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Livelihood Status and Human Pressure on Forest Resources by the Inhabitants of Forest Villages of Assam, India

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ABSTRACT

Livelihood and sustenance of the forest and fringe dwelling communities are inextricably linked with the forest ecosystem as it provide wide range of services and products. Forest helps them overcome poverty, acts as season gap-filler during income slack period and shock absorber in case of poor harvest. Poverty analysis shows that economical weaker section of the people live in and around the forests. In India, around 40% of the poor population dwells in forest fringes. Forest degradation due to human settlement, agriculture, exploitation of forest resources, landuse/ landcover change has resulted in loss of biodiversity, habitat fragmentation, shrinkage of wildlife habitats man-animal conflicts and climate change. Assam has also suffered rapid loss of forest cover due to encroachment in the forest areas, clearing of forest for expansion of agriculture land, excessive dependency of the rural communities on forest resources and displacement of people by annual floods, erosion, militancy, ethnic clashes. Lower literacy rate, large family size, unsustainable use of forest products, frequent trips to forests, income slack periods, dependency on forest for firewood and bamboo, monetary benefit by selling forest products and feeding cattle in the forests creates human pressure on forest ecosystem. Dependency on the forest ecosystem can be reduced by providing livelihood opportunities to the communities through community orchards, community fisheries, organic farming and composting and establishing market link as a joint initiative by the Forest Department and the local bodies, use renewable energy for cooking purpose instead of firewood use of solar cooker and engaging youth and women folk in forest based crafts and handloom.

Keywords: Livelihood, Forest dependency, Human pressure, Forest Villages

INTRODUCTION

Traditionally, livelihood of the forest dwelling communities and forest fringe dwellers are inextricably linked with the forest ecosystem as it provide wide range of services and products like food, fodder, fuel, medicine, building materials etc. Forests are of prime importance to the rural communities of the developing countries because their livelihood and sustenance are dependent on forests and help them overcome poverty, acts as season gap-filler during income slack period and as shock absorber in case of poor harvest, family illness or other misfortune [1-3]. But unsustainable harvest of forest products to sustain rural livelihood possess potential threat to forest structure, biodiversity, forest soil, carbon pool and other environmental services casting adverse impacts on forest ecosystem and human beings on a large scale [4]. In developing countries, forest degradation and deforestation are primarily caused by growing population, lack of markets for promotion and selling of local products, poverty and inability of government to address to such needs [5,6]. Majority of economically weaker section of people inhabit in and around the forests and

depend on the forests leading to extraction and degradation of forest resources. In addition to that landuse/ landcover change of forest areas is another major threat to the forest ecosystem and biodiversity [7].

Poverty analysis shows that forest degradation results in unemployment of large number of people whose livelihoods primarily depend on agriculture, animal-husbandry, forest based art and craft, bamboo and cane products and collection and processing of medical plants, gums, resin and other forest fruits, seeds or leaves [8]. Haphazard collection and exploitation of Non-Timber Forest Products (NTFP) for livelihood and sustenance result in adverse effect on the forest ecosystem [9-13]. The diverse nature of NTFPs makes it important for forest management and biodiversity conservation [14,15].

In India, over exploitation and domestic use of forest products by forest dwelling and fringe communities are one among the other causes of forest degradation [16]. Nearly 40% of the poor population in 1,96,000 villages India lives in forest fringe villages of India and depends on forest for their livelihood and sustenance [17,18]. Initially, these inhabitants were mainly dependent on forest products for their sustenance but as their population started increasing and they started settling for agriculture, domestication of animals and other manual jobs brought pressure of forest land for conversion to agriculture land, settlement areas, industries etc. In addition to other activities like fuel wood extraction, collection of NTFPs, illicit felling of trees for timber extraction, hunting and poaching, fishing, livestock grazing have altered forest cover and paved paths for other landuse in many protected areas of India [19-22]. Depletion of forest in the past decades for agriculture, human settlement etc., have contributed to climate change, loss of biodiversity, habitat fragmentation, shrinkage of wildlife habitats and exploitation of forest resources have adversely affected the sustenance of forest dependent communities [23-26]. Shrinking wildlife habitats due to encroachment and fragmentation have resulted in human-wildlife conflicts in many parts of India especially in the north-eastern region [27]. The state of Assam have suffered rapid loss of forest cover in the past decades due to encroachment in the forest areas and displacement of people by annual floods, erosion, militancy, ethnic clashes and excessive dependency of the rural communities on forest resources and clearing of forest for expansion of agriculture land [28, 29].

Conservation of forest, its resources and wildlife and implementation of conservation policies depends on the perception, understanding and attitude of the local people towards forest and wildlife [30]. In this regard, understanding the existing social and economic condition of the forest and fringe communities helps in assessing the pressure exerted on the forests and formulation and execution of policies and programmes for conservation of forest and biodiversity [31-33].

The objective of this paper is to understand the socio-economic and livelihood condition of the forest dwelling inhabitants in Kamrup West Forest Division of Assam, India and their dependency on the forests and its resources for livelihood and sustenance.

MATERIALS AND METHODS

Study Area

The study was carried out in a forest stretch of 92.40 sq. km comprising Barduar and Mayang Hill Reserve (RF) in Loharghat Forest Range of Kamrup West Forest Division located approximately 64 km away from Guwahati city of Assam, India. The study area is situated both in the plains of lower Brahmaputra valley and outer ranges of the West Khasi Hills, Meghalaya dominated by moist mixed deciduous forest, moist plains *Sal* forest – Kamrup Sal and eastern hill *Sal* forest – Khasi Hill Sal [34]. The region experiences sub-tropical monsoon type of climate with warm-humid summer and mild-dry winter [35]. The annual

average temperature is 24^{o}C and average rainfall is 2639 mm much of which is experienced during the monsoon. The historic tectonic lake of the 1897 Great Assam Earthquake, *Chandubi beel*, is situated between the two Reserve Forests and serves as the central dogma of the forest ecosystem. There are 17 forest villages with a population of 4,120 and 792 households, classified as Schedule Tribe area (Rabha Hasong Autonomous Council). Forest villages in different parts of India were established under the Colonial Regime to meet the demand of large scale timber for expansion of railways and revenue of the British government, labourers drawn from different areas were given temporary settlements in forest areas and forced to render free service for fixed number of days annually. In due course of time those labourers were provided with homestead and cultivation land in exchange of their services [36].

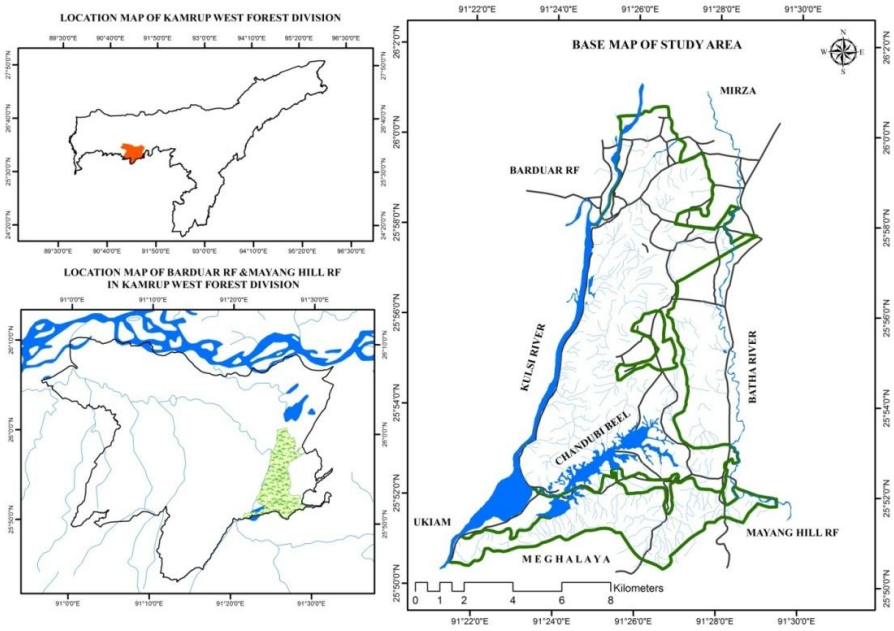


Figure 1: Base Map of the Study Area

Sample Design and Sampling

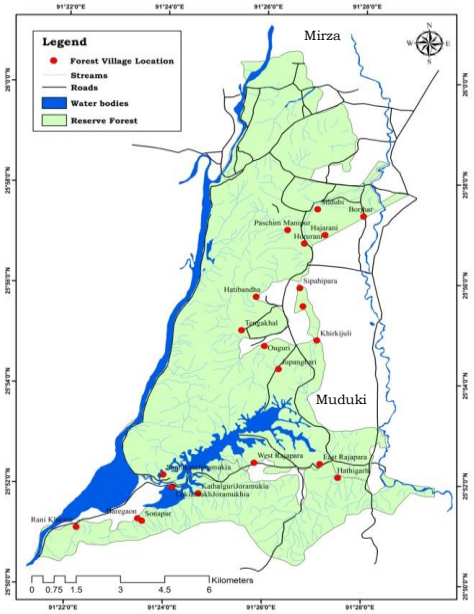


Figure 2: Map showing Forest Villages

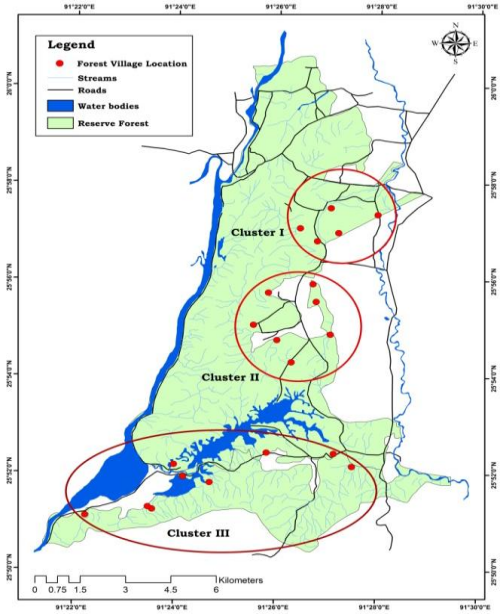


Figure 3: Map showing Cluster of Forest Villages

The socio-economic survey in the forest villages of Barduar RF and Mayang Hill RF was carried out during October, 2017 to April, 2019 following random sampling technique. 10% household from each village was surveyed and in total 85 households were studied. To understand the dependency of the inhabitants on the two RFs, the forest villages were grouped into 3 clusters viz., cluster I, II and III based on their location (Figure 3).

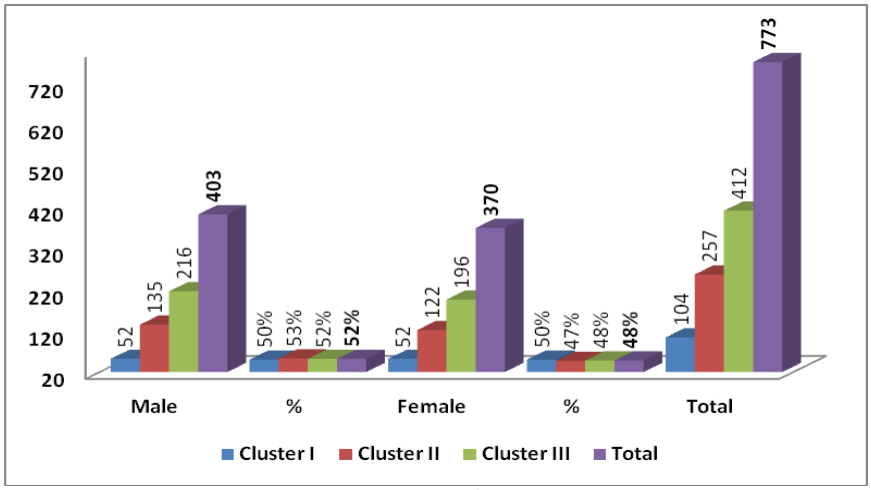
Data Collection

Data for the study was collected through mixed-method from both primary and secondary sources. Primary data was collected through focus group discussion with the village headman (*Gaon Bura*) and other members of the *Gaon Panchayat*, personal interview and questionnaire survey encompassing information on family size, literacy level (education level), primary and secondary occupation, crops cultivated, items collected from the forest, frequency of collection, monetary benefits earned from forest, fuel wood consumption, livestock grazing and experiences of human-animal conflict etc., was sought from the inhabitants of the villages. Secondary data was collected from records of Assam State Forest Department, Loharghat Forest Range Office, Statistical Handbooks, research reports etc.

RESULTS

Gender Representation, Family Size and Ethnicity

Gender representation of the study is such that of the households surveyed 52% is male and 48% female (Graph1). Cluster I has equal representation of male and female, Cluster II has majority male population (53%) and female population stands at 47%. Similarly, Cluster III has more male (52%) than female (48%).



Graph1: Gender representation of the households surveyed

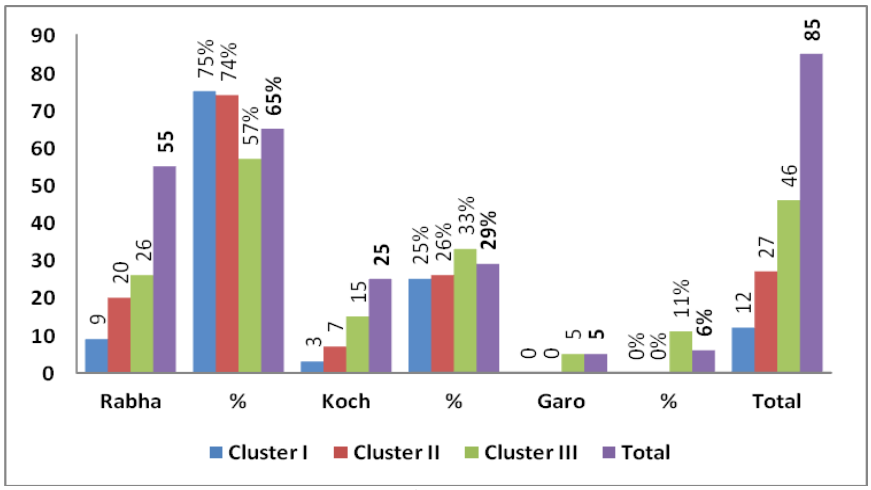
Table 1: Family Size of the households surveyed

Village Cluster	Family Members								Total
	5 - 7	%	8 - 9	%	10 - 11	%	12 - 13	%	
Cluster I	4	33%	4	33%	4	33%	Nil	Nil	12
Cluster II	3	11%	12	44%	9	33%	3	11%	27
Cluster III	9	20%	22	48%	14	30%	1	2%	46
Total	16	19%	38	45%	27	32%	4	5%	85

Family size of the households surveyed were classified into 4 groups consisting of 5-7 members, 8-9 members, 10-11 members and 12-13 members (Table 1). Large family size is on higher side in the clusters showing 45% in 8-9 members group followed by 32% in 10 -11 members, 19% in 5-7 members and 5% in 12-13 members. Cluster I shows equal representation in 5-7 members, 8-9 members, 10-11 members

group (33%) and no representation in 12 - 13 members group. Cluster II and III on the other hand has the highest representation in 8-9 members groups 44% and 48% respectively followed by 33% and 30% in 10-11 members groups, 11% and 22% in 5 - 7 members groups and 11% and 2% in 12 - 13 members groups.

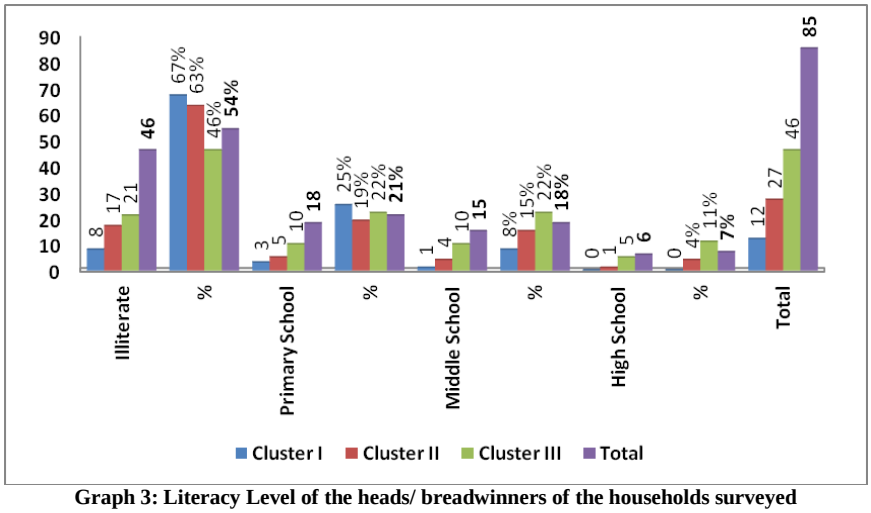
Graph 2 shows that of the 85 households surveyed, 55 households (65%) belonged to Rabha community, 25 households (29%) belonged to Koch community and 5 household (11%) were from Garo community. The study area is predominantly Rabha majority followed by Koch and Garo community.



Graph2: Ethnicity of the households surveyed

Literacy Level, Occupation and Housing Type

Of the households surveyed, 54% of the heads or breadwinners of the families are illiterate, 21% have primary education, 18% had been to middle school and only 7% had been to high school (Graph 3). 67% head of the households in Cluster I, 46% both in Cluster II and III are illiterate. 25%, 19% and 22% in Cluster I, II and III respectively have primary education. 8%, 15% and 22% in Cluster I, II and III respectively had been to middle school. High school education among head of the households in the study area is rare.



Graph 3: Literacy Level of the heads/ breadwinners of the households surveyed

80% of the households are engaged in cultivation, 18% works as daily wage earners/ labourers and only 2% are engaged in service sector (Table 2). 67% and 74% of the households are engaged in cultivation, 33% and 26% as wage earners in Cluster I

and II respectively. In Cluster III, 87% is engaged in cultivation, 95 as wage earners and only 2% is engaged in service sector.

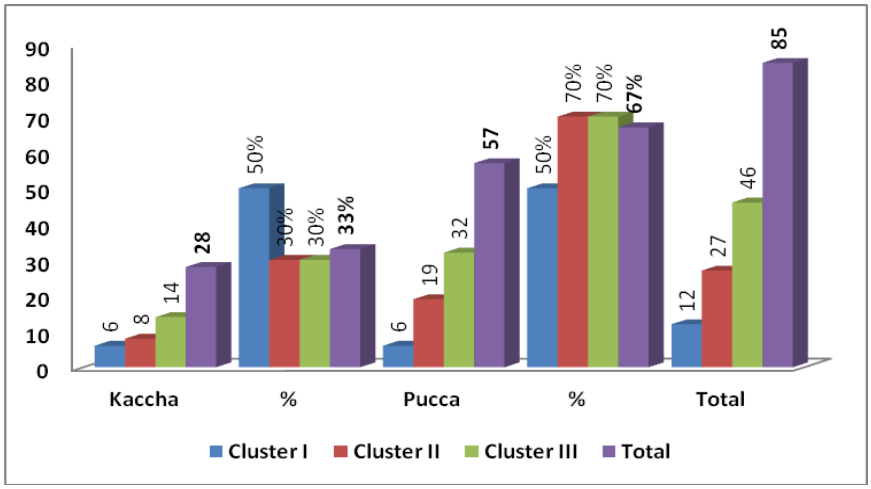
Table 2: Primary Occupation of the people of the households surveyed

Primary Occupation	Cultivation	%	Wage earner/ labourer	%	Service (Govt/Private)	%	Total
Cluster I	8	67%	4	33%	0	0%	12
Cluster II	20	74%	7	26%	0	0%	27
Cluster III	40	87%	4	9%	2	4%	46
Total	68	80%	15	18%	2	2%	85

Secondary occupation of 71% of households is wage earning through manual labour after the cultivation season is over and crops are harvested. 26% is engaged as masons or carpenters, 2% have no secondary occupation or alternate source of livelihood since they are engaged in service sector and only 1 household responded to earn livelihood during off season by selling forest products. 92% of the households in Cluster I is engaged in daily wage earning followed by 78% and 61% in Cluster II and III respectively. In Cluster III, 33% of the households sustain their alternate source of livelihood working as mason/carpenter followed by 22% and 1% in Cluster II and I respectively. Only 2% households of Cluster III are dependent on selling forest products and4% has secondary occupation as they are engaged in service sector. As the forest villages are located in the interiors therefore the percentage of household engaged in daily wage earning is directly proportional to the distance of the Cluster of villages to the nearest market hub/ township. The villages located near to the market hub/ townships can easily render their services as day labourer or find other sources of income but it is not the same with people residing in the interior villages like Cluster III. Hence, the residents of interior forest villages have to skill themselves in secondary occupation as shown in Table 3.

Table 3: Secondary Occupation of the people of the households surveyed

Secondary Occupation	Wage earner	%	Mason / Carpenter	%	Selling of Forest products	%	No alternative	%	Total
Cluster I	11	92%	1	8%	0	0%	0	0%	12
Cluster II	21	78%	6	22%	0	0%	0	0%	27
Cluster III	28	61%	15	33%	1	2%	2	4%	46
Total	60	71%	22	26%	1	1%	2	2%	85



Graph4: Housing Type of the households surveyed

Most of the households have *pucca* or cemented houses (67%) and 33% have *kaccha*/ hut/ thatched houses (Graph 4). Cluster I shows equal scenario of *kaccha* and *pucca* houses (50% each). Majority of the households in Cluster II and III have

pucca houses (70%). The houses and fences are mostly made up of various wood species, bamboo and cane collected from the forest.

Cultivation Seasons and Type of Crops Cultivated

93% of the households surveyed are engaged in one season (summer or monsoon) cultivation, only 1% is engaged in two season cultivation and 6% is not engaged in cultivation (Table 4). All the households surveyed in Cluster II villages are engaged in one season cultivation. 91% and 83% in Cluster III and I respectively are engaged in one season cultivation and only 2% in Cluster III is engaged in two season (summer and winter) cultivation.

Table 4: Cultivation Seasons of the surveyed households

Cultivation Season	One season	%	Two season	%	Not engaged in cultivation	%	Total
Cluster I	10	83%	0	0%	2	17%	12
Cluster II	22	81%	5	19%	0	0%	27
Cluster III	29	63%	14	30%	3	7%	46
Total	61	72%	19	22%	5	6%	85

Rice is the staple food of Assam and 69% of the surveyed population is engaged in paddy (Kharif crop) cultivation, 21% cultivates two varieties of crops paddy and mustard (both Rabi and Kharif crops) and 6% is not engaged in cultivated as their primary occupation is wage earning as labourers (Table 5). In Cluster I, 67% of the households are engaged in paddy cultivation, 17% in both paddy and mustard and 17% not engaged in cultivation. 81% of the households in Cluster II are engaged in paddy cultivation, 19% in both paddy and mustard. 63% in Cluster III are engaged in paddy cultivation, 30% in both paddy and mustard and 7% not engaged in cultivation. The inhabitants meet their food grain requirement through cultivation and their requirements meted from market only consists of salt and kerosene. They mostly dependent on the forest for edible items in the form of roots, tubers, yams, leaves, flowers and fruits (Table 9).

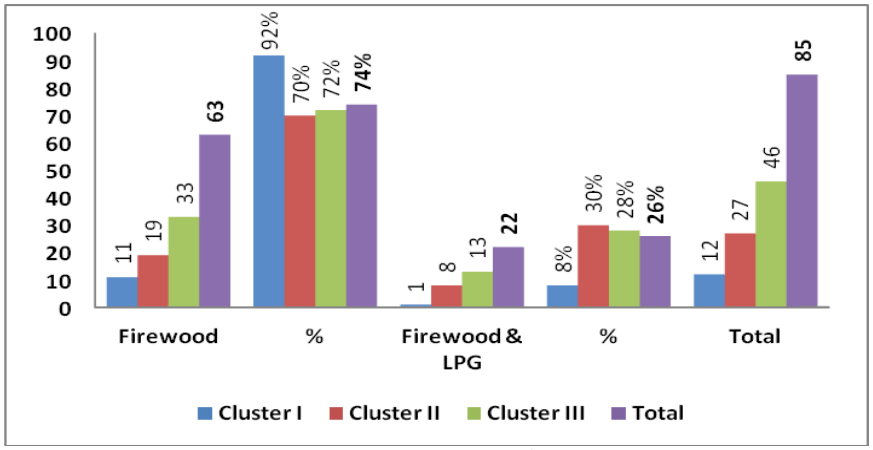
Table 5: Types of Crops cultivated by the inhabitants of the Forest Villages

Crop Types	Paddy	%	Paddy and mustard	%	No Cultivation	%	Total
Cluster I	10	83%	0	0%	2	17%	12
Cluster II	22	81%	5	19%	0	0%	27
Cluster III	29	63%	14	30%	3	7%	46
Total	61	72%	19	22%	5	6%	85

Fuel used for household activities, usage and expenditure of firewood

In rural areas of Assam firewood is the conventional fuel and source of energy for household activities mostly cooking. Fuel statistics of the study in Graph 5reveals that 74% of the households surveyed are dependent on only firewood and 26% use both firewood and LPG. In Cluster I, 92% of the households are dependent of firewood followed by 72% in Cluster III and 70% in Cluster II. On the other hand, only 8% in Cluster I, 30% in Cluster II and 28% in Cluster III are dependent on both firewood and LPG for fuel requirement.

The average per capita monthly consumption of firewood of the households surveyed is 103 kg/ household (Table 6). Market price of a bundle of firewood weighing 20 kg is Rs. 25.00 and Rs.1.25/ kg. Therefore, average monthly expenditure on firewood of the 85 household studied is Rs.128.75. In Cluster I, average monthly consumption of firewood is 108kg/ household (average monthly expenditure Rs. 135/ household) and 103kg/household for both Cluster II and III. It is vivid from the cost that firewood is a cheaper source of fuel hence it is natural for the poor forest dwellers to depend on firewood as the mainstay of energy.



Graph 5: Fuel used by the inhabitants of the Forest Villages

Table 6: Monthly consumption and average monthly of firewood for household activities in the forest villages

Firewood required	Monthly Consumption (in Kg)	No. of household studied	Average monthly consumption per household (in Kg)	Market price of firewood (INR)	Market price of firewood per kg
Cluster I	1292	12	108	Rs. 25.00 for a bundle of 20 kg	
Cluster II	2768	27	103		Rs. 1.25
Cluster III	4728	46	103		
Total	8788	85	103		

Collection of Forest products, trips made for collection and monetary benefits

59% of the households surveyed collects all types of forest products, 39% collects only firewood, 1% collects only edible items like roots, yams, tubers, leaves, flowers fruits etc., 1% does not collect any products from forest and no household solely collect bamboo from the forest (Table 7). In Cluster I, 67% of the household collects all types of forest products, similarly 59% and 57% in cluster II and III respectively. On the other hand, 41% in Cluster II, 39% of Cluster III and 31% of Cluster I collect only firewood from the forest. Only 2% of Cluster III collects roots, yams, tubers, leaves, flowers fruits etc., from the forest.

Table 7: Types of forest products collected by the inhabitants

Collection of Forest Products	Only Firewood	%	Only Bamboo	%	All types of forest products	%	Fruits/ roots/ tubers/ yams/ seeds/ flowers	%	No Collection	%	Total
Cluster I	4	33%	0	0%	8	67%	0	0%	0	0%	12
Cluster II	11	41%	0	0%	16	59%	0	0%	0	0%	27
Cluster III	18	39%	0	0%	26	57%	1	2%	1	2%	46
Total	33	39%	0	0%	50	59%	1	1%	1	1%	85

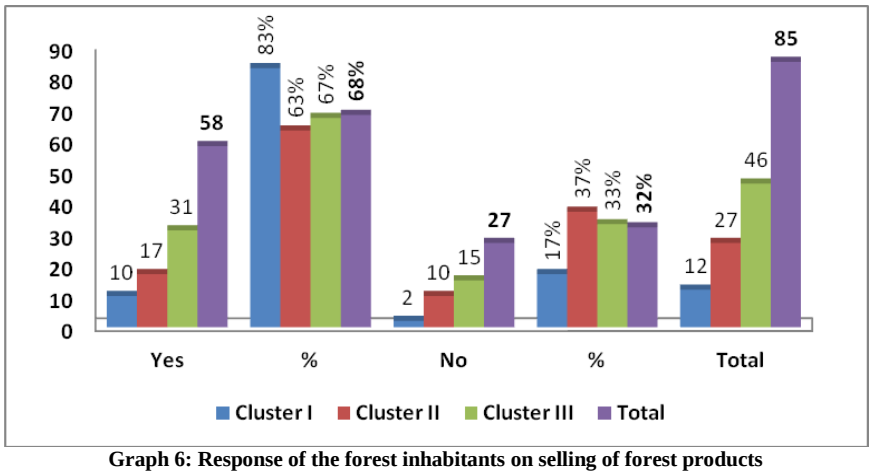
Table 8: Trips made to forest by the inhabitants for collection of forest products

Trips	Everyday	%	Twice/thrice in a week	%	Once in a week	%	No trips	%	Total
Cluster I	3	25%	2	17%	7	58%	0	0%	12
Cluster II	10	37%	8	30%	9	33%	0	0%	27
Cluster III	19	41%	17	37%	9	20%	1	2%	46
Total	32	38%	27	32%	25	29%	1	1%	85

Frequency of collection of forest products or trips made to forest to collection in Table 8 shows that 38% of the total households collect forest products on daily basis, 32% twice or thrice in a week, 29% once in a week and 1% rather one household makes no trip for collection of forest products. The frequency of collection of forest products also reveals that location of forest village clusters is a contributing factor to the trips made for collection because the frequency is more in Cluster III (41%) followed by Cluster II (37%) and Cluster I (25%). 37% of Cluster III, 30% of Cluster II and 17% of Cluster I make two or three trips in a week. However, percentage of weekly trips is higher in Cluster I (58%), 33% and 20% in Cluster II and III respectively. The collection of firewood and bamboo induces human pressure and inhabitants are

dependent on forest resources mostly on NTFP for their livelihood.

The response recorded from the households surveyed on selling of forest products in Graph 6 shows that majority (68%) of the surveyed households sells the products they collect from the two Reserve Forests such as firewood, bamboo, edible roots, tubers, yams, flowers fruits etc. Cluster I villages in which 83% of the respondents sell forest products are located near to the market hub provided ease of doing the business followed by Cluster III villages (67%) where a weekly village market which occurs at Muduki. 63% respondents of the Cluster II villages are also involved in selling of forest products.



Graph 6: Response of the forest inhabitants on selling of forest products

Table 9: List of items collected from Forest by the village inhabitants

Items Collected	Uses	Local Names
Fruits	Food	*Aegle marmelos*, *Phyllanthus emblica*, *Dillenia indica*, *Garcinia pedunculata*, *Syzygium jambolanum*, *Syzygium cumini*, *Mangifera indica*, *Musa balbisiana*, *Artocarpus heterophyllus*, *Baccurea sapida*, *Zizyphus jujuba*, *Capsicum annuum*, *Moringa oleifera*
	Medicine	*Garcinia pedunculata*, *Phyllanthus emblica*, *Terminalia chebula*
	Others	
Flowers	Food	*Sesbania gradiflora*, *Phlogocanthus thyrsiflorus*, *Moringa oleifera*, *Leucas aspera*, *Gmelina asiatica*, *Nyctanthes arbor-tristis*, *Musa balbisiana*
	Medicine	*Phlogocanthusthyrsiflorus*, *Leucasaspera*, *Gmelinaasiatica*
	Others	
Leaves & Grasses	Food	*Diplazium esculentum*, *Colocasia esculenta*, *Ipomoea aquatica*, *Centella asiatica*, *Hydrocotyl esibthorpioides*, *Paederia foetida*, *Murraya koenigii*, *Houttuynia cordata*, *Pogostemon plectranthoides*, *Cinnamomum tamala*
	Medicine	*Andrographis paniculata*, *Elsholtzia blanda*, *Azadirachta indica*, *Chromolaena odorata*, *Murraya koenigii*, *Houttuynia cordata*
	Others	*Cynodon dactylon*, *Aegle marmelos*, *Musa balbisiana*
Barks	Food	*Cinnamomum zeylanicum*
	Medicine	*Terminalia arjuna*, *Alstonia scholaris*, *Azadirachta indica*, *Pongamia pinnata*, *Oroxylum indicum*
	Others	
Roots/ Tubers/ Yams	Food	*Dioscorea alata*, *Colocasia esculenta*, *Colocasia* sp, *Homalomena aromatica*, *Amorphophallus paeoniifolius*, *Ipomoea batatas*, *Celastrus paniculata*
	Medicine	*Andrographis paniculata*, *Celastrus paniculata*, *Curcuma zedoaria*, *Zingiber officinale*
	Others	
Seeds	Food	*Artocarpus heterophyllus*
	Medicine	*Terminalia chebula*, *Phyllanthus emblica*, *Terminalia bellerica*
	Others	*Tectona grandis*, *Gmelina arborea*, *Shorea robusta*
Twigs & Shoots	Food	Bamboo shoot
	Medicine	*Azadirachta indica*,
	Others	
Gums & Resins	Food	
	Medicine	
	Others	*Canarium strictum*
NTFP	Building materials	*Acacia catechu*, Cane and bamboo
	Others	*Thysanolaena latifolia*, *Livistona jenkinsiana*, *Trachycarpus martianus*

Income Level and Livestock Property

The average annual income for the households surveyed is Rs. 62,729 ranging

between Rs. 50,000 – 87,000 (Table 10). The average annual income of Cluster III is high followed by Cluster II and I. The average monthly income of the surveyed households is Rs. 5,227 and it is high for Cluster III (Rs. 5,253) followed by Cluster II (Rs. 5,228) and I (Rs. 5,125). The average monthly earning by selling forest produce of the households surveyed is Rs. 845 ranging between Rs. 500 – 1,200. In a monthly average, Cluster III villages earn highest by selling forest products (Rs.1055) followed by Cluster I (Rs.613) and Cluster II (Rs.589).Cluster III villages have higher income than other two clusters due to its location and easy access to dense forest areas. From the survey it has been observed that the forest dwellers are living in poor condition and the average annual and monthly income is quite low for all the clusters.

Table 10: Average annual and monthly income of the households surveyed and average monthly earning by selling of forest produce

Income	Average monthly earning from forest produce (INR)	Range of monthly earning from forest produce (INR)	Average Annual Income (INR)	Range of Annual Income	Average Monthly Income (INR)
Cluster I	613	550 - 1,500	61,500	55,000-67,000	5,125
Cluster II	589	550-1,200	62,741	50,000-76,000	5,228
Cluster III	1055	500-1,200	63,043	50,000-87,000	5,253
Sample	845	500 -1,200	62,729	50,000 - 87,000	5,227

In the 85 households surveyed (Table11), 260 livestock were recorded of which highest was recorded from Cluster III villages (140) followed by Cluster II (82) and Cluster I (38). It has also been learned during the survey that the livestock raised by the inhabitants of the forest villages graze in the forest areas which is also the cheapest way of feeding livestock [37].

Table 11: Livestock property and poultry of the surveyed households in the Forest Villages

Livestock and Poultry	Livestock	Poultry
Cluster I	38	58
Cluster II	82	166
Cluster III	140	246
Sample Total	260	470

DISCUSSION

Livelihood in forest villages is mostly labour intensive and enough manpower is required to carry out various forest dependent activities and large family size suffices livelihood needs [38-41]. Extending families or increasing population in and around the forest also possesses threat to forest degradation and deforestation [42,43]. Education and development of skills provides more scope of livelihood but illiteracy/ lower literacy reduces the many aspects of livelihood except manual labour and dependency of forest. The forests of South-eastern Nigeria and Terai of Nepal are experiencing human pressure due to lack of literacy and skill of the inhabitants of the region [44,45].

Prime cause of deforestation in Phnom Tbeng Forest was illegal logging for its demand of commercial timber, construction of houses and fences and firewood [46]. Firewood becomes the mainstay of fuel and source of energy due non-availability of other low cost alternative and resource constraint of the forest village dwellers, thereby use of firewood increases the dependency of the dwellers on forest and its produce and many collect firewood from the forest as a source of income also for selling in the local market. Like the present study, inhabitants of forest villages in Nagaon District and forest fringe villages in Sonitpur District of Assam are also highly dependent on firewood as fuel [47,48]. The average daily consumption of firewood is 12 kg/household in the forest villages of Nagaon District, Assam [48] which is quite high as compared to the present study due to the reason that the inhabitants of the forest villages in Barduar and Mayong Hill Reserve Forests purchase firewood as an add-on only and the major share of firewood used is collected from the forest. Collection of forest products and dependency on it for livelihood and sustenance results in forest degradation [13]. The average monthly income of the forest fringe inhabitant Sonai

Rupai Wildlife Sanctuary, Assam ranged between Rs. 3,000 – 6,000 [47] between Rs. 5,000 – 10,000 in the forest villages of Nagaon District, Assam [48]. Grazing of livestock raised by the inhabitants in and around the forests affects forest plantations, regeneration of green cover, causes compaction of soil deterioration of grassland and desertification [25,49].

During the survey the respondents also revealed that the area had insurgency issues (since 1995 to around 2010 approximately). Insurgency in the state has led to reduction of forest cover, large scale deforestation, encroachment of forest areas by insurgents and extortion of forest and fringe dwellers. Insurgency also halted initiatives of Forest Department such as plantation drives, forest management etc., and developmental activities of forest and fringe dwellers [50,51].

CONCLUSION AND RECOMMENDATION

From all the sections of the socio-economic survey detailed above viz. literacy rate, type of housing, type of family, primary occupation, secondary occupation, cultivation season and crops cultivated, collection of forest products, trips made for collection of forest products, dependency on forest for firewood and bamboo, monthly earning by selling forest products and grazing of cattle suggests that the dwellers of the forest villages are strongly dependent on Barduar and Mayang Hill RF for their sustenance. Human pressure on forest can be reduced by reducing the human dependency on forest and its produce which can be meted through popularization of renewable source of energy for cooking purpose like use of solar cooker, patronizing community orchards, community fisheries, engaging youth and women folk in forest based crafts and handloom, organic farming and composting and establishing market link for such products as a joint initiative by the Forest Department and the local bodies will provide livelihood opportunities to the people and thereby reduce human dependency on the forest.

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