

Cost and Return Structure of Some Selected Non-Timber Forest Products in Adjoining Community in Arakanga Forest Reserve in Ogun State

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ABSTRACT

The study focuses on the cost and return structure of non-timber forest in adjoining communities in Arakanga forest reserve in Ogun State, Nigeria. Purposive sampling was used to select four villages (Ajegunle, Ibode-Olude, Mawuko, Quarri) which are close to the forest reserve with projected populations of 300, 280, 220 and 340, respectively. Furthermore, Diaw, et al., (2002) was used to select respondents for the study which indicate 10% sampling intensity was used to sample respondents in the study area where the population is less than 500, 5% sampling intensity for population between 500 and 1000, and 2.5% for a population above 1000.

Purposive sampling was used to select four villages around the reserve, representing 10% sampling intensity in the study area total of 114 questionnaires were administered to the collectors within the village. Data was analyzed using descriptive statistics and budgetary analysis. A majority of respondents were within the age group of 40-49 years (29.8%) and were mostly male (52.6%), 31.6% had no formal education, while 35.9% had primary education and were mostly married (56.1%). The result on profitability showed that fuel wood had the highest returns of ₦10,916.85. Identified NTFPs include fuelwood, mushroom, charcoal, and honey. Constraints faced by NTFPs include price fluctuation (16.7%), low demand (18.4%), and inadequate credit facilities (13.2%). About 47.3% realized above N200,000 as annual income. It was recommended that NTFPs should be introduced to the youth in order to reduce the level of unemployment. The road network to the forest should be rehabilitated for easy accessibility for NTFPs operation.

(Keywords: cost returns, NTFP, non-timber forest products, communities, Arakanga, forest reserves)

INTRODUCTION

Forests have been central to human survival for as long as we have inhabited the Earth. How people use and value forests at a particular place and time, however, depends in large part on their scarcity or abundance relative to changing human needs. In recent years, human population growth, migration, and industrialization, with other socioeconomic changes have had a dramatic impact on the world's forestry sources.

Deforestation in tropical regions is widely acknowledged as a global problem, as is the decline in so-called "old-growth" forests in all countries (Barbier, et al., 2009). The recent increase in secondary forests in temperate regions, while less well-known, will also have a profound effect on the future supply of forest goods and services (Arnold, 2001; Sedjo and Lyon, 2000). Meanwhile, human demands on forests are changing rapidly, as we become more aware of the important environmental benefits they provide.

Millions of people across the developing world trade in a diverse range of non-timber forest produce (NTFPs) everyday, which are marketed primarily in local and regional domestic markets (Schanker, et al., 2004). Building materials, fuel wood, charcoal, indigenous foodstuffs, medicines, crafts items (from wood, grass, reeds, and vines), resins, honey, oils, and alcoholic beverages are examples of some of products that may be found for sale in the vast majority of rural

markets and in nearby towns and cities (Shackleton, et al., 2007).

The term 'forest product' almost immediately brings to mind wood and wood-based products but there are equally important non-wood products that are procured from the forest. These include all products extracted from the forest other than timber. Non-timber forest products (NTFPs) are components of the forest system that exist in nature (Adepoju and Salau, 2007). In agreement with this, Aderounmu et al., (2002), defined non-timber forest products as forest products other than timber that are termed minor forest products. These products are called minor not because they are insignificant in utility but because their consumption, marketing, production, and utilization patterns are not well defined due to particular characteristics of plasticity to different uses and availability in relatively small quantities when compared to timber.

According to Adepoju and Salau (2007), the gathering of non-timber forest products is as old as the human species itself. Wild food and other items from the forest provided food, shelter, medicine and materials for ceremonies and worship. However, in the 1990s, there was a dramatic increase in demand for natural products including those of non-timber forest products which are traceable to a number of factors, which include a growing interest in alternative medicines, and homeopathy (Hammett, et al., 1998).

Mirjam (2003) also agrees with this submission, since early 1990s, the role of non-timber forest products for sustainable forest use and poverty alleviation has received increased attention for its important benefits and such as goods (foods, fodder, fuel, medicine, construction materials and small wood for tools and handicrafts), income and employment. Compared to timber, the harvesting of non-timber forest products seems to be possible without major damage to the forest and its environmental services and biological diversity. In sum, non-timber forest products expected to offer a model of forest use, which could serve as an economically competitive and sustainable alternative to logging.

Non-timber forest products are dependable components of food security and it is an important source of income for the poor in many developing countries. Several opportunities for improved rural development are linked to non-timber forest

products. In many areas, rural populations are traditionally dependent on local forest resources to provide additional income through collection and marketing of non-timber forest products.

Where employment opportunities from traditional industries are declining, workers looking for alternative income sources often turn to collection of these products from nearby forests. Okafor, et al. (2004) observed that in Nigeria, food security of rural dwellers is improved by growing trees in the home garden and on farms. He also stated that leaves, rattan, honey, sap, gums, etc. from the small-scale industries are important sources of income. A lot of households were able to meet their immediate needs by collecting non-timber forest products from nearby forest while some other household earn income to meet other needs through the marketing of non-timber forest products harvested (Mirjam, Rose-Tonen, and Fereek, 2003).

CLASSIFICATION OF NON-TIMBER FOREST PRODUCTS

The number of products available from non-timber forest products is considered staggering; 138 products are identified (Emery, 1998). According to Hammett, et al. (1998), The United Nations, Food, and Agricultural Organization claimed that at least, 150 non-wood forest products are found in international markets.

Classifying these products into categories is an important step of understanding the non-timber forest products industry. It can be broadly classified into edible and non-edible which include plants and animals, honey, oils, fish, spices, grass, ornamental plants, leaves and medicinal products etc. These two classes further be divided into four general categories:

i. Edible- such as mushroom, the most well-known and documented edible forest products as well as many other food products gathered from the forest. These products include ferns, berries or other fruits, nuts, herbs, and spices (McGrath, 2003).

ii. Medicinal and Dietary supplements- these include plant products used for decorative applications (Gibb, 2007).

iii. Floral products- it includes pine boughs, grapevines, ferns and other plant products used for decorative applications (Gordon, 2004)

iv. Specialty wood products- this includes handicrafts, carving and turnings, musical instruments, containers (baskets), special furniture, as well as utensils. These are generally considered non-traditional if produced directly from trees and not from lumber purchased from mills (Sastry, 2005)

METHODOLOGY

The Study Area

This study was carried out in Arakanga Forest Reserve (AFR). It is one of the 9 forest reserves in Ogun State with a land area of about 2.39 km². The reserve is predominantly of high forest and savanna vegetation type. It is situated at the border between Abeokuta North and Opeji ward of Odeda Local Government Area. Arakanga Forest Reserve is a peri-urban forest.

A peri -urban forest reserve has been described as trees and forest resources outside but close to

urban areas because they are major contributors of goods and services to urban society (Mbwambo, et al., 2014). Arakanga Forest Preserve (Arakanga Forest Preserve) is a forest reserve (class L - Area) in Ogun State (Nigeria (general)), Nigeria (Africa) with the region font code of Africa/Middle East. It is located at an elevation of 71 meters above sea level and its population amounts to 118,097. Its coordinates are 7°10'60" N and 3°21'0" E in DMS (Degrees Minutes Seconds) or 7.18333 and 3.35 (in decimal degrees). Its UTM position is EH39.and its Joint Operation Graphics reference is NB31-03. The standard time zone for Arakanga Forest Preserve is UTC/GMT+1.

A Forest reserve is a forested area set aside for preservation or controlled use. This study was carried out at Arakanga Forest Reserve, Abeokuta, Ogun State to determine the contribution of the reserve to livelihoods of the people in the neighborhood. Four (4) communities were selected, they are, Ajegunle, Ibode-Olude, quarry,, and Mawuko, to determine the productivity line among the respondents. A total number of 114 Questionnaires were distributed to collect information from the respondents.

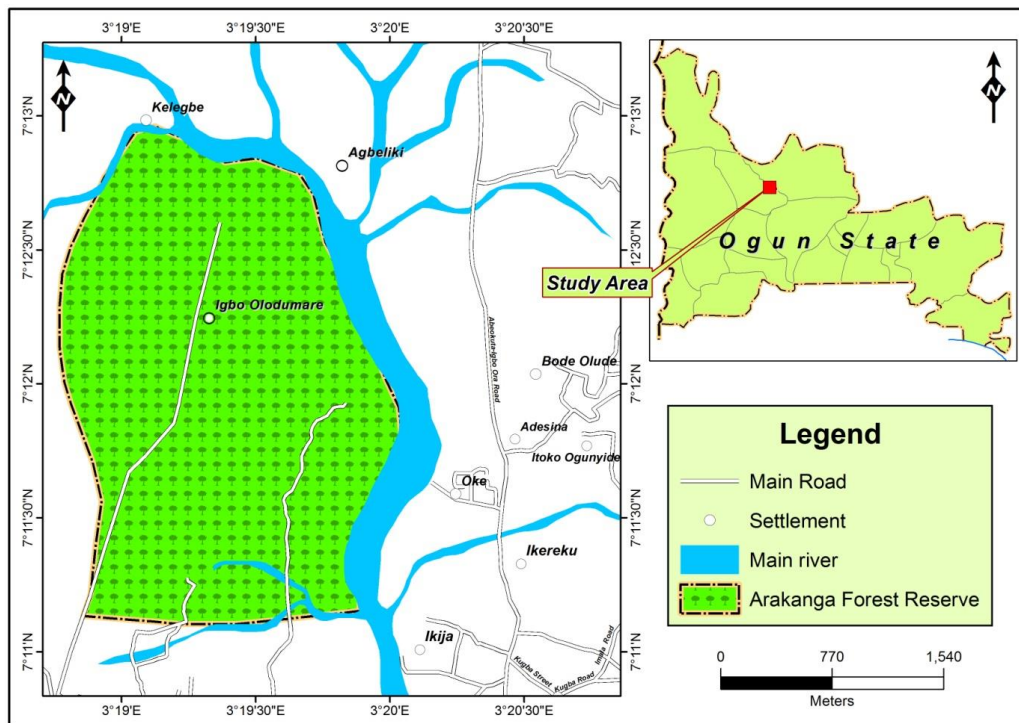


Figure 1: Map of Ogun State showing the Study Area.

Sampling Technique and Sample Size

Purposive sampling was used to select four villages (Ajegunle, Ibode-Olude, Mawuko, Quarri) which are close to the forest reserve with projected population of 300, 280, 220, and 340 respectively. Furthermore, Diaw, et al. (2002) was used to select respondents for the study which indicate 10% sampling intensity was used to sample respondents in the study area where the population is less than 500, 5% sampling intensity for population between 500 and 1000, and 2.5% for the population above 1000.

In the light of this, 30 questionnaires in Ajegunle, 28 in Ibode-olude, 22 in Mawuko, and 34 in Quarri, making a total of 114 questionnaires of 120 were administered in the study area. In addition, questionnaires were administered to some respondents to whom the questionnaire was read and interpreted since they were non-literate respondents.

DATA ANALYSIS

Descriptive statistics tools such as frequencies, means, modes and percentages were used to analyze the variables of interest such as age, gender, family size, education, income, religion, how they transport products from collection point to sales point and the amount paid to laborers. Budgetary analysis was also employed to determine the profitability of the NTFPs collected.

The data collected were subjected to frequency, percentage and profitability analysis.

Gross Margin = Total revenue – Total marketing cost

Profitability index = Rate of return on investment

$TR-TC/TC \times 100$

GM = TR-TC

TR = Output (kg)*price/Unit

TC = $X_1P_1 + X_2P_2 + X_3P_3 + \dots - X_nP_n$

Where X_1 = transportation

X_2 = labor (#)

X_3 = Cutlass

X_4 = knife

X_5 = Basket

X_6 = bottle

P = price of input

Table 1: Sampling Size.

Village	Projected population	Sample size
Ajegunle	300	30
Ibode-olude	280	28
Mawuko	220	22
Quarry	340	34
Total		114

Table 2: Socioeconomic-Characteristics of the Respondent.

Variables	Frequency N=114	Percentage 100%
Villages		
Ajegunle	30	26.3
Ibode-olude	28	24.6
Mawuko	28	24.6
Quarri	28	24.6
Gender		
Male	60	52.6
Female	54	47.4
Age (Years)		
20 – 29	15	13.2
30-39	21	18.4
40-49	34	29.8
50-59	32	28.1
Above 60	12	10.5
Educational Level		
No Formal Education	36	31.6
Primary Education	41	35.9
Secondary Education	33	28.9
Tertiary Education	4	3.5
Marital Status		
Single	5	4.4
Married	64	56.1
Divorced	26	23.7
Window/Widower	5	15.8
Household Size (Units)		
1-3	20	17.5
4-6	63	55.3
7-9	26	22.8
10 above	5	4.4
Source : Field Survey (2020)		

Table 2 shows the demographic characteristics of the respondent, information on gender shows that 47.7% of the respondents are females while 52.6% were male that are involved in the collection of NTFPs in the study area. This results corroborate to the findings of Sani Yahaya (2005) who stated that men's contribution to economic life and share in the labor force continues to rise as they are becoming more involved in small scale enterprises such as agricultural processing and marketing.

The respondents within the age distribution shows that 29.8% of the respondents were between the age ranges of 40 – 49 years, 18.4% were in the range of 30 – 39 years, 28.1% on the range of 50 – 59 years, followed by 13.2% were in the range of 20 – 29 years, while age within range of 10.5% accounted for above 60 years. This implies that majority of the respondents were young and still possess enough strength vigor and vitality to play their active roles in agriculture related entrepreneur. This is agreed with Salawu (2011) who stated that the highly productive age in agricultural and all forestry activities fall with the age group of 40-49 years.

The result revealed that 31.6% of the respondents had no formal education, 35.9% were with primary education, while respondents with secondary education had 28.9%, and respondents with tertiary had 3.5%. While a very few percentages of the respondents possess tertiary education. It therefore supported the findings of Awe, et al. (2011) that although education is an engine for development, it is not necessarily needed for the forest dependent communities as their utmost concern is the easy, cheap and readily available farm practice and non-timber forest products gathering in other to sustain livelihood.

It was further revealed that (56.1%) of the respondents were married, 4.4% were single, also 23.7% were divorced, while 15.8% were widows/widowers. This implies that majority of the respondents were married and committed to the collection of non-timber forest products in the study area in order to take care of the family needs. This however supported the findings of Jibowo (2000) who stated that high percentage of the rural population were married. Also supported were the findings of Afolayan (2000) who stated that majority of people engaged in collection of Non-Timber Forest Products are married.

Table 3: Economic Characteristics of NTFPs Respondents in the Study Area.

Characteristics	Frequency	Percentages
How do you sell your products?		
Wholesales	57	50
Retailer	43	37.7
Middle men	12	10.5
Others	2	1.5
Do you belong to association?		
Yes	60	52.6
No	54	47.4
Do you meet the demand?		
Yes	92	80.7
No	22	19.3
Means of Transportation?		
Woman labour	34	29.8
Motorcycle	41	35.9
Cars	18	15.8
Truck	21	18.4
Sources for the products?		
Purchased with government permit	36	31.6
Produced collected with government truck load	22	19.3
A and B	52	45.6
	4	3.5
Cost of government permit (Naira)		
₦1000-5,000	46	40.4
₦50001-7,500	23	20.1
₦7,5001-10,000	21	18.4
₦10,001-12,500	24	21.1
Business operational capital (Naira)		
Below ₦50,000	64	56.1
₦50,000-₦75,000	50	43.9
Annual Income (Naira)		
₦50,000-100,000	23	20.2
₦100,000-150,000	37	32.5
Above ₦200,000	54	47.3

The result on household showed that respondents with 4-6 persons recorded the highest percentage with 55.3%. This was followed by those with household between 7-9 persons with 28.6% while those with 1-3 and 10 above accounted for 17.5%. and 4.4%, respectively. This signifies that the household head employs family activities, however, the household size is function is a function of the income of the family as this will lead to a pull of resources together for a better standard of living. This is in line with the findings of Awe, et al. (2011) who stated that non-timber forest products collection and gathering is a collective effort which requires more hands hence the use of family labor is required.

Table 3 shows that most of the respondents are wholesalers (50%) while 37.7% of the respondents are retailers while 10.5% of respondents are middle men. It further reveals that respondent that are belongs to an association are with (52.6%) while respondents that do not belong to an association are (47.4%). It revealed that respondent that meet demand of customers are (80.7%) while (19.3%) do not meet demands of their customers.

The results of means of transportation shows that those who use motorcycle had the highest percentage of (35.9%), while 29.8% are female labor, 18.4% used trucks, and 15.8% used cars. The result disagreed with Agbonlahor (2010) who found out that majority of the collectors transport their products with a truck. This is not in agreement with Alfred and Akintunde (2002) who stated that car was used to transport their products. Sources for the products showed that purchasers with government permits were (31.6%), produce collected with government are (19.3%) per truck load are (45.6%) while respondents that are purchase with government permit and collect produce with government permit are (3.5%).

The table also revealed the cost for Government permits which ₦1001-5000 were 40.4% of the

respondents, ₦5001- 7500 were 20.1%, ₦75001-10,000 were 18.4%, while ₦10,001-12,500 were 21.1%. Also, the table shows that the business operational capital in the study area, below ₦50000 were 56.1%, ₦50000-75000 were 43.9%, while ₦100,000-150,000 were 32.5%, 20.2% were between 50,000-100-000, and 47.3% were with above ₦200,000.

Table 4 shows the budgetary analysis of the NTFPS collected in Arakanga Forest Reserve. The total variable cost for the products are, (mushroom) ₦9,795.99, (honey) ₦3,471.43, (charcoal) ₦5,161.22, (bamboo) ₦5,951.98, (fuelwood) ₦10,810.20, (rubber) ₦7,673.47, (fruits) ₦2,959.18, (edible oil) ₦4,224.49, (medicinal plants) ₦6,959.24, and (herbs) ₦6,22.04.

The total fixed cost were ₦605.44, ₦357.14, ₦66.66, ₦313.13, ₦313.13, ₦462.26, ₦389.66, ₦357.14, ₦389.66, and ₦389.7, respectively. The total revenue realized were ₦15,361.22, ₦35,714.30, ₦28,571.43, ₦14,591.82, ₦22,040.18, ₦16,530.00, ₦20,480.16, ₦35,714.29, ₦13,612.25, and ₦4,062.21, respectively. The net profits are ₦4,959.79, ₦3,828.57, ₦2,334.36, ₦8,326.71, ₦10,916.85, ₦8,394.25, ₦8,691.34, ₦3,132.66, ₦6,226.35, and ₦3,050.47.

Table 4: Cost and Returns to Non-Timber Forest Products

Products	Mushroom	Honey	Charcoal	Bamboo	Fuel-wood	Rubber	Fruit	Edible oil	Medicinal plants	Herbs
Av.Qty.coll.(₦)	15,361.22	35,714.30	28,571.43	14,591.82	22,040.18	16,530.00	20,480.16	35,714.29	13,612.25	4,062.21
Av.Qty.sold (₦)	21,979.59	38,571.4	31,428.57	17,244.9	25,555.1	23,673.64	28,959.21	39,776.51	18,959.18	10,122
Av.Labour cost (Mandary)(₦)	3,693.88	2,442.86	4,346.94	1,143.82	3,195.92	2,234.69	2,995.18	4,428.57	2,938.78	145.40
Av.transport cost (₦)	989.79	2,857.14	214.35	1,624.49	2,655.51	163.27	620.41	961.25	620.40	93.95
Total variable cost (₦)	9,795.99	3,471.43	5,161.22	5,951.98	10,810.20	7,673.47	2,959.18	4,224.49	6,959.24	6,22.04
Av.cost of basket (₦)	76.53	0	0	0	0	0	76.53	0	76.53	76.53
Av.cost of cutlass (₦)	313.13	0	0	313.13	313.13	313.13	313.13	0	313.13	313.13
Av. Cost of bag (₦)	66.66	0	66.66	0	0	0	0	0	0	0
Av. Cost of knife (₦)	149.12	0	0	0	0	149.1	0	0	0	0
Av.cost of bottle (₦)	0	357.14	0	0	0	0	0	357.14	0	0
Total Fixed cost (₦)	605.44	357.14	66.66	313.13	313.13	462.26	389.66	357.14	389.66	389.7
Total cost(₦)	10401.43	3828.57	5227.88	6265.11	11123.33	8135.75	3348.84	4581.63	7348.9	1011.74
Total revenue (₦)	15,361.22	35,714.30	28,571.43	14,591.82	22,040.18	16,530.00	20,480.16	35,714.29	13,612.25	4,062.21
Gross margin(W)	10,070.11	30,057.16	4,627.45	11,510.38	15,875.62	13,661.89	16,475.18	29,967.33	9,663.81	3,433.20
Net profit	4,959.79	3,828.57	2,334.36	8,326.71	10,916.85	8,394.25	8,691.34	3,132.66	6,263.35	3,050.47
Profitability index	4.76	8.32	4.46	1.32	0.98	1.03	5.11	6.79	0.85	3.01

Source: field survey 2020

This shows that fuelwood had the highest net profit (₦10,916.85) among the NTFPs in the study area. The rate of return is as follows mushroom (4.76%), honey (8.32%), charcoal (4.46%), bamboo (1.32%), fuel-wood (0.98%), rubber (1.03%), fruits (5.11%), edible oil (6.79%), medicinal plants (0.85%), and herbs (3.01%). These results indicate that for every naira invested (also known as return to capital) was high in the study area. 1-18 was realized and the rates of return follow the same trend. Based on this the collection of NTFPs were more profitable in Arakanga Forest Reserve.

The table showed the identified Non-Timber Forest Products collected in the study area. Fuelwood is the highest (25.4%) NTFPs collected, this agree with the observation of (Kramer et al., 2000) that for daily needs, more people depend on wood than any single energy source. In this respect wood can still be counted as the world's most important fuel.

The table also revealed that honey and charcoal were 14% and 12.3%, respectively. Fruit are collected for sale and also for household consumption and honey is a highly medicinal non-timber forest product in the study area. Also, the table showed that bamboo was also used for fuel energy, this implies that the respondents collect the NTFPs in the natural forest. And these supported findings of Maler (2000), who stated that the rural household normally gathered fuel wood themselves from the wild.

Table 5 : Identified Types of Non-Timber Forest Products in Arakanga Forest-Reserve.

NTFPs	Frequency	Percentage
Mushroom	20	17.5
Honey	16	14.0
Charcoal	14	12.3
Bamboo	16	14.0
Fuelwood	29	25.4
Rubber	1	0.9
Medicinal plant	8	7.0
Fruits	5	4.4
Herbs	4	3.5
Edible oil	1	0.9
TOTAL	114	100

Source: Field-Survey(2020).

The table shows that the collection of NTFPs in the study area encounters several constraints. Majority 18.4% of the respondent were faced with low demand which implies that customer demand for NTFPs are very low which is in line with UNEP-WCMC (2006) study. 16.7% were face with price fluctuation which is in line with Wilkinson, (2004) which states that market expanded at a rate of 13%-15% annually.

A total of 13.2% were facing with inadequate facilities which implies that majority of the rural dwellers as no access to credit facilities which is in line with chamber lain (1998). NTFPs contribute significantly to local and regional economics. Also, 28% usually faced the challenges of high transportation which implies that bad road usually affects the rate at which the villagers participated in the collection of NTFPs in the study area. Lastly, 23.7% were the respondents that is facing with the storage facilities most of the NTFPs collected usually spoil and make farmers effort wasted and make customer interest reduce in the consumption of the products.

Table 6: Constraints of NTFPs in Arakanga Forest Reserve.

Constraints	Frequency	Percentage %
Low demand	21	18.4
Price fluctuation	19	16.7
Inadequate credit facilities	15	13.2
High transportation	32	28.0
Storage problem	27	23.7
TOTAL	114	100

Source: Field Survey (2020).

CONCLUSION

The study shows that Non-Timber Forest Products have the potential ability to sustain lives in the rural area. The importance of Non-Timber Forest Products cannot be over-looked in the ability to sustain livelihood. It requires education before one can take part in the collection and sales of NTFPs. It requires little capital, and the turnover is great. Based on the collection of non-timber forest products by a large majority of the people living in the study area and coupled with the role they play in meeting the basic needs and sustaining livelihood, it can be concluded that there are wide range of non-timber forest

products in Arakanga Forest Reserve such as mushroom, honey, charcoal, bamboo, fuel wood, rubber, medicinal plant, fruits, herbs, edible oil. It is concluded that the collection of NTFPs is viable and will be a sustainable potential for income generation.

RECOMMENDATIONS

The rural dwellers of the study area should be encouraged to cultivate the cultivable non-timber forest products for continuous income generation. The youth should be informed about the importance and benefits of Non-Timber Forest Products. Community forestry should also be encouraged by the state government and Non-Governmental Organizations through education the seminars, construction of roads for adequate transportation of NTFPs and assisting the foresters in protecting the forest from encroachers and illegal feeling.

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