

Social and Economic Benefits from the Managing Forest Areas as Global Commons [A Case Study of Andaman & Nicobar Islands]

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Milan Halder and Prof. (Mrs.) Anjali P. Kulkarni

Forests constitute a large part of CPRs. The nature of household dependence on forests and the factors that bring about changes in it are therefore relevant in the present context. Godoy (1992 to 2002) has argued that increases in income and modernization of economics lead to changes in the mix of forest activities on which people depend with an implication that forest extraction opportunities decrease with an increase in income from cultivation. Gunatileke and Chakraborty (2003) show for Shrilanka that even when cultivation can not be extended to forest land; agricultural income shows a statistically significant negative relationship with the level of forest extraction. The relationship works through competing labour times allocation between two activities. Households at times make a deliberate choice of spending labour time available on forest extraction as against agricultural activities.

S. N. Rai and S. K. Chakrabarti (2005) has presented a report as "Fuel-wood, Timber and Fodder from Forests of India". They had estimated the fuel wood, timber and fodder and also prepared the projected demand of these for 2001 and 2006. But, their estimation had not covered all state and UTs properly. Prof. R. Prasad and Aparna Das (1996) present an article on "Marketing Problems of Minor Forest Produce in Tribal Areas of Chhattisgarh". The objective of them is to focus on tribal exploitation in the marketing of minor forest produce, and suggest to remedying of this problems.

The central issue in the context of household dependence on CPRs is to find out the preferences of the households for income originating from the forest with open access a limited access (CPRs) and examine their time allocation of forest-based activities meant for self consumption and for sale. It is also important to go beyond substitutability of complimentary of income from forest-based CPRs and other kinds of economic activity. Dr. Kanchan Chopra (1990) focuses on the complimentary between agriculture and livestock income and protection of upper catchments for fodder collection and common water resources for irrigation.

There is a general agreements, in large parts of the country, that CPRs provide a source of income and consumption, and therefore, utility augmentation for households that have access to them.

The present case study tries to estimate the dependence of Andaman & Nicobar Islands on forest-based CPRs. This geographical region has a special historical significance and tribal settled in Andaman Region are very dangerous from the point of view of accessibility to them apart from their language. The peculiar characteristics of this tribal area studied from the point of view of contribution of forest-based CPRs in enhancing the welfare of Andaman & Nicobar Islands.

Till now, there has been about 84.01% of total geographical land (8249 Sq. Km.) under actual forest cover area; in which about 95.14 percent is covered by giant evergreen forest or dense forest or luxuriant forest. In one extreme, we find the

Andaman & Nicobar Islands having 100% productive forest area. The products of Andaman & Nicobar forest are richer than that of the Indian forests as whole. Mainland Indian and foreign markets do not have any knowledge about Andaman & Nicobar forest's flora and fauna. The forests of the Islands are rich in biodiversity with almost 2000 plant species and over 5100 animal species. The Islands have maintained bio-diversity through establishment of 9 National Parks, 96 Wildlife Sanctuaries and 2 Biosphere Reserves in the Region. The Islands are one of the last vestiges of the three interconnected natural ecosystems, namely 'Tropical Rain Forests', 'Mangrove Swamp', and 'Coral Reefs'.

Research Methodology and Objectives:

The present exercise is an attempt to find out the role of CPRs in the quality of life and as a source of livelihood to the tribal as well as non-tribal population of Andaman & Nicobar Islands. The focus of the study is on the NTFPs collection from 'Commons' to be used either for self consumption or for sale. Since the tribal population in Andaman & Nicobar Islands has some non-labour income, an attempt has also been made to study the pattern of their time allocation between collection from the commons (NTFPs), working for wage income and leisure.

A distinction is also made between CPR based collection activity and returns (income) to CPR-based labour and return to labour in an alternative/assigned industrial employment.

For the analysis of household behavior a sample of population from the four forest Divisions of Andaman & Nicobar Islands is taken. Three Divisions are randomly drawn out of six Divisions from Andaman Area, and one from Nicobar Area. Five villages are randomly drawn from each of the four divisions. As target groups, 10 households are taken from each selected village belonging to the villages closest to the Islands' forests. Thus, total 200 households are randomly selected mainly to estimate the market and non-market use value of CPRs. A pre-structured questionnaire has been introduced to conduct household survey of 200 households; of them, 10% are tribal households belonging to tribal area.

To examine the dependence of village communities on forest based CPRs, their time allocation for different type of activities, their dependence on forest for biomass consumption or their dependence for livelihood on forest.

The dependence of tribal communities and other communities is examined by studying their consumption pattern. Two **criteria** have been used to find out their degree of dependence on the forest based CPRs:

1. Income Criteria - Proportion of income (in the form of NTFPs collection) derived from CPRs.
2. Fuel Use Criteria - Dependence of households for consumption of fuel.

The main **objective** of the above analysis is to examine their dependence for livelihood purpose as well as for earning income, if they sale the NTFPs in the market.

The analysis is mainly restricted to collection of NTFPs and Timber.

The households have been classified into three categories on the basis of their CPRs collection.

1. Those households who collect NTFPs and timber from forests but use only for self consumption.
2. Those households who collect NTFPs and timber for both self consumption and sale.
3. Those who collect NTFPs and timber from forests for sale.

The attempt is made to estimate the Imputed Value of self consumption of NTFPs. The quality of life of households around forest or in the proximity of the forests gets mainly determined by their self consumption of NTFPs. Collection of various forest produce entering into consumption basket of the households enhances their welfare.

Imputed values, (Imputed Income) have been estimated on the basis of quantity produced for 'own consumption'. Imputed value of different quantity produce is calculated on the basis of average current market prices prevailing in different zones during the survey period in the year-2003. (The market price may be differ in different zones and same produce may also be sold at different prices).

Therefore, imputed income is computed by multiplying quantity consumption of particular product and market price of it per unit.

For instance –

Imputed Income of Particular Commodity:

Imputed Income *is equal to* Quantity Produced for 'Own Consumption' *multiplied by* Market Price of it per Unit.

Symbolically,

$$II = P \times Q$$

II = Imputed Income

P = Market Price of 2003

Q = Quantity Produced for 'Own Consumption'

Therefore,

Imputed Income from different quantities of particular commodity is calculated at average market prices prevailing in the zones. Further, the equation used for this purpose is given below:

$$II = P_1Q_1 + P_2Q_2 + P_3Q_3 + \dots + P_nQ_n$$

Where,

II = Imputed Income from particular product at different market prices.

P₁, P₂, P₃, ..., P_n; Average market price of particular product for different zones and for households.

Q₁, Q₂, Q₃, ..., Q_n; Different quantity consumed of particular product by different households from the different zones.

Sample Study:

The purpose of the study is to examine the dependence at an aggregate level as well as at the level of individual forest Divisions. The variations in the degree of

dependence have been examined to explain them with socio-economic-cultural characteristics of the Region.

Major Findings of the Sample Population:

The NTFPs constitute an array of Products like honey, incense, cane, bamboo, thatching leaves, medicinal plants, firewood, etc. Timber is also collected (through illegal) by many households for selling purpose only. The distribution of households as per their occupation - principal and subsidiary shows the extent to which NTFPs and timber collection is the main source of income or subsidiary source of income. About 100% households collect NTFPs for own consumption.

Dependence of Sample Population on NTFPs and TP:

The local people – tribal as well as non-tribal population derive socio-economic benefits from the forests of the Region. These benefits are reflected in the dependence of locals for their daily subsistence – NTFPs, TP, Fuel wood, fodder - which is a major source of their livelihood in the absence of alternative employment / livelihood opportunities. Almost 100% rural households closest to forests collect NTFPs for 'own consumption'. Largest percentages, i.e., 98% sample households collect firewood for their day-to-day use. Average per-head man-days engaged in collection is estimated at about 48 days per year. The estimates of direct / indirect income / employment opportunities to the locals have been quantified to give some rough estimates of the economic benefits of the Islands. Forest related occupations are principal source of income for 11% households and collection of NTFPs is principal occupation for 45% tribal households close to forest.

The Managing Forest Areas As Global Commons of Andaman & Nicobar Islands Provide the Following Social and Economic Benefits:

1. Employment to Local People: Dependence on CPR-based Occupations:

The CPR-based Occupations have been divided into:

1. TP (Timber Products) Extraction; and 2. NTFPs (Non-Timber Forest Products) Collection: includes - (i) honey, (ii) incense, (iii) cane, (iv) bamboo, (v) thatching leaves, (vi) fire-wood, (vii) medicinal plant, and (viii) others.

Table-1 gives division wise distribution of households as per the principal and subsidiary occupation (source of income).

Dependence of Total Sample Population on NTFPs and TP:

Out of total sample of 200 households, 0.5% (one) household is engaged in extraction of timber and reported it (TP collection) as his principal means of livelihood, whereas only 3.5% households reported TP collection as their subsidiary source of income. They constituted only 4% households of the total sample.

NTFPs collection as a principal occupation was reported by 4.5 % households whereas only 2.5 % households reported this activity as secondary source of income. Thus, out of 200 sample size, only 7 % households reported NTFPs collection as either main or subsidiary source of income.

Division wise Dependence of Sample Households on CPR-based Occupations

S I. N o.	Sources of Income	Principal Occupation		Subsidiary Occupation		TOTAL Principal+Subsidiary	
		House- holds (In No)	% to Its Total Households	House- holds (In No)	% to Its Total Households	House- holds (In No)	% to Its Total Households
I	North Andaman Division						
	1. TP	0	0 %	1	2 %	1	2 %
	2. NTFPs	0	0 %	1	2 %	1	2 %
	Total	0	0 %	2	4 %	2	4 %
II	Baratang Division						
	1. TP	1	2 %	6	12 %	7	14 %
	2. NTFPs	0	0 %	2	4 %	2	4 %
	Total	1	2 %	8	16 %	9	18 %
III	South Andaman Division						
	1. TP	0	0 %	0	0 %	0	0 %
	2. NTFPs	0	0 %	1	2 %	1	2 %
	Total	0	0 %	1	2 %	1	2 %
IV	Nicobar Division						
	1. TP	0	0 %	0	0 %	0	0 %
	2. NTFPs	9	18 %	1	2 %	10	20 %
	Total	9	18 %	1	2 %	10	20 %
	Total of the Four Divisions (I+II+III+IV)						
	1. TP	1	0.5 %	7	3.5 %	8	4.0 %
	2. NTFPs	9	4.5 %	5	2.5 %	14	7.0 %
	TOTAL	10	5.0 %	12	6.0 %	22	11.0 %

Note: Here only those occupations have been described which have income potential.

Primary Source – based on household survey

Inter Divisional Variations in the Occupational Distribution:

A sample of 50 households has been drawn each division making a total of 200 households for the entire Andaman & Nicobar Region. Nicobar Division shows heavy concentration of households with NTFPs collection as the principal occupation and main source of income. Nine households constituting 18% of the sample (50 households) reported NTFPs collection as their principal source of income, only one household has reported NTFPs collection as a subsidiary source of income. This gives a total of 10 households constituting 20% of the size of the total sample drawn in Nicobar Forest Division.

Thus, lots of variations are observed among the four forest Divisions whose main source of occupation was NTFPs and TP collection. Nicobar is 100% tribal areas as a result of which 18% of the households have CPR as a main source of income. Baratang Division has also 16% of the households engaged in collecting NTFPs and TP but it is their secondary source of income.

Collection of timber produce is a main as well as secondary source of income for the 7 (14%) households in Baratang Division whereas in North Andaman Division only one household (2%) is engaged in this activity which constitutes them secondary source of income.

Table-1.1 shows dependence on CPR-based occupations in tribal villages and other villages in Nicobar division. The tribal households are highly dependent on NTFPs; it is estimated at 45% households in tribal villages. Collection of NTFPs is their principal occupation. Besides, the collection of NTFPs is subsidiary occupation for 5% tribal households. Thus, total 50 % tribal households depend on NTFPs in the tribal area.

Table-1.1

Dependence on CPR-based Occupations in **Nicobar** – By Type of Households

Sources of Income	Principal Occupation		Subsidiary Occupation		TOTAL	
	House-holds (In No.)	% to Its Total Households (20/30)	House-holds (In No.)	% to Its Total Households (20/30)	House-holds (In No.)	% to Its Total Households (20/30)
Tribal Villages / Tribal Households (20 Households)						
1. TP	0	0 %	0	0 %	0	0 %
2. NTFPs	9	45 %	1	5 %	10	50 %
Total	9	45 %	1	5 %	10	50 %
Other Villages / Other Households (30 Households)						
1. TP	0	0.00 %	0	0 %	0	0.00 %
1. NTFPs	0	0.00 %	0	0 %	0	0.00 %
Total	0	0.00 %	0	0 %	0	0.00 %

Primary Source – based on household survey

Their further disaggregation into tribal and non-tribal villages shows predominance of tribal villages which practiced this activity as a main source of income.

2. Income to the Local People from CPRs:

Dependence on 'commons' from forest can be shown on the basis of income collected through the forest-based CPRs. Dependence of sample villages can be shown by income / revenue earned through extraction of timber (TP) and NTFPs having direct or indirect link with forests of the islands. Information regarding sources of income of sample villages has been collected by conducting sample survey (or by introducing pre-structured questionnaire).

The details of income criteria from CPR-based occupations have been studied under two broad heads:

2.1. Annual Income and Percentage Share of CPRs:

Further, the details about annual income and percentage share of various CPRs of income can be studied under two sub heads:

(i) Income of Total Sample Population from NTFPs and TP:

Table-2 presents an aggregate estimation of total income from Forest-Based CPRs.

Table-2

Annual Income from Forest-Based CPRs				(Rs. In '000')
Sources of	Principal	Subsidiary	Total of Both the	

Income	Occupations		Occupations		Occupations	
	Annual Income	% to Total Annual Income (Rs.10519.08)*	Annual Income	% to Total Annual Income (Rs.5816.57)*	Annual Income	% to Total Annual Income (Rs.16335.65)*
1. TP	392	3.73 %	1576.00	27.10 %	1968.00	12.05 %
2. NTFPs	54	0.51 %	16.74	0.29 %	70.74	0.43 %
TOTAL	446	4.24 %	1592.74	27.38 %	2038.74	12.48 %

* The total annual income is both from Forest and Non-forest sources.

As Per Principal Sources of Income: The annual income from CPRs has been estimated at about 4.24% to total annual income of the sample households, it occupies a considerable place to local population. In CPRs, timber contributes maximum income.

As Per Subsidiary Sources of Income: Forest-based CPRs occupy a place of prominence to local population. The total income from CPRs is estimated at 27.38% to total income of the sample households (or income out of 200 sample households). Individually, TP contributes a significant share to total subsidiary income of sample households, it is 27.10%.

As Per Total of Both from Principal and Subsidiary Sources of Income: About 12.48% of the income of the households is derived from both Timber extraction and NTFPs collection. The major share in the total income from commons is derived from Timber extraction as its share is 12.05% in total income.

(ii) Inter Divisional Variations in Annual Income from Forest-Based CPRs:

Tables-2.1, 2.2, 2.3 and 2.4 show division wise distribution of income from forest-based CPRs according to principal and subsidiary occupations:

According to Principal Occupations: Only in Baratang, collection of TP as principal occupation contributes 13.49% annual income to total annual income of the sample households (regarding to the income of 50 sample households).

Table-2.1

Sources of Income	Principal Occupations		Subsidiary Occupations		Total (Principal+Subsidiary)	
	Annual Income	% to Total (Rs.1672.80)*	Annual Income	% to Total (Rs.1043.10)*	Annual Income	% to Total (Rs.2715.90)*
1. TP	0	0.00 %	160.00	15.34 %	160.00	5.89 %
2. NTFPs	0	0.00 %	2.70	0.26 %	2.70	0.10 %
Total	0	0.00 %	162.70	15.60 %	162.70	5.99 %

* The total annual income is both from Forest and Non-forest sources.

Table-2.2

Sources of	Principal	Subsidiary	Total
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Income	Occupations		Occupations		(Principal+Subsidiary)	
	Annual Income	% to Total (Rs.2904.8)*	Annual Income	% to Total (Rs.1976.04)*	Annual Income	% to Total (Rs.4880.84)*
1. TP	392	13.49 %	1416.00	71.66 %	1808.00	37.04 %
2. NTFPs	0	0.00 %	7.44	0.38 %	7.44	0.15 %
Total	392	13.49 %	1423.44	72.03 %	1815.44	37.20 %

* The total annual income is both from Forest and Non-forest sources.

Table-2.3

Income from Forest-based CPRs in **South Andaman** (Rs. in '000')

Sources of Income	Principal Occupations		Subsidiary Occupations		Total (Principal+Subsidiary)	
	Annual Income	% to Total (Rs. 3471.2)*	Annual Income	% to Total (Rs. 2046.93)*	Annual Income	% to Total (Rs. 5518.13)*
1. TP	0	0.00 %	0	0.00 %	0	0.00 %
2. NTFPs	0	0.00 %	3	0.15 %	3	0.05 %
Total	0	0.00 %	3	0.15 %	3	0.05 %

* The total annual income is both from Forest and Non-forest sources.

Table-2.4

Income from Forest-based CPRs in **Nicobar** (Rs. in '000')

Sources of Income	Principal Occupations		Subsidiary Occupations		Total (Principal+Subsidiary)	
	Annual Income	% to Total (Rs.2470.28)*	Annual Income	% to Total (Rs. 750.50)*	Annual Income	% to Total (Rs. 3220.78)*
1. TP	0	0.00 %	0.00	0.00 %	0.00	0.00 %
2. NTFPs	54	2.19 %	3.60	0.48 %	57.60	1.79 %
Total	54	2.19 %	3.60	0.48 %	57.60	1.79 %

* The total annual income is both from Forest and Non-forest sources.

According to Subsidiary Occupations: The cultivation has been reported as main occupation of the villages; but as a subsidiary occupation or sources of income, CPRs occupies a place of prominence to the Islanders. For instance, as subsidiary occupation, forest-based CPRs contribute 72.03%, 15.60%, 0.48% and 0.15% to total annual income in Baratang, North Andaman, Nicobar and South Andaman respectively. It can be noted that Baratang contributes significantly largest share as compared to other divisions; while Nicobar division and South Andaman show very little, because tribal households are highly dependent on forestry in Nicobar for own consumption and illegal extraction is very rare in South Andaman because forest Department is existed in the Division. On the other hand, maximum earning is estimated through TP in Baratang and North Andaman.

According to Total Income of Both from Principal and Subsidiary Occupations: It reflects the total income from both the occupations belonging to CPRs. As per total of all forest-based CPRs of income, Baratang contributes largest income to total annual income of sample households as compared to other divisions; it is 37.20%. While 5.99%, 1.79% and 0.05% incomes are earned through forest related sources of income in North Andaman, South Andaman and Nicobar and South Andaman

respectively. Nicobar shows very little income from forest sources as compared to other divisions.

Maximum income is earned through TP in Baratang and North Andaman. However, TP occupies a significant place in Baratang Division; contribution of it is estimated at about 37 % to total annual income of sample households in the division.

Table-2.4.1 shows income through forest-based CPRs in tribal villages and other villages belonging to Nicobar division. In the tribal villages, NTFPs contribute a considerable percentage share to total annual income of tribal households (i.e., 20 households); it is estimated to be around 5.14 % annual income to total annual income of the sample tribal households.

Table-2.4.1

Income from Forest-based CPRs in **Nicobar** – by Type of Households (Rs. in '000')

Sources of Income	Principal Occupations		Subsidiary Occupations		Total (Principal + Subsidiary)	
	Annual Income	% to Total (Rs. 1050.28/ Rs. 1420)*	Annual Income	% to Total (Rs. 213.6/ Rs. 536.9)*	Annual Income	% to Total (Rs. 1263.88/ Rs. 1956.9)*
Tribal Villages / Tribal Households						
1. TP	0	0.00 %	0.00	0.00 %	0.00	0.00 %
2. NTFPs	54	5.14 %	3.60	1.69 %	57.60	4.56 %
Total	54	5.14 %	3.60	1.69 %	57.60	4.56 %
Other Villages / Other Households						
1. TP	0	0.00 %	0	0 %	0	0.00 %
2. NTFPs	0	0.00 %	0	0 %	0	0.00 %
Total	0	0.00 %	0	0 %	0	0.00 %

* The total annual income is from both Forest and Non-forest sources.

2.2. Per-Household Annual Average Income from Forest-based CPRs:

Table-3 presents per household annual average income from CPRs with respect to principal and subsidiary income. Further, the table presents a total overview of all sample villages.

Similarly, it has been explained under two heads:

(i) Description at an Aggregate Level:

As Per Principal Occupations: Per-household annual average income is Rs. 44.60 thousands from CPRs. Tremendous variations are observed in per household annual average income. For instance, extraction of timber TP is principal occupation for only one household (belong to Baratang) and his annual income is Rs. 392 thousands while per household annual average income is only Rs. 6 thousands from NTFPs. It is very little as compared to TP.

According to Subsidiary Occupations: Per-household annual average income is Rs. 132.73 thousands from CPRs. There have also been observed tremendous variations among per household annual average incomes from TP and NTFPs. Per household annual average income of timber extractors is Rs. 225.14 thousands

while per household average annual income from NTFPs is negligible, i.e., Rs. 3.35 thousands.

Table-3

Division-wise Distribution of Annual Average Income Per Household from CPRs
(Rs. in '000')

Sl. No.	Sources of Income	Principal Occupations	Subsidiary Occupations	TOTAL (Principal + Subsidiary)
I	North Andaman Division			
	1. TP	0	160.00	160.00
	2. NTFPs	0	2.70	2.70
	Total	0	81.35	81.35
II	Baratang Division			
	1. TP	392.00	236.00	258.29
	2. NTFPs	0.00	3.72	3.72
	Total	392.00	177.93	201.72
III	South Andaman Division			
	1. TP	0	0.00	0.00
	2. NTFPs	0	3.00	3.00
	Total	0	3.00	3.00
IV	Nicobar Division			
	1. TP	0.00	0.00	0.00
	2. NTFPs	6.00	3.60	5.76
	Total	6.00	3.60	5.76
	Total of the Four Divisions (i+ii+iii+iv)			
	1. TP	392.00	225.14	246.00
	2. NTFPs	6.00	3.35	5.05
	TOTAL	44.60	132.73	92.67

Note: Several households are engaged in more than one forest related occupations as subsidiary source of income at the same time or year

According to Total of Both from Principal and Subsidiary Occupations: Per household annual average incomes show wide disparities in the sample villages and divisions according to different CPRs. Per household annual average income from CPRs is Rs. 92.67. Per household annual average income of timber extractors is Rs. 246 thousands while it is only Rs. 5.05 thousands for NTFPs collectors.

(ii) Inter Divisional Variations:

According to Principal Occupations: Extraction of timber products as principal occupation is seen only in Baratang, one household is directly engaged as self-employed in it; his annual income is adequate, i.e., Rs. 392 thousands. The collection of NTFPs as principal source of income is observed in Nicobar per household annual average income from it is Rs. 6 thousands.

According to Subsidiary Occupation: Extraction of TP as subsidiary occupation is observed in North Andaman and Baratang. But per household annual average income of timber extractors (though illegal) is Rs. 236 thousands in Baratang, it is greater than Rs. 160 thousands per household annual income of timber extractor in North Andaman. Only few households are engaged in collecting NTFPs in each division, and per household annual average income of them from it is considerably

small, but it is observed some-what better in Baratang (i.e., Rs. 3.72 thousands) as compared to other Divisions.

According to Total of both from Principal and Subsidiary Occupations: TP contributes income of Rs. 258.29 thousands per household in Baratang, it is largest as compared to timber extractors of other Divisions. Per household annual average income from NTFPs is largest (i.e., Rs. 5.76 thousands) in Nicobar as compared to other Divisions.

Table-3.1 presents per household annual average income from CPRs in 'tribal villages' and 'other villages' belonging to Nicobar Division.

Table-3.1

Distribution of Annual Average Income of Per Household from CPRs in **Nicobar**
– By Type of Households (Rs. in '000')

Sources of Income	Principal Occupations	Subsidiary Occupations	TOTAL (Principal + Subsidiary)
I	Tribal Villages / Tribal Households		
1. TP	6	3.60	5.76
2. NTFPs	0	0.00	0.00
Total	6	3.60	5.76
II	Other Villages / 'Other' Households		
1. TP	0	0	0
2. NTFPs	0	0	0
Total	0	0	0

With respect to NTFPs, per household annual average income of tribal households is around Rs. 6 thousands; while it is zero in 'other villages'.

3. Collection and Consumption of CPRs: TP and NTFPs:

Forest-based CPRs have been divided into two broad categories. Further, the above study has been made under two heads:

3.1. Households Engaged in collection of CPRs for 'Own Consumption' and for 'Sale':

The households consume a huge part of forest products. Even most of the households are engaged to collect forest produces for own consumption. Households as sellers of CPRs are very small as compared to consumer themselves. They sell the remaining part after their consumption. Traditionally, households collect forest resources for own consumption. For instance, most of households collect NTFPs mainly for own consumption.

According to purpose, the households engaged in producing for 'own consumption' and for 'sale' can be explained under two ways:

Table-4 depicts Division-wise distribution of households for 'own consumption' and for 'sale'. The table presents an aggregate scenario of four sample divisions.

(i) Description at an Aggregate Level:

Further, it can be studied under following manners:

As Per 'for Own Consumption': Almost 100% sample households collect NTFPs for 'own consumption'. A largest percentage, i.e., 98% sample households collect firewood for their day-to-day use; while 89%, 77% and 61% households collect cane, bamboo and thatching leaves for 'own consumption'. In addition, the villagers collect other NTFPs. Thus, the villagers are highly dependent on NTFPs mainly for own consumption. Moreover, they can easily collect it due to existing all around forest resources.

As Per 'for Sale': A few households are engaged to collect CPRs for selling purpose, because most of villagers can easily collect NTFPs, even without money cost. On the other hand, TP is that type of product, which is being produced only for sale. However, 11% households are engaged in collecting CPRs for earning income (i.e., for selling purpose), in which 7 % households collect NTFPs for sale.

Table-4

Distribution of Households Engaged in Quantity Produced for 'Own Consumption' and for 'Sale' – By Division

Forest-based CPRs	For Own Consumption		For Sale	
	No. of Households Engaged	% to Total Households	No. of Households Engaged	% to Total Households
I	North Andaman Division			
1. TP	0	0 %	1	2 %
2. NTFPs	50	100 %	1	2 %
(i) Honey	1	2 %	0	0 %
(ii) Incense	2	4 %	0	0 %
(iii) Cane	49	98 %	0	0 %
(iv) Bamboo	47	94 %	0	0 %
(v) Thatching Leave	36	72 %	1	2 %
(vi) Fire-wood	50	100 %	0	0 %
(vii) Medicinal Plant	4	8 %	0	0 %
(viii) Others	0	0 %	0	0 %
Total (1+2)	50	100 %	2	4 %
II	Baratang Division			
1. TP	0	0 %	7	14 %
2. NTFPs	50	100 %	2	4 %
(i) Honey	11	22 %	1	2 %
(ii) Incense	9	18 %	0	0 %
(iii) Cane	42	84 %	0	0 %
(iv) Bamboo	44	88 %	0	0 %
(v) Thatching Leave	32	64 %	1	2 %
(vi) Fire-wood	50	100 %	0	0 %
(vii) Medicinal Plant	4	8 %	0	0 %
(viii) Others	0	0 %	0	0 %
Total (1+2)	50	100 %	9	18 %
III	South Andaman Division			

1. TP	0	0 %	0	0 %
2. NTFPs	50	100 %	1	2 %
(i) Honey	19	38 %	0	0 %
(ii) Incense	15	30 %	0	0 %
(iii) Cane	50	100 %	0	0 %
(iv) Bamboo	48	96 %	0	0 %
(v) Thatching Leave	33	66 %	1	2 %
(vi) Fire-wood	50	100 %	0	0 %
(vii) Medicinal Plant	17	34 %	0	0 %
(viii) Others	0	0 %	0	0 %
Total (1+2)	50	100 %	1	2 %
IV	Nicobar Division			
1. TP (Cbm)	0	0 %	0	0 %
2. NTFPs	50	100 %	10	20 %
(i) Honey	7	14 %	0	0 %
(ii) Incense	7	14 %	0	0 %
(iii) Cane	37	74 %	0	0 %
(iv) Bamboo	15	30 %	0	0 %
(v) Thatching Leave	21	42 %	0	0 %
(vi) Fire-wood	46	92 %	0	0 %
(vii) Medicinal Plant	26	52 %	0	0 %
(viii) Others	17	34 %	10	20 %
Total (1+2)	50	100 %	10	20 %
TOTAL	Total of the Four Divisions (i+ii+iii+iv)			
1. TP	0	0.0 %	8	4.0 %
2. NTFPs	200	100.0 %	14	7.0 %
(i) Honey	38	19.0 %	1	0.5 %
(ii) Incense	33	16.5 %	0	0.0 %
(iii) Cane	178	89.0 %	0	0.0 %
(iv) Bamboo	154	77.0 %	0	0.0 %
(v) Thatching Leave	122	61.0 %	3	1.5 %
(vi) Fire-wood	196	98.0 %	0	0.0 %
(vii) Medicinal Plant	51	25.5 %	0	0.0 %
(viii) Others	17	8.5 %	10	5.0 %
TOTAL (1+2)	200	100.0 %	22	11.0 %

(ii) Inter Divisional Variations:

As has been mentioned earlier most of the quantity produced from forest is being consumed (except TP) by the households themselves. It is similar in all villages of sample divisions, which can be described as following manner:

As Per for 'Own Consumption': NTFPs are very important factors for the islanders. Especially cane, bamboo and thatching leaves are very useful for constructing houses; peoples are highly dependent on these NTFPs. Besides, firewood is most demanded forest products in NTFPs. From each division, 100% households are more or less dependent on NTFPs for 'own consumption'. They consume large portion of NTFPs. 100% households from each of North Andaman, Baratang and South Andaman collect fire-wood from forest for 'own consumption'; while 92% households in Nicobar collect fire-wood for own consumption. Thus, maximum households depend on firewood for cooking, because the LPG is not available, which is confined in urban (Port Blair) area only. Moreover, both the administration

and the people of rural area do not concentrate towards LPG for cooking due to availability of fuel wood in all around forests at a cheap rate or without incurring cost. Also, horticulture-waste is very useful. Now-a-days, it is being used widely.

Cane is an important NTFP for the islanders. 100%, 98%, 84% and 74% households in South Andaman, North Andaman, Baratang and Nicobar division respectively collect cane specie only for own consumption, it is highest in South Andaman as compared to other divisions. It is lowest in Nicobar as compared to other divisions, because ex-serviceman settlement has been made there after 1974; they are not highly dependent on forestry as compared to other settlers of other divisions.

Similarly, bamboo species are consumed in a major way in the divisions. For instance, 96%, 94%, 88% and 30% households of South Andaman, North Andaman, Baratang and Nicobar respectively extract it for 'own consumption', such as for making fence, furniture, handicraft products, etc. It can be noted that only 30% households of Nicobar division consume bamboo, it is significantly lowest as compared to other divisions, because bamboo species are rare in Nicobar. But those have water transport vehicles (i.e, boat), they collect it from other Divisions. Generally, the households belonging to ex-serviceman settlement do not collect bamboo for house construction. The tribal households of the Division significantly depend on bamboo for construction of houses.

On the other hand, 72%, 66%, 64% and 42% households from North Andaman, South Andaman, Baratang and Nicobar division respectively depend on thatching leaves for the construction of roofs of own residential houses and cowsheds or others. It also shows significantly low share in Nicobar as compared to other Divisions, as has been mentioned earlier that the ex-serviceman settlers do not use it and their type of housing comes under semi *pucca* (semi metal) and *pucca* (completely metal), thus, they make roof by using of tin, asbestos, cement, etc.

As Per 'for Sale': A few households from each division are engaged in collecting forest produce for selling purpose. It can be noted that some-what considerable percentage of households sale forest-based CPRs. For instance, 18% and 20% households of Baratang and Nicobar respectively collect forest-based CPRs for selling purpose. Most of these households in Baratang extract timber and make sleepers, plates, battens, etc for selling. They sell 100% timber produce. While most of the households in Nicobar collect NTFPs (which are included in 'Other' category of produce) for selling, they belong to tribal village – *Chingam Basti*.

Table-4.1 shows households engaged in collecting NTFPs both consumption and sale in 'tribal villages' and 'other villages' belonging to Nicobar Division. Tribal households are highly dependent on NTFPs for own consumption. Bamboo and thatching leaves are being extracted to make fence and roof respectively. The consumption of these produces is significantly largest in tribal villages as compared to 'other villages' in Nicobar division. For instance, 100%, 75%, 70% and 45% households extract fire-wood, cane, thatching leaves and bamboo respectively in tribal villages; while 86.67%, 73%, 23.33% and 20% households of 'other villages' extract firewood, cane, thatching leaves and bamboo respectively. It can be noted that 23.33% and 20% households extract thatching leaves and bamboo respectively in 'other villages'. It reflects that few households use thatching leaves for roof and bamboo for fence in 'other villages' because their type of housing is well or maximum houses are semi *pucca* and *pucca*. On the other hand, maximum tribal houses are *Kutchra* (non-metal). Besides, 100% tribal households collect medicinal plants and

85% of them collect 'other' NTFPs including coconut, areca nut, other wild fruit, etc. While in 'other villages', only 18% households collect medicinal plants for own consumption, and any household does not collect 'other' NTFPs.

However, 100% households depend on NTFPs. It can be noted that 20% tribal households sell 55.77% 'other' NTFPs including natural growing areca nut and coconut; they belong to *Chingam Basti*. In Nicobar, other households do not sell forest-based CPRs.

Table-4.1

Distribution of Households Engaged in collection for 'Own Consumption' and for Sale – By Type of Households

Forest-based CPRs	For Own Consumption		For Sale	
	No. of Households Engaged	% to Total Households (20/30)	No. of Households Engaged	% to Total Households (20/30)
I	Tribal Villages / Tribal Households			
1. TP	0	0 %	0	0 %
2. NTFPs	20	100 %	10	50 %
(i) Honey	5	25 %	0	0 %
(ii) Incense	5	25 %	0	0 %
(iii) Cane	15	75 %	0	0 %
(iv) Bamboo	9	45 %	0	0 %
(v) Thatching Leave	14	70 %	0	0 %
(vi) Fire-wood	20	100 %	0	0 %
(vii) Medicinal Plant	20	100 %	0	0 %
(viii) Others	17	85 %	10	20 %
Total (1+2)	20	100 %	10	50 %
II	Other Villages / Other Households			
1. TP	0	0.00%	0	0 %
2. NTFPs	30	100.00%	0	0 %
(i) Honey	2	6.67%	0	0 %
(ii) Incense	2	6.67%	0	0 %
(iii) Cane	22	73.33%	0	0 %
(iv) Bamboo	6	20.00%	0	0 %
(v) Thatching Leave	7	23.33%	0	0 %
(vi) Fire-wood	26	86.67%	0	0 %
(vii) Medicinal Plant	6	20.00%	0	0 %
(viii) Others	0	0.00%	0	0 %
Total (1+2)	30	100.00%	0	0 %

3.2. Per Household Quantity Produced for 'Own Consumption' and for 'Sale':

Table-5 depicts division-wise annual aggregate and per household quantity collection for 'own consumption', for 'sale' from CPRs.

Similarly, the consumption and sale of forest-based CPRs by per household can be studied under two sub heads- Description at an Aggregate Level and Inter Divisional Comparison.

(i) Description at an Aggregate Level:

Table-5 has also been prepared to make an overall study of the four divisions. The table shows annual aggregate and per household quantity collected for both the purposes.

Table-5

Distribution of Per Household Produce for 'Own Consumption' and for 'sale' – By Division

Forest-based CPRs	For Own Consumption		For Sale		Total	
	Annual Quantity Consumed	Per Household Quantity Consumed	Annual Quantity Sold	Per Household Quantity Sold	Annual Quantity Produced	Per Household Quantity Produced
I	North Andaman Division					
1. TP (Cbm)	0	0.00	20	20	20.0	20.00
2. NTFPs	----	----	1800	1800	----	----
(i) Honey (Ltr.)	5.0	5.00	0	0	5.0	5.00
(ii) Incense (Kg.)	11.0	5.50	0	0	11.0	5.50
(iii) Cane (Mtr.)	4010.0	81.84	0	0	4010.0	81.84
(iv) Bamboo (Ps.)	12790.0	272.13	0	0	12790.0	272.13
(v) Thatching Leave (Pr.)	82500.0	2291.67	1800	1800	84300.0	2341.67
(vi) Fire-wood (Cord)	133.5	2.67	0	0	133.5	2.67
(vii) Medicinal Plant (Kg.)	17.0	4.25	0	0	17.0	4.25
(viii) Others (Kg.)	0.0	0.00	0	0	0.0	0.00
Total (1+2)	----	----	----	----	----	----
II	Baratang Division					
1. TP (Cbm)	0	0.00	226	32.29	226	32.29
2. NTFPs	----	----	----	----	----	----
(i) Honey (Ltr.)	159	14.45	24	24.00	183	16.64
(ii) Incense (Kg.)	265	29.44	0	0.00	265	29.44
(iii) Cane (Mtr.)	5255	125.12	0	0.00	5255	125.12
(iv) Bamboo (Ps.)	31720	720.91	0	0.00	31720	720.91
(v) Thatching Leave (Pr.)	60000	1875.00	3000	3000	63000	1968.75
(vi) Fire-wood (Cord)	178	3.56	0	0.00	178	3.56
(vii) Medicinal Plant (Kg.)	13	3.25	0	0.00	13	3.25
(viii) Others (Kg.)	0	0.00	0	0.00	0	0.00
Total (1+2)	----	----	----	----	----	----
III	South Andaman Division					
1. TP (Cbm)	0	0.00	0	0	0	0.00
2. NTFPs	----	----	2000	2000	----	----
(i) Honey (Ltr.)	156	8.21	0	0	156	8.21
(ii) Incense (Kg.)	134	8.93	0	0	134	8.93
(iii) Cane (Mtr.)	14570	291.40	0	0	14570	291.40
(iv) Bamboo (Ps.)	17450	363.54	0	0	17450	363.54
(v) Thatching Leave (Pr.)	57400	1739.39	2000	2000	59400	1800.00
(vi) Fire-wood (Cord)	143	2.86	0	0	143	2.86
(vii) Medicinal Plant (Kg.)	119	7.00	0	0	119	7.00
(viii) Others (Kg.)	0	0.00	0	0	0	0.00
Total (1+2)	----	----	2000	2000	----	----
IV	Nicobar Division					
1. TP (Cbm)	0.00	0.00	0.0	0.00	0.00	0.00
2. NTFPs	----	----	2215.5	221.55	----	----
(i) Honey (Ltr.)	92.00	13.14	0.0	0.00	92.00	13.14
(ii) Incense (Kg.)	98.00	14.00	0.0	0.00	98.00	14.00
(iii) Cane (Mtr.)	4930.00	1333.24	0.0	0.00	4930.00	133.24
(iv) Bamboo (Ps.)	4519.00	301.27	0.0	0.00	4519.00	301.27
(v) Thatching Leave (Pr.)	11650.00	554.76	0.0	0.00	11650.0	554.76
(vi) Fire-wood (Cord)	221.11	4.81	0.0	0.00	221.11	7.81
(vii) Medicinal Plant (Kg.)	182.00	7.00	0.0	0.00	182.00	7.00
(viii) Others (Kg.)	1757.00	103.35	2215.5	221.55	3972.50	233.68
Total (1+2)	----	----	2215.5	221.55	----	----
TOTAL	Total of the Four Divisions (i+ii+iii+iv)					

1. TP (Cbm)	0.00	0.00	246.0	30.75	246.0	30.75
2. NTFPs	----	----	----	----	----	----
(i) Honey (Ltr.)	412.00	10.84	24.0	24.00	436.0	11.47
(ii) Incense (Kg.)	508.00	15.39	0.0	0.00	508.0	15.39
(iii) Cane (Mtr.)	28765.00	161.60	0.0	0.00	28765.0	161.60
(iv) Bamboo (Ps.)	66479.00	431.68	0.0	0.00	66479.0	431.68
(v) Thatching Leave (Pr.)	211550.00	1734.02	6800.0	2266.67	218350.0	1789.75
(vi) Fire-wood (Cord)	675.61	3.45	0.0	0.00	675.61	3.45
(vii) Medicinal Plant (Kg.)	331.00	6.49	0.0	0.00	331.0	6.49
(viii) Others (Kg.)	1757.00	103.35	2215.5	221.55	3972.5	233.68
TOTAL (1+2)	----	----	----	----	----	----

For 'Own Consumption': As has been mentioned earlier that most of households extract produce forest produces for own consumption. Per household quantity consumed is significantly large, for instance, per household quantity consumed of thatching leaves is estimated about 1734 Prs. While cane and bamboo species are very useful for making fence, furniture, handicraft products, binding, etc. Per household consumption of cane and bamboo are estimated at about 161.60 Mtr and about 432 Ps respectively. Per household consumption of firewood is significant, i.e., 3.45 Cords (or 7.314 Cubic Meter).

Medicinal plants are collected for domestic use. Per household quantity consumed of it is 6.49 Kg. Some households collect 'other' category of NTFPs, include areca nut, coconut, wild fruit, curie fruit, etc. Per household consumption of it is around 103 Kg, it is considerable.

As Per For 'Sale': Per household timber product for selling is 30.75 Cbm. Per household quantity sold 'Other' NTFPs is 221.55 Kg.

As Per Total of Both the Purposes: Negligible percentage of households is engaged in collecting forest resources for selling purpose. Since most of the households are engaged in extraction of forest produces for self-consumption; no wide variations are observed in extraction for 'sale' or for 'self-consumption'.

(ii) Inter Divisional Comparison:

As Per for 'Own Consumption': Many disparities are observed in per-household quantity produce used for own consumption in the divisions. It may be due to different degree of dependence. For instance, per household consumption of honey and incense are 5 Ltr and 5.5 Kg respectively in North Andaman; these are less than the other divisions. Per household consumption of bamboo is significantly higher in Baratang (i.e., around 720 Ps) as compared to other Divisions. Because the forest of Baratang is very rich and plenty of bamboo species, the Division is also well known for naturally growing bamboo species. Similarly, the forest of South Andaman is very rich for naturally growing cane species and there per household quantity consumed of it is very high (i.e., 291.40 Mtr.) as compared to other Divisions. Per household fire wood consumption are 2.67 cords, 3.56 cords, 2.86 cords and 4.81 cords in North Andaman, Baratang, South Andaman and Nicobar division respectively, it is significantly large in Nicobar division as compared to other Divisions because of existing large family size of tribal households. Therefore, they need more fuel wood for cooking; and also, they use fire-wood for campfire. Besides, per household quantity consumed of firewood is more in Baratang than the North Andaman and

South Andaman because some households of Baratang are regularly engaged in camp-firing.

As Per For 'Sale': One household is engaged in extracting TP in North Andaman, his annual quantity sold is 20 Cbm. While 7 households extract it in Baratang and per household quantity sold is 32.29 Cbm.

As Per Total of Both Purposes: No significant disparities have been observed between "per household total quantity produced for both purposes" and "per household quantity produced for own consumption" because a negligible part of households collect CPRs for selling purpose.

Table-5.1 has been prepared to present annual and per household quantity produced for own consumption and for sale by 'Tribal households' and 'other households' in Nicobar Division. The table shows that per household quantity produced for own consumption is significantly higher in tribal villages as compared to 'other villages' in Nicobar and other divisions. 'Others' category of NTFPs, include coconut and areca-nut for selling purpose and per household quantity sold of it is estimated at about 221.55 Kgs in Nicobar. While any household does not sale forest produces in 'other villages'.

Table-5.1

Distribution of Per Household Produce for 'Own Consumption' and for 'sale' in **Nicobar** – By Type of Occupation

Forest-based CPRs	For Own Consumption		For Sale		Total	
	Annual Quantity Consumed	Per Household Quantity Consumed	Annual Quantity Sold	Per Household Quantity Sold	Annual Quantity Produced	Per Household Quantity Produced
I	Tribal Villages / Tribal Households					
1. TP (Cbm)	0	0.00	0.0	0.00	0.0	0.00
2. NTFPs	----	----	2215.50	221.55	----	----
(i) Honey (Ltr.)	85	17.00	.0	0.00	85.0	17.00
(ii) Incense (Kg.)	92	18.40	0.0	0.00	92.0	18.40
(iii) Cane (Mtr.)	3340	222.67	0.0	0.00	3340.0	222.67
(iv) Bamboo (Ps.)	3699	411.00	0.0	0.00	3699.0	411.00
(v) Thatching Leave (Pr.)	8900	635.71	0.0	0.00	8900.0	635.71
(vi) Fire-wood (Cord)	121	6.05	0.0	0.00	121.0	6.05
(vii) Medicinal Plant (Kg.)	164	8.20	0.0	0.00	164.0	8.20
(viii) Others (Kg.)	1757	103.35	2215.5	221.55	3972.5	233.68
Total (1+2)	----	----	2215.5	221.55	----	----
II	Other Villages / Other Households					
1. TP (Cbm)	0.00	0.00	0	0	0.00	0.00
2. NTFPs	----	----	0	0	----	----
(i) Honey (Ltr.)	7.00	3.50	0	0	7.00	3.50
(ii) Incense (Kg.)	6.00	3.00	0	0	6.00	3.00
(iii) Cane (Mtr.)	1590.00	72.27	0	0	1590.00	72.27
(iv) Bamboo (Ps.)	820.00	136.67	0	0	820.00	136.67
(v) Thatching Leave (Pr.)	2750.00	392.86	0	0	2750.00	392.86
(vi) Fire-wood (Cord)	100.11	3.85	0	0	100.11	3.85
(vii) Medicinal Plant (Kg.)	18.00	3.00	0	0	18.00	3.00
(viii) Others (Kg.)	0.00	0.00	0	0	0.00	0.00
Total (1+2)	----	----	0	0	----	----

4. Distribution of Per Head Mandays Engaged for Collection of CPRs (TP and NTFPs):

Table-6 has been prepared to present division wise per-head mandays engaged to collect quantities of CPRs in the year.

It can be studied under two sub-heads:

Description at an Aggregate Level: -

Per head mandays worked are estimated at about 45 days for NTFPs. It is difficult to separate mandays engaged in NTFPs collection for consumption or for selling purpose as both these activities take place at one single point of time or simultaneously. Consequently, per head mandays employed in collecting varieties of NTFPs for selling purpose are included in per-head mandays used in collecting NTFPs for own consumption. But it can be concluded that maximum mandays are engaged in production or collection of NTFPs for own consumption. Besides, the mandays employed to produce TP only for selling purpose; there average per head mandays worked are 148 days in a year. Total annual average per-head mandays is estimated at about 48 days in a year.

Table-6

Distribution of Per Head Mandays Engaged for Collection of TP, NTFPs and Total
- By Divisions

Name of the Divisions	TP	NTFPs	Total Annual Average Per Head Mandays
North Andaman Division	120.0	28.29	29.56
Baratang Division	152.3	34.61	43.77
South Andaman Division	0.0	33.63	33.63
Nicobar Division	0.0	71.19	71.19
TOTAL	148.0	45.50	47.60

[Note: Those family members and mandays are engaged to produce for selling; they are initially included in family members and mandays engaged to produce for own consumption (except family members mandays engaged in extracting TP)]. **Per Manday = 5 Hours (Average or Apx.).**

Inter Divisional Variations:

Table-6 has also been prepared to present division wise per-head mandays engaged to collect quantities of CPRs in the year. For 'Own Consumption' and for 'Sale', total annual average per-head mandays engaged in extracting TP and NTFPs is around 30 days, 44 days, 34 days and 71 days in North Andaman, Baratang, South Andaman and Nicobar division respectively. It is highest in Nicobar division because the tribal family members of the division are highly and regularly engaged in collecting NTFPs due to lack of alternative opportunities of livelihood. Per-head mandays engaged in extracting TP is 120 days and around 152 in North Andaman and Baratang respectively, while it is zero in other divisions. Per-head mandays engaged in collecting varieties of NTFPs is around 28 days, 35 days, 34 days and 71 days in North Andaman, Baratang, South Andaman and Nicobar respectively.

Table-6.1 has been prepared to depict annual average per-head mandays engaged to collect NTFPs in tribal villages and other villages belonging to Nicobar division. For collecting varieties of NTFPs; annual average per head mandays worked at around 85 days in tribal villages while it gives estimate of per head mandays worked

around 36 days in tribal villages. Finally, it can be concluded that the tribal people are highly dependent on varieties of NTFPs for day-to-day livelihood.

Table-6.1

Distribution of Per Head Mandays Engaged for Collection of TP, NTFPs and Total in
Nicobar – By Type of Villages

Types of Villages	TP	NTFPs	Total Annual Average Per Head Mandays
Tribal Villages (20)	0.0	84.64	84.64
Other Villages (30)	0.0	35.89	35.89
NICOBAR DIVISION	0.0	71.19	71.19

5. Imputed Income from NTFPs:

It include; (i) Honey, (ii) Incense, (iii) Cane, (iv) Bamboo, (v) Thatching leaves, (vi) Firewood, (vii) Medicinal plants and (viii) Others.

Maximum part of NTFPs is being consumed by households themselves, while only negligible quantity is being sold. Consequently, the monetary values of those quantities for 'own consumption' are being neglected. The attention of the producers, planners and experts can be diverted towards its actual monetary value by calculating its 'Imputed Value' or 'Imputed Income' of the collectors or producers. The imputed incomes from the quantity consumed can be calculated with the help of its prevailing market price during the survey period. Since the survey with pre-structured questionnaire has been calculated in 2003, the market prices of that year (2003) have been considered accepted to calculate the 'imputed income'. The market prices of various forest products have been given in Appendix-1 for that year. Refer The details of methodology applied to calculate imputed incomes have been described in the 'Research methodology'.

However, as has been mentioned earlier; the annual imputed income and per-household imputed income form NTFPs can also be presented under two heads.

Description at an Aggregate Level: -

Table-7 has been constructed to show division wise distribution of annual imputed incomes and per household annual imputed incomes form NTFPs.

Annual imputed income of 200 households is calculated to be around Rs. 1829.21 thousands and per household imputed annual income is calculated at about Rs. 9.15 thousands from NTFPs

Table-7

Division Wise Distribution of Annual Imputed Income and Per- Household Imputed Income form NTFPs
(Rs. in '000')

Name of the Divisions	Annual Imputed Income	Per Household Imputed Income
North Andaman	396.28	7.93
Baratang	541.25	10.83
South Andaman	437.82	8.76
Nicobar	453.86	9.08
TOTAL	1829.21	9.15

Inter Divisional Variation:

NTFPs contribute considerable annual imputed income and per household imputed income in each division. For instance, annual imputed income of 50 households is calculated to be around Rs. 541.25 thousands; and per household imputed income is calculated at about Rs. 10.83 thousands in Baratang division, these are largest as compared to other divisions.

Table-7.1 has been prepared to show annual imputed income and per-household imputed income of “tribal households” and “other households” in Nicobar division.

Annual imputed income and per household imputed income in ‘tribal villages’ are significantly largest as compared to ‘other villages’ in Nicobar division. For instance, annual imputed income and per household imputed income of 20 tribal households are Rs. 275.60 thousands and Rs. 13.78 thousands respectively in tribal villages; while annual imputed income and per household imputed income of 30 ‘other’ households are Rs. 178.28 thousands and Rs. 5.94 thousands respectively from NTFPs in ‘Other villages’.

Table-7.1

Distribution of Annual Imputed Income and Per- Household Imputed Income form
NTFPs in Nicobar – By Type of Households (Rs. in ‘000’)

Type of Households	Annual Imputed Income	Per Household Imputed Income
Tribal Households	275.60	13.78
Other Households	178.26	5.94
NICOBAR	453.86	9.08

From above discussions, it can be concluded that the tribal villages are highly dependent on NTFPs for own consumption, which has improved their quality of life.

6. Aggregate Income from NTFPs (Imputed Income + Reported Income):

The explanation has been given earlier regarding reported (recorded) income through quantity sold and imputed income through quantity consumed separately. The present exercise is directed towards estimating aggregate income of the households, viz., **imputed income plus reported income**. The aggregate income consists of ‘imputed income’ through the quantity consumed and ‘reported or recorded income’ through the quantity sold.

Table-8 has been constructed to present on overall scenario of aggregate annual income and per household aggregate income from various NTFPs in the four Divisions. Further, the details of aggregate income from NTFPs have been presented under following sub-heads:

Description at an Aggregate Level:

However, the annual aggregate income from NTFPs is around Rs. 1899.95 thousands for 200 households; per household annual aggregate income is around Rs. 9.50 thousands.

Inter Divisional Variations:

Annual aggregate income and per household annual aggregate income from NTFPs are largest in Baratang as compared to other divisions because income from bamboo is significantly large in Baratang as compared to other divisions. It has been

mentioned earlier that the forest of Baratang is very rich and plentiful for growing natural bamboos species.

Table-8

Division-wise Distribution of Aggregate Annual Income and Per Household Aggregate Income from **NTFPs** (Rs. in '000')

Name of the Divisions	Aggregate Annual Income	Per Household Aggregate Income
North Andaman	398.98	7.98
Baratang	548.69	10.97
South Andaman	440.82	8.82
Nicobar	511.46	10.23
TOTAL	1899.95	9.50

Table-8.1 has been prepared to present a separate scenario of annual aggregate income and per household annual aggregate income for tribal villages and other villages in Nicobar divisions.

Generally, it can be concluded that the annual aggregate incomes and per-household annual aggregate incomes from various NTFPs are significantly high in tribal villages as compared to other villages in Nicobar division.

Table-8.1

Distribution of Aggregate and Per Household Aggregate Income from NTFPs in **Nicobar** – By Type of Households (Rs. in '000')

Type of Households	Aggregate Annual Income	Per Household Aggregate Income
Tribal Households	333.20	16.66
Other Households	178.26	5.94
NICOBAR	511.46	10.23

It can be concluded that degree of dependency on NTFPs is very high in the islands. Especially for collection of firewood, cane, bamboo, thatching leaves. However, dependence on plants for preventing diseases and preparing plan-based drugs are small.

To conclude, it can be said that tribal households are highly dependent on NTFPs for 'own consumption'.

7. Firewood Use Criteria:

As per household survey, it is pointed out that firewood is being collected for two purposes, viz., (a) For cooking and (b) For campfire in the villages of the islands. Also for both the purposes, the households use firewood as principal and subsidiary sources of fuel. Table-9 presents Division-wise distribution of households by firewood consumption pattern. Now, the details of it can be described in two ways –

(i) Description at an Aggregate Level:

It can be studied with respect to both the purposes:

(a) For Cooking: - As per the table, most of households use firewood as principal source of cooking while horticulture waste is being used as subsidiary source of cooking. It has been mentioned earlier that out of 200 sample households, 98%

households collect firewood from the forests. Of them, firewood is principal source of cooking for 84% households while 16% households use it as a subsidiary source for cooking.

(b) For Campfire: - Out of 200 sample households, 34.50% households are irregularly engaged in practicing campfire. Of them, 15.50% households use firewood as principal sources for camp firing. Besides, 19% households used firewood as a subsidiary source of it.

Table-9

Division-wise Distribution of Households by Firewood Consumption Pattern

Name of the Divisions	For Cooking		For Campfire	
	Principal	Subsidiary	Principal	Subsidiary
	% to Total Households (200)	% to Total Households (200)	% to Total Households (200)	% to Total Households (200)
North Andaman	100 %	0 %	6.0 %	0 %
Baratang	86 %	14 %	14.0 %	22 %
South Andaman	90 %	10 %	12.0 %	48 %
Nicobar	60 %	40 %	30.0 %	6 %
TOTAL	84 %	16 %	15.5%	19 %

(ii) Inter Divisional Variations:

(a) For Cooking: -

It is common that firewood is principal source of cooking for maximum households in each division.

As per principal source: The largest percentage of households use firewood as principal source of cooking in the North Andaman as compared to other divisions; it is 100% in North Andaman. While 60% households to total of 50 sample households in Nicobar use firewood as principal source of cooking, it is lowest as compared to other divisions.

As per subsidiary source: It can be noted that 40% households of Nicobar division use firewood as subsidiary source of cooking, it is highest as compared to other divisions because a significant percentage of households use horticulture waste and LPG as principal sources of cooking in Nicobar division.

(b) For Campfire: -

Maximum households use firewood for this activity. This practice is very irregular in the villages.

As per principal source: 30% households of Nicobar division use fire-wood as principal source of campfire, most of them are belonging to tribal villages, it is highest as compared to other divisions; while 6%, 14% and 12% households use firewood as principal source of campfire in North Andaman, Baratang and South Andaman respectively.

As per subsidiary source: 22%, 48% and 6% households use firewood for that activity in Baratang, South Andaman and Nicobar respectively; it is highest in South Andaman as compared to other divisions, while it is zero in North Andaman.

Table-9.1 presents pattern of firewood Consumption by tribal households and other households belonging tribal villages and other villages respectively in Nicobar division. For cooking, tribal households are highly dependent on firewood. For instance, 85% tribal households use firewood as principal source of cooking while it is principal source for 56.67% households in other villages.

Table-9.1

Distribution of Households by Firewood Consumption Pattern in **Nicobar** - By Type of Households

Type of Households	For Cooking		For Campfire	
	Principal	Subsidiary	Principal	Subsidiary
	% to Total Households (20/30)	% to Total Households (20/30)	% to Total Households (20/30)	% to Total Households (20/30)
Tribal Households	85.00 %	15.00 %	55.00 %	0 %
Other Households	43.33 %	56.67 %	13.33 %	10 %
TOTAL	60.00 %	40.00 %	30.00 %	6 %

For campfire, the tribal households are highly dependent on firewood. For e.g., 55% tribal households use firewood as principal source of campfire while only 13.33% other households use it as principal source of campfire. On the other hand, 10% other households use firewood as subsidiary source of campfire while it is zero in tribal villages. It is concluded that firewood is principal source for cooking and the forest-based CPRs is main source for collection of fuel wood.

Concluding Remarks:

Special seamak is that the sample households - tribal or non-tribal - are highly dependent on forest-based CPRs for 'own consumption' mainly, especially for collection of firewood, cane, bamboo, thatching leaves. For instance, about 100% sample households depend on NTFPs for cooking, housing, etc. The 100 percent tribal households are highly dependent on NTFPs for surviving daily life. The tribal people belonging to tribal villages predominantly depend on the collection of NTFPs for their livelihood. The tribal people are highly depend on the forest-based CPRs for direct marketed benefits and for 'own consumption' such as honey, incense, cane, bamboo, thatching leaves, fire-wood, medicinal plants, others NTFPs.

SUGGESTIONS AND POLICY RECOMMENDATIONS:

Two way measures should be taken by the Govt. for reducing the directly dependence on forest in the islands; **firstly**, creation of alternative employment opportunities, and **secondly**, generation of awareness among the islanders.

Firstly, following measures can be taken for creation of alternative employment opportunities:

- (i) Rural tourism development

- (ii) Introducing of artificial and natural regeneration in tribal and rural area
- (iii) Expanding developmental work and infrastructure development work, such as construction, transportation, education and other in rural area
- (iv) Establishment of tourism related activities such as institutions, education, training, etc.
- (v) Open other natural area for growing tourism activities
- (vi) Establishment of local-product based industry such as banana chip factory, coconut hair-oil factory, areca nut based factory, etc.
- (vii) To increase the production of NTFPs and timber, the Govt. should inspire the islanders through various incentives, aids and concessions
- (viii) Generation of coastal development and creation of employment for protection
- (ix) Increment in forest cadres and other categories of forest staff
- (x) A conceptual project can also be designed on the strengthening the village level institutions to ensure their participation in the management process and gain employment

Secondly, the following strategies should be taken for generation of awareness among the islanders to conserve the forest resources.

- (i) Extension work with tribe for conservation and education
- (ii) Similar education programmes for the settlers of islands
- (iii) Protection from foreign poachers
- (iv) Establishment of effective infrastructure
- (v) Providing full protection- prevent degradation, intensive patrolling, communication network, etc.
- (vi) Rewards and incentives to informers
- (vii) Eco-restoration – afforestation
- (viii) Rehabilitation- identify threatened area to declare as sanctuaries
- (ix) To check reclamation, encroachment, destruction for aquaculture
- (x) Awareness on importance of ecosystem need to preserve socio-economic value
- (xi) Proper data base- inventory status survey, research
- (xii) Protection zones to maintain genetic diversity
- (xiii) Nature camps, animal and bird watching, ecotourism interpretation centers

Appendix-1

Average Price of Various CPR Products (Price In Rs.)

Products	Average Price Per Unit
1. TP (Cbm)	8000.00
2. NTFPs	---
(i) Honey (Ltr)	79.71
(ii) Incense (Kg)	20.00
(iii) Cane (Mtr)	3.00
(iv) Bamboo (Ps)	3.00
(v) Thatching Leave (Pr)	1.64
(vi) Fire-wood (Cord)	1660.00
(vii) Medicinal plant (Kg)	NA
(viii) Others (Kg)	18.00

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