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Research Article

FOREST DEPENDENCY AND SUSTAINABILITY OF FOREST RESOURCES: EVIDENCE FROM RURAL ODISHA

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ABSTRACT

The forest has been recognized as an important source of livelihood for the people living in rural areas in general and the forest fringe villages in particular. They collect different types of forest products from the forest. But the often collection of some products (more than their growth) affects the sustainability of the resources. This is a study from three forest villages (near Simlipal National Park), of Mayurbhanj, Odisha where even people of villages from the core area of Simlipal Tiger Reserve, are rehabilitated. The study finds high forest dependency of the people in all the three villages. It also finds evidence of un-sustainability of forest resources by the collection of forest products by the local people.

INTRODUCTION

Forest has been recognized as an important source of livelihood for the people living in rural areas in general and the forest fringe villages in particular. In the forest fringe, such villages the proportion of the scheduled tribe (ST) population is high. Tribals have a symbiotic relationship with the forest. Their economy is largely subsistence oriented, non-stratified and non-specialized. They depend on the forest for their livelihood and they subsisted on a different combination of shifting cultivation, hunting, and gathering. They collect different types of forest products like leaves (sal leaves, kendu leaves, siali leaves etc.), roots (for food and medicine), flowers (like, mahua flower), fruits (like sal seeds, mahua seeds, neem seeds), fodder, bamboo, medicine (the roots, barks, leaves, flowers, fruits of different medicinal plants), etc. which are known as non-timber forest products (NTFP) from the forest. According to the World Resource Institute (1990)[1], nearly 500 million people in India depend upon non-timber forest products (NTFPS) for their livelihood. A survey carried out by the National Sample Survey Organization (NSSO) in its 54th round indicated large scale dependence of the population on common property resources (CPR), of which forest is a major part which provides different products like fuel wood, fodder, thatching materials, fruits, bamboo, canes, reeds, honey and other products (NSSO, 1999). Jodha (1985a, 1985b, 1986, 1990), Pasha (1992), Singh *et al*., (1996), Iyenger and Shukla (1999), Beck and Ghosh (2000) also state that forest as commons provide food, fodder, firewood and medicine to the rural poor. NTFP collection generates about 1063 million man-days of employment in India (Kadekodi, 1997).

Compared to men, the dependence of women on the forest is higher. Often the collection of NTFPs is their main occupation. Rao (1996), in a study from southern Districts of Bihar found women collecting Kendu leaves, mahua flowers and mahua seeds, tamarind and mushrooms from the forest. Poffenberger (1993), in a study from West Bengal, finds women collecting sal leaves from the forest for preparing cup and plates for selling in the market to earn their livelihood. It found that as high as six months in a year they are engaged in this activity. In Odisha also women collecting different products like kendu leaves, sal leaves, sal seeds are revealed from different studies (Sarap, 2004; Mallik, 2001; Das, 2011). On the basis of a study from Mayurbhanj District of Oisha, Rout *et al.* (2010) opine that collection of Non-Timber Forest Product provides employment for the tribal women and they have a larger potential for generating employment in future.

Forest and its Sustainability

Forest is a renewable resource; the collection of NTFPS, like dry twigs, leaves taken for fuel wood, mahua flower and seeds, sal seeds does not cause problem to the forest. Similarly, limited amount of taking of sal leaves, twigs of different bushes for fodder, barks of medicinal plants, tamboo and cane may not cause degradation of the forest. But more amount of subtraction of these products (than their growth) causes degradation of the forest. Thus, the area under forest has not only reduced over time (due to the conversion of forest area for non-forest purposes like agricultural extension, mining, development

[1] Taken from Kadekodi (1997), page-204.

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projects like hydel power project, establishment of industries, expansion of roads and railways etc.), but also the quality of forest has declined, i.e. tree density of forest has declined. It is stated that approximately 11 lakh hectares of forest are lost (degraded) every year of the country due to various factors.

The area under forest has not only reduced over time (due to the conversion of forest area for non-forest purposes like agricultural extension, mining, development projects like hydel power project, establishment of industries, expansion of roads and railways etc.), but also the quality of forest has declined; area under dense forest has declined. Pressure on forest arising from the demand for different forest products is said to the cause of it. The reasons of the more subtraction are population growth, growing market demand for these NTFPs (Kadekodi 1997), fuelled by non-availability of alternative employment opportunities in the forest fringe villages (Sarap, 2004). Gadgil and Rao (1994), Shanker *et al* (1998), Shahabuddin and Prasad (2004), have shown how intensive harvestings of NTFPs have caused loss of forest cover and biodiversity. Studies by Malhotra and Poffenberger (1989), Mukherjee (1995), Jodha (2000) and Guha *et al* (2000) indicate that much of the illegal extraction of timber is due to poverty and unemployment. Timber mafias motivate these poor unemployed people to cut the trees (and sell them to earn a livelihood) causing deforestation. Baviskar (1994) while examining the experiences of adivasis in Jhabua, Madhya Pradesh, whose livelihood derives from their use of the forest and who are held responsible by the state for destroying the forest. According to Baviskar (*ibid*) the state's persistent efforts to deny rights to the tribals who live adjacent to forest has resulted in an ongoing conflict that today constitutes the biggest obstacle to forest conservation.

Further, the growing demand for timber (for household use, industrial use as well as for construction purposes) causes felling of trees by the local unemployed poor, and their sale to the timber mafias. Commercially valuable trees like sal, piasal, teak, asan, kurum, kusum, mahua flower etc. require 20 to 25 years for maturing; implying their slow growth processes. Thus, when market demand causes such cutting of trees, the other role of these trees (and the forest) like, provision of NTFPs, promoting life support system, protection of bio-diversity, etc. are ignored. One of the requirements of sustainable forestry practice is: allowing young trees time to mature and delay their harvest. Sustainable forest management is also known as sustainable forestry. It is the practice of regulating the use of forest resources to meet needs of the people while preserving the forest's health. Therefore sustainable forest management is always looking to strike a balance between the demand for the forest resources and the continuity of the forest. The main objective is to protect sustainable forest management in the state, with a large goal of supporting the development of forest resources with a focus on afforestation. Sustainable forest management (SFM) is a management regime that integrates and balances social, economic, ecological, cultural, and spiritual needs of present and future generations (United Nations, 1992). Essential aspects of SFM include the following:

Economic: The capacity of the forests to attract investment and support economically viable forest uses in the present and the future is undiminished. The forest is not used beyond its long-term capacity for production of wood, and non wood forest products.

Social: It includes a variety of aspects. The rights of indigenous peoples and local communities are respected and protected. Forest workers are healthy, safe, and their rights are protected (e.g., freedom of association, the right to bargain, equal remuneration and nondiscrimination, no child labour or forced labor). Local communities, including indigenous peoples' economic benefit from forest management, are recognised. Sites of religious, spiritual, archaeological, historic, as well as of aesthetic and recreational value are preserved.

Environmental: Forest use protects biodiversity (ecosystems, species, genes and ecological processes) and the capacity to maintain ecosystem processes and services such as watershed protection, pollination, protection against mudslides, aesthetic beauty, carbon storage, etc.

Studies, as mentioned earlier, are numerous on the importance of forest as a source of livelihood, but there are a few studies which examined the issue of sustainability of forest resource through people's involvement in the forest management. To our knowledge, a study by Saha and Kuri (2014) has tried to examine it for the state of West Bengal. However, it assumed sustainability as the outcome of the households' effort/willingness to control extensive withdrawal of forest products, to regenerate forest and also to reduce illicit grazing. We try to examine the sustainability issue in a slightly different manner. Instead of asking the people' willingness or practice we observe the situation and also use some other related variables for this purpose.

DATA AND METHODOLOGY

We have taken the case of Mayurbhanj District which has a forest cover of 439 thousand ha (2006-07). This constitutes 42.13 % of the total geographical area of the district. The forest areas of this district are known for their rich timber and non-timber forest products. They are generally well stocked, diverse, multi-storied and dense. The main plant species found here are *Sal, Piasal, Asan, Korum, Arjun, Kadamba, Karanja, Gambari, Palas, Simul, Kumbhi, Kasi*. The non-timber forest products available from this area include *mahua* flower, bamboo, *sabai* grass, *sal* leaves, *sal*seeds, honey, *jhuna*, lac, *anla, harida, bahada*, etc. *Sabai*grass grows luxuriantly on the red soil. The forest produce provides employment and livelihood to many households. It is also the source of agricultural and industrial inputs.

To study the extent of forest dependency of the people and its effect on forest sustainability we have taken three forest villages of Thakurmunda Block (i.e. Batagaudagan, Cheliaposi and Sarangagarh), where people of 11 villages from the core area of the Simlipal Tiger Reserve were rehabilitated by the Government. The names of the rehabilitated villages and their place of rehabilitation are given in Table-1. Thakurmuda bloack is chosen as in this block highest number of villages is relocated.

Table-1 Names of the villages from and to where Rehabilitation Took (or will take)

Forest Range	Old Place	Rehabilitated To
Thakurmunda (2)	Upper Barhakamuda	kusanpur
	San Bahakamuda	Asankudar
Jashipur (5)	Chahala, Bilapagha, Gudgudia, Barehipani, Astakusha	**Not shifted yet**
Udala (2)	Jamunagarh	Nabra
	Jenabil	Ambadiha
Karanjia (11)	Hatibari, Tulaposi, Karadia, Miludihi, tikasil, Hatisalbeda, Jharbeda	Batagaudagan
		Cheliaposhi
	Satkairi, Pingua, Nadupal, Jhatiali	Sarangagada

In our sample, we have taken both the rehabilitated households as well as the households dwelling there from a very long period (whom we can call the original inhabitants). The total sample size is 34 which constitute approximately 33 percent of the total households in these villages.

Table-2 Number of Households in the Sample Villages

Village	Rehabilitee households	Non-Rehabilitee households	Total households	Sample households
Batagaudagan	16	17	33	10
Cheliaposhi	20	21	41	13
Sarangagada	18	12	30	11
Total	54	50	104	34

Using structured schedule household heads were interviewed personally (during October-November, 2015) regarding their occupations and income, land and other assets, facilities and disadvantages, dependence on forest and forest management. The collected information was processed and simple statistical tools were used.

It was assumed that collection of all forest products do not create deforestation. For example, collection of mahua flower, mahua seeds, different leaves (other than sal leaves), flowers, roots for food, sal seeds, mushrooms etc. does not affect the forest health. Rather, importance of the collection of these products creates incentives for the protection of the forest in general and the types of tree involved in particular. But the collection of (i) sal leaves, (ii) fuelwood (iii) timber and (iv) grazing of cattle in the forest land are the important activities which can result in deforestation. Accordingly, we assume the following:

Collection of fuel wood (for own consumption and for sale)= f (family size, household income, presence of able-bodied unemployed members, price of fuel wood, extent of restriction on this activity)….(i)

It is assumed that family size and household income will affect positively the household's requirement of fuel wood. The presence of able-bodied unemployed members who will be involved in the collection will affect positively the collection. market for fuel wood. Similarly, the price of fuelwood is expected affect positively and restriction on collection is expected to affect negatively the collection of fuelwood.

Timber collection= f (market price, restriction/freedom on collection, male adult able bodied member, availability of employment in other sectors)….(ii)

It is assumed that market price, the number of the adult member will affect positively and restriction on the collection, availability of alternative employment opportunity affects negatively the timber collection.

Collection of sal leaves and sticks = f (market size and price, female members, unemployment or employment situation)….(iii)

It is assumed that the households with more female adult members collect more compared to others. While the male adults work as a daily labourer, the female members often hesitate to do so as work is not available in the neighbourhood. Further, there is less demand for female labour in the market. Moreover, female members want to work only when they work with other members of their family or other female workers of their village. The scope of such work is less and they take sal leaves collection as a suitable occupation for the livelihood of the family. For collection of leaves, they go to the jungle in a group. For rest of the work relating to it (drying and stitching), they do it at home. Higher demand and price of sal leaf plates and cup is expected to increase the collection as it would yield higher return other thing remaining same.

Grazing= f (livestock population, rule regarding grazing in forest)…...(iv)

We assume a negative relationship between per capita cattle unit and sustainability of forest resources. In fact, households with higher per capita cattle unit collect more fodder to feed animals and require a higher quantity of fuel wood to prepare concentrated food for the animals. They also leave their cattle to the forest that is also another reason.

In the following section, findings from the study is presented.

Socio-Economic Condition of the Sample Households

Socio-economic condition of the households in the study is found to be low. 85 percent of the households belong to scheduled caste category. Educational status of the household heads was found to be low; only one of them was educated up to class seven, eight are class five pass and the rest are illiterate.

None of the household is landless, though their land holding was low. Their total land holding was 34.54 acres and the per capital holding was 1.02 acres. The highest land holding was 1.78 acre and the lowest one was 0.13 acre. 50 percent of the household have land above one acre. Thus, agriculture as an occupation is not providing adequate livelihood to the people. Thus, they also take up other economic activities for their sustenance.

Livestock rearing is found to a good occupation in the forest villages as fodder is not a problem. Further people have kept cattle for agricultural operation and also for getting manure. In the study area, almost all households possess cattle population; income from the sale of goats, cows etc. is an important source of earning for them. It is found that on an average each family possesses four heads.

Besides livestock rearing, we find other occupations like a collection of forest products (like sal leaves, fuel wood) for sale in the market, wage employment, shop keeping are other livelihood opportunities people have taken up in the study area.

Extent of Forest Dependency and Sustainability of Forest Resources

Here we present the dependence of the people on the forest for different products. First, we consider the products whose collection does not affect the forest health much. Then the cases of the products whose collection is likely to affect the forest health, are presented.

Mahua flower: It is collected during March-April and used as food immediately and also after processing (i.e. drying) is preserved for its use in future (within six months at best) as food when the household faces food insecurity. This is also used as a raw material for producing wine, hence, there is a good market for it. Traders from distant places come and purchase this product from the villages, though at a low price. 97 percent of the households reported that they have collected this product during the last year (i.e. 2015). 71 percent households reported that they have sold Mahua flower. Generally, female members collect this from the forest. However, 35 percent of the households have reported that both male and female members of their households have collected this product. This shows that it is an important product providing both the food security and livelihood security to the people here.

Mahua fruits and seeds: Mahua fruits are used as vegetables, almost all households have reported that they have collected and used it for some days. 10 households have said that they have sold them in Thakurmunda along with other forest products like sal leaves, sticks.

Mushrooms: Variety of mushrooms is found in the forest during the month of August- September. During this period employment in agriculture is low and households suffer from the problem of food security, as harvesting of rice is rare. Women collect the mushrooms for home consumption and sale in the market. In the neighbourhood town of Thakurmunda and Karanjia they sale the mushrooms.

Edible leaves, flowers and fruits*:* Different types of edibles leaves like *Kundal/Kuler* leaves, *Ghilri* flowers, wild *Kundri*, bitter guards are used as vegetables in the locality and have good demand. Similarly, fruits and berries like *Kendu, Char, Anla, Bhudru*, *Kusum* are also collected for home consumption and sale, particularly, *Kendu, Char, and Anla* have good demand in the market. In these products often male also act as collector, but in general, in the market, the female are found as the seller. As high as 91 percent of the households have reported that they have collected some of these products at least 10 days during the last year. Similarly, 59 percent of them stated that they have sold some of these products in the market.

Now we present the cases of forest products whose collection is likely to affect forest sustainability.

Sal leaves*:* Female members collect and process the leaves. Almost all households in the study villages collect sal leaves and stitch cup and plate and sell in the market. As the demand for the cup plates is rising, the number of stitching machine in the Karanjia and Thakurmunda market is rising, indicating a threat to the sustainability of the sal forest, especially when the rise in labour supply (through population growth) is not accompanied by increased livelihood opportunities. The households also revealed that now they have to walk a longer distance to collect the (usual amount of) sal leaves for this purpose. It is also asked that does the JFM puts some restriction like (i) number of days of collection, (ii) number of collectors per family. But answers were almost negative as *de facto* control through JFM was almost zero. The inadequacy of sunlight for drying up the leaves during the rainy season only, the collection is less (only for home consumption or sale of leaves only and not for cup plate).

Fuel wood*:* Almost all households in the study area collect fuel wood for their household use. Asked whether they collect the dry twigs/leaves for the purpose or cut the trees, they said that they collect dry twigs, but not the leaves. If dry twigs are not available, they cut the bushes and collect. The practice is: one day they cut the twigs, kept them in a bulk to indicate their right, leave them there for drying for some days and then collect as the raw twigs are heavy and difficult to carry. With the increase in the number of families (especially after the relocation of forest villages from Simlipal Tiger Reserve), the pressure on the forest for fuelwood has increased, said the original inhabitants of these villages. 15 households (constituting 45 percent of the sample) have revealed that they are also selling fuel wood in the neighbourhood market, to earn the livelihood. None of these households belong to the rehabilitee category. Rehabilitation of other villages has increased the pressure on the forest and that has increased the cost of collection said these villagers. They also said that these rehabilitated households received houses and land (from this area) by the Government. Their relocation has affected adversely their (original inhabitants') livelihood (of sale of fuel wood). Thus, some sort of antagonistic feeling is found here.

Fodder*:* Grass, some varieties of leaves and twigs are used as fodder. In the study area, almost all households possess cattle population; income from the sale of goats, cows etc. is an important source of earning for them. Further by keeping bullocks they get manures for the field, use them in their cultivation, often use them for hiring out. It is found that on an average each family possesses four heads. So in the large villages say in Cheliaposi in our case it amounts to 205 cattle. Further, observing an average number of 4 children each couple in the study, and the average age of marriage of male persons being 20, it is expected that the number of families and the number of cattle possession will increase. In the absence of new livelihood opportunities' creation, there is a threat to forest sustainability. An additional point in this context is: stall feeding of the cattle is not a usual practice in the area. Even if there is joint forest management in the area, but its functioning is not active and its restriction on the members' access to the forest is not very effective. In the rainy days, the households are found cutting the branches of the trees for feeding the cattle; while doing so, no serious thought is given to the tree growth. Thus, grazing may be considered as a threat to forest sustainability.

Timber*:* With the rise in timber price, the activity of the timber mafia in the forest is noticed. The mafias engage the local cheap labour. To avoid the punishment they purchase the timber (planks) from the people. Some of the members in the village are engaged in this activity; they cut the tree and prepare the planks on the spot and sell the planks in the evening. In the absence of (i) any incentive to forest

preservation and (ii) alternative livelihood opportunities, there is a threat to the forest sustainability from timber collection.

Thus, from our study, we find some evidences of unsustainable forest collection and management. Socio-economic variables like poverty, the number of unemployed adult members, lack of wage employment opportunity, per capita cattle unit, are important factors which have positively affected the extraction and thus, are leading to the risk of unsustainability.

Market is also another factor that which has affected the collection of forest products like sal leaves fuelwood and timber. Nearer the market, more is the collection. Similarly, higher the price, reflecting demand, higher is the collection.

Effective joint forest management is essential for the sustainability of forest and the sustainable livelihood from forest. So, local people's participation in the JFM is essential. Participation of tribals in JFM include among other activities, the reforestation work and protection of plantation, prevention of freely grazing livestock and illicit removal of forest products. Both men and women are major users of forest resources; they should involve themselves in planning decision making and implementation of the forest conservation programs. Hence, sustainability of forest resources depends on active participation of people in JFM, which is lacking in this place.

CONCLUSION AND SUGGESTIONS

The study finds high forest dependency in all these three villages. This is one of the important livelihood opportunities to the people. It is also helping the households' food insecurity. However, in the absence of other opportunities of earning the pressure on the forest is rising and it is apprehended that in the near future, sustainability of the forest resources will be at stack. Hence, there is a need to activate the defunct JFM in these villages. Forest Department and the local civil society groups having an interest in the sustainable management of natural resources for rural livelihood must come forward and halt the process of forest degradation through activating people's participation for sustainable management of the forest resources.

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