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Exploration of the socioeconomic conditions of forestry farmers in Leh Himalaya, India

[1]FA Shah Khan, [1]MA Islam, [1]AA Gatoo, [2]GM Bhat, [3]AA Parrey, [2]MR Bakshi and [1]Ummar Atta

[1]Division of Forest Resource Management, Faculty of Forestry, Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir, Benhama, Ganderbal, Jammu and Kashmir, India

[2]Division of Silviculture and Agroforestry, Faculty of Forestry, Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir, Benhama, Ganderbal, Jammu and Kashmir, India

[3]Division of Wildlife Sciences, Faculty of Forestry, Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir, Benhama, Ganderbal, Jammu and Kashmir, India

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Corresponding Author: MA Islam

Abstract

The adoption process of forestry interventions in the Indian arid region, particularly in cold deserts, necessitates a thorough understanding of the underlying socioeconomic conditions. This study investigated the socioeconomic conditions of forestry farmers to predict the psychological behaviours guiding the adoption of forestry interventions in Leh Himalaya, India. The data were collected from 185 sample households drawn from nine selected villages and five blocks, employing a multi-stage random sampling technique. Descriptive statistics were used to analyze the data. The results indicated that the majority of the respondents were middle-aged (51.36%), low-literate up to middle-level (64.85%), Schedule Tribe (71.35%), had no membership in or membership in only one organization (50.26%), and belonged to large-sized (71.89%) nuclear (69.18%) families. The size of land holdings among most (90.08%) of the respondents was either marginal or small, engaged mainly in cultivation, wage labour, or caste occupation (58.91%), having mixed houses (55.13%) with up to three rooms (67.01%), up to 10 livestock (64.33%), medium wealth status (51.35%), and gross annual income up to ₹ 60000/year (52.96%). The study concluded that socioeconomic upliftment and livelihood diversification through forestry resources should be given top priority as an important strategy for poverty reduction among backward people. The characterization of socioeconomic conditions of forestry farmers will be a basis for planning and implementation of forestry programmes for forest resource production and livelihood diversification in the Leh district of Ladakh.

Keywords: Socioeconomic conditions, forestry farmers, forest resource, livelihoods, Leh, Ladakh

Introduction

Forestry resources are the common thread in all aspects of life, whether it is birth, marriage, livelihood, or death, among the local communities of Leh district in Ladakh Union territory (Fatima *et al*., 2022) [10]. Forestry resources are an integral part of the development and survival of people living in the district. Forestry resources are important intervention for addressing poverty issues for marginalized rural communities by contributing to livelihoods, including food security, income, health, and sustainable human development (Kumar *et al*., 2021) [12]. The forestry resources have multifarious uses, constituting an important source of livelihood among local people in the district, and are the source of revenue, employment, shelter, housing materials, cloth, ornament, fuel, fodder/grazing, timber, food, vegetables, medicines, fertilizer, fibre, floss, oilseed, cottage industries, handicrafts, and other forestry resources, besides playing a vital role in the environmental amelioration in the district (Bhat *et al*., 2022) [7]. Traditional and ancient knowledge about utilization of forestry resources still exists in the Leh district. The rural communities in the district are socially, educationally, economically, and politically backward, with accompanying impediments of illiteracy, poverty, malnutrition, superstitions, addictions, ignorance, and exploitation (Shah Khan *et al*., 2018) [20]. They have their own ways of life, traditions, cultural identities, and customary modes of living closely intertwined with nature. Unemployment and underemployment features are inherent in the district, causing low income and a miserable life for the households. The forestry resources are an important contributor to the livelihoods of the local communities in the district (Fatima *et al*., 2022) [10]. The forestry resources are an imperative part of the traditional life style in Leh district of Ladakh. The forestry resource development integrated with agricultural and industrial progress has great potential to enhance livelihood security, food security, and poverty reduction for vulnerable sections of society, including the illiterate, unskilled, resource-poor, jobless, landless, and labourers in the area (Bhat *et al*., 2022) [7].

Socioeconomic conditions are the combined social and economic status of an individual or group in relation to

others in society (Islam *et al*., 2015) [11]. They play a significant role in determining an individual's accessibility to common resources, livelihood options, income sources, food security, etc. (Banday *et al*., 2019) [6]. They also drive the psychological behaviours of humans, including knowledge, attitude, perception, adoption, change-proneness, level of aspiration, risk bearing ability, economic motivation, etc. (Atta *et al*., 2018) [3]. There are a lot of social and economic variables that cumulatively influence household adoption and the development of forestry interventions (Malik *et al*., 2022) [13]. Although local people are mostly dependent on agriculture to secure their families' food and livelihoods, forestry interventions substantially support their subsistence, income, and safety nets. There are several forestry practices, including homestead plantations, woodlots, agroforestry, roadside plantations, bund plantations, village forestry, community forestry, green manuring, etc., that provide higher yield, return, proper utilization of natural resources, sustainable livelihood security, and food and nutritional enrichment (Namgial *et al*., 2020) [15]. Adoption of forestry practices is not contingent upon a realistic recognition of their livelihood-enhancing value. There are some determinant socioeconomic variables of the people that largely affect their adoption behaviour. The socioeconomic conditions of forestry farmers are an important subject for study as they are dwelling in a complex, diverse, and risk-prone situation. The potential value of socioeconomic conditions guiding the adoption and strengthening of forestry programmes, either for household production or their marketing, is often underestimated or unknown. Keeping these facts in mind, the present study was undertaken to investigate the socioeconomic conditions of forestry farmers and characterize the adopters for enhancement of forestry practices in the Leh district of Ladakh.

Materials and Methods

Description of study area

Leh district (Fig. 1.), with an area of 45110 sq. km, which probably makes it the largest district in the country in terms of area, is one of the coldest and most elevated inhabited regions of the world, having 112 inhabited villages and one uninhibited village with an altitude ranging from 2900 to 5900 metres (Anonymous, 2011) [2]. The district is situated roughly between 32- and 36-degrees north latitude and 75- and 80-degrees east longitude, with an altitude ranging from 2300 metres to 500 metres above sea level. The district is bounded by Pakistan-occupied Kashmir in the west, China in the north and eastern part, and Laquan Spite of Himachal Pradesh in the south. The district is at a distance of 434 km from Srinagar and 474 km from Manali (HP). Topographically, the whole of the district is mountainous, with three parallel ranges of the Himalaya. The district consists of nine (9) blocks, *viz*., Leh, Khalsi, Khru, Nyoma, Durbok, Saspol, Panamic, Chuchot, and Nubra. Due to its location and high altitude, the Leh district experiences heavy early precipitation (snow), which results in its being cut off from the rest of the country for six months of the year. The district remains inaccessible, as the road links from Srinagar as well as Himachal Pradesh remain closed due to the closure of Zojila and Rotang passes due to heavy snowfall in the winters. The human population of Leh district is 117232 (Census of India, 2011) [9]. The density of population is 3 people per sq. km. Leh district is one of the places where population density is lowest on the inhibited part of the earth. Approximately 23.30% of the of the population is semi-urban, and the remaining 76.70% is rural. The main occupations engaged by the working force are cultivation, agriculture labour, household industry, and other works. The Ladakh Autonomous Hill Development Council emerged in September 1995 as the main development agency of the district.

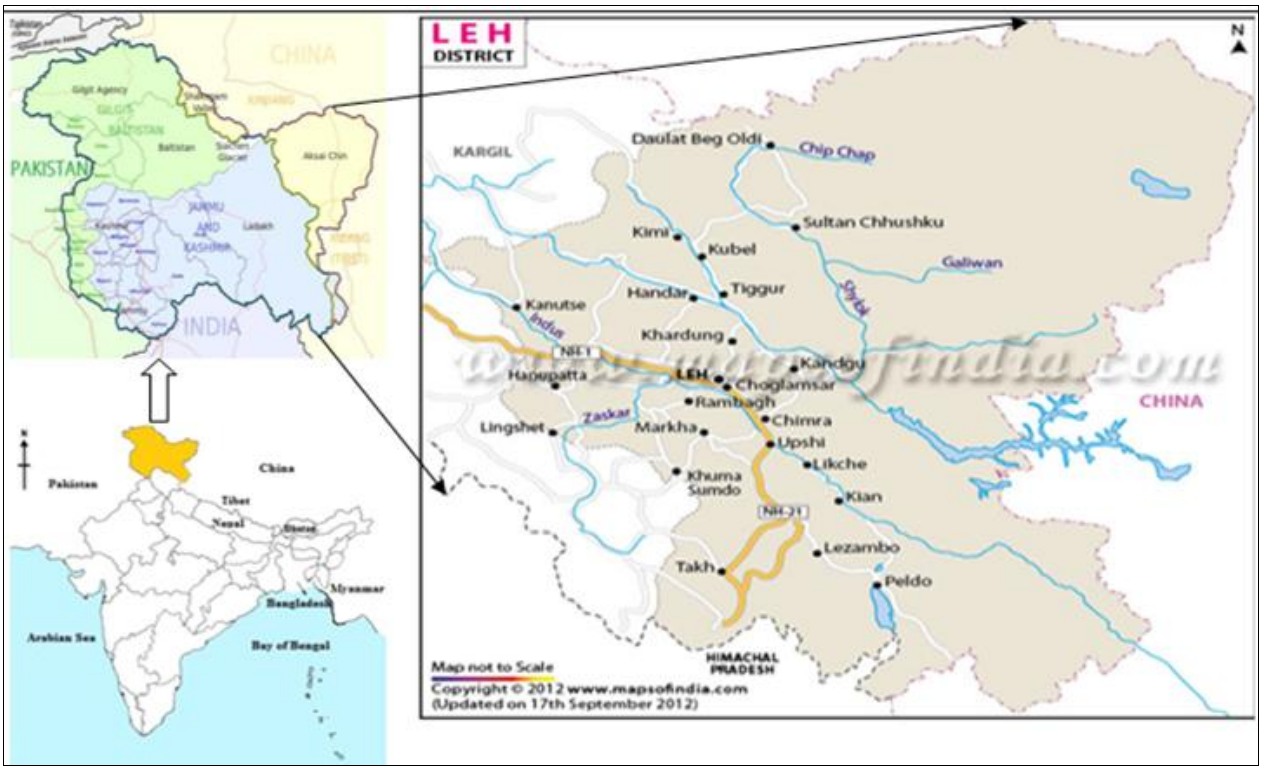

Fig 1: Location map of the study area

Sampling technique and Sample

The present study was conducted in the Leh district of Ladakh Union Territory. A multi-stage random sampling technique (Ray and Mondol, 2011) [19] was used to select the villages and the respondents. The first stage was the random sampling of five (5) blocks, namely, Leh, Nyoma Chochot, Panamic, and Khaltsi of Leh district. The second stage involved random sampling of ten (10) villages, *viz*., Saboo from Leh Block, Chumathang and Mud from Nyoma Block, Stakna and Nang from Chochot Block, Lakjung and Panamic from Panamic Block, and Dha, Lamayuru, and Nurla from Khaltsi Block. In the third stage, a total of 185 households were selected from the sample villages with a 15 percent sampling intensity employing a simple random sampling technique for the field study. The respondents interviewed were either household heads or eldest members. The summary of the sample selection process is given in the flow chart, as detailed below in Fig. 2.

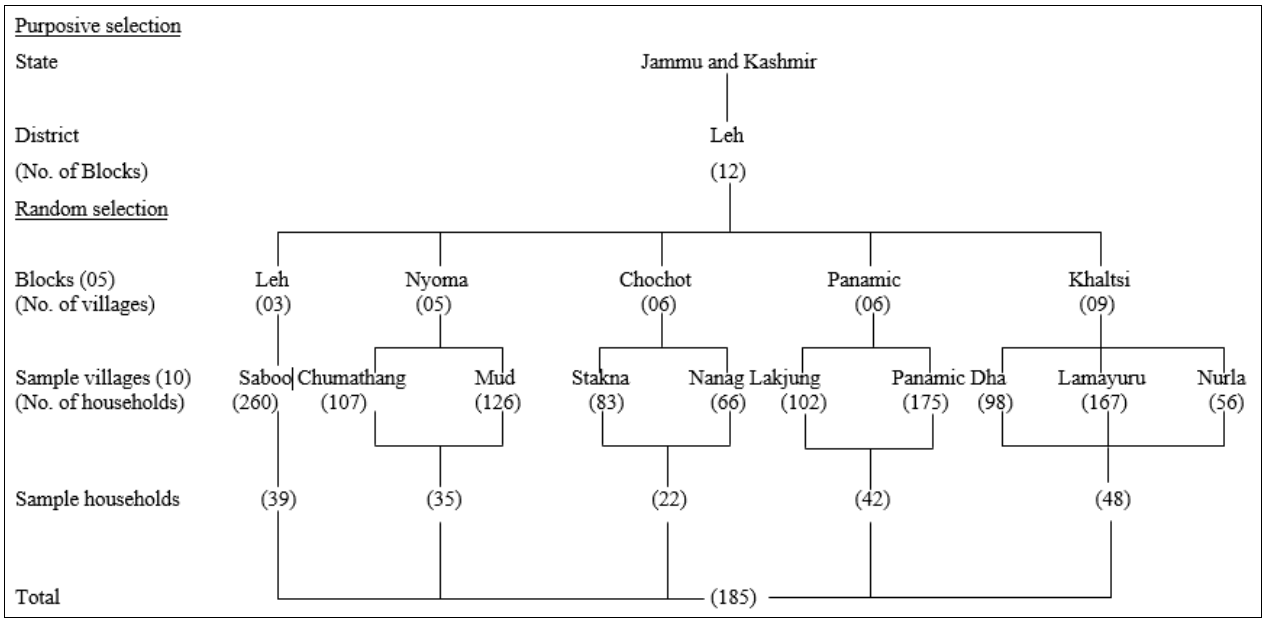

Fig 2: Sampling procedure

Data collection

In order to achieve the research objectives, the present study included both qualitative and quantitative methods. Data were collected by using both secondary sources and primary field surveys. Secondary sources included literature from various journals, forest department records, village records, the internet, previous research, annual reports and other related documents, and different governmental and non-governmental agencies. Primary sources included structured interviews with selected respondents and non-participant observations (Mangal and Mangal, 2020) [14]. The primary data were collected at the household level, whereas the secondary data were collected at the block, village, and household/individual level.

Structured interview

The primary data were collected through the personal interviews of the respondents through a well-structured, pre-tested interview schedule at the household level. The interview schedule for the household survey was prepared on the basis of the literature referred to, a reconnaissance survey of the study area, discussion with local people, and consultation with the experts. The interview schedule so prepared was employed to collect information on people's socioeconomic conditions influencing the adoption of forestry practices for forestry resource-based livelihoods in the locality. The data, thus generated through these approaches, was used in exploring the interrelationship between socio-economic characteristics and forestry resource-based livelihoods to put forth strategies to keep pace with current development and future challenges in the locality.

Non-participant observation

The qualitative analysis was done on the basis of personal observation and interaction with the respondents. This technique helped to have firsthand on-the-scenes contact with the respondents, examine the behaviour in a natural situation, and study the situation-based features of conduct.

Data analysis

Descriptive statistics, including frequency (f), percentage (%), average (x), standard error, and range (Snedecor and Cochran, 1967) [21], were used to summarize the socioeconomic variables of the forestry farmers.

Results and Discussion

Social characteristics of forestry farmers

Among the 185 sampled households, the majority of the respondents (51.36%) were middle-aged, followed by the old (27.56%) and young (21.08%) age groups (Table 1.). The mean age was 45.57 years. The preponderance of middle-aged respondents could be attributed to the fact that middle-aged people are generally enthusiastic, innovative, and hard-working, with more experience, vigour, zeal, aptitude, and challenge (Ajake and Enang, 2012; Raj *et al*., 2020) [1,18]. The maximum sampled respondents (34.05%) had education up to middle, followed by high (16.75%), primary (14.59%), intermediate (13.51%), below primary (10.27%), illiterate (5.94%), and graduate and above

(4.86%) (Table 1.). The mean score of education was 3.05, which indicated that low literacy dominates in the surveyed population. The low literacy might be due to inadequate socio-economic conditions of parents, lack of educational facilities in the area, higher involvement of boys and girls in livelihood earnings, and ignorance towards education (Pandey and Mishra, 2011) [17].

Table 1: Social characteristics of forestry farmers in Leh Himalaya (N=185)

Characteristics	Category	Household (%)	Mean±S.E.	95% CI for Mean (Lower Bound-Upper Bound)
Age	Young (up to 30 years)	39 (21.08)	45.57±1.13	43.35-47.80
	Middle (31 to 50 years)	95 (51.36)		
	Old (> 50 years)	51 (27.56)		
Education	Illiterate	11 (5.94)	3.05±0.11	2.83-3.27
	Below primary	19 (10.27)		
	Primary	27 (14.59)		
	Middle	63 (34.05)		
	High school	31 (16.75)		
	Intermediate	25 (13.51)		
	Graduate & above	09 (4.86)		
Caste	ST	132 (71.35)	1.47±0.06	1.34-1.59
	SC	27 (14.59)		
	OBC	18 (9.72)		
	General	08 (4.32)		
Social participation	No participation	21 (11.35)	1.74±0.09	1.56-1.91
	Membership of 1 organization	72 (38.91)		
	Membership of > 1 organization	49 (26.48)		
	Office bearer	20(10.81)		
	public leader	23 (12.43)		
Family type	Nuclear	128 (69.18)	1.31±0.03	1.26-1.36
	Joint	57 (30.81)		
Family size	Small (up to 5 members)	52 (28.10)	1.72±0.03	1.65-1.78
	Large (> 5 members)	133 (71.89)		

The majority of the respondents (71.35%) were Schedule Tribe, followed by Schedule Cast (14.59%), other backward classes (9.72%), and general categories (4.32%) (Table 1.). The mean value (1.47) indicated the prevalence of the Schedule Tribe in the area. The prevalence of Schedule Tribe is likely because tribal communities form the main social group and constitute a major component of the total population. They are socially, educationally, economically, and politically backward, with accompanying impediments of illiteracy, poverty, malnutrition, superstitions, addictions, ignorance, and exploitation (Malik *et al*., 2022) [13]. As indicated in Table 1., most (38.91%) of the respondents had membership in one organization, followed by those with membership in more than one organization (26.48%). About 12.43% of the respondents were public leaders, 11.35% had no participation, and the rest (10.81%) were office-bearers. The mean value of social participation was 1.74. The social participation showed the grousing magnitude of interest and willingness of the respondents to be associated with various formal and informal organizations (Pandey and Mishra, 2011) [17]. Table 1 shows that the majority (69.18%) of the respondents were from nuclear families, and the rest (30.81%) belonged to joint families. Similarly, most of the respondents (71.89%) had large families, and the rest (28.10%) belonged to small families. The mean score (3.02) of family composition showed the prevalence of large-sized nuclear families in the surveyed population. Because of growing individualism, people prefer to lead an independent life with personal assets and proper accommodation in nuclear families. Consideration of the child as an added asset to the family who can contribute by way of labour and lack of knowledge of the benefits of small families might be the reasons for large-sized families (Pal, 2011; Raj *et al*., 2020) [16, 18].

Economic characteristics of forestry farmers

The maximum number of respondents (63.24%) were marginal farmers, followed by small (27.56%), medium (7.02%), large (2.16%), and landless (0.00%) (Table 2.). The average score of landholdings was 1.48, which indicated the prevalence of marginal landholders. The prevalence of marginal farmers in the surveyed area is due to the nuclear and neo-local structure of families in the community, which urged early fragmentation of land from generation to generation and among married offspring (Bijalwan *et al*., 2011; Ajake and Enang, 2012) [8,1]. Table 2. showed that 41.62% of the respondents possessed 6 to 10 livestock, followed by 35.67% of them owning more than 10 livestock, 19.45% up to 5 livestock, and only 3.24% of them having no livestock at all. The mean score of the livestock possessions of the respondents was 2.09, which indicated that households possessing 6 to 10 livestock were prevalent. Holding a good number of livestock could be attributed to the fact that livestock rearing was the most preferred secondary occupation. Livestock support agriculture and allied activities besides providing nutritional, social, economic, religious, and recreational benefits to the people (Bijalwan *et al*., 2011; Pal, 2011; Banday *et al*., 2019) [8,16,6]. As noticed from Table 2., the majority (55.13%) of the respondents had mixed-type houses, followed by pucca (35.13%), katcha (5.94%), and hut (3.75%), whereas no household was found without a house. As far as the size of the house is concerned, the majority (52.43%) of the respondents have three rooms in

their houses, followed by more than three rooms (32.99%), two rooms (11.35%), and one room (3.24%). The mean scores of house type and size were 3.21 and 3.16. The low housing status could be attributed to low socio-economic conditions, poverty, a lack of infrastructure, a rural environment, etc. Traditionally, people make mixed-type houses to correspond with the geographical conditions of the area (Malik *et al*., 2022) [13]. It is apparent from Table 2. that cultivation remained the main occupation for 26.48% of the respondents, followed by wage labour (21.08%), business (17.29%), service (14.59%), caste occupation (11.35%), and any other (9.18%). The mean score of the main occupation was 3.20, indicating agriculture as the backbone of the economy. Agriculture and livestock rearing being the backbone of the economy in the area, most of the respondents either belong to farming families or are dependent on farming for their livelihoods. The families engaged in other occupations and activities were also doing agriculture or livestock rearing as their subsidiary occupations (Islam *et al*., 2015; Baba *et al*., 2016) [11,5].

Table 2: Economic characteristics of forestry farmers in Leh Himalaya (N=185)

Characteristics	Category	Household (%)	Mean±S.E.	95% CI for Mean (Lower Bound-Upper Bound)
Land size	Landless	00 (0.00)	1.48±0.05	1.37-1.58
	Marginal (< 1.00 ha)	117 63.24)		
	Small (1.01-2.00 ha)	51 (27.56)		
	Medium (2.01-4.00 ha)	13 (7.02)		
	Large (> 4.00 ha)	04 (2.16)		
Livestock possession	No livestock	06 (3.24)	2.09±0.05	1.97-2.21
	Up to 5 livestock	36 (19.45)		
	6 to 10 livestock	77 (41.62)		
	> 10 livestock	66 (35.67)		
House type	No house	00 (0.00)	3.21±0.05	3.10-3.31
	Hut	07 (3.75)		
	Katcha	11 (5.94)		
	Mixed	102 (55.13)		
	Pucca	65 (35.13)		
House size (No. of rooms)	01	06 (3.24)	3.16±0.05	3.05-3.26
	02	21 (11.35)		
	03	97 (52.43)		
	>03	61 (32.99)		
Main occupation	Wage labour	39 (21.08)	3.20±1.58	2.97-3.43
	Caste occupation	21 (11.35)		
	Cultivation	49 (26.48)		
	Business	32 (17.29)		
	Service	27 (14.59)		
	Any other	17 (9.18)		
Annual income	Very low income (≤₹ 30000/year)	35 (18.91)	61521.08±1757.65	58053.71-64988.44
	Low income (₹ 30001-60000/year)	63 (34.05)		
	Medium income (₹ 60001-90000/year)	79 (41.08)		
	High income (>₹ 90000/year)	08 (4.32)		
Wealth status	Low (Score up to 15)	39 (18.08)	21.36±0.57	20.21-22.49
	Medium (Score 16 to 30)	95 (51.35)		
	High (Score>30)	51 (27.56)		

Table 2. depicts that a considerable percentage (41.08%) of the respondents belong to the medium income category, followed by low income (34.05%), very low income (18.91%), and high income (4.32%). The average income of sampled households was recorded to be ₹ 61521.08/year. The study established the preponderance of families with a medium gross annual income ranging between ₹ 60001 and ₹ 90000/year, with an average of ₹ 61521.08/year. The probable reasons for this might be that the majority of the respondents are either farmers with marginal-sized landholdings or livestock herders. Low agricultural production due to lack of irrigation facilities, scientific know-how, improved equipment and machinery, monocropping systems, low fertility of land, and erratic climatic conditions accrues paltry income to the farmers (Baba *et al*., 2015; Atta *et al*., 2018) [4,3]. Similarly, the majority of businessmen have low money-making assets and are not getting consistent income. It is evident from Table 2. that the majority (51.35%) of the respondents belong to the medium wealth status group, followed by the high (27.56%) and low (21.08%). The average household wealth status score of the respondents was recorded to be 21.36. Although different and varied types of domestic materials were possessed by the respondents, the overall picture of wealth status was not satisfactory, especially in the context of the improved, modern, and prestigious material resources. The main reasons for such a scenario might be poverty, low literacy, lack of knowledge, lack of exposure, infrastructural insufficiency, etc. (Baba *et al.*, 2015) [4]. As the study site is dominated by rural areas, rural people, and rural livelihood backgrounds, the average urban closeness of the sample households was quite high in the locality (Baba *et al*., 2016) [5].

Conclusion

The household survey indicated that the majority of the

respondents were middle-aged, low-literate up to middle-level, of the of the Schedule Tribe, had no membership in or membership in only one organization and belonged to a large nuclear family. The majority of respondents had marginal or small land holdings, were mostly employed in wage labour, caste, or cultivation, had mixed houses with up to three rooms and up to ten animals, were of medium wealth, and earned up to ₹60,000 annually in gross income in the sample villages. The findings of the study led to the conclusion that, despite inhabiting resource rich areas, the local communities are in an underprivileged position in all respects, as reflected by their low socioeconomic conditions. The overall assessment of the socioeconomic conditions of forestry farmers indicated that Leh district had better opportunity and potential to prosper in the field of forestry farming. Hence, it is imperative to improve forestry-based livelihood interventions by exploiting people's socioeconomic conditions and existing resources.

Conflict of Interest Statement

The authors declare that they have no potential conflicts of interest, whether financial or non-financial.

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