are by no means limited to, the following:

- More precise research is needed on the ecological requirements and functions of NTFP species, their regeneration rates, and yields, in different forest types and ecological zones and on innovative silvicultural techniques to manage for multiple products.

- Continuing work is needed to assess utilization and extraction rates in order to determine volume flows of different products over time and in different seasons, to identify trends, and match use patterns with growth and yield information to avoid over-exploitation which may cause declining yields for collector groups.

- Research is needed on the values of selected commodities in village, district, national and international markets,on the marketing chain and the profits of collector/producers, processors, and middlemen.

- The impact of product substitution and the possibility of creating new markets needs to be examined, along with the impacts of changes in collection, processing and marketing patterns. Price, supply, and demand trends will need to be assessed to determine the medium- and long-term economic viability and market absorptive capacity of each NTFP.

- The role of marketing cooperatives and forest corporations and voluntary agencies should be examined to maximize benefits to collectors and producers. Special emphasis should be placed on developing appropriate small-scale processing technology and enterprises which maximize value-added at a local level but do not strain the resource base.

- Research is needed to clarify tenurial arrangements and understand the often conflicting layers of traditional rights, use patterns settlements, concessions and privileges, and gender relationships.

- Institutional processes need to be better understood in order to help communities manage NTFPs as part of a larger livelihood strategy, while maintaining an equitable distribution of responsibilities and benefits.

- Research is needed to examine the effects of different management practices in the sustainability and biodiversity of NTFPs.

The development of NTFP industry is hence imperative for both maintenance of sustainable forestry and biodiversity in tropics. A few critical guidelines which should be kept in mind when developing NTFPs are given below:

- Base NTFP activities on participatory management planning: establish NTFP programs based on clear tenure, and participatory management through the use of PRA techniques, clear contractual agreements, and traditional knowledge as currently being practiced through involving joint forest management programs.

- Maintain the traditional characteristics of NTFP activities by keeping them small and household or community based, and giving women the first option, the skills and training to continue to specialize in their management.

- Secure the value added benefits, and try to improve harvesting, quality, storage, processing, marketing at a local, household or community level.

- Diversify products used. To avoid problems with market substitution, or fluctuations in price and consumer interest, and to relieve pressure on the resource base, use a variety of products, and processing levels.

- Integrate NTFP components of community forest management with other income streams. NTFP may never provide a sole source of income to rural users. Perhaps by keeping NTFP activities seasonal if need be, they will remain as an enhanced component of larger livelihood strategies.

- Insure multiple market base by taking advantage of village, regional, national and international market possibilities.

- Develop creative financing by providing start up loans, and also through creative use of collective community funds as these build up.

Some of these guidelines may be easier to implement than others. But time is limited and forest resources are under increasing pressure. NTFP enterprises offer a very exciting alternative to timber dominated forest management. They are most successfully linked to participatory forms of forest management where clear access and tenure is provided. However they most certainly do not provide all the answers, and many issues remain resolved. They should be investigated with clarity and caution, but deserve immediate attention.

REFERENCES

Anonymous, (August 1992), "Improving the Sustainability of Forest (Fuel) Resources: Participatory Forest Management Experiences", **Wood Energy News**, 7(2):4-7.

Badi, K.H., A.E.H. Ahmed, and A.A.M.S. Bayoumi, **The Forests of Sudan**, Khartoum, Agricultural Research Council, 1989.

Bawa, K.S., (1992), The Riches of Tropical Forests: Looking Beyond for Non-Timber Products. **Trends in Ecology and Evolution** (In press 1992).

Bhatt, Ela, **Shramshakti: National Commission on Self-Employed Women and Women in Informal Sector**, Department of Women and Child Development, Government of India, 1988.

Browder, J.O., (1992), "The Limits of Extraction: Tropical Forest Strategies Beyond Extractive Resources", **Bioscience**, 42(3): 174-182.

Business News 10/21/1981, Quoted in Safran and Godoy (1993).

Caldecott, J. (1988), **Proposal for an Independent Review of Forestry Policy in Sarawak**, London, Land Associates (Unpublished), In: Wickens (1991).

Calish, S., R.D. Fight and D.E. Teeguarden (1978), "How Do Nontimber Values Affect Doughlas-Fir Rotations", **Journal of Forestry**, 76 (4) : 217-221.

Campbell, J.Y., (1988), **Putting Peoples's Products First: Multiple use Management for Non Wood Forest Products in India**, Unpublished Draft.

Campbell J.Y. (ed.), **Case Studies in Forest-Based Small Scale Enterprises in Asia: Rattan-Matchmaking-Handicrafts**, Food and Agricultural Organization, Community Forestry Case Study 4, Bangkok, 1991 [a].

Campbell J.Y. (ed.), **Women's Role in Dynamic Forest-Based Small Scale Enterprises: Case Studies on Uppage and Lacquerware from India**, Food and Agricultural Organization, Community Forestry Case Study 3, Rome, 1991(b).

Cashman, K. (1987), "Women's Activities and the Potential of Alley Farming in South Western Nigeria. Report Prepared for the Ford Foundation, International Livestock Center for Africa, Humid Zone Programme, Ibadan, Nigeria (Unpublished). Quoted in Falconer and Kopell (1990).

Central Statistical Organization (CSO), Department of Statistics, **National Account Statistics**, 1990

Chambers R., N.C. Saxena, and S.Tushaar, **To the Hands of the Poor: Water and Trees**, New Delhi: Oxford & IBH, 1990, 273 pp.

Clay, J., (1989), "Building and Supplying International Markets for Nonwood Tropical Forest Products." Paper Presented at the Symposium 'Extractive Economies in Tropical Forests: A Course of Action.' National Wildlife Federation, Washington D.C., 30 November-1 December. Quoted in Browder (1992).

Connelly, W.T. (1985), "Copal and Rattan Collecting in the Philippines" **Economic Botany**, 39(1); 39-46.

Cornelius, L., **Bamboo and Rattan: Restoring the "Most Neglected", Resources of Southeast Asia**, Ottawa: International Development Research Centre (IDRC), 1984.

Davidson, J. **Economic use of Tropical Forests**, International Union for Conservation of Nature and Natural Resources. Paper No 9. 1985, 28 pp.

de Beer, J.H., and M.J. McDermott, **Economic Value of Nontimber Forest Products in Southeast Asia**, Council for the International Union of the Conservation of Nature, The Netherlands, 1989.

Deb, D., **An Estimation of the Possible Effect of Community Leaf Harvesting on the Productivity of Sal Forests in West Bengal**, Indian Institute of Bio-Social Research and Development, 1990.

Dutta, M. and M, Adhikari, **Sal Leaf Plate Making in West Bengal: A Case Study of The Cottage Industry in Sabalmara**, West Midnapore, Indian Institute of Bio-Social Research and Development, 1991.

El-Namaki, M.S.S., (1987), "Developing and Promoting Technology and Technical Skills in Small-Scale Rural Manufacturing Enterprises", In: **Small-Scale Forest- Based Processing Enterprises**, FAO Forestry Paper 79, Rome, 1987.

Endicott, K.L., (1980), **"Batek Negrito Sex Roles: Behaviour and Ecology"**, Paper presented at Second International Conference on Hunting and Gathering Societies, September, 19-24.

Falconer, J. and C.R.S. Kopell, **The Major Significance of "Minor" Forest Products: The Local Use and Value of Forests in the West African Humid Forest Zone**, Community Forestry Note No 6, FAO, Rome, 1990.

Fisseha, Y., "Basic Features of Rural Small-Scale Forest-based Processing Enterprise", In: **Small-Scale Forest-Based Enterprises**, FAO Forestry Paper 79, Rome, 1987, pp. 31-60.

Food and Agricultural Organization (FAO), **Non Wood Forest Products: The Way Ahead**, FAO Forestry Paper 97, Rome, 1991.

Food and Agricultural Organization (FAO), "Review of Forest-Based Small-Scale Processing Enterprises", In: **Small-Scale Forest-Based Processing Enterprises**", FAO Forestry Paper 79, 1987, pp. 5-30.

Food and Agricultural Organization (FAO), **Household Food Security and Forestry: An Analysis of Socio-economic Issues**, Rome, 1989.

Gillis, M., **Non-Wood Forest Products in Indonesia**, Chapel Hill, NC: Department of Forestry, University of North Carolina, 1986.

Godoy, R, (1992),"Some Organizing Principles in the Valuation of Tropical Forest," **Forest Ecology and Management**, 50: 171-180.

Godoy, R. and R. Lubowski (1992), "Guidelines for the Economic Valuation of Nontimber Tropical Forest Products", **Current Anthropology**, 33(4):423-433.

Godoy, R. L.V.B. Nicholas, D. Wilkie (1992), **The Effects of Economic Development on the Extraction of Nontimber Tropical Forest Products: Hypotheses, Methods, and Information Requirements**. Manuscript, 1992.

Guha, Ramachandra., (1983), "Forestry in British and Post-British India", **Economic and Political Weekly**, October 29th.

Gupta, R., Prava Banerji and Amar Guleria, **Tribal Unrest and Forestry Management in Bihar**, Indian Institute of Management, Ahmedabad, CMA Monograph No.98, 1982, 88 pp.

Hartman, R., (1976), "The Harvesting Decision when a Standing Forest Has Value", **Economic Inquiry**, 14 (1) : 52-58.

Hyde, W.F., D.H. Newman, and R.A. Sedjo, **Forest Economics and Policy Analysis: An Overview**, Draft, June, 1991.

International Society for Ecological Economics (ISEE), "Calculating the Value of Harvesting Plants in Rain Forest", **ISEE-Newsletter**, 2 June, 1992.

International Development Research Centre (IDRC), **Rattan: A Report of a Workshop Held in Singapore**, Ottawa, Canada, 1980.

International Tropical Timber Organization (ITTO), **Not by Timber Alone**, Oxford: Oxford University Press, 1988, (in press cited in Godoy and Lubowski, 1992).

Iqbal, M., (August, 1991), "Pakistan Women's Income From Nontimber Forest Products" **Wood Energy News**, 6(2) : 9-10.

Jodha, N.S., (1986), "Common Property Resources and Rural Poor in Dry Regions of India", **Economic and Political Weekly**, 21(27): 1169-1181.

Kaur. R., **Women in Forestry in India,** World Bank, Working Paper Series- 717, 1991, 78pp.

Kerr, K., (1991), "The Economic Potential of Handicrafts Enterprises in Rural Development: Focus on Indonesia", **Unasylva**, 42 : 31-36

Khare, A., "Small-Scale Forest Enterprises in India with Special Reference to Role of Women", **Wastelands News : A National Review Paper**, November 89-January 90, pp. 15-27.

Lal, J.B., **India's Forests: Myth and Reality**, Dehra Dun: Natraj Publishers. 1989.

Lasschuit, J.A., and F.A.C. Van Eerd, **Minor Forest Products and Nontimber Products of Forest,** Wageningen, Netherlands: University of Wageningen, 1983.

Malhotra, K.C., D. Deb, M.Dutta, T.S. Vasula, G. Yadav and M. Adhikari, **Role of Nontimber Forest Produce in Village Economy: A Household Survey in Jamboni Range, Midnapore, West Bengal**, Indian Institute of Bio-Social Research and Development, 1991.

Malhotra, K.C. and M. Poffenberger, **Forest Regeneration through Protection: The West Bengal Experience**, Proceedings of the Working Group Meeting on Forest Protection Committees, Calcutta, June 21-22, 1989, 47 pp.

May, P.H., (1991), "Building Institutions and Markets for Non-Wood Forest Products from the Brazilian Amazon", **Unasylva**, 42(165): 9-15.

Mors, W.B. and C.T. Rizzini, **Useful Plants of Brazil**, San Francisco, CA: Holden Day, 1966, 166pp.

Myers, N., **The Primary Source: Tropical Forests and Our Future**, New York: W.W. Norton, 1984, 379 pp.

Myers, N., **The Nontimber Values of Tropical Forests**, Department of Forest Resources, University f Minnesota, Working Paper No.10, 1990, 15 pp.

Okafor, J.C., (1979), "Edible Indigenous Woody Plants in the Rural Economy of Nigeria Forest Zone." Quoted in Falconer and Kopell (1990).

Olsson, G., (1991), "The Socioeconomic Importance of Nontimber Forest Products in the South Pacific: Focus in Vanuatu", **Unasylva**, 42 : 24-29.

Padoch, C. and Wil de Joney (1989) "Production and Profit in Agroforestry: An Example from the Peruvian Amazon" In: John G Brawder,(ed.), **Fragile Lands of Latin America: Strategies for Sustainable Development,** Boulder, Colorado : Westview Press, 102-113.

Parameswarappa, S. (1992), "Agarbathi Industry in Karnataka: Some Thoughts on Raw Materials", **MYFOREST**, 28(2): 143-146.

Peirse, H. Beresford, **Forests, Food and People**, FFHC Basic Study No.20, Food and Agriculture Organization, Rome, 1968.

Peters, C.H., A.H. Gentry and R.O. Mendelssohn (1989), "Valuation of An Amazonian Rainforest", **Nature**, 339: 655-656.

Poffenberger, M., B. McGean and K. Bhatia (Editors), **Forest Management Partnerships: Regenerating India's Forests**, Executive Summary of the Workshop on Sustainable Forestry, 10-12 September, New Delhi, 1990, 32 pp.

Poffenberger, M., B. McGean, N.H. Ravindranath and M. Gadgil, **Joint Forest Management: Field Methods Manual**, volume I, New Delhi: Society for Promotion of Wastelands Development, 1992 [a], 102pp.

Poffenberger, M., B. McGean, A. Khare and J. Campbell, **Joint Forest Management, Fields Methods Manual**, volume II, New Delhi: Society for Promotion of Wastelands Development, 1992 [b], 79 pp.

Ramakrishna Mission Lokashiksha Parishad, Role of NTFPs in Forest Fringe Dwellers' Economy and Current Status of Forest Flora: A Case Study at Raigarh Forest Protection Committee under Bankura South Division, **Ford Foundation Project Report**, 1992.

Rao, Vipul (Ayurvedacharya) (no date), "Improve your Health with Neem: Full of Nutritive and Medicinal Qualities, Diamond Pocket Books Pvt. Ltd., New Delhi, 40 pp.

Richards, D.C., **Eco Protection Enterprise, Hope, Hyperbole, or Hoax**. Draft Paper Prepared for The Bio Diversity Support Program, 1992.

Safran, E.B. and R.A. Godoy, (1993), "Effects of Government Policies on Smallholder Palm Cultivation: An Example from Borneo", **Human Organization**, (In Press).

Schwartzman, Stephan, (1989), "Extractive Reserves in the Amazon" In: John, G. Browder (ed.), **Fragile Lands of Latin America: Strategies for Sustainable Development**, Boulder, Colorado : Westview Press, 150-163.

Sinden, J.A. and A.C. Worrel, **Unpriced Values: Decision Without Market Prices**. John Wiley & Sons Inc, New York, 1979, 511 pp.

Tewari, D.D., J.C. Nautiyal and K. Singh, (1989/90), "Incorporating Environmental Impacts of Deforestation in Project Appraisal: A Case Study of Western Himalayas, India", **Journal of Environmental Systems**, 19(4): 339-347.

Tewari, D.N., (1991), "Research on Nonwood Products", **MFP News**, Centre for Minor Forest Products for Rural Development and Environmental Conservation, 1(1): 1-2.

Wahlberg Kare, (1990), "Can Local Knowledge Be Transferred: The Neem Tree (Azadirachta indica)", **Forests, Trees and People Newsletter**, 5(9 & 10): 35-37.

Weinstock, J.A., **Rattan: Ecological Balance in Borneo Rain Forest** Sweden, Botanic Gardens, Kew, London, 1983, pp 155-185.

Wickens, G.E., (1991), "Management Issues for Development of Nontimber Forest Products", **Unasylva**, 42 (2): 1-8.

Winpenny J.T., Values for the Environment: A Guide to Economic Appraisal, HMSO, London, 1991, 277 pp.

World Resources Institute (1990), "The World Bank in the Forest Sector: A Global Policy Paper", Summarized In: **Wasteland News**, 8(2): 6-12, 1993.

World Watch (July-August 1991) Quoted in **Wastelands News: A Quarterly Newsletter of Society for Promotion of Wastelands** Development, 7(2): p.22.

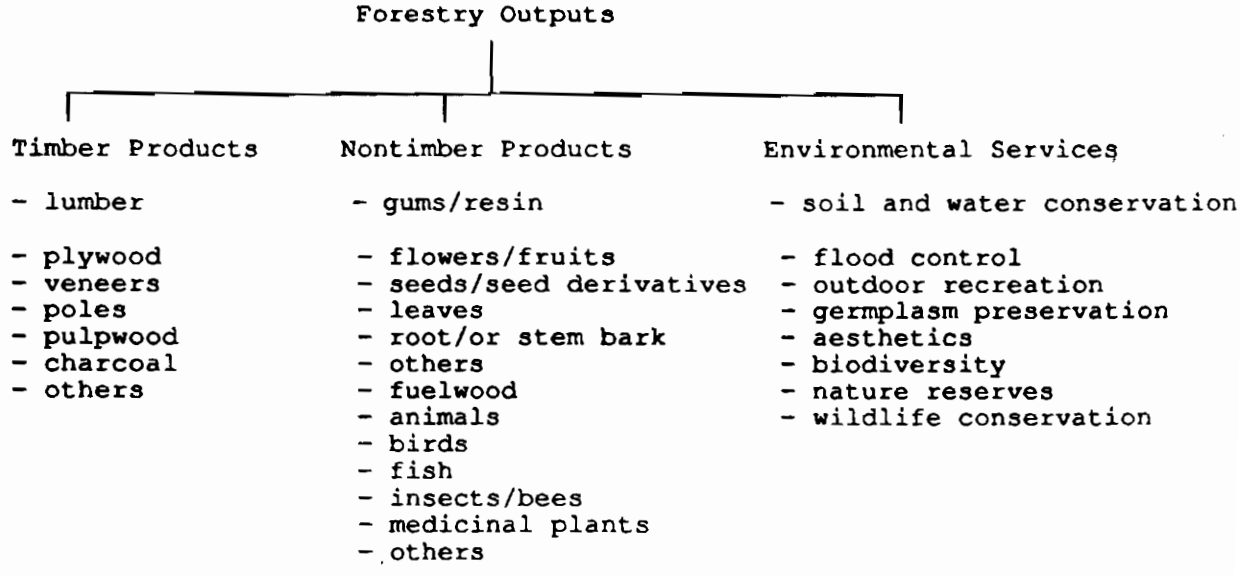

Figure 1: A Simplified Classification of Forestry Outputs

Table 1: Impacts of Government Interventions on Production of NTFPs, India.

Particulars	Before Nationalization	After Nationalization	Percentage decrease from the previous time period
Tendu leaves production in Madhya Pradesh	5.1 million bags in 1981-82	3.9 million bags in 1985-86	23.5
Annual average tendu leaves production in Orissa	36000 tonnes during 1967/68-1972-73	35200 tonnes during 1979/80-1984-85	2.2
Collection of sal seeds in India	200,000 tonnes in 1977	60,000 tonnes in 1987	70.0
Average annual production of lac in India	32,000 tonnes during 1961-70 period	16,000 tonnes during 1981-86 period	60.0

Source: Constructed from data from Chambers et al (1990,p.149).

NOTES

1. For example, Hartman (1976) argued for non-cutting of trees or forest since their intangible environmental benefits exceeded or outweighed the timber benefits. Recent studies by De Beer and McDermott (1989) and Myers (1984) identify the NTFPs worth as cash crops and subsistence goods.

2. FAO (1991) uses the term non-wood forest products and further sub-divides these into vegetal and faunal non-wood forest products and forestry services.

3. Some researchers such as Calish et al (1978) and Hartman (1976) have used the term "nontimber outputs" for environmental services emanating from forests.

4. This does not include people who live away from forests but indirectly depend upon forests such as livestock rearing tribal communities Maldharis in Gujarat.

5. Based on personal communication with Mr. R.S. Pathan, Conservator of Forest, Surat circle, Baroda, 1993.

6. However equitable distribution may not be realized in the absence of clear usuary and tenure rights.

7. For example, some 60% of NTFPs in India are consumed locally (Gupta and Guleria, 1982, p. 123).

8. Constructed from data obtained from Gupta and Guleria (1982).

9. In fact, valuation of environmental services from forests is equally useful for deciding alternative uses of forest; however, in this article, we are primarily concerned with nontimber products only.

10. With respect to forest management and sustainability, there are three issue schools of thought which argue that: (1) indigenous people do maintain forest sustainability; (2) they do not maintain forest sustainability; and (3) more detailed empirical evidence is required and hence are undecided. For details see Godoy and Lubowski (1992).

11. Here Q_i refers to the flow, not the inventory of NTFPs in the forest. The value of inventory does not reflect the economic benefits accruing to people, nor does it reflect flows under sustainable management (Godoy and Lubowski 1992).

12. For valuation of nonmarket commodities, see Sinden and Worrel (1979), Winpenny (1991) and Tewari et al (1989/90). Some guidelines for NTFP valuation are discussed in Godoy and Lubowski (1992).

13. There are some 73 uses of Neem as per old indigenous and Ayurvedic knowledge of India; for details see Rao (no date).

14. In the Indian context, some organizations are starting or about to start the neemseed processing. For example, the National Dairy Development Board (NDDB) is planning this operation. Source: Personal Communication with Mr. V.K. Mishra, Managing Director, Rashtriya Vriksha Mitra Sahyog Limited, Anand, India, 1993.

15. For a review of potentials of some NTFPs, see Myers (1990).

16. The dangers of commoditization refers to putting economic value on each and everything and trying to solve problems through manipulation of economic incentives/disincentives system. But this is extremely difficult to do so as economists as such do not have an unique and faultfree method of putting value on such ecological outputs and on their benefits that accrue to the next generation.

17. The displacement of local population to cities would likely to be less successful. For example, recruitment of wood-carvers from faraway places for an urban-based small scale NTFP-based industrial enterprize in Java did not take the progress too far, mainly because of chronic absenteeism (Kerr 1991).

18. Based on discussion with Prof. J.K. Das, Indian Institute of Forest Management, Bhopal, March 1993.

19. About 70% of NTFP collection takes place in the central tribal belt in five states of Maharashtra, Madhya Pradesh, Bihar, Orissa, and Andhra Pradesh where lives 65% of tribal population of the country (Guha 1988, Kaur 1991, p.43).

20. One such incident showing lack of empathy towards tribals is quoted in Chambers et al (1990, p.150). The incident was narrated by a tribal lady before government commission. The tribal lady in MP who walked a long distance to sell her produce to the FDC found the FDC office often closed or was told to come next day. This forced tribals to undersell their produce to traders at only 20% of the price fixed by the government. More details see Bhatt (1988, p.25).

21. For example, in 1978 tribals in Santhal Parganas resolved to direct group action against Forest

Department Officials with their bows and arrows. This called for police intervention leading to Simdega firing. See for details Gupta, Banerji, and Guleria (1982).

22. This however does not mean that all extraction practices by tribals are unsustainable. For example, the harvesting of salt leaves for making salt plates has been found as a sustainable practice. See Deb (1990).