Forest Conservation, Tourism and Extraction: An Economic Perspective

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INTRODUCTION

Revenue realisation from forests has undergone evolutionary changes in the last century. Under the colonial administration and in the first few decades of Independence, commercial timber extraction thrived as the major source of revenue from forests. With the rapid depletion in forest cover, the global community awakened to the realisation that forests in any part of the globe can be crucial to the overall healthy existence of the planet. The rules were thus enacted in many countries especially in the tropics to protect the forest cover from over-exploitation. Plantations were raised to meet the requirement of wood and related products, but many non-wood products continued to be tapped from the forests. Nodal agents extracting these non-wood forest products (NWFPs) also changed: from forest dependent indigenous people to forest departments, commission agents, or co-operative societies. Indigenous entrepreneurship which developed the expertise in exploring local plant resources ended up at the most as wage earners helping the commission agents or the forest department (FD) in collecting these products, the sources of which continue to be more familiar to them than to any others.

As timber and other wood products disappear gradually as a source of revenue from the natural forests, another enterprise, namely, forest tourism has emerged as a lucrative option. Tourism has been making its debut in Indian forests as an appendage of wild life conservation efforts. Increasing number of protected areas and sanctuaries have increased the tourist potential of forested areas in India, particularly in wild life sanctuaries. Wild Life Protection Act 1972 (and the 1991 Amendment) discourages utilisation of forests for other purposes and also aims to conserve the existing natural forest cover and biodiversity. While conservation Act professes to retain sanctity of protected areas by prohibiting removal of any forest output, tourism gains entry. So we have a scenario wherein tourism is implicitly accepted as complementary to conservation whereas extraction of forest produce is considered as making the forest vulnerable to depletion. Both tourism and extraction of non-wood products are significant forest uses in terms of revenue earning potential to the government and in

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terms of their potential to create a source of livelihood to the dependent communities. Maintaining the forest cover also serves to protect the interests of the country's agricultural sector. When forests have such varied roles to play, determining and maintaining ecologically optimum levels of economic activities inside the forest area can be crucial for an over-populated developing economy.

Deciding on a combination of forest uses and their levels of realisation for a specific area thus becomes an optimisation problem with revenue and welfare maximisation objective. Miranda (1993) had suggested that forest managers should be trying to develop policies that are consistent with a three-part objective function: one that simultaneously emphasises revenue generation, social development and environmental services. Any strategy chosen by a forest manager affects the contradictions and complementarity among these three objectives where in the choice ought to maximise the welfare function:

\[ W = V \] (revenue generation, social development, environmental services). If \( x_1, x_2, \ldots, x_n \) represent the forest strategies available, Revenue generation \( = f (x_1, x_2, \ldots, x_n) \), Social development \( = g (x_1, x_2, \ldots, x_n) \), Environmental services \( = h (x_1, x_2, \ldots, x_n) \).

The national development objective whether it be the profit motive or protection of the natural wealth has not been enough even to sustain conservation itself. The present paper discusses a combination of revenue generating strategies for tropical forests along with their social and environmental repercussions.

**OBJECTIVE**

The paper attempts to assess and compare the potential and realised use values of forests: tourism and extraction of produce, at forest gate prices. Among different direct use values of forests, the values to be extracted and scales of exploitation have to be chosen on the basis of four criteria: whether they have backstop technologies/sources, whether they provide local households with employment/livelihood, whether they can be maintained at levels below the rate of regeneration in the forest at a reasonable cost and the costs involved in extraction. Questions raised in this context would include: whether tourism or extraction of NWFPs would be a better net revenue earner?, to what extent can they be kept at sustainable levels?, and to what extent are tourism and extraction compatible in a protected area? Current data availability allows us only to compare the financial potential of the two economic activities, viz., tourism and extraction and to analyse their compatibility in the context of ecological sustainability and management feasibility.

**STUDY AREA**

Two forest areas near Coimbatore: Sathyamangalam Forest Division (referred to as extractive reserves/reserve forests from now on) and Indira Gandhi Wild Life Sanctuary (hitherto referred to as the sanctuary/IGWS), Anamalai were taken for
understanding and comparing two use values of tropical dry deciduous forests: recreation and extraction of forest produce. Sathymangalam is the northern-most taluk in Erode district of Tamil Nadu, with about 62 per cent of its area under forest cover. The forest division is located between Coimbatore and Mysore, about 65 km from Coimbatore. Sathymangalam forest division with a reserve forest area of 1,45,000 hectares is constituted of five forest ranges. Apart from the sheer size and diversity of terrain, the division also is constrained in its operations by virtue of it being the home range of the forest brigand, Veerappan. The Indira Gandhi Wild Life Sanctuary and National Park constituted by six forest ranges, is also one of the hot spots of biodiversity in the Western Ghats. Located in Coimbatore district of Tamil Nadu, the sanctuary covers an area of 95,800 hectares of which 10,800 hectares has been declared as National Park.

METHODOLOGY

Recorded official data on flow of revenue for past ten years from various sources have been collected from the Divisional Forest Office, Sathymangalam, Office of the Wild Life Warden, IGWS, Pollachi and the multi purpose co-operative society (LAMP) at Sathymangalam. Revenue to the forest department is taken as the indicator of the realisable worth of forests at forest gate prices, regarding the two use values under scrutiny: extraction and tourism. In between the ten years (1989-1999) there has been several policy changes leading to subsequent changes in many activities inside the forests. For instance sandalwood, mosses and stones used to be good revenue earners till they were banned in 1993-94 and in the sanctuary the NWFPs which used to be auctioned publicly, began to be allotted to a co-operative society from 1994 onwards.

One major constraint in the current analysis originates from the difficulty in identifying, segregating and quantifying different cost components. Since administrative costs were found to be overlapping between various activities including conservation and management, only incomes are being examined in the present study. The costs involved (fixed, operational and externalities) if available would have provided a clear picture of relative economic efficiency of the revenue earning activities. Sunk costs associated with tourism in meeting the infrastructure requirement of tourists (roads, buildings, etc.), costs in the form of negative externality of accumulated garbage and nuisance, opportunity cost in setting up farms for all NWFPs and the economies of scale involved in habitat conservation are ignored. The managerial cost involved in ensuring that non-wood produces are harvested at sustainable rates, and the costs involved in confining the tourist activities to sustainable levels have also not been accounted for in the present study.

Income from both tourism and extraction are computed at forest gate prices which are much below market rates. Non-wood produces are allotted to the tribal co-operative societies wherever they exist, at fair prices fixed by the FD. Fair prices of non-wood products are derived from the market price after making allowances for
understanding and comparing two use values of tropical dry deciduous forests: recreation and extraction of forest produce. Sathyamangalam is the northern-most taluk in Erode district of Tamil Nadu, with about 62 per cent of its area under forest cover. The forest division is located between Coimbatore and Mysore, about 65 km from Coimbatore. Sathyamangalam forest division with a reserve forest area of 1,45,000 hectares is constituted of five forest ranges. Apart from the sheer size and diversity of terrain, the division also is constrained in its operations by virtue of it being the home range of the forest brigand, Veerappan. The Indira Gandhi Wild Life Sanctuary and National Park constituted by six forest ranges, is also one of the hot spots of biodiversity in the Western Ghats. Located in Coimbatore district of Tamil Nadu, the sanctuary covers an area of 95,800 hectares of which 10,800 hectares has been declared as National Park.

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collection and transport and a fixed percentage of subsidy. If there are no tribal societies operating in the jurisdiction of the forest division, like wood products, NWFPs also are auctioned publicly. Charges for recreation, wild life watching and accommodation in the sanctuary are currently being fixed arbitrarily by the FD.

RESULTS AND DISCUSSION

An overall observation from the data reveals that annual forest revenue has been increasing in the extractive reserves and declining in the sanctuary. The increase can be mainly attributed to revenue from wood products in the extractive reserves, while the decline in the sanctuary to tourism replacing extraction as a source of revenue. In both the areas NWFPs have not been significant contributors to total revenue. Surprisingly, revenue from unit area of extraction of NWFPs is higher in the sanctuary compared to the reserve forests. Revenue from and expenses incurred in both the sanctuary and extractive reserves are compared on unit area basis (Figures 1 A and 1B and Table 1). In the case of sanctuary where all kinds of extractions are minimal and wild life based tourism is pursued, net revenue is shown to be decreasing at an increasing rate. Even though conservation is not taken as a revenue earner in itself, the risk of decreasing net profit discouraging future investments cannot be ruled out.

Figure 1A. Revenue and Expenditure Per Unit Forest Area:
Sathyamangalam Division
Figure 1B. Revenue and Expenditure Per Unit Forest Area: IGWS

Wood Products

Analysis of the components of total revenue in the forests shows the dominance of wood products. The bar charts (Figures 2A and 2B) suggest that in both reserve forest and sanctuary, total revenue is directly related to wood products over the years. Sandalwood, and eucalyptus are the major sources of wood products in the extractive reserves while in the sanctuary, teak poles and pulp wood dominate. Even charcoal and firewood used to fetch good revenue as did confiscated products in certain years. Extraction of wood products is on the decline and tourism becomes the major contributor to revenue and as a consequence, total revenue has shown a decreasing trend in the sanctuary.

Among all the wood products only firewood and small timber are locally relevant, the supply of which would not have come in the records since firewood for adjoining forest villages must be collected at random by the villagers having collection rights. The auctioned quantity of charcoal and lops of wood is generally bought by firewood based industries and hotels. As complete restrictions on extractions come into force, the local needs of firewood have to be met from village common property resources/farm forestry while paper and other industries might have to switch over to private plantations/farm forestry to get raw materials. Since tree felling for extracting timber has been identified as a major cause of deforestation (Agarwal, 1992), the above substitution becomes significant in the practice of conservation. This shift of focus of FD from selection felling or maintaining forests based on silvicultural management systems can generate resources for conservation and other productive activities like watch and ward, censuses, regeneration of NWFP source plants, etc. Auctioning dead and valuable trees would then constitute the only source of revenue.
from wood products. However, the current trend in revenue of the reserve forests does not seem to reflect such a shift in the pattern of income generation and is still dependent upon wood products. This lends credence to the argument that there still needs to be much more than just a ban on tree felling to reap other benefits sustainably. This point would be discussed in the subsequent sections.

Non-Wood Forest Products

During the ten years under study: 1989-1999, NWFPs have never been a major contributor, even in the case of extractive reserves (Figures 2A and 2B) and has consistently been around Rs. 2.5 lakhs/annum. This is largely explained by low prices fetched at the FD. A comparison of Figures 3A and 3B shows that in a given year, the same product fetches much more revenue to the LAMP. Also in the case of many products, extraction is not being done (Figure 4) at feasible scales due to accessibility factor especially in Sathyanangalam division.

Among the 15 NWFPs being extracted, the prominent ones in terms of contribution to total revenue are given in Table 2. Major NWFPs are nellikkai (fruits of Emblica officinalis used in food and pharmaceutical industry), date leaves (leaves of phoenix dactylifera used for making brooms, etc.), poochakkai (soap nuts, Sapindus mukorossi), gallnuts (fruits of Terminalia chebula used in pharmaceutical industry), honey, etc. Collection of stones and mosses which used to earn good revenue has been banned since 1993. Trends in annual revenue from major NWFPs are shown in Figures 3A and 3B. The co-operative society seems to earn most from

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**TABLE 1. ANNUAL REVENUE PER UNIT AREA FROM MAJOR SOURCES**

<table>
<thead>
<tr>
<th>Source of revenue</th>
<th>Mean* (Rs./ha)</th>
<th>IGWS</th>
<th>Sathyamangalam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grazing fee</td>
<td>0.633</td>
<td>0.784</td>
<td></td>
</tr>
<tr>
<td>Tourism</td>
<td>14.458</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>NWFP</td>
<td>22.876</td>
<td>17.16</td>
<td></td>
</tr>
<tr>
<td>Teak poles</td>
<td>146.554</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>Timber</td>
<td>224.600</td>
<td>140.500</td>
<td></td>
</tr>
<tr>
<td>Pulp wood</td>
<td>505.430</td>
<td>21.580</td>
<td></td>
</tr>
<tr>
<td>Total receipts**</td>
<td>67.525</td>
<td>189.439</td>
<td></td>
</tr>
<tr>
<td>Expenditure***</td>
<td>154.772</td>
<td>106.83</td>
<td></td>
</tr>
</tbody>
</table>

* Mean of revenue for the years between 1989-1999 whenever extraction took place/area of extraction.
** Mean (1989-1999) of total revenue of the division/total area.
*** Mean (1989-1999) of total expenditure of the division/total area.
*nelliikkai,* while for the FD it is the date leaves which earn them the maximum revenue among NWFPs.

Figure 2A. Wood and Non-Wood Produces in Forest Revenue: Sathyamangalam Division

Figure 2B. Share of Different Sources in Total Forest Revenue Over Years: IGWS
Figure 3A. Revenue from Major NTFPs - Sathyamangalam Forest Division

Figure 3B. Revenue from NTFPS: LAMP, Sathyamangalam
Figure 4. Estimated and Removed Quantities of NWFPs: Sathyamangalam Division

![Graph showing estimated and removed quantities of NWFPs over years from 1987-88 to 1997-98.]

**TABLE 2. MAJOR NWFPS IN SATHYAMANGALAM**

<table>
<thead>
<tr>
<th>NWFP</th>
<th>Mean annual (per cent to total income)</th>
<th>Mean (Rs./ha/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FD</td>
<td>LAMP</td>
</tr>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>Stones and moss</td>
<td>38.75</td>
<td>23.42</td>
</tr>
<tr>
<td>Date leaves</td>
<td>48.84</td>
<td>33.84</td>
</tr>
<tr>
<td>Nellikkai</td>
<td>16.77</td>
<td>37.79</td>
</tr>
<tr>
<td>Poochakkai</td>
<td>5.52</td>
<td>10.24</td>
</tr>
<tr>
<td>Gall nuts</td>
<td>6.34</td>
<td>5.90</td>
</tr>
<tr>
<td>Tamarind</td>
<td>5.36</td>
<td>2.3</td>
</tr>
<tr>
<td>NWFP to total</td>
<td>17.06</td>
<td>16.96</td>
</tr>
</tbody>
</table>

**Source:** Records of Divisional Forest Office and LAMP, Sathyamangalam.

Figure 5 which gives the income for the FD which leases out the NWFP and for the co-operative society shows declining trends for recent years. The contribution of these products to total revenue was also seen as decreasing (Figures 2A and 2B). The annual flow of NWFPs from reserve forests and IGWS came to the tune of Rs. 17/ha and Rs. 22/ha respectively (Table 1). Even the extraction of non-wood products...
currently proceeding at a minimum level in the sanctuary, earns more than that in the reserve forests of Sathyamangalam from unit area. The huge area under the division of Sathyamanglam and the nuisance factor of the forest bandit might have been significant contributory factors for this poor performance of non-wood products here. Manageable extents of reserves would help in proper estimation of extractable produces, vigil and regeneration. Given the fact that the two regions are of comparable vegetative potential while the sanctuary permits removal of only very few NWFPs, this under-exploitation of NWFPs in the extractive reserves seems difficult to comprehend.

Figure 5. Revenue from NWFPs

Considering the estimate that, usually the flow is only 2.5 to 3.5 per cent of the inventory of NWFP in a forest (Godoy and Bawa, 1992), there should be NWFPs valued about at Rs. 766 and Rs. 534 per hectare per year in the sanctuary and the extractive reserves respectively. The total revenue from NWFPs in the forests under study can also be compared against estimated net incomes from NWFPs in other forests. The net economic value of non-timber forest products of Mudumalai sanctuary in Tamil Nadu has been estimated as 3 U.S $/ha/year in 1989 (Sukumar, 1989). While the value of floral inventory in a forest in Peru has been estimated as 420 US $/ha/year (Peters et al., 1989), in Central Indian tropical dry deciduous forests about 375 US $/ha/year worth NWFPs has been estimated in the form of medicinal value (at 1994 prices, derived from Purushothaman et al., 2000). It is also estimated that the annual economic value of selected NWFPs varies between Rs. 538...
to Rs. 2,957/ha in India (12 to 73 $/ha) (Chopra, 1993). The difference between the current estimates and the above-mentioned studies further validates the argument that shadow pricing is important in providing an economic rationale for extractive reserves which may not be financially viable (Godoy and Bawa, 1992).

Not realising the potential income from non-wood forest products for decades when the world over their demand has been noticeably high due to increased attention paid on herbal medicines in the context of scarce supplies may appear economically irrational. Subsidising these floral assets conserved at the cost of managerial, scientific and monetary inputs may render their habitat vulnerable. The untapped potential in these non-timber forest products should be reaped through a well managed strategy including differential control in quantity along with augmenting the regeneration of these floral species. In order to make extractions economically efficient without disturbing the wilderness, there has to be a proper channelisation of harvesting non-wood produce. Products which can be derived from plantations should be raised in non-forest or degraded forest areas, while materials without any alternative source should be identified. This calls for a detailed plant census of such essential plants which should come from their natural habitats, especially those which require the extraction of the whole plant, bulbs or root tubers. Census of such herbal wealth also should help in augmenting the richness and diversity of forest flora.

Extraction of these essential forest products should be linked to demand, the quantity needed to allow regeneration inside the forests and market price.

Tourism

Faunal diversity in the Anamalai region has been increasingly encouraging wildlife enthusiasts and recreationists throughout the years under study. Among the different components of tourism revenue, income from entrance fee (more than 70 per cent of the revenue from tourism) was followed by ride charges, showing that tourists paying a single day visit largely outnumber those preferring to stay over night inside the sanctuary. This in fact can be taken advantage of in designing further recreation activities. Casual visits compared to prolonged holidays are less of a burden to the sanctuary too. More recently, extraction of wood and non-wood products have been cut down to a minimum in the sanctuary, reportedly for minimal disturbance to the wild life population and its habitats.

In IGWS, tourism though has been increasing its contribution towards total revenue over the study period, has not so far been able to generate profit. It has been estimated that revenue from recreation activities in Periyar tiger reserve (777 sq.km), Kerala came to 2.4 million in 1994 (Manoharan and Muralideharan, 2000) at the rate of about Rs.3.10 per hectare annually from recreation alone. Judging by this figure the mean annual revenue from tourism of Rs. 14.45 per hectare (Table 1) of IGWS seems to be high. At this earning potential coupled with a per hectare annual expenditure of Rs.155, eco-tourism by itself is not self-sustaining as implied by the rapidly declining annual revenue (Figure 1B). Sanctuaries and protected areas can be
financially self-sustainable only if costs are kept at a minimum, and revenue ploughed back into the system.

The issue of closing the area for all other activities also deserves a re-think. Compatibility of wild life tourism and extraction of forest products have been questioned owing to the following assumptions:

1. Extraction activities have been causing disturbance to wild life habitats: There are no comparative studies of ecological and economic externalities of tourism and extraction based on the carrying capacity and/or natural regeneration, to authentically justify alienation of one against the other. On the contrary, there are instances of sustained co-existence of wild animals and indigenous collectors in many areas of Indian forests.

2. Wild animals pose threat to the life of those engaged in extraction and could create people versus animal conflicts: This could be happening even in reserve forests. Maintaining the wild life density at appropriately assessed carrying capacity of the forest coupled with skill and experience of the collectors in the locality should take care of the situation. Another new approach of community ownership and management of wild life parks, which can provide built in solutions to people animal conflicts has been the case in Zimbabwe (Pearce and Warford, 1993). Community proprietorship of natural resources have been functional in several districts of Zimbabwe from 1988. Apart from successfully fixing up sustainable off-take quotas for different sources of income (like hunting and extraction of timber), the scheme has been getting net profits out of which 20 to 37 per cent have been reportedly going to the community (apart from compensation for losses incurred in attacks by animals) and the rest re-invested.

3. Most of the forest produces form food base for the animals inhabiting them: As discussed in the section on NWFPs, produces which have alternate sources in plantations and farm forestry like goose berries, tamarind, date leaves, etc., need not always be coming from forests. For the herbs/plant parts which need to be extracted from the habitat itself, there has to be periodical censuses and thorough quantity checks along with right pricing.

Socio-Economic Linkages of Tourism and Extraction

Wood and non-wood products are forwardly linked to various sectors: ranging from paper, chemical and pharmaceutical industries to cottage industries; with little or no backward linkage. Tourism as practised at present draws from forests without much forward linkages compared to extraction. It probably helps in adding to the willingness to pay for conservation through better awareness about the natural world. Apart from the probable case of unmanageable number of tourists disturbing wilderness, tourism also has the externality of littering and polluting the forest environment. Extraction activities are largely based on the traditional familiarity of the local dwellers with the area and their customary occupation. Even though
collection rights to the local communities are minimal, they are still being engaged in extraction through co-operative societies to which the produces are leased out by the department or undertaken by the FD itself. Tourism lacks even this participation except to the extent of employing few guides from among the locals or setting up petty businesses in the vicinity, the latter mostly adding to the nuisance factor. With intellectual property rights of indigenous people getting commercial recognition as in the case of 'Arogya paccha' (Trichopus zeylanicus) among Kani tribes in Kerala, NWFP collection has revealed an economic potential for the tribal people more than what tourism can offer. If participation and involvement of traditional stake holders (local dependent communities) is yet to be fully integrated in strategic management for even a conventional forest use like NWFP extraction, tourism as a relatively newer enterprise would have to wait even longer. Both tourism and extraction can be contributing to conservation, if the revenue realised from them are channeled to the source themselves thus providing the incentive needed for both revenue generation and conservation.

CONCLUSION

By virtue of better incomes and economic linkages, low ecological externalities, potential community stakes and absence of alternate sources, essential non-wood products deserve greater role in sustaining forest conservation. Wood product extraction, the highest income earner, is being relocated away from natural forests due to their relatively high ecological externalities, low local stakes and possible alternate sources. Tourism as shown in our study is not a lucrative enterprise in terms of revenue earned, externalities and community stakes.

Extractive reserves under study are currently earning Rs. 189/ha (Rs. 17/ha from NWFP) as compared to the wild life sanctuary which earns Rs. 67/ha (Rs. 22/ha from NWFP and Rs. 15/ha from tourism respectively) per year. With the prevailing income pattern, the reserve forests have shown the potential for some increase in revenue which can be mainly attributable to wood products and hence may not be sustained. NWFPs continue to be major contributors to the forest revenue while their estimated harvestable stock inside the forest is much above the removed quantity as per records in the FD. Periodical plant censuses and market surveys of NWFPs are warranted in order to decide what to be extracted, at what quantity and to be sold at what price. Both from the point of view of keeping a feed stock for wild life and minimising disturbance to their habitat, forest products having possible alternate sources can be collected from elsewhere. Quantity checks and right pricing at forest gate are extremely crucial for both tourism and extracted products. Being two economically realisable use values (in the Indian context) exclusive to the forest environment, neither can these be ignored as sources of revenue nor can they be mismanaged jeopardising the flow of indirect use and non-use values. Individual incentives and community proprietorship have proven potential to economise and sustain the ethos of conservation.
REFERENCES


