



Socio-Economic and Biophysical Characteristics of Forest Fringe Communities of Sindh Forest Division in Kashmir Himalayas

Muneesa Banday^{1*}, M. A. Islam¹, P. A. Sofi¹, A. A. Wani¹, P. A. Khan¹ and Showkat Maqbool²

¹Faculty of Forestry, Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir, Benhama, Ganderbal (J&K)

²Faculty of Agriculture, SKUAST-K Wadoora Sopore, J&K

*Corresponding Author E-mail: 13forestry08@gmail.com

Received: 5.03.2019 | Revised: 8.04.2019 | Accepted: 21.04.2019

ABSTRACT

A study based on structured interviews and personal observations was carried out to investigate the socio-economic and biophysical characteristics of forest fringe communities (Kashmiris, Gujjars, Sheenas and Pakhtoons) in Manasbal forest range of Sindh forest division, J&K. Primary data were collected from 208 sample households drawn from 10 selected villages employing multi-stage random sampling. Descriptive statistics were used to analyse the data. Results indicated that majority of the respondents belonged to middle age group, having low literacy and living in large sized joint families. Most of them were having mixed and katcha type houses, inadequate wealth status and possessing 1-5 livestock household¹. Size of landholding was mainly marginal, labour force of ≥ 3 workers, engaged mostly in occupations like wage labour and cultivation and earning low annual income. The sampled households were having substantial remoteness from the urban areas, lived in close vicinity of forests and visited forests very frequently for fuel wood, fodder, timber and other NTFPs. The extent of forest resource possession i.e. area owned under agroforestry/ homestead forestry was < 0.10 ha; hence, they accessed the alternative forest resources very often. The fringe people are underprivileged regarding socio-economic attributes while they are prosperous concerning forest resource characteristics. Poverty, low literacy and high dependence on forests are the major limiting factor. Hence, the livelihood diversification using alternative forest resources and adopting agroforestry should be of top most priority for poverty eradication and socio-economic upliftment of these backward forest fringe communities by the policy makers, planners and scientists etc.

Key words: Socio-economics, Biophysical characteristics, Forests, livelihood, Fringe communities, Manasbal range.

Cite this article: Banday, M., Islam, M.A., Sofi, P.A., Wani, A.A., Khan, P.A. and Maqbool, S., Socio-Economic and Biophysical Characteristics of Forest Fringe Communities of Sindh Forest Division in Kashmir Himalayas, *Int. J. Pure App. Biosci.* 7(2): 470-781 (2019). doi: <http://dx.doi.org/10.18782/2320-7051.7479>

INTRODUCTION

World Bank reported that 25% of the world's poor directly or indirectly depend upon forests for their livelihoods¹. The rural households and forest dependent communities interact closely with forests and hence derive their economic livelihood and often their cultural and spiritual identity². India has a forest dwelling population of over 100 million belonging to 550 communities of 227 ethnic groups; of which some 60% live in forest areas and depend on forest for sustenance³. The distinct tribes in the area which live closely to the forests have rich indigenous traditional knowledge systems on the uses of available natural resources for their daily sustenance like food, fodder, shelter and healthcare⁴. Since forest resources constitute the only natural resource that provides free access and subsistence to the poorest of the poor, they should really assume greater importance and receive priority for their development and management⁵. The tribal people inhabiting the forests areas carry a very long history of extraction of forest resources, for subsistence and/or sale⁶. The traditional knowledge about the various uses of plant species *i.e.* food, medicine *etc.* is preserved from generation to generation and they depend mainly on the forest resources for their survival⁷. Forest products are also used for cultural and recreational purposes⁸. However, households utilise these benefits in different ways and to varying degrees. In rural cultures, the gathering of wild fuel plants is part of the traditional ecological knowledge of accumulated learning, practices, and beliefs developed through cultural transference and adaptive processes and passed down through generations⁹. This cultural transference is a complex cognitive process in which practices, attitudes, and values learned are closely related to ecological and socio-cultural contexts¹⁰. Therefore, variables such as age, gender, education, and degree of acculturation are all relevant in the intra-population variation¹¹. As perception and action are closely linked to the cognitive process, perception and cultural interpretation of the environment lead to direct

action on plants and surroundings, which generates patterns of interaction between humans and their environment¹². Households' socio-economic characteristics dictate both what the forest resources are utilised for and also the extent to which they are harnessed¹³⁻¹⁵. Forest based climate change mitigation and adaptation projects are widely promoted to enable households to adapt to the challenge of climate change¹⁶⁻¹⁸. Hajost and Zerbock¹⁹ noted that forest-based adaptation initiatives were more likely to succeed if they built on the lessons learned from community based forest management. Therefore, reliable information on the factors that influence rural people's engagement in sustainable use and management of forest resources, and how the socio-economic characteristics of people influence them is crucial^{20,16}. Tribal regions in Himalayas are sparsely populated in small settlements with high dependence on rain fed agriculture and adjoining forests. In order to meet the challenges of acute poverty and food insecurity and to make existing livelihoods stronger and sustainable much attention must be paid on the development and value addition of these forest resources. To design a strategy of livelihood security and promotion based on forest resources, a thorough understanding of the socio-economic and biophysical characteristics of tribal people subsisting in forest resources of Kashmir is imperative. The socio-economic and biophysical characteristics of forest based communities in Kashmir Himalayas has not been studied much, hence, the study was carried out in the Manasbal forest range of Sindh forest division in order to gather baseline information about the socio-economic status and biophysical characteristics of these forest fringe households in Sindh forest division to generate a database to the planners, scientists and policy makers.

MATERIAL AND METHODS

2.1. Study Area

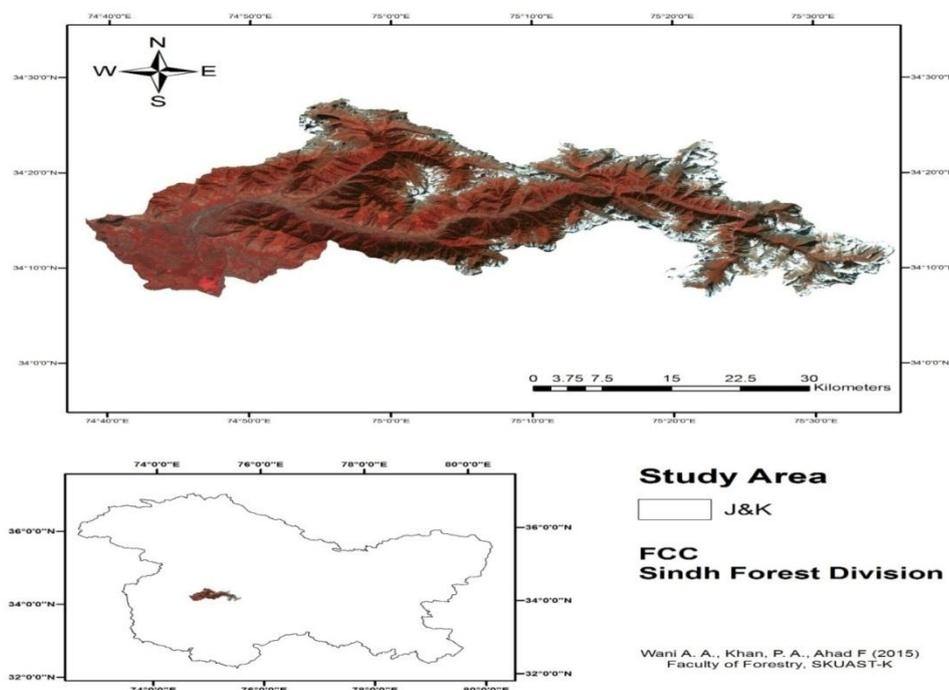
The proposed study was conducted in Manasbal range of Sindh forest division of Jammu and Kashmir state (Map 1.). The Sindh

forest division lies on the geographical coordinates of 34°7'0" to 34°28'0"N and 74°42'0" to 74°26'0"E in the mountainous and rugged terrain of Kashmir valley²¹. Manasbal range is dominated by southern aspect as against Sindh range (another range of Sindh forest division) which is mostly on the northern aspect. The area experiences both temperate and sub-alpine conditions and is well known for excessive annual rainfall (700 mm) and temperature varying from 5⁰ C to 20⁰ C. The temperature usually falls below freezing point during winter; the relative humidity remains high and varies from 40% to 86%. The main tree species in the range is kail (*Pinus wallichiana*) although fir (*Abies pindrow*) is also found mixed with kail at exposed sites and deodar (*Cedrus deodara*) at isolated ones. Regeneration of fir is almost non-existent whereas kail is seen having colonized around certain blanks. These forests are subjected to damage by unrestricted grazing by both nomadic and local grazers. Above the fir zone some pure patches of birch (*Betula utilis*) also exist. The population in the study area consisted of communities like Kashmiris, Gujjars, Sheenas and Pakhtoons

etc. The study area consisted of 4154 households with a population of 33952 individuals²². The literacy rate was around 35% and most of the population were dependent on livestock rearing. The cattle population was quite high in the area thus exerting heavy grazing pressure on forests for fodder and pastures.

2.2. Sampling technique

Multi-stage random sampling technique²³ was employed in the selection of villages and respondents for the household survey. Ten sample villages out of the total of eighteen forest fringe villages of the range having around 50% sampling intensity have been selected in the first stage. The sample villages selected were Wangat from Wangat forest block; Arhama and Anderwan from Chittergul block; Chuntvalivar and Chanthan from Lar block; Barnebugh from Barnebugh; Preng, Worpash, Baba wayil and Bailawussan from Gutlibagh. In the second stage, selection of households was done having sample size of 5% of the total number of the households in the sample villages. A total of 208 respondents were selected randomly.



Map 1 Map of Manasbal Forest Range

2.3. Data collection and Analysis

The primary data on socio-economic and biophysical characteristics of the forest fringe households were collected through field surveys and interactions based on the structured interview schedule developed for the purpose in advance and personal observation²⁴. The characteristics included in the interview schedule were based on scales developed by Venkataramaiah²⁵ and Singha and Talukdar²⁶. Simple statistical tools like mean, standard error and percentage were used for the analysis of the data²⁷.

2.4. Measurement of variables

The socio-economic viz., age, education, family labour, family composition, size of land holding, livestock possession, housing status, main occupation, gross annual income and wealth status were measured on the basis of “Socio-economic status scale” developed by Venkataramaiah²⁵. The biophysical variables namely, proximity to forests, frequency of forests visits extent of agroforestry/ homestead forestry and access to forestry plantations were measured as per Singha and Talukdar²⁶. The details of the measurement systems of socio-economic and biophysical variables were summarized in the Table 1.

Table 1: Description of the socioeconomic variables

Variable	Score
Age	Chronological age in years.
Education	Illiterate-0 ; Below primary -1; Primary -2; Middle -3; High school-4; Intermediate -5; Graduate and above-6.
Family labour	01 worker- 1; 02 workers – 2; 03 workers – 3; > 03 workers - 4
Family composition	Family type: Nuclear- 1; Joint – 2.
Size of land holding	Family size: Small (upto 5 members)-1; Large (> 5 member)-2.
Main occupation	Landless -0; Marginal (0.1 ha) – 1; Small (1.1-2.0 ha) -2; Medium (2.1-4.0 ha) - 3; Large (> 4.0 ha) – 4.
Housing status	Wage labour – 1; caste occupation – 2; cultivation – 3; Business – 4; Service – 5; any other – 6.
Livestock possession	Type: No house – 0; Hut – 1; Katcha – 2; Mixed – 3; Pucca – 4.
Wealth status	No. of rooms: 01- 1, 02 – 2 and > 02 – 3.
Gross annual income	No livestock – 0; upto 5 – 1; 6-10 – 2; > 10 – 3.
Proximity to forests	wealth status = (1= crude oven, 1= stove, 1= sewing machine, 1= watch, 1= cycle, 1= radio, 1= wooden furniture, 1= pressure cooker, 2= improved storage bin, 2= tape recorder, 3= scooter/ motor cycle, 1= any other)
Frequency of forest visits	Low score (upto 15); Medium (16-30)2; High (> 30).
Forest resource possession	Very low (upto ₹30000) – 1; low (₹ 30000-60000) – 2; medium (₹ 60001 – 90000) – 3; high (>₹ 90000) – 4.
Urban closeness	< 5 km – 1; 5-10 km – 2; 10-15 km – 3; > 15 km - 4
Access to alternative forest resources	Very frequently – 3; frequently – 2; occasionally – 1; never - 0
	<0.10 ha – 1; 0.11-0.20 ha – 2; 0.21-0.30 ha – 3; >0.30 ha – 4.
	< 5 km – 1; 5-10 km – 2; 11-15 km – 3; > 15 km - 4
	Most often – 3; often – 2; seldom – 1; never – 0.

RESULTS AND DISCUSSION

The findings of the present study as well as relevant discussion have been presented under the following heads:

2.1. Socio personal characteristics of the forest fringe community

2.1.1. Age

Of the sample households in the villages, the majority of the respondents were middle aged (49.03%) followed by young (28.84%) and old age (22.13%) groups respectively (Table 2).

The mean age was 39.97 years. Sinha *et al.*²⁸ in a study on enhancing livelihoods of forest dependent communities through synergizing FDA activities with other development programs found that majority of the respondents were between the age group of 31-42 years that means a large percentage of villagers were from younger and middle age groups, similar results were reported from Chilpati forest reserve in West Bengal²⁹. Sood *et al.*³⁰ reported that majority of the

agroforestry farmers were middle aged. Pal³¹ observed that majority of the lac growers belonged to middle age category. In a study in African tribes by Ofoegbu *et al.*³² where it was

reported that the most respondents were 59-69 years old in Mutale district as compared to 36-47 years in Thulamela district.

Table 2: Age, education and family labour in the study area (N=208)

S. No.	Age		Education		Family labour	
	Category	Households	Category	Households	Category	Households
1.	Young (upto 30 years)	60 (28.84)	Illiterate	90 (43.27)	1	38 (18.27)
2.	Middle (31-50 years)	102 (49.03)	Below primary	15 (7.22)	2	86 (41.35)
3.	Old (> 50 years)	46 (22.13)	Primary	29 (14.00)	3	45 (21.63)
4.	-	-	Middle	42 (20.20)	>3	39 (18.75)
5.	-	-	High school	4 (1.90)		
6.	-	-	Intermediate	21 (10.10)		
7.	-	-	Graduate and above	7 (3.36)		
X ± S.E. = 39.97 ± 0.842			X ± S.E. = 1.72 ± 0.128		X ± S.E. = 2.38 ± 0.068	

2.4.1. Education

The percentage of literate and illiterate among the respondents was found to be 56.73 per cent and 43.27 per cent (Table 2). The major proportion (41.42%) of the respondents fell in the categories upto middle education, only 1.90%, 10.10% and 3.36% of the respondents had an education level of high school, intermediate and graduate and above respectively. The mean score of education was 1.72 depicting the low literacy status of the sampled population. Singh and Quli³³ found that 50.98% of the respondents are illiterate, 27.57% are educated upto primary level, 13.37% are educated upto middle class level and rest 8.08% are educated upto high school level in Achanamkar Amarkantak Biosphere Reserve, Chhattisgarh. Such a low education status in forest based communities can be attributed to the poor financial conditions of the family, involvement of children as family labour or poor education infrastructure in these backward areas³³⁻³⁴.

2.4.2. Family labour

The perusal of Table 2 showed that most households (41.35%) consisted of 2 members

who carried out forest related activities and extraction followed by those having 3 (21.63%), more than 3 (18.75%) and only 1 (18.27%) family labour respectively. The mean score for the family labour (2.38) depicted that the population consisted of household with mostly 2 family labour. Fodder and fuel wood collection is done from the nearby forests, mainly by the women and children of the family and they spend 3 to 4 hours in these activities as also reported by Kumar *et al.*³⁵.

2.4.3. Family composition

Majority of the respondents belonged to joint families (62.02%) and the rest were from nuclear families (37.98%) (Table3). Similarly, large families were more prevalent (83.65%) as compared to smaller ones (16.35%). The mean scores (1.63 and 1.84) showed the prevalence of large joint families among the sample population. Joint family system is traditional to the Gujjars and other tribes of hilly areas. Consideration of child as an added asset to the family in the form of labour and lack of concept of family planning might be the reasons for large families³⁶.

Table 3: Family composition in the study area (N=208)

S. No.	Family type		Family size	
	Category	Households	Category	Households
1.	Nuclear	79 (37.98)	Small	34 (16.35)
2.	Joint	129 (62.02)	Large	174 (83.65)
		$X \pm S.E. = 1.63 \pm 0.031$	$X \pm S.E. = 1.84 \pm 0.025$	

2.5. Economic characteristics of forest fringe communities

2.5.1. Size of land holding

A considerable proportion of the respondents was marginal farmers (85.10%) and the rest were small (14.9%) farmers (Table 4). The mean score of the size of land holding was found to be 1.15 which is indicative of a huge tilt of population towards marginal category of

landholding in the surveyed area. Pandey *et al.*³⁷ in a study in Uttarakhand state of Indian Himalayas found that the land holding of such households was less than 0.5 ha due to hilly terrain and lack of irrigation facilities. Also the fragmentation of land from generation to generation and among married off-springs is the main cause of small sized land holding³⁸⁻³⁹.

Table 4: Size of land holding, livestock possession and housing status in the study area (N=208)

S. No.	Size of land holding		Livestock possession		Housing status			
	Category	Households	Category	Household	Type		Number of rooms	
					Category	Households	Category	Households
1.	Landless	-	No livestock	23 (11.06)	No house	-	01	-
2.	Marginal	177 (85.10)	Upto 5 livestock	162 (77.88)	Hut	04 (1.92)	02	04 (1.92)
3.	Small	31 (14.9)	6-10 livestock	12 (5.77)	Katcha	55 (26.44)	>02	204 (98.07)
4.	Medium	-	> 10 livestock	11 (5.29)	Mixed	125 (60.10)	-	-
5.	Large	-			Pucca	24 (11.54)	-	-
		$X \pm S.E. = 1.15 \pm 0.024$	$X \pm S.E. = 1.05 \pm 0.04$		$X \pm S.E. = 3.44 \pm 0.054$		$X \pm S.E. = 2.98 \pm 0.008$	

2.5.2. Livestock possession

Around 77.88 per cent of the respondents showed preponderance towards possession of 1-5 livestock whereas around 11.06 per cent had no livestock at all, 5.77 per cent has 6-10 livestock and 5.29 per cent had more than 10 livestock (Table 4). The mean score of the livestock possession was 1.05 which was indicative of the majority of respondents have 1-5 livestock. Livestock are considered as the capital that people fall back on to raise money to survive crisis situations⁴⁰. At higher elevations of Himalayas, little agriculture is practiced due to severe climate and shallow soils⁴¹. Thus, Livestock rearing forms an important occupation in the mountain areas⁴²,

which contributes to around 20% of household cash income⁴³.

2.5.3. Housing status

The perusal of Table 4 indicated that approximately 60.10 per cent of respondents lived in a mixed home followed by *katcha* (26.44 %), *pucca* (11.54) and hut (1.92 %). It is also imperative to mention that despite the backward nature of the area, no respondent was homeless. Around 98.07 per cent of households had more than 2 rooms. The mean score of 3.44 and 2.98 was indicative of that fact. Similar results were reported by Hussain *et al.*⁴⁴ for Vann-gujjars in Uttarakhand. The high proportion of mixed and *katcha* houses can be attributed to low socio-economic

condition, poverty and rural environment *etc.*^{38,31}.

2.5.4. Main occupation

A considerable percentage (43.26%) of the respondents were working as daily wage labours followed by cultivation (39.91%) (Table5). Only meagre percentages were involved in other forms of occupations such as business (7.22 %), caste occupation (5.28%)

and service (4.33%). The introduction of schemes like MGNREGA has lead to a sudden spike over the few years in people of tribal areas working as wage labours as opposed to agriculture which is their traditional economic backbone. In other Himalayan areas as well Agriculture and labour under MGNREGA scheme was the main source of income followed by extraction of NTFPs⁴⁵.

Table 5: Main occupation, gross annual income and wealth status in the study area (N=208)

S. No.	Main occupation		Gross annual income		Wealth status		
	Category	Households	Category	Households	Category	Households	
1.	Wage labour	90 (43.26)	Very low income	15 (7.21)	Low	122 (58.65)	
2.	Caste occupation	11 (5.28)	Low income	131 (62.98)	Medium	82 (39.42)	
3.	Cultivation	83 (39.91)	Medium income	54 (25.96)	High	4 (1.93)	
4.	Business	15 (7.22)	High income	8 (3.85)	-	-	
5.	Service	9 (4.33)	-	-	-	-	
6.	Any other	-	-	-	-	-	
		$X \pm S.E. = 1.48 \pm 0.078$			$X \pm S.E. = 2.25 \pm 0.04$		
					$X \pm S.E. = 1.43 \pm 0.03$		

2.5.5. Gross annual income

Among the households sampled a major proportion (62.98%) of respondents belonged to the low income group followed by medium income category (25.96%), very low income (7.21%) and high income (3.85%) (Table5). The mean score (2.25) for the same also reiterated the same. In Table 3, it was found that majority of the population including farmers are having marginal land holding and the rest of the majority are employed under labour schemes as unskilled labours that provide very low wages and irregular employment, that could contribute significantly to their low income; similar causes have been reported by Kumar *et al.*³⁵.

2.5.6. Wealth status

More than half of the households (58.65%) were found to be of low wealth status followed by medium (39.42 %) and a negligible proportion (1.93 %) of population had high wealth status (Table 5). Thus, it was found that the majority of the sampled households possessed less of day to day use commodities like mobile phones, rice cooker, fridge, radio

etc. even though there was a variety of traditional commodities owned like fan, radio or choolas but the overall was unsatisfactory in terms of modern and improved technologies and materials of comfort. The obvious cause of such a state is poverty, low literacy and lack of exposure³⁸⁻⁴⁶.

2.6. Biophysical characteristics of forest fringe communities

2.6.1. Proximity to forests

An overwhelming majority (88.46%) of the households were found to reside within 5 km vicinity of the forests and the rest (11.54%) were found to live within 5-10 km range of the forests (Table 6). Acute poverty, low socioeconomic status, sizeable livestock possession and livelihood dependence on forests to get cheapest fodder, fuel wood and other natural resources which they cannot afford to buy from regular market also oblige to live in proximate to forests. Furthermore, these aboriginal communities have been dependent on forests since times immemorial and still are keeping this tradition alive of living near forests.

Table 6: Proximity to forests, frequency of forest visits and extent of agroforestry/ homestead forestry in the study area (N=208)

S. No.	Proximity to forests		Frequency of forest visits		Forestry resource possession		
	Category	Households	Category	Households	Category	Households	
1.	< 5 km	184 (88.46)	Very frequently	123 (59.13)	<0.10 ha	185 (88.94)	
2.	5-10 km	24 (11.54)	Frequently	19 (9.13)	0.11-0.20 ha	23 (11.06)	
3.	10-15 km	-	Occasionally	46 (22.12)	0.21-0.30 ha	-	
4.	>15 km	-	Never	20 (9.62)	>0.30 ha	-	
		$X \pm S.E. = 1.11 \pm 0.022$			$X \pm S.E. = 2.16 \pm 0.076$		
					$X \pm S.E. = 1.10 \pm 0.021$		

2.6.2. Frequency of forest visits

More than half of the households (59.13 %) in the sample area reported to be extracting resources from the forests very frequently (daily or weekly basis) followed by occasionally (half yearly; 22.12%), never (9.62%) and frequently (monthly; 9.13%) (Table6). Forest was the major source of leaf fodder and bedding material for livestock. Fodder is collected from forests mostly by women which is more frequent in summer time and less frequent in winter. The average time spent per day was found to ranging from 2-5 hours depending on the distance of households from the fodder source areas. The close vicinity to forests, low income, low literacy rate, high livestock fodder requirements and dependence on traditional *choolas* are some of the contributory reasons for such high dependence on forests. In a study by Ofoegbu *et al.*³² in Vhembe district of South Africa, it was found that the most common socio-economic factor for forest dependency was easy accessibility of forest resources. Sapkota and Oden⁴⁷ found that household's wealth status exert a strong

influence on appropriating frequency of fuel wood exertion from the forest in Terai community of Nepal. Poor households were highly dependent on the forests for resources in order to sustain their day-to-day livelihoods.

2.6.3. Forest resource possession

The area under agroforestry and homestead farming for sampled households was found to be very less i. e. 88.94 per cent of the households had area under agroforestry less than 0.10 ha whereas the remaining 11.06 per cent had area in the range of 0.11-0.20 ha. None of the sampled households reported area under agroforestry and homestead farming more than 0.21 ha. There can be various causes to such land use pattern like small to marginal land holding. The size of land holding had a positive and significant association with the adoption of agroforestry systems as reported from north eastern districts of Karnataka⁴⁸. Furthermore, forests fulfilling the resource requirements due to its close vicinity, economic poverty of the households that impede the maintenance and establishment of an agroforestry system along with their traditional farming unit.

Table 7: Urban closeness and access to alternative forest resources in the study area (N=208)

S. No.	Urban Closeness		Access to alternative forest resources	
	Category	Households	Category	Households
1.	< 5 km	23 (11.06)	Most often	116 (55.77)
2.	5-10 km	116 (55.77)	Often	56 (26.92)
3.	>10 km	69 (33.17)	Seldom	27 (12.98)
4.			Never	09 (4.33)
		$X \pm S.E. = 8.98 \pm 0.248$		
			$X \pm S.E. = 2.23 \pm 0.043$	

2.6.4. Urban closeness

Urban closeness was measured as the distance from the tehsil headquarter of each sampled village and household. Majority of the households (55.77 %) lived more than 5 km away from the nearest urban town followed by a distance of more than 10 km (33.17%). Only a very small percentage (11.06 %) lived close i.e., less than 5 km from the nearest town.

2.6.5. Access to alternative forest resources

More than the half of the households (55.77%) frequented the community forests very often followed by often (26.92%), seldom (12.98 %) and never (4.33 %) respectively. Community forests or other alternative forest resources provide the closest and most feasible alternative to forest resources especially during harsh weather like winter *etc.* hence the dependence on the alternative forest resources is equally high as on the forests as they are supplementary to forests.

CONCLUSION

The analysis of socioeconomic characteristics of the local people indicated that they are in deprived position in all respects. The forests play a central role in the livelihood and resource dependency of the area due to its close vicinity and ample resource availability. These communities are in extreme need of livelihood diversification and better education infrastructure in order to uplift them both socially and economically. The high dependence on forests is also a major cause of concern as the forest biomass is highly exploited in these areas leading to its degradation. To build the livelihoods stronger, secured and sustainable and reduce the forest dependence, the forestry interventions based mitigation strategies must be given due importance during decision making, implementation and execution for all-round development of the communities and accordingly the re-orientation of the land use integrating various alternative forestry measures should be implemented.

Acknowledgement

Authors are thankful to the respondents and forest fringe people for providing valuable information and sharing their knowledge with

us. We are also grateful to local people for their cooperation during the field data collection. Authors are also thankful to the DFO Sindh forest Division and concerned Tehsil officers of the villages for their help in providing secondary data related to the area.

3. REFERENCES

1. Anonymous, What do we know about the contribution of forest resources to livelihoods and poverty reduction? Some facts and figures. <http://www.fao.org/DOCREP/005/AC914E02.ht> (2000).
2. Byron, N., Arnold, J. E. M., What futures for the people of the tropical forests? *World Development* **27**: 789-805 (1999).
3. Nautiyal, S., Rao, K. S., Maikhuri, R. K., Negi, K. S., Kala, C. P., Status of medicinal plants on way to Vashuki Tal in Mandakini Valley, Garhwal, Uttaranchal, *J Non-Timber Forest Product* **9**: 124-131 (2002).
4. Kumar, A., Avasthe, R. K., Shukla, G., Pradhan, Y., Ethnobotanical edible plant biodiversity of Lepcha Tribes, *Indian Forester* **138**: 798-803 (2012).
5. Sarmah, R., Arunachalam, A., Contribution of non-timber forest products (NTFPs) to livelihood economy of people living in forest fringes in Changlang district of Arunachal Pradesh, India. *Indian J. Fundamental & Appl. Life Sci.* **1(2)**: 157-169 (2011).
6. Maske, M., Mungole, A., Kamble, R., Chaturvedi, A., Chaturvedi, A., Impact of non-timber forest produces (NTFPs) on rural tribes economy in Gondia district of Maharashtra, India. *Archiv. Appl. Sci. Res.* **3(30)**: 109-114 (2011).
7. Narzary, H., Brahma, S., Basumatary, S., Wild Edible Vegetables Consumed by Bodo Tribe of Kokrajhar District of Assam, North-East India. *Archiv. Appl. Sci. Res.*, **5**: 182-190 (2013).
8. Kar, S. P., Jacobson, M. G., NTFP income contribution to household economy and related socio-economic factors: lessons from Bangladesh. *Forest*

- Policy and Economics* **14**: 136–142 (2012).
9. Cavalli-Sforza, L. L., Feldman, M. W., Chen, K. H., Dornbusch, S. M., Theory and observation in cultural transmission. *Science*, **218(4567)**: 19-27 (1982).
 10. Sharada, A., Lal, B. S., Demography, Socio-Economic and Health Conditions of the Tribes in Warangal District of Telangana State. *International Journal of Academic Research*. **1(10)**: 2348-7666 (2017).
 11. Berkes, F., Colding, J., Folke, C., Rediscovery of traditional ecological knowledge as adaptive management. *Ecol Appl*, **10(5)**: 1251-1262 (2000).
 12. Lambertz, C., Chaikong, C., Maxa, J., Schlecht, E., Gauly, M., Characteristics, socioeconomic benefits and household livelihoods of beef buffalo and beef cattle farming in Northeast Thailand. *Journal of Agriculture and Rural Development in the Tropics and Subtropics*. **113(2)**: 155–164 (2012).
 13. Mamo, G., Sjaastad, E., Vedeld, P., Economic dependence on forest resources: a case from Dendi District, Ethiopia. *Forest Policy and Economics*. **9**: 916–927 (2007).
 14. Vedeld, P., Angelsen, A., Bojö, J., Sjaastad, E., Kobugabe, B. G., Forest environmental incomes and the rural poor. *Forest Policy and Economics* **9**: 869–879 (2007).
 15. Babulo, B., Muys, B., Nega, F., Tollens, E., Nyssen, J., Deckers, J., Mathijs, E., Household livelihood strategies and forest dependence in the highlands of Tigray, northern Ethiopia. *Agricultural Systems*, **98**: 147–155 (2008).
 16. Chia, E. L., Somorin, O. A., Sonwa, D. J., Tiani, A. M., Local vulnerability, forest communities and forest carbon conservation: case of southern Cameroon. *International Journal of Biodiversity and Conservation*, **5**: 498–507 (2013).
 17. Rennaud, J. P., Ruitenbeek, J., Tennigkeit, T., Challenges of community-forestry based carbon projects: process, participation, performance. *Journal of Field Action, Special Issue*, **7**: 21–34 (2013).
 18. FAO, FAO, forests and climate change: working with countries to mitigate and adapt to climate change through sustainable forest management. Rome: FAO, (2015).
 19. Hajost, S., Zerbock, O., Lessons learned from community forestry and their relevance for REDD+. Washington, DC: USAID-supported Forest Carbon, Markets and Communities Program (2013).
 20. Cardona, W. C., Forest regulation flexibility, livelihoods, and community forest management in the northern Bolivian Amazon. In: Mery GA (ed.), *Forests in the global balance: changing paradigms. IUFRO World Series* 17. Vienna: IUFRO, pp 97–111 (2005).
 21. Anonymous, Directorate of Economics and Statistics, District Statistics and Evaluation Office, Ganderbal, Jammu and Kashmir (2011).
 22. Census of India, A - 5 State Primary Census Abstract, Government of India (2011).
 23. Ray, G. L., Mondol, S., Research methods in social sciences and extension education. Kalyani Publishers, New Delhi, India (2004).
 24. Mukherjee, N., Participatory Rural Appraisal. Methodology and Applications, Concept Publishing Company, Delhi (1993).
 25. Venkataramaiah, P., Development of socio-economic status scale, Ph.D. Thesis, Department of Agricultural Extension, University of Agricultural Sciences, Bangalore, Karnataka, India, (1990).
 26. Singha, A. K., Talukdar, R. K., Utilization behaviour of forest resources in forest villages of Assam. *Journal of Non-Timber Forest Products*, **9(1/2)**: 9-15 (2006).

27. Snedecor, G. W., Cochran, W. G., *Statistical Methods*. Iowa State University Press, Ames, Iowa-50010 (1967).
28. Sinha, B., Kala, C. P., Katiyar, A. S., Enhancing livelihoods of forest dependent communities through synergizing FDA activities with other development programs. RCNAEB sponsored project, Indian Institute of Forest Management (IIFM), Bhopal, (2010).
29. Biswakarma, S., Pala, N. A., Shukla, G., Pradhan, V. K., Chakravarty, S., Influence of Socio-Economic Factors on Attitude of Ethno-Botanical Users among Forest Fringe Communities in Sub-Himalayan Region of West Bengal, India, *Indian Journal of Hill Farming* Special Issue: 27-35 (2018).
30. Sood, K. K., Najjar, C., Singh, K. A., Handique, P., Singh, B., Rethy, P., Association between socio-economic parameters and agroforestry uptake: evidences from eastern Himalaya, *Indian J. Forestry*, **31(4)**: 559-564 (2008).
31. Pal, G., Resource use efficiency and level of technology adoption in lac cultivation among trained and untrained lac growers in Jharkhand. *Internat. J. Agric. Sci*, **5(2)**: 615-618 (2009).
32. Ofoegbu, C., Paxie, W., Francis, C. J., Babalola, F. D., Socio-economic factors influencing household dependence on forests and its implication for forest-based climate change interventions, *Southern Forests: a Journal of Forest Science* <http://dx.doi.org/10.2989/20702620.2016.1255420> (2017).
33. Singh, P. K., Quli, S. M. S., Economic valuation of non-timber forest product's contribution in tribal livelihood in West Singhbhum district of Jharkhand. *Indian Forester* **137(11)**: 1258-1264 (2011).
34. Pal, G., Socio-economic characteristics of lac growers in Kanker district of Chhattisgarh. *Indian Forester*, **137(11)**: 1294-1297 (2011).
35. Kumar, P., Rawat, L., Basera, H., Socio-economic studies of Henwal Watershed, TehriGarhwal, Uttarakhand. *Indian J. Forestry*, **33(2)**: 149-154 (2010).
36. Gangadharappa, N. R., Sajeev, M. V., Ganesamoorthi, S., Nagesha, G., Ibrahim, S., Ranganatha, A. D., Reddy, M. V. S., Exploratory study on economic and marketing aspects of agroforestry and their implications in Dharwad and Belgaum districts, Karnataka. *My Forest*, **41(2)**: 107-119 (2005).
37. Pandey, A. K., Tripathi, Y. C., Kumar, A., Non timber forest (NTFPs) for sustained livelihood challenges and strategies. *Research Journal of Forestry*, **6(2)**: 23-33 (2016).
38. Islam, M. A., Rai, R., Quli, S. M. S., Trambo, M. S., Socio-economic and demographic descriptions of tribal people subsisting in forest resources of Jharkhand, India, *Asian Journal of Bio Science*, **10(1)**: 75-82 (2015).
39. Bharathkumar, L. B., Impact of non-timber forest products on tribal economy-an econometric analysis. M.Sc. Thesis, University of Agricultural Sciences, Dharwad, Karnataka, India. (2010).
40. Bijalwan, A., Sharma, C. M., Kediya, V. K., Socio-economic status and livelihood support through traditional agroforestry systems in hill and mountain agro-ecosystem of Garhwal Himalaya, India. *Indian Forester*, **138(12)**: 1423-1430 (2012).
41. Dev, I., Problems and prospects of forage production and utilization of Indian Himalaya, *ENVIS Bulletin: Himalayan Ecology and Development*, **9(2)**: 11-18 (2001).
42. Singh, V., Technology for forage production in hills of Kumaon. In: Harzra, C. R., BimalMisri (eds) *New Vistas in forage production*. AICRPF (IGFRI). Publication Information Directorate, New Delhi, pp 197-202 (1995).
43. Tulachan, P. M., Neupane, A., Livestock in mixed farming systems of the Hindu Kush-Himalayas: trends and sustainability. ICIMOD and FAO, Kathmandu (1999).
44. Hussain, A., Dasgupta, S., Bargali, H. S., Conservation perceptions and attitudes of

- semi-nomadic pastoralist towards relocation and biodiversity management: a case study of Van Gujjars residing in and around Corbett Tiger Reserve. *India. Environ. Dev.*, **18**: 57-72 (2016).
45. Khanduri, V. P., Sharma, C. M., Ghildiyal, S. K., Puspwan, K. S., Forest composition in relation to socioeconomic status of people at three high altitudinal villages of a part of Garhwal Himalayas. *Indian Forester*, **128(12)**:1335–1345 (2002).
46. Seema, Manoharan, M., Socio-economic characteristics and marketing behaviour of coconut growers of Andaman and Nicobar Island. *Indian J. Agric. Mktg*, **16(2)**: 26-31 (2002).
47. Sapkota, I. P., Odén, P. C., Household characteristics and dependency on community forests in Terai of Nepal. *International Journal of Social Forestry*, **1(2)**: 123-144 (2008).
48. Nagesha, G., Gangadharappa, N. B., Adoption of agroforestry systems in north eastern districts of Karnataka. *My Forest*, **42(4)**: 337-347 (2006).
46. Seema, Manoharan, M., Socio-economic characteristics and marketing behaviour