# ARE WE EXTRACTING NON-TIMBER FOREST PRODUCTS (NTFPs) ON SUSTAINABLE BASIS IN INDIA?: CURRENT EVIDENCES, CAUSES AND REMEDIAL POLICY FRAMEWORK

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## Introduction and Objectives

The harvesting or extraction of NTFPs should concur to the sustainability principle of forest management; that is the forest managers should combine the conservation of forest functions (biodiversity, watershed protection, erosion control, carbon storage) with improved livelihoods of local people (Ros-Tonen, 1999). The extraction or harvesting of NTFPs is assumed to be less-damaging to forest hence more sustainable as extraction of NTFPs involves the non-destructive harvesting of annually renewable plant parts (Myers, 1988). Although studies on logging and silvicultural practices and other studies in early 1990s ( Plotkin and Famolare, 1992; De Jong and Mendelsohn, 1992, Evans, 1993) suggested that both timber extraction and collection of NTFPs can be integrated with positive ecological and economic outcomes, commercialization in real world has produced altogether opposite results. Arnold and Perez (2001) have reiterated that the old concept of conservation through commercialization in the case of NTFPs is to be revised in the light of new evidences of unsustainable extraction. Kuster *et al.* (2006) have insisted that there are trade-offs between conservation and development of NTFPs as an economic resource. The management of extraction of NTFPs has become enormously important as it has direct consequences to the environment and to the communities in terms of economic benefits. In the case of India, this is hugely important as NTFPs are the backbone of the Indian forestry sector in that over 50 per cent of forest revenues and 70 per cent of forest export income accrues from NTFPs (Shiva, 1994). The direct contribution of NTFPs is estimated to be about $27 billion compared to $17 billion from timber forest products (ITTO, 2007, p.20). Similarly small-scale enterprises, which are NTFP-based, provide up to 50 per cent of income for 20 to 30 per cent of the rural labor force in India (Campbell, 1994). India has also developed a system of institutions to harness NTFP resources intensively since 1970s in terms of Forest Development Corporations (Tewari, 2008); the study suggested that bureaucratic management procedures do not necessarily adhere to sustainable management practices and nor do they benefit the tribal collectors. It is hence imperative to understand whether India is extracting NTFP resources on a sustainable basis and what kind of policy-framework should be placed in to thwart impending dangers of unsustainable extraction.

The major objective of this study is therefore to examine whether NTFPs are being harvested on a sustainable basis with special reference to Indian context. More specifically, study aims at:

1. Discussing the overall impacts of extraction of NTFPs in terms of their sustainable use;
2. Analysing the factors responsible for unsustainable extraction of NTFPs in general;
3. Developing principles and policy framework toward sustainable management of NTFPs in India.

## Impacts of NTFP- Extraction on Sustainability

Every NTFP resource has a site-specific maximum sustainable yield (MSY) level. If the resource is harvested above the maximum sustainable yield level, it will begin depleting and will in turn impact all communities of animals and human-beings that depend on them. Under the subsistence demand regime, human communities rarely harvested them over the maximum sustainable yield level which rarely resulted in species-specific overexploitation. As the commercialization drive gained momentum in the last three decades, people in many parts of Africa, Asia, central Europe and the America have shifted from subsistence to the cash economy, leading to increased frequency and intensity of harvesting or extraction of NTFPs. For example, extraction increased manifold in response to commercial demand stimulated by increased road access; for example, between 400 and 2000 hectares of forests may be deforested by each kilometre of road built into the forests in Latin America (Mahar and Schneider, 1994). The impacts of overexploitation are felt across a number of NTFPs and upon the different parts of the plant or tree. For the purpose of convenience, the innumerable varieties of NTFPs have been grouped into three categories based on the type of plant tissue or plant part exploited: fruits and seeds, plant exudates and vegetative structures (Peters, 1996).

***On fruits and seeds***

The ecological consequences of unsustainable harvesting stem from the destructive harvesting techniques. For example, an increasingly common practice in many tropical regions is to simply cut down a forest tree to harvest its flowers which has the direct impacts on the population and distribution of the NTFPs (Peters, 1996). For example, in Peruvian Amazonian, the commercial fruit collectors frequently fell female trees of the dioecious aguaje palm (*Mauritia flexuosa*). This leaves the barren male trees in the forest and further propagation is arrested, leading to eventual disappearance of species (Vazquez and Gentry 1989). Lack of control on felling aguaje palm trees has eliminated these trees from forests surrounding Iquitos, Peru; as a result, the local collectors now travel up to some days to find unharvested palm stands in far away areas (Padoch, 1988). Destructive harvesting has also adversely reduced the population of the ungurahui palm (*Jessenia bataua*), the babassu palm (*orbygnia phalerata*) and a wide variety of other important Amazonian fruit trees (Peters *et al.* , 1989). The tagua seeds (*Phytelephas macrocarpa/aequatoialis*) are exported from northwest South America and rising demand is depleting the resource (Southgate *et al.*, 1996).

In India, we have a number of reported examples. In the *Mahuva* belt of Gujarat, production of *mahuva* (*Madhuca indica*) flowers and seeds have shown declining trends. The average annual *mahuva* flowers collection declined from about 45,000 quintals during the 1970s to 29,000 quintals during 1990s; the primary reason for this decline was that a large number of 'mahua' trees were cut for furniture from the private fields (Tewari, 1998). In West Bengal, faulty procedure of collecting 'mahua' flowers ( breaking the apical twigs which affects flowering in the following year) was found to make considerable damage to the natural resource (Ramkrishna Mission Loka Shiksha Parishad, 1992). In central India, 'mahua' forests are burnt to harvest petals—a common practice—which kills regeneration. It is suggested that it would get extinct by 2200 AD (Tewari, 1994).

It is not always the destructive harvesting which destroys the NTFPs, rather simple collection of quantities of fruits and seeds can also impact regeneration and the livelihoods of the associated communities. For example, in the Western Ghats of southern India, honey and gooseberry have gone from subsistence collection to a large–scale commercial extraction from the forests of Biligiri Rangan Hills (BRH). As a result, both harvesting practices and intensity of extraction of these forest products have changed rapidly over the last decades. A study by Sinha and Bawa (2002) examined the impacts of harvesting techniques on the demography of two NTFP species *Phyllanthus emblica* and *Phyllanthus Indofscherri* and they found that harvesting techniques used by the *Soligas* people had negative impacts on regeneration as they lopped branches or cut the trees in order to harvest the fruits. A similar study by Pandey *et al.* (2011) confirmed that destructive harvesting was the major cause of extinction of *Phyllanthus emblica* or Aonla in *Chhatisgarah* state of India. The seeds of Chironji (*Buchanania lanzan/latifolia*) or Cuddapah almond are over-harvested and this was stimulated by steep increase in prices. An unprecedented increase in the prices of Chironji seeds (150 per cent) incentivized the tribal collectors to prematurely harvest the fruits which hampered the natural regeneration especially in the province of Madhya Pradesh (Tewari, 1994, p. 169). The collection of Sal (*Shorea robusta*) seeds in India is registering a decline and regeneration being affected (MoEF, 2008).

***On Plant Exudates***

The extraction or tapping of plant exudates such as latex, resins and gums do not destroy the forest canopy or kill the seeds, hence this kind of extraction comes close to the ideal of sustainable use. In practice, however, things can be quite different and intense extraction can damage trees. The most common and frequently cited historic case is of gum Arabic (*Acacia sengal)* trade in West Africa (Hanson, 1992). The extraction of aloe-resin or damar from *Dipterocarpus* trees in South-East Asia has also resulted into reduction of forest production and growth (Peters, 1996). The indiscriminate felling of *Aquilaria* (agarwood or gaharu) trees eliminated this species from all but the most remote and inaccessible forests in Malaysia (Jessup and Peluso, 1986). The trees of *Couma macrocarpa,* a valuable latex and fruit producing tree in Amazonia, have been felled by the people to maximize extraction with a heavy cost to the ecology (Vazquez and Gentry, 1989; Peters, 1996). It has been found that intense tapping can reduce the diameter increment of plantation–grown rubber trees in Southeast Asia by as much as 50 per cent over a five-year period (Peters, 1996). That is, commercial tapping forces the tree to divert plant resources for the production of rubber, rather than to growth of the tree (Peters, 1996).

In the Indian context, the famous story of *Salai gums* in north Gujarat is a notable one. The Salai gum (*Boswellia serrata*) tree population declined rapidly due to excessive extraction in north Gujarat; for example, the average annual extraction of *Salai* gum declined from about 4000 quintals in the 1970s to 1500 quintals in

1990s (Tewari, 1998, p. 91). Besides *Salai* gum, *Kadaya* gum (*Sterculia urens*) has also been highly affected by the destructive tapping. And it is now economically extinct from north Gujarat. Following these facts, many other states took lead in banning the extraction of such items. For example, the Madhya Pradesh declared the Kadya gum as a "specified forest produce" in 1969. In the state of Madhya Pradesh, the collection of *Terminalia chebula*, Sal seed and other resins show decline due to loss of trees (MoEF,2008). In the state of Tripura, the Agar and Mucuna seeds have been extensively extracted (MoEF, 2008).

***On Vegetative Structures***

The vegetative structures include different plant tissues used for fibres, stem, leaf, bark or apical bud. Destructive harvesting can affect these vegetative structures as well. For example, the rising rattan demand led to over-harvesting of small cane rattan which can sprout once cut unlike large cane rattan. As a result, some species of rattan became either extinct or were at the verge of extinction. For example, natural population of *Calamus manan, C. peregrinus,* and *C. ornatus* in the West Malaysia are virtually extinct due to over-harvesting (Ave, 1988). The other historically interesting case is intensive exploitation of tree fibres from Southern Africa (South Africa, Zimbabwe, and Botswana). The increased export demand for basketry goods during 1980s in Southern Africa intensified the extraction of fibres from 30 indigenous species and other 22 tress species for dyes (Terry and Cunningham, 1993). This finally culminated into over-harvesting of the resource. For example, Mbare palms (*Hyphane ventricosa*) was used as a source of fibre in Ngamiland, Botswana. Collectors here resorted to cutting of the trees rather than selective harvesting of the parts. Similarly, the sap tapping in two palm species (*Hyphaene coriacea and Phonix reclinata*) in Maputaland of Southern Africa destroyed the natural resource base (Cunningham, 1990). The harvesting of bark of *Prunus africana* or African Cherry has led to unsustainable exploitation (Cunningham and Mbenkum, 1993) as it is used for treatment of prostate ailments.

In the Indian context, the bamboo production is declining in the country due to lack of investments for gregariously flowered bamboo areas (MoEF, 2008). Bamboo extraction, for example, in the Tamil Nadu in Table 1 shows how overexploitation has led to reduced yield as well as incomes (Hall and Bawa, 1993). The yield declined from 11.1 tonnes/acre/annum in 1984-86 to 1.1 tonnes/acre/annum in 2010. The story of declining population of Gulmavu (*Machilus macarantha)* trees in Karnataka is also a well known fact. The bark of Gulmavu is used for producing binding material for the incense sticks industry. The heavy demand for incense sticks led to intensive debarking which in turn led to severe decline in the population of these trees in Coorg and Malnad districts. Similar trend was exhibited in other provinces such as in Orissa (Parameswarappa, 1992; Rath, 2003). Also, the indiscriminate felling of and collection of NTFPs from uppage (*Garcinia cambogia*) trees in Karnataka experienced depletion of this natural resource (Tewari and Campbell, 1995).

**Table 1**

*Bamboo Yields in Tamil Nadu, India.*

| Year | Quantity (tonnes) | Value (lakhs INR) |
|---|---|---|
| 1985-86 | 11,108 | 11,66 |
| 1986-87 | 12,541 | 13.17 |
| 1988-89 | 4,672 | 7.36 |
| 1990-91 | 2,399 | 2.90 |
| 2010-11 | 1,154 | - |

*The data for 2010/11 is taken from The Hindu.

**NB**: $ 1.00 = Rs 30.00 (1992 exchange rate). One lakh= 100,000 INRs

**Source**: Hall and Bawa (1993) and Anonymous (2011).

The tropical dry deciduous forests of central India harbour several varieties of medicinal and aromatic plants. The two species *Curcuma caesia* and *Rauvolfia serpentina* are critically endangered (Mishra, 2003). About half a century ago, these plants were in abundance but now they are almost extinct due to unsustainable harvesting as demand for these products increased in the international markets. Similarly the *Litsea chinensis* in Madhya Pradesh, *Machlus macarantha* trees in Coorg and Malnad districts of Karnataka, *Taxus baccata* and the Rhododendrons in Himalayas are at risk of extinction due to unsustainable extraction (MoEF, 2008). Dry deciduous forests of Madhya Pradesh are rich in species like *Emblica officinalis, Buchanania lanzan* an *Chlorophytum* spp; some 14-23 per cent of these species are being destroyed annually and some 50 per cent of their germ plasm material is lost (MoEF, 2008). This holds true for many other economically attractive NTFPs.

Indian Himalayas, the store house of medicinal herbs, are also experiencing the destruction. Gaston and Garson (1992) found evidence of over-exploitation of the most of the herbs on the Great Himalayan National Park in Kullu district of Himachal Pradesh. The study by Singh (1999) in the Chhkinal watershed in Himachal Pradesh confirmed the findings of slow extinction of herbs. These herbs were prematurely and frequently extracted, leading to poor regeneration. The species of *Morchella esculenta, Dioscorea deltoid, Dactylorhiza hatagirea, Ainslie aptera, Juglans regia,* and *Aconitum heterphyllum* are almost extinct (Singh, 1999).

Pushpangadan (1996) have reported that some 30 species as extinct due to overexploitation and unscientific collection in Indian Himalayas. It is estimated that currently about 70 per cent of the medicinal plant collections in India involve destructive harvesting practices which may lead to the extinction if not controlled (Task Force on Conservation and Sustainable Use of Medicinal Plants, 2000). The threat is more likely to become true as the world demand for medicinal products is increasing. For example, the current trade in medicinal plants in India is estimated approximately to be at US$1 billion per annum as opposed to the world market of US$ 60 billion which is growing at the rate of 7 per cent per annum; the world demand for medicinal plants is expected to increase up to more than US$ 5 trillion by 2050 (RCDC and TFRI, 2008). It is obvious that a rapidly increasing market is bound to lead to unsustainable harvesting of medicinal plants in the country in general.

**Factor Causing Unsustainable Extraction**

Several factors contribute to unsustainable harvesting of NTFPs. It has been observed that decreased level of NTFPs in the forest lead to decline in the level of wildlife and plant species (Cuaron, 2000). The remaining vegetation becomes more susceptible to intensive harvesting practices. There can be a phenomenon of "empty forest" in which population of high value, vulnerable plant and animal species can be thinned out due to overexploitation (Redford, 1992). Therefore, for sustainable management of NTFPs an understanding of the causes of over-extraction is required. These factors include market-related factors, biological factors, socio-economic factors and cultural and religious factors (SCBD,2001).

***Market Factors***

When markets fail to price NTFPs or other forest products, this leads to destruction or over-harvesting of forest resources (Contreras-Hermosilla, 2000). Many pharmaceutical companies which use NTFPs as raw material push the prices and thus incentivize collectors to extract the resource intensively. This in turn leads to destruction of the NTFPs (MoEF, 2008). Many forest products or services, such as the carbon-sequestering capacity of forests, do not get priced and hence do not enter in to the decision-making of the individuals and these resources get over-exploited. This shows the gap between the objectives of private individuals and the society as whole. In this situation, the market fails to give signals to individuals so that objective of maximizing social welfare is not attained. However, this kind of factors can be managed through a proper policy-making.

***Biological Factors***

"Differences in climate, soil and vegetation types result into sufficient differences in the availability and use of NTFPs across tropical Africa, Asia and Latin America" (SCBD, 2001). Low productivity of forests can allow the threshold of unsustainable extraction to be reached soon enough even with modest extraction rates (Bennett and Robinson, 2000). For example, wild populations of American ginseng (*Panax quinquefolium*) and wild leeks (*Allium triccocum*) in Canada (Nantel *et al.,* 1996) and Amla tree fruit in India (Shanker *et al.*, 1996; Pandey *et al.,* 2011) are not biologically at a sustainable level (SCBD, 2001).

***Sociological Factors***

High rates of human and animal population growth are related to forest or environmental degradation in many developing countries especially in sub-Sahara Africa (Contreras-Hermosilla, 2000). Increased road building activity leads to clearing of forests and thus impacts the magnitude of NTFPs. Economic growth and forest cover show a Kuznet curve type of relationship (Vincent *et al.*, 1997). That is, the forest cover declines in the beginning as economy grows and per capita income rises; after a while, the deforestation rate peaks and then starts declining as per capita income increases further. At lower level of income, people depend upon forest products for their livelihood and thus leads to unsustainable extraction. The process is reversed after a certain level of income is achieved. This is because the achieving higher per capita income leads to a fundamental change in the composition of demand for forest products and services; that is, at higher income level, the demand for environmental services for the forests outstrips the demand for the forests tangibles (Contreras-Hemosilla, 2000). Economic hardships coupled with poor regulation mechanisms finally led to illegal extraction of forest resources including NTFPs through encroachment. Lack of regulation is generally attributed to poor financial resources. Illegal extraction is one of the major cause of forest decline as per various studies (SCBD, 2002).

***Cultural Factors***

Common NTFPs in many cities of Africa, Asia and Latin American are the wild collected medicines, chewing sticks and indigenous foods and bush meats (SCBD, 2001). Globalization has led to cultural homogenization which reduces the diversity of management techniques related to sustainable management of NTFPs and forests (SCBD, 2002). Globalization has also promoted consumerism and commercialism thus reducing scope for alternative techniques of managing NTFPs.

**Managing Sustainable Extraction of NTFPs : Principles and Policy Framwork**

India has some 15000 plant species of which some 3000 produce NTFPs. However, only 126 species (0.8 per cent of the total) have been commercially developed (Maithani, 1994). Some 25 NTFPs dominate the economic scene (Nilsson, 2008). It is estimated some 60 per cent of total production of NTFPs is consumed locally and the rest is traded; nearly 400 million people living in and around forests depend upon NTFPs for sustenance and supplemental income; about 30 per cent of rural people in India derive 50 per cent of their income from NTFPs (Tewari and Campbell, 1995). The NTFPs are contributing a higher value to the Indian forestry economy compared to timber and this gap is predicted to grow (Nilsson, 2008). This indicates that there is a lot more scope to harvest NTFPs provided they are managed on a sustainable basis.

However, from the foregoing discussion, it is the shift from subsistence use to commercial sale which induces destructive harvesting, overexploitation and a basic disregard for the ecological value of the forests. In the Indian context, the purposeful policy decisions were made after 1970s to intensively extract NTFPs. A timeline of institutional developments in the country is presented in Table 2. In terms of forest policy, forestry sector comes in the "Concurrent List" of the Constitution of India. The forestry policy is made by the central government and is implemented by the state or provincial governments. Prior to 1970, there were virtually no rules for managing the NTFPs in the states of India. The Devar Commission of 1961 suggested the intensive collection and local processing of NTFPs or Minor Forest Products (MFPs). Finally in 1976, the National Commission on Agriculture (NCA) recommended the extraction of NTFPs for increasing income and systematic utilization of these resources. Following the recommendation of NCA in 1976, the Government of India established the Forest Development Corporations (FDCs) in the provinces. A brief review of their performance over the past 30 years was done by Tewari (2005). The major findings were that most FDCs did not function efficiently for various reasons such as organizational structure, leadership styles, lack of dynamic capabilities in organizations, organizational culture, legal environment, market conditions and so on (Tewari, 2005, 2008). The impacts of this policy are now visible and various factual evidences have been reviewed in previous sections. It is obvious that symptoms of unsustainable extraction now prevail and appear in different parts of the country. We should hence have a re-look at the extraction management of NTFPs in the country.

**Table 2**

*A review of institutional development related to NTFP management in India.*

| Institutional Event | Activity |
|---|---|
| Devar Commission (1961) | State governments were asked to extract NTFPs intensively and process them locally. |
| Committee on Tribal Economy in Forest Areas (1967) | Recommended establishment of Forest Development Corporation and Tribal Development Corporation for intensive collection and processing of NTFPs |
| National Commission on Agriculture (NCA) (1976) and National Commission and Development of Backward Areas (1981) | They suggested the establishment of Forest Development Corporations (FDCs) for better and effective management of NTFPs in the country. |
| National Report of the Committee on Forestry and Poverty Alleviation (1984) | The report recommended identification of new NTFPs, scientific extraction techniques, and introduction of new breeding techniques for increasing yields of NTFPs |
| National Forest Policy, 1988 | It suggests a policy to protect NTFPs for the benefit of forest dwellers and tribal population and the resource should be harvested on sustainable basis. |
| National Forestry Action Program 1999 | A comprehensive long term strategic 20 year plan for achieving sustainable forestry in India is drawn out. It had identified 5 programs: (1) Protecting existing forest resources, (2) improve forest productivity, (3) reduce total demand, (4) strengthen policy and institutional framework, (5) expand forest area. The improvement of forest productivity comprises the development of NTFPs. |
| Coimbatore Charter on Environment and Forests 2001. | The National conference of the Ministers of Environment and Forests resolved to protect and improve the environment and forests. It targets of bringing 109 m.ha or one-third of the total area under forest and the cover in next 20 years. |

Sources: Based on Mahapatra and Mitchell (1997) and MoEF(1988).

The National Forest Policy (NFP) of 1988 makes a specific mention of the NTFPs and states that "such produce should be protected, improved and their production enhanced with due regard to generation of employment and income" (MoEF, 1988). The sections 4.3.4 .2 and 4.3.4.3 of the NFP, 1998 states that,

"The holders of customary rights and concessions in forest areas should be motivated to identify themselves with the protection and development of forests from which they derive benefits. The rights and concessions from forests should primarily be for the bonafide use of the communities living within and around forest areas, specially tribals."....."The life of tribals and other poor living within and near forests revolves around forests. The rights and concessions enjoyed by them should be fully protected. Their domestic requirements of fuelwood, fodder, minor forest produce and construction timber should be the first charge on forest produce. These and substitute materials should be made available through conveniently located depots at reasonable prices."

The sustainable management of NTFPs in the country can be based on five principles (Fig.1). Each principle is briefly discussed as follows.

**Principle of first claim**

The first and foremost principle is that the objective of NTFP management is to ensure their sustainable use with first claim of use given to tribal people or forest dwellers as clearly spelled in the National Forest Policy.

**Principle of multiple use management**

The second principle is to use NTFPs in the over-all management of forests in the country as whole. The multiple uses of tree are rarely taken into consideration in the forest inventory management. For example, Nepal Forest Department has included NTFPs in five year planning process (Wong, 2000); and, Forest Department of Finland uses double inventory methods for developing management plans for berry yielding shrubs and for edible mushrooms (Saastimoinen *et al.*, 1998).

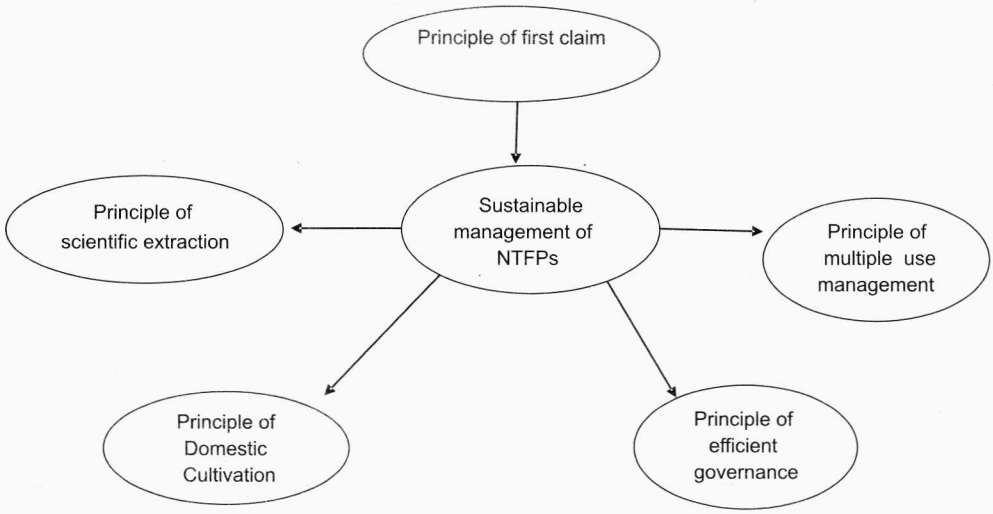
**Principle of domestic cultivation**

The third principle is to promote cultivation of NTFPs where it is deemed necessary and it is more economic than harvesting from the forests. For example, the total world demand for *Prunus africana* bark could be produced by a total plantation area of 2743 to 4200 hectares or a 12 year rotation of a total of 230 to 350 hectares of trees (SCBD, 2001). Similarly, bamboo cultivation in Gujarat was found economically feasible and can be promoted through proper socioeconomic policies in order to reduce pressure on natural forests (Tewari, 2001).

**Principle of scientific extraction**

The fourth principle is to regulate the harvesting of NTFPs through scientific principles of extraction. Programs that can increase the awareness about the ecological footprint of the trade in NTFPs are promoted; these may include programs like the Forest Steward Council (FSC) applied to NTFPs (Shanley *et al.*, 2002) and certifying the Environmental Management System as per ISO14004 (SCBD, 2001, p.17). The scientific tapping of plant exudates is warranted as unsustainable harvesting leads to reduced regenerative capacity of the tree populations. In addition to scientific harvesting, certain management strategies should be employed to

**Fig. 1**




A Policy Framework for Sustainable Management of NTFPs, India

periodically monitor the population level under different tapping intensities. Most of the time this is happening due to institutional inertia to apply the right kind of policies; for example, even after almost 150 years of exploiting Amazonian forest rubber the scientific harvesting is not done and the information about it is still lacking (Peters, 1996).

**Principle of efficient governance**

Sustainable management of NTFPs postulates a good system of economic management and infrastructures (physical and institutional). Unless these two conveniences are in place, the management of NTFPs cannot run on a sustainable basis. The new theme in managing natural resources is in terms of democratic decentralization (Ribot, 2002). That means at the micro level the NTFPs should be managed by the local people or organizations; the control and management should be in the hands of people to whom this resource matters the most. However, the government is responsible for providing a good market coordination which can be done by setting floor prices of NTFPs and by creating an all-India level system of information for stakeholders of the industry (Tewari, 2008).

***A Suggested New Policy Framework***

An All-India policy framework with their provincial counterparts is perhaps the need of the hour. However, more important than this is the implementation and monitoring mechanism. The key questions in developing this framework that need to be answered are: 1. What should be the objective of such a policy? 2. What constraints operate in attaining that chosen objectives? 3. How can mechanisms for sustainable extraction can be developed and enforced with minimum administrative costs? 4. What role the government, central or provincial, should play in attaining the chosen objective? If we can find the definite answers to these questions, the task of building such a policy framework becomes much simpler while bearing in mind the five principles of sustainable management as discussed above. We would discuss these questions one by one as below.

The National Forest Policy makes a special mention that forest should first serve the needs of tribal people or those who live in and around forests, giving rise to the First claim principle. The NTFPs should hence be treated as a resource set aside for the less-privileged people in the society and it should enhance the quality of life of these people. Similar interpretations of the policy are also suggested by Saxena (2010). The current forest policy of India has shown shift from "forests as source of State Revenue" to "local needs" and "environmental concerns" and recognizes and encourages local communities as "stewards" and "co-managers" of forest resources (Saxena, 2010). The major objective of sustainable management of NTFPs is therefore to maximize the social welfare of the tribal people or forest dwellers.

Two major constraints that limit the attainment of the social welfare objectives are: 1) the limited nature of stocks of NTFPs which cannot support a very high extraction rate without affecting the sustainability of the resource in question; 2) diminishing stocks of NTFPs due to over-extraction. When increased demand for NTFPs leads to increased prices, the collectors are tempted to extract beyond the maximum sustainable limit, leading to the rapid destruction of the resource in question. This is because the increased income and employment from sale and collection of NTFPs can only be achieved by extracting NTFPs heavily. Therefore a balance between extraction rate and regeneration rate must be maintained as to avoid resource exhaustion.

The third question is a tricky one and there is no one answer. The mechanisms to extract the resource on sustainable basis may be many but we do not know all of them. Firstly, we need to know: what is the maximum sustainable yield and what should be the extraction rate? It is easier to compute the sustainable extraction rate in a mathematical model but difficult to find the optimum operationally. The rate of sustainable extraction will however depend upon a number of parameters and will vary from one location to other. Moreover , we need to find out the leading indicators which will warn us much before the extraction rate exceeds the limits of sustainability. This certainly needs research in local conditions and thus develop some criteria of identification of reaching optimal extraction rate in a practical environment. Secondly, we need to understand the behavioural side of the equation; that is , what motivates the collectors to extract and how that behaviour can be monitored so that it does not lead to unsustainable extraction rate. It is important that collectors' self interest and private initiative is preserved and motivation for sustainable extraction is maintained. It has more to do with the psychology of extraction given the environment and the stock of knowledge of collectors. So it is not just teaching collectors what is the sustainable extraction rate but also why should they have interest in sticking to this practice. Public education is hence essential part of this process.

Given the above, the government's role is very decisive and crucial. The government plays the role of the coordinator and facilitator and it must ensure three things: a) Sufficient amount of income and employment

is generated through the collection and marketing of NTFPs and hence markets for NTFPs need to be coordinated to avoid price collapse. b) The stocks of NTFPs are harvested in a manner that they are sustained and not diminished. c) It must also ensure that the self-interest initiative of collectors is not scuttled and they are given enough opportunity to prosper by their self-interest initiative. A set of suggested changes which are already in operation may bring these desired results. These include the following:

1. Promotion of free trade of NTFPs except the currently nationalized NTFPs is allowed and primary collectors are given rights to collect, process, and market freely. This function is supported by the minimum support price program (Saxena, 2003; Tewari, 2008).
2. The system of giving leases for the procurement of NTFPs, which is based on the relative ease of royalty collection, is to be amended as the current system has many loopholes. The system can be amended in favour of taxes on NTFP transits; and, royalty on nationalized product can be linked with the collectors' price (Saxena, 2003).
3. Transit formalities should be made simpler and relaxed so as to promote free trade (Saxena, 2003).
4. Promote the cooperativization at the grassroots level so as to organize primary collectors effectively in order that they participate in the market economy. These organizations take the task of collection, processing and marketing and benefit from them. Perhaps the Anand-Based system of coopertivization can be emulated in some form in the countrywide attempt to alleviate poverty.
5. A system of new institutions or overhaul of the existing ones to suit to the needs of the society is needed. This will enhance the functioning of the free market economy of NTFPs with much success and whose benefits are reaped by the people in charge of the forests. This may require to have a re-look at the laws of country which govern interregional trade and commerce in the country and forest laws in general.

In brief, a mildly-regulated NTFP economy where the markets are coordinated and facilitated but collectors are treated as entrepreneurs and owners of the resource at the micro level so that they have long-term interest in resource management, not just harvesting for enhancement of income alone. Evolution of such a system of governance and local management is possible with some coordination at the higher level of Indian bureaucracy.

**Conclusions and Policy Implications**

The use of many NTFPs has gone from subsistence collections to large-scale commercial extraction at the global level. The limits of sustainability have reached in many NTFPs around the world. An assessment of the current situation is made on the basis of past studies and reported results with focus upon India. There are various instances in India that confirm unsustainable extraction of NTFPs are present throughout India. There are various causes which promote unsustainable extraction; these include market-related, biological, socioeconomic, and cultural factors. This demands a policy and strategy to reclaim the dwindling resources of NTFPs in the country. The study suggests a set of five basic principles for sustainable management of this resource and a new policy framework to implement these principles. The factors that will determine its success depends upon the efficiency of infrastructure and institutions of governance.

**SUMMARY**

**The extraction of non timber forest products in the world has increased rapidly during the last two decades as markets for these products has developed internationally. As a result, a large number of NTFPs have been extracted beyond sustainable limits. Frequent occurrences of unsustainable extractions is challenging the old thinking that harvesting of NTFPs should concur to the sustainable forest management. This study assesses the global impacts of extraction practices in general with special focus upon India. A new thinking is needed to tackle the non-sustainability of NTFPs due to over-extraction. The study suggests a remedial policy framework for India to be adopted with stringent requirement for making harvesting decisions.**

***Key words :*** Non-timber forest products, current evidences, remedial policy framework.

**क्या हम दीर्घकालिक चलते आधार पर भारत में गैर प्रकाष्ठ वनोपजों का निष्कासन कर रहे हैं ?**
**वर्तमान साक्ष्य, कारण और उसमें सुधार लाने वाला नीतिगत ढांचा**

डी.डी. तिवाड़ी

**सारांश**

विश्व में गैर प्रकाष्ठ वनोपजों की निकासी पिछले दो दशकों के दौरान बहुत तेजी से बढ़ गई है क्योंकि अन्तर्राष्ट्रीय तौर पर इन उपजों का बाजार

बहुत विकसित हो गया है। परिणामत: गैर प्रकाष्ठ वनोपजों का निष्कासन उनके दीर्घ काल तक चल सकने वाली सीमाओं से भी ज्यादा किया गया है। दीर्घकालिक निष्कासन किया जाना इस पुरानी सोच के लिए चुनौती खड़ा कर रहा है कि गैर प्रकाष्ठ वनोपजों की कटाई दीर्घकालिक वन प्रबन्धन से मेल खाती होनी चाहिए। इस अध्ययन में सामान्य तौर से विश्व में चल रही निष्कासन रीतियों का आंकलन भारत पर विशेष ध्यान में केन्द्रित रखकर किया गया है। अति समुयोजन किया जाने से गैर प्रकाष्ठ वनोपजों की लम्बे समय तक न चल पाने की समस्या सुलझाने के लिए नई सोच विकसित करने की आवश्यकता है। यह अध्ययन भारत के लिये ऐसे सुधारात्मक नीतिगत चोखटा सुझाता है जिसे कटाई करने के निर्णय करते समय कड़ी शर्तों को लगाते हुए अपनाया जाना चाहिए।

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