Socio-economic assessment of existing agroforestry systems in Bangana Tehsil of Una district, Himachal Pradesh

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ABSTRACT

The present study was carried out at Bangana Tehsil of Una district, Himachal Pradesh with the aim to identify existing agroforestry systems and to assess the demographic and socio-economic conditions of farmers. Five agroforestry system types were found being practiced by the farmers in the study area viz agri-silviculture (AS), agri-horticulture (AH), agri-horti-silviculture (AHS), silvi-pastoral (SP) and horti-pastoral (HP). Four agroforestry systems types were identified in the marginal and five each in the small and medium categories of farmers. Among them, SP and AS types were most widely adopted irrespective of farmers' category. The average family members per household were in the order: medium (6.50) >small (6.29) >marginal (6.10). Sex ratio was observed as small (1005.89) >marginal (1003.03) > medium (988.66). Literacy rate was recorded highest (82.70%) in marginal followed by medium (81.33%) and small (80.44%) category of farmers. All the farmers adopted traditional methods of milking as they did not possess big dairy farms. Overall average landholding was recorded 7.47 hectares in all sampled categories of farmers. The average landholding area was found maximum (4.68 ha) in medium followed by small (1.9 ha) and marginal (0.89 ha) categories.

Keywords: Agroforestry system; socio-economic; landholding; land use; employment; livestock

INTRODUCTION

India is mainly an agriculture-based country and it plays a major role in the country's national economy. Contribution of agriculture to the gross domestic product (GDP) and incremental jobs however are likely to decline every day. The natural resources are depleting because of constant pressure from the rising population. Therefore suitable production systems should be developed to feed the ever increasing population to maximize production without deteriorating existing resources. One of such land use systems is agroforestry. It is a land use system that integrates trees, crops and animals in a way that is scientifically sound, ecologically desirable, practically feasible and socially acceptable to the farmers (Nair 1979). Mercer (1993) states that agroforestry projects have two main objectives: first, to increase the efficiency of the use of rural resources by reducing or eliminating ecologically destructive land-use practices and by introducing new or improved agroforestry enterprises in order to produce sustainable increases in incomes and living standards and second, to provide for social equity. Estimating the socio-economic impact of an agroforestry system is a way to measure the success of meeting the above fundamental objectives of economic and social equity/distributive efficiency. Agroforestry practices can provide food security, enhance soil fertility, provide fodder and generate income by ensuring a diversity of outputs (Garrity 2004, Huxley 1999, Jose 2009, Nair 2007) and provide ecosystem services defined as the conditions and processes by which natural ecosystems and the species that make them up, sustain and fulfill human life (Daily 1997). The ecosystem services provided by agroforestry are noteworthy for their positive contributions towards the water, carbon and nitrogen cycles as well as for their cultural and socio-economic potentials in precipitous mountainous regions. In the hills, the agriculture production is supported by the inputs from the forest in the form of fuelwood, fodder and manure. The variation in the ecosystem services is

explained by social factors such as education level, income level and gender (Al-assaf et al 2014, Hossain et al 2016). Agroforestry is not a new concept in Himachal Pradesh and other Himalayan regions rather it has been practiced traditionally since time immemorial (Nautiyal et al 1998). The prosperity of the hill communities has traditionally being dependent on the forest, farming, agroforestry and livestock. The main cause of the poor economic status is degradation of the forest ecosystem, less farm production, poor watershed management and lack of infrastructure development. Social factors such as farmers' economic and educational status, demography, social connection, and culture and resource availability are important to understand why and how farmers select certain farming practices (Seabrook et al 2008). In the rural areas people for their livelihood exclusively depend on the forest, farming including agroforestry and livestock or migrate to the plains in search of employment. Comparative studies on agroforestry systems are however still lacking in Himachal Pradesh. Hence present study was undertaken to assess socio-economic aspect of existing agroforestry systems in Bangana Tehsil of Una district, Himachal Pradesh.

METHODOLOGY

The present study was carried out in Bangana Tehsil of Una district of Himachal Pradesh between 31°18' to 31°55' N latitude and 75°55' to 76°28' E longitude at an altitude of 650-900 m amsl. The climate of the study area is mostly sub-tropical and it receives an average annual rainfall of about 1,253 mm mostly from southwest monsoon. The average temperature of the study site varies from 2°C in winter and 46°C in summer. May and June are the hottest months. The methodology used for the study consisted of site selection, sampling procedure, identification of existing agroforestry systems, data collection, analytical framework and valuation.

Study was conducted through multi-stage random sampling technique in which twelve Panchayats (Muchali, Dohgi, Dhundla, Malangar, Tanoh, Lathiani, Hatli Kesru, Jasana, Piplu, Sihana, Thanakalan and Tihra) were chosen and from each Panchayat, three villages were selected. In each village, farmers were divided into three different categories viz marginal (<1 ha), small (1-2 ha) and medium (2-5 ha) on the basis of their landholding as per the classification of government of Himachal Pradesh. Nine farmers were selected from each village which included three farmers each from marginal, small and medium categories. Information about the family structure, demographic features, livestock status, animal husbandry practices, land utilization pattern, tree inventory and crop production from various agroforestry systems was collected through pre-tested interview schedule for the purpose through personal interviews with each head of the household and field visits. Agroforestry systems existing in the study area were identified on the basis of structure (nature and arrangement) and function (role of output) of components (Nair 1985). However stratified classification of agroforestry practices given by Zou and Sanford (1990) was used to designate the system types and system units. System types were named considering the major components whereas system unit termed as basic functional unit was identified as combination of specific crop species within a component with the species from other components. Hence functional unit like foodgrain, vegetables and pulses in agriculture; specific fruit trees in horticulture; grasses in pasture and tree species in forestry components were described. Primary and secondary components of each system type were identified after recognizing the structure of the system and specific function of the components.

RESULTS and DISCUSSION

Identification of agroforestry system types

Five agroforestry system types were found (Table 1) in the study area viz agri-silviculture (22.94%), agri-horticulture (20.30%), agri-horti-silviculture (18.81%), silvi-pastoral (23.93%) and horti-pastoral (14.03%) among different categories of farmers (Fig 1). Four agroforestry system types were identified in the marginal and five each in the small and medium categories of farmers. These system types may be familiar to agro-climatic conditions of the area and need of the farmers viz fodder, food, fuelwood, timber etc. The silvi-pastoral (SP) system type dominated in the existing agroforestry systems under all farmer categories followed by agri-silviculture system. Silvi-pastoral system was practiced by 23.93 per cent of the sampled farmers. Whereas horti-pastoral system type was least preferred system (14.03%) by the farmers. Horti-pastoral system type was not practiced by the farmers of marginal category due ~~to~~ less landholding for further diversification of other agroforestry systems. Agri-horticulture system type was practiced maximum (23.77%) and agri-horti-silviculture system was practiced minimum (15.10%) by medium category of farmers. The minimum

preferred system among small category of farmers was agri-horticulture (16.13%). Thus SP and AS were most prevalent among different categories of farmers. Functional units under agricultural component were cereals viz *Triticum aestivum*, *Hordeum vulgare*, *Cicer arietinum*, *Zea mays*, *Brassica nigra*, *Vigna mungo* and *Sesamum indicum*; vegetables viz *Pisum sativum*, *Colocasia esculenta*, *Curcuma longa*, *Solanum tuberosum, Lycopersicon esculentum*, *Zingiber officinale*, *Abelmoschus esculentus*, *Foeniculum vulgare*, *Solanum melongena*, *Brassica oleracea* var *botrytis* and *B oleracea* var *capitata*. The silviculture components were *Dalbergia sissoo*, *Leucaena leucocephala*, *Toona ciliata*, *Cassia fistula*, *Grewia optiva*, *Morus alba*, *Acacia catechu*, *Albizia lebbeck*, *Bauhinia variegata*, *Eucalyptus* hybrid and *Bambusa nutans*. The main fruit tree species included *Litchi chinensis*, *Mangifera indica, Syzygium cumini*, *Psidium guajava*, *Musa acuminata*, *Carica papaya* and *Citrus sinensis*. The grass species were *Cenchrus ciliaris*, *Megathyru maximus*, *Cyperus cariosus*, *Setaria sphacelata, Pennisetum purpureum*, *Agrostis* sp*, Cynodon dactylon*, *Megathyrsus maximus* and *Loliume perenne*. Different combinations of forest trees, horticultural plants, agricultural crops and grasses were found in different existing agroforestry systems adopted by the farmers in the study area. Kumari et al (2008) identified five prevalent agroforestry system types viz agri-horticulture, agri-silviculture, agri-silvi-pastoral, silvi-pastoral and horti-pastoral in Lahaul and Spiti and Kinnaur districts of Himachal Pradesh. Five agroforestry systems viz agri-silviculture (maize, barley, *Ficus* and *Grewia*), agri-horticulture (maize, capsicum, tomato, plum and pear), agri-horti-silviculture (wheat, rajmash, tomato, pomegranate and *Grewia*), agri-silvi-horticulture (maize, wheat, blackgram, *Grewia*, *Ficus* and pear) and silvi-pasture (*Pinus, Acacia* and grasses) were reported by Goswami (2009) in Kwaal Khad watershed in district Solan, Himachal Pradesh. Poonam et al (2011) also identified and categorized five different types of agroforestry systems viz agri-silviculture, agri-horticulture, agri-silvi-pastoral, silvi-pastoral and horti-pastoral in Lahaul and Spiti district of Himachal Pradesh.

Sood and Mitchell (2009) reported existing traditional agroforestry systems in Mandi district of Himachal Pradesh. Traditional agroforestry systems found in the area were agri-silviculture, agri-silvi-horticulture, silvi-pastoral, horti-agriculture and horti-silviculture systems. The most common method of growing trees (except fruit trees) on the farms in the area was through deliberate retention and management of naturally regenerating tree seedlings. The majority of fruit trees were grown by planting of the seedlings obtained from government and private nurseries. A study was conducted by Bijalwan (2012) in mid-hill areas of district Tehri Garhwal, Uttarakhand at an elevation between 1,000 and 2,000 m amsl. The author identified agri-silviculture (AS), agri-horti-silviculture (AHS), agri-horticulture (AH), agri-silvi-pasture (ASP), silvi-pasture (SP) and horti-silviculture (HS) systems in the study area and reported that the major systems were AS, AHS and AH. The major trees in AS were *Grewia optiva*, *Celtis australis*, *Melia azedarach*, *Ficus roxburghii* etc along with agricultural crops and under AHS were the combinations of *Grewia optiva* + *Malus domestica* (apple) + wheat, *Quercus leucotrichophora* + *Malus domestica* (apple) + wheat/potato and *Grewia optiva* + *Prunus domestica* (European plum) + barnyard millet etc. The major fruit trees in AH were *Malus domestica*, *Prunus domestica* and *Prunus armeniaca* along with routine agricultural crops. In all systems tree density was higher in southern than northern aspect. Rahul (2014) represented similar results by identifying various land use systems viz agricultural, silvi-pastoral and agroforestry in subtropical parts of the districts of Sirmaur, Solan and Kangra of Himachal Pradesh. Kumar (2004) identified seven existing agroforestry systems viz AS, AH, ASH, AHS, PS, PSH and PHS in three altitudinal zones of Bilaspur district of Himachal Pradesh.

Kumar et al (2018) reported six existing agroforestry systems viz agri-silviculture, silvi-pastoral and horti-pastoral, agri-horti-silviculture, agri-silvi-horticulture and agri-silvi-pastoral in Kandaghat block of Solan district, Himachal Pradesh.

Demographic and socio-economic status of the farmers

Family structure of sampled households: The average family size was found to be 6.29 persons at overall level (Table 2). It was found highest (6.50%) in medium and lowest (6.10%) in marginal category of farmers. Overall adult population constituted 78.94 per cent of the total population. Whereas children population constituted 21.06 per cent of the total population of the sampled households. Similarly highest sex ratio (1005.89) was found in small and lowest (988.66) in medium category of farmers. Sex ratio at

Table 1. Existing agroforestry systems in selected villages of Bangana Tehsil of Una district, Himachal Pradesh

System type	Number of families under different categories practicing agroforestry systems			
	Marginal	Small	Medium	Total
Agri-silviculture	27 (21.77)	55 (25.35)	57 (21.51)	139 (22.94)
Agri-horticulture	25 (20.16)	35 (16.13)	63 (23.77)	123 (20.30)
Agri-horti-silviculture	32 (25.81)	42 (19.35)	40 (15.10)	114 (18.81)
Silvi-pastoral	40 (32.26)	45 (20.74)	60 (22.64)	145 (23.93)
Horti-pastoral	-	40 (18.43)	45 (16.98)	85 (14.03)
Total families in each category	124 (100)	217 (100)	265 (100)	606 (100)

Table 2. Family structure of farmers of sampled households in Bangana Tehsil of Una district, Himachal Pradesh

Category of farmers	Total number of families	Average family size	Adults			Children			Sex ratio
			Male	Female	Total	Male	Female	Total	
Marginal	108	6.10 (100)	2.44 (39.91)	2.47 (40.52)	4.9 (80.43)	10.61 (10.01)	0.58 (9.56)	1.19 (19.57)	1003.03
Small	108	6.29 (100)	2.45 (38.98)	2.50 (39.55)	4.95 (78.53)	0.68 (10.88)	0.66 (10.59)	1.34 (21.47)	1005.89
Medium	108	6.50 (100)	2.53 (39.04)	2.53 (38.89)	5.06 (77.93)	0.73 (11.25)	0.71 (10.82)	1.44 (22.07)	988.66
Overall	324	6.29 (100)	2.48 (39.29)	2.49 (38.65)	4.97 (78.94)	0.66 (10.58)	0.66 (10.33)	1.32 (21.06)	1004.91

Figures in the parentheses indicate the percentages to total respective figures, Sex ratio refers to the number of females per thousand of males

overall level (1004.91) was found to be higher than the state and national averages of 972 and 940 respectively (Anon 2011). There was no difference in case of gender of children. Similar results were also observed by Kumar (2016) about family structure who reported an overall sex ratio of 1038 in sub-temperate region of Solan district of Himachal Pradesh. Singh (2017) reported that the average family size varied from 6.10 to 6.30 individuals in all categories of farmers which was found maximum in medium followed by small and marginal farmer categories in Kangra district of Himachal Pradesh. Devi (2013) recorded the overall average family size of 5.53 persons. Biggest family size (6.50 persons) was recorded in medium farmers' category in mid-hills of Himachal Pradesh.

Educational status of sampled households: Educational status determines the farmers' awareness pertaining to the adoption of different modern technologies of agroforestry systems. Data pertaining to educational status of sampled households are presented in Table 3. Literacy rate varied from 80.44 to 82.70 per cent among different categories of farmers. Literacy rate was recorded highest (82.70%) in marginal followed by medium (81.33%) and small farmer (80.44%) categories. The literacy rate of male farmers was highest (83.28%) in marginal followed by medium (80.73%) and small (80.53%) farmers' categories. The female literacy rate was highest (84.24%) in marginal and lowest (80.35%) in small category. The percentages of literate females were found higher than that of males in all categories. Overall literacy rate was found maximum in marginal category of farmers. The findings exhibited that overall literacy rate of farmers in the study area was lower than the literacy rate (82.80%) of Himachal Pradesh (Anon 2011). Boateng (2008) reported that high literacy rate is likely to reduce conservativeness and increase technological productivity. Literacy rate of 75.79 per cent in Katli

and 88.09 per cent in Pacchad blocks of Sirmour district Himachal Pradesh was reported by Joshi (2011). Similarly Yadav et al (2017) also reported 83 per cent overall literacy rate in Kumaon Himalaya, Uttarakhand.

Employment status of sampled households: In the present study, it was found that the farmers met their livelihood through government jobs, pension, industries, self-employment, shop-keeping, carpentry, tailoring, private transport etc. Data shown in Table 4 indicate that 240 male and 205 female farmers were engaged in government jobs whereas 340 male and 324 female farmers were in private services. Average income per month from government sector was found to be Rs 3,035.41 for males and Rs 1,070.73 for females. In case of private services, average income per month was found to be Rs 1,195.52 for males and Rs 7,666.66 for females. Overall income of the farmers from government and private sectors in the study area was found to be Rs 29,259.25 and 20,243.82 respectively. Off-farm employment can produce various farm enterprises. It gives more risk bearing abilities to the farmers. Thus off-farm income of farmers is known to increase the capabilities of farming community to implement improved technologies and practices. In present study maximum entrance to off-farm employment was observed because of the higher literacy rate and increased opportunities of cash generation facilities available with respect to industry enterprises and others. Similar results on off-farm employment were also reported by Sharma et al (2009) and Yadav et al (2017).

Livestock inventory of the sampled households: The data pertaining to livestock inventory in the study area has been shown in Table 5. Highest number of average buffaloes per family (1.81) was recorded in medium followed by small (1.55) and marginal (1.48) categories of farmers. Maximum (55.36%) local breeds were found in small and minimum (51.25%) in marginal category. Maximum cows of local breeds (100%) were recorded in medium followed by small (53.33%) and marginal (52.50%) categories. Maximum buffaloes of improved breeds (48.75%) were found in marginal followed by medium (47.69%) and small (44.64%) categories. It was also found that 76.19, 73.75 and

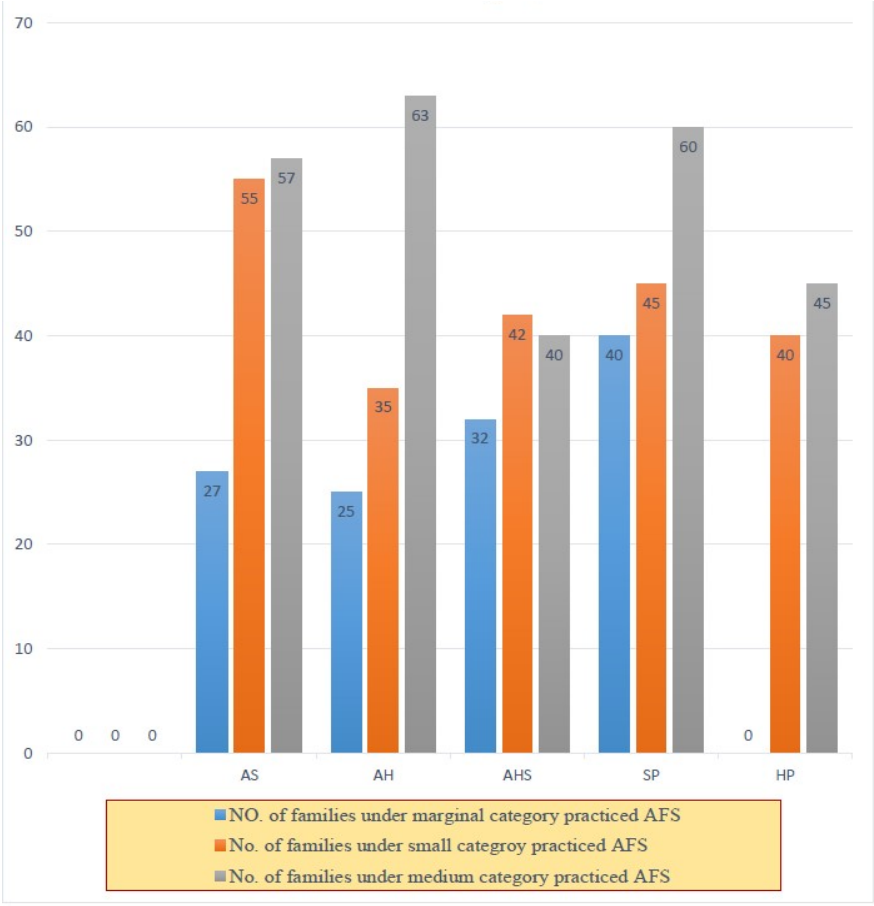

Fig 1. Status of existing AF systems amongst marginal, small and medium category of farmers

Table 3. Educational status of sampled households in Bangana Tehsil of Una district, Himachal Pradesh

Farmers' category	Primary	Middle	Matric	SS	UG	PG	Illiterate	Total	Literacy rate (%)	Literacy rate (%)	
										Male	Female
Marginal	0.86 (13.96)	1.24 (20.33)	1.28 (20.94)	0.88 (14.42)	0.47 (7.74)	0.32 (5.31)	1.06 (17.30)	6.10 (100)	82.70	83.28	84.24
Small	0.85 (13.53)	1.27 (20.15)	1.09 (17.35)	0.98 (15.59)	0.54 (8.53)	0.33 (5.29)	1.23 (19.56)	6.29 (100)	80.44	80.53	80.35
Medium	1.01 (15.67)	1.27 (19.52)	1.10 (16.81)	1.06 (16.38)	0.55 (8.40)	0.30 (4.56)	1.21 (18.67)	6.50 (100)	81.33	80.73	81.94

Figures in the parentheses indicate the percentages to respective figures; Primary= 1-5 classes, Middle= 6-8 classes, Matric= 9-10 classes, SS (Senior secondary)= 10+1 & 10+2 classes, UG= Undergraduate, PG= Postgraduate, Illiterate= No formal education; Literacy rate= (Total literates/total members) ×100

Table 4. Employment status of farmers in Bangana Tehsil of Una district, Himachal Pradesh

Component	Category				Average
	Marginal	Small	Medium	Total	
Total number of families	108	108	108	324	-
Total members	659	680	702	2,041	-
Government service					
Male					
Number	80	75	85	240	(11.76)
Income/month (Rs)	25,60,000	22,50,000	24,75,000	72,85,000	3,035.41
Female					
Number	70	60	75	205	(10.04)
Income/month (Rs)	5,60,000	5,10,000	11,25,000	21,95,000	1,070.73
Private service					
Male					
Number	120	105	115	340	(16.65)
Income/month (Rs)	13,20,000	12,60,000	14,95,000	40,75,000	1,195.52
Female					
Number	105	108	111	324	(15.87)
Income/month (Rs)	7,87,500	8,64,000	8,32,500	24,84,000	7,666.66
Total	2,10,7500	21,24,000	23,27,500	65,59,000	20,243.82

Values in parentheses are the percentages, The average income per month was calculated on the basis of total number of beneficiaries only

61.53 per cent buffaloes were found lactating in small, marginal and medium categories of farmers, respectively. In case of young stocks, maximum number of animals (124) was recorded in small followed by marginal (92) and medium (81) categories. Buffaloes were found to be main domesticated animal species among all young livestocks in the sampled households with a highest average value (0.56) in small followed by marginal (0.42) and medium (0.41) categories. It was also observed that number of bullocks per family stayed less in comparison to buffaloes and cows because land preparation in the study area was done by owned as well as by hired bullocks in addition to tractors.

Land use pattern: Data presented in Table 6 depict that agriculture (irrigated and unirrigated), pasture and orchard were the major land use systems prevalent in the study area. Overall area under irrigated and unirrigated land was found 26.24 and 40.83 per cent respectively in all three farmers' categories. Data further indicated that more than half of the total land was used for agriculture. Maximum area of agriculture (71.91%) was found in marginal followed by medium (69.01%) and small (59.99%) categories. The pasture land contributed 27.71 per cent of the overall landholding in three categories of farmers. Maximum area (7.35%) under orchard was recorded in small followed by medium (5.34%) categories of farmers

Table 5. Livestock status of the sampled households of different categories of farmers in Bangana Tehsil of Una district, Himachal Pradesh

Animal species	Number of animals	Average number/ family	Local breed	Improved breed	Dry	Milking	Young stock	
							Number of animals	Average number/family
Marginal farmers (total number of families having livestock= 98)								
Buffaloes	160 (56.74)	1.48	82 (51.25)	78 (48.75)	42 (26.25)	118 (73.75)	45 (48.91)	0.42
Cows	80 (28.37)	0.74	42 (52.50)	38 (47.50)	32 (40.00)	48 (60.00)	35 (38.04)	0.32
Bullocks	30 (10.64)	0.28	20 (66.67)	10 (33.33)	–	–	9 (9.79)	0.08
Goats	12 (4.25)	0.11	12 (100.00)	–	–	–	3 (3.26)	0.03
Total	282 (100.00)	2.61					92 (100.00)	0.85
Small farmers (total number of families having livestock= 102)								
Buffaloes	168 (55.44)	1.55	93 (55.36)	75 (44.64)	40 (23.81)	128 (76.19)	61 (49.19)	0.56
Cows	90 (29.70)	0.83 -	48 (53.33)	42 (46.66)	35 (38.88)	55 (61.11)	48 (38.71)	0.44
Bullocks	30 (9.90)	0.28	25 (83.33)	5 (16.66)	–	–	11 (8.87)	0.11
Goats	15 (4.96)	0.14	15 (100.00)	–	–	–	4 (3.23)	0.03
Total	303 (100.00)	2.80					124 (100.00)	1.14
Medium farmers (total number of families having livestock= 102)								
Buffaloes	195 (63.52)	1.81	102 (52.30)	93 (47.69)	75 (38.46)	120 (61.53)	44 (54.32)	0.41
Cows	70 (22.80)	0.64	70 (100.00)	–	30 (42.86)	40 (57.14)	31 (38.28)	0.29
Bullocks	22 (7.16)	0.20	18 (81.81)	4 (18.18)	–	–	–	–
Goats	20 (6.52)	0.19	20 (100.00)	–	–	–	6 (7.40)	0.05
Total	307 (100.00)	2.84					81 (100.00)	0.75

Values in parentheses are the percentages to the actual owners

Table 6. Land use pattern of farmers in Bangana Tehsil of Una district, Himachal Pradesh

Farmers' category	Agricultural land (ha)				Orchard (ha)	Total average landholding (ha)
	Arable			Non-arable pasture		
	Irrigated	Unirrigated	Sub-total			
Marginal	0.23 (25.84)	0.41 (46.07)	0.64 (71.91)	0.25 (28.09)	- -	0.89 (100.00)
Small	0.31 (16.31)	0.83 (43.68)	1.14 (59.99)	0.62 (32.63)	0.14 (7.35)	1.9 (100.00)
Medium	1.42 (30.34)	1.81 (38.67)	3.23 (69.01)	1.20 (25.64)	0.25 (5.34)	4.68 (100.00)
Total	1.96 (26.24)	3.05 (40.83)	5.01 (67.07)	2.07 (27.71)	0.39 (5.22)	7.47 (100.00)

Values in parentheses are the percentages to the total; 20 Marlas= 1 Kanal, 25 Kanals= 1 ha

while it was found absent in marginal category. The average landholding area per household was maximum in medium (4.68 ha) followed by small (1.9 ha) and marginal (0.89 ha) categories. Overall average landholding area was recorded 7.47 ha in all categories. Similar results regarding land use pattern were reported by Upadhayaya (1997) in Balh valley of Mandi district, Himachal Pradesh. The present findings indicate that the total area under unirrigated land was more than under irrigated land in all categories of farmers which was found similar with studies on socio-economic survey in Solan district of Himachal Pradesh by Verma and Kachru (2000) who reported the percentage of unirrigated and irrigated land as 26.18 and 21.21 per cent respectively.

CONCLUSION

In the study area, overall family sex ratio was higher than the state and national average depicting no cultural difference on the gender of a child. The average family size was found to be 6.29 individuals per family and overall adult population constituted 78.94 per cent of the total population thereby suggesting greater availability of the family labour. The majority of family heads were educated that suggested better scope for their motivation towards adoption of new agroforestry technologies. Females were more literate than males. Five agroforestry system types were practiced by different categories of farmers. Silvi-pastoral type was practiced by maximum number of farmers whereas horti-pastoral type was practiced by minimum number of farmers. No woodlots were observed in the study area as people were meeting their fuel, fodder and other needs through trees retained on agriculture and pasture land. Agroforestry systems observed in the study area help the farmers to increase their farm income and make easy availability of firewood and timber on the farmland. Finally it can be concluded that agroforestry is prerequisite for the conservation of natural forest and socio-economic upliftment of rural population.

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