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VALUATION OF DIRECT CONSUMPTIVE BENEFITS OF FORESTS OF HIMACHAL PRADESH

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ABSTRACT

Himachal Pradesh is a hill state which comprised about 90 per cent of its total population depending on forest resources for the subsistence needs of fuel wood, fodder, grazing, construction timber and other non-timber forest products for some of which there is no available substitutes. Such contributions of forests in the form of goods and services used for subsistence needs are termed as direct consumptive benefits or contributions of forests which often go unnoticed and unaccounted as the products do not enter the market. Consequently, the true worth of forest resources is often underestimated. The present paper focuses on the valuation of such direct consumptive benefits of forests to rural people and is based on a survey of 894 households across the different climatic and vegetation zones of the state of Himachal Pradesh. The sample households were classified on the basis of land holding and social strata. Multi criteria approach was used to estimate the value of forest resources used. The annual average value of forests of Himachal Pradesh was estimated at Rs. 52504.9 per household. Values will be helpful to the policy makers in formulating policies for forest management and make rural people aware about the true worth of forests.

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INTRODUCTION

Himachal Pradesh has a vast reserve of forest wealth making significant contribution to the rural livelihood. Forests provide a wide range of valuable products like timber, fuel wood, etc. to the rural people which are of vital importance for their subsistence. Forests supported people living in their vicinity by providing approximately 32 lakh tonnes of fuel wood and 1.5 lakh cubic meters of timber to right holders on an annual basis. In addition, forests provided roughly 75lakh tonnes of grass to support its cattle stock. The livelihood support provided by the non-timber forest produce (NTFP) to rural communities was estimated to be Rs. 20 crores (Himachal Pradesh Forest Department, 2000). However, the absence of data on economic contributions of NTFPs and lack of information systems that can incorporate such data systematically are major bottlenecks in a better understanding of forest sector contributions (Agrawal *et al*, 2012). Further, Singh (2010) and Mali *et al* (2012) added that the conventional system of forest resource assessment in India does not capture the value of most of the tangible and intangible benefits and costs of forest resources including their depletion.

Consequently, the real contribution of the forestry sector to the country's GDP is underestimated. Morrison, (2000) during the study of participatory forestry policy in Himachal Pradesh, stated that rural population in Himachal Pradesh which comprised about 90 per cent of its total population depended on forest resources for the subsistence needs of fuel wood, fodder, grazing, construction timber, non-timber forest products for some of which there were no available substitutes. However, such contributions of forests in the form of goods and services used for subsistence needs often go unnoticed and unaccounted because the products do not enter the market. Consequently, the true worth of forest resources is often underestimated. Even when markets are available, they are often distorted and do not reflect true value (Mukherjee, 1997). Thus, the valuation of natural resources like forests, by applying the appropriate valuation methods/ techniques becomes essential to assess the true value of such resources. Winpenny, (1991) had gone to the extent of stating that valuation of forest resources is a reminder that forests are not 'free', even though there may not be a conventional market for its services. It measures the rate at which these resources are being used up, and signals the growing scarcity of the same to their users. In addition, Winpenny (1991) had also stated that valuation can provide a truer indication of economic performance and can provide a more secure basis for policy formulation to induce more careful utilization of forests and

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other environmental resources. A number of studies attempted to value forest benefits and services like timber, non-timber forest products (NTFP), eco-tourism/ recreational benefits etc. Most of the studies have used Contingent Valuation Method (CVM) and travel cost method.

The total values, as well as their components vary considerably across location, which is understandable from the fact that India has sixteen major agro climatic and eco - regional configurations (Kadekodi, 2001). Some studies estimated several benefits of biodiversity in economic terms (Parikh and Haripriya, 1998; Chopra and Kadekodi, 1997; Verma, 2000). However, in case of the state of Himachal Pradesh, Verma (2000) attempted economic valuation of Himachal forests by using various methods like the market price, substitution approach, productivity method, welfare method, avoidance cost and household production function approaches as applicable to various values and estimated the total economic value of forests at 1,06,888 crores out of which direct benefits constituted 7740 crores which was 7.24 per cent of the total economic value and 92.76 per cent were indirect benefits in which watershed benefits constituted 68.94 per cent of the total indirect benefits. Keeping in view the above scenario, it was imperative to attempt a valuation of the contributions of forest resources at the household level so that the true worth of forests can be understood.

MATERIALS AND METHODS

To study the contributions of forests to the rural people of Himachal Pradesh, a sample of 894 households was drawn across the three zones of the state viz. low (upto 1200 meters), mid (1200-3500 meters) and high hill zone (above 3500 meters). Hamirpur, Mandi and Kinnaur districts were purposively selected from low, mid and high hill zone respectively. One block from each district viz. Bijhari, Gohar and Kalpa respectively was randomly selected on the basis of forest cover and population size across the three districts. A sample of 5, 4 and 3 villages from the three respective blocks was chosen purposively keeping in view the availability of forests. All households in the selected villages were classified into four categories on the basis of size of land holding^N, viz. marginal, small, medium and large farmers and into two categories on the basis of social strata i.e. general and scheduled caste. In addition, people above 60 years of age were interviewed separately to get better understanding of the dependence on forests, over the years. They were identified as 'key persons' in the study. The contributions of forest resources to rural people in terms of various forest products were quantified and valued across these two classifications of the households.

Valuation of Forest Resources

Multi-criteria approach was used for valuation of the contributions of forests to rural people. Forest products for which market prices were available, were valued at the market prices. Further, there were some forest products like fodder, compost material and bamboo etc., for which no market price existed. These products were valued at local market prices which emerged from the sale and purchase of these products at

the village level. Hence, the following methods were used for valuation of forest resources in the present study

Market Price Method: Market price method was used for the valuation of timber, fuel wood and wood for agriculture implements. The prices fixed for different types of wood prescribed by the State Government for Right Holders were used. Fodder and compost materials were valued at local market prices. Fodder and compost material were valued at an average rate of Rs. 0.75/kg.

Shadow Price Method: This is an appropriate method in the valuation of those resources which have alternative uses. The resources can be valued in terms of their alternative values known as shadow prices (Reyer *et al*, 1999). This method was used for the valuation of staking materials in which the use of local bamboo species and shrubs was found to be prominent. The alternate use of these bamboo species and the other shrubs in the study regions was identified as the use in manufacturing of baskets by the basket weavers. The sale of final output produced by the basket weavers from bamboo was taken as the basis for valuation of staking materials.

Valuation of the extent of grazing: The methodology followed by Verma (2000) for the valuation of extent of grazing during 'Economic Valuation of Himachal Pradesh Forests' was adopted for valuing the extent of grazing. In this process the total grazing livestock except goat and sheep which accounted for 1266 animals was initially converted into sheep units. It was estimated to be 3798 units and then the population of sheep and goat was added to it and hence the total grazing livestock was calculated equal to 5354 sheep units. Taking on an average 2kg/sheep unit as the daily requirement of fodder in keeping with Verma (2000), the total quantity of fodder demanded per annum was estimated and multiplied by the local market price of fodder (Rs 0.75/kg) and the value of extent of grazing in forests, was estimated.

Valuation of minor forest produce: Minor forest produce collection was reported in mid and high hill zones. The mid hill zone reported the collection of *Guchhi (morchella)* and the collection of *Kuth (Saussurea lappa)* and *karu* for sale in the market, was reported in high hill zone. These minor forest produce were valued at local market prices. *Guchhi* was valued @ 1500/kg and *Karu (Picrorhiza kurrooa)* @ Rs 45/kg and *kuth* @ 40/kg (as reported by the collectors).

Valuation of staking materials: The use of local bamboo and shrubs was reported for staking purpose in high and the mid hill zone. In the absence of market prices, an indirect approach was followed for the estimation of the value of staking material used. In this approach, the use of bamboo and shrubs by the basket weavers and the sale of the final products by these weavers were used as the basis of valuation. The quantity of bamboo and shrubs collected and used by the basket weavers for manufacturing of *Kiltas* (a cone shaped basket used for the collection of fruits, vegetables and compost materials from one place to another) and baskets was used for this purpose. The total sale of the final output by the basket weaver was used to estimate the value of staking material. In this manner the price of bamboo and shrubs used was estimated to be Rs. 3/kg and the total value of staking material was calculated by using this imputed price of bamboo and shrubs used for basket making.

^N Marginal =< 1 hectare, small =1-2 hectares, medium =2-4 hectares, large=>4 hectares.

Table 1. Percentage of Households Reporting Dependence on Forest Resources for Various Products

Zone	Category	Households (%)										No. of HH
		Fuel wood	Timber	Fodder	Grazing	Agri. Imp.	Fencing Material	Staking Material	Compost Material	Minor Produce	Others*	
Low Hill Zone	Marginal	81	89	49	44	39	75	-	40	-	1	255
	Small	40	90	20	20	20	70	-	20	-	-	10
	Medium	33	100	17	17	-	100	-	17	-	-	6
	Large	100	100	-	-	-	100	-	-	-	-	1
	SubTotal	78	89	47	42	37	75	-	38	-	1	272
	General	73	87	46	37	35	89	-	32	-	-	196
	SC	89	93	51	55	42	41	-	55	-	4	76
	SubTotal	78	89	47	42	37	75	-	38	-	1	272
Mid Hill Zone	Marginal	100	97	73	92	100	79	78	98	68	4	275
	Small	100	97	59	79	100	76	62	100	59	3	34
	Medium	100	100	20	35	100	70	40	100	5	-	20
	Large	100	100	-	-	100	100	-	100	-	-	1
	SubTotal	100	97	68	87	100	78	74	98	63	4	330
	General	100	96	64	84	100	84	76	98	59	-	244
	SC	100	99	80	95	100	62	67	100	76	14	86
	SubTotal	100	97	68	87	100	78	74	98	63	4	330
High Hill Zone	Marginal	100	100	84	87	100	86	92	94	86	3	235
	Small	100	100	53	69	97	81	69	86	78	6	36
	Medium	100	100	6	28	83	83	78	72	44	-	18
	Large	100	100	-	-	100	67	33	67	-	-	3
	SubTotal	100	100	74	80	99	85	88	91	81	3	292
	General	100	100	73	79	99	84	88	92	80	-	271
	SC	100	100	95	95	100	90	86	90	95	43	21
	SubTotal	100	100	74	80	99	85	88	91	81	3	292

Note: '-' Collection was not reported, Agri. Imp.= agriculture implements, HH=household; percentage figures have been rounded off to the nearest whole number.

*includes the dependence of the artisans (blacksmith and basket weavers) on forests who collected wood for the fabrication of the items of daily use

Valuation of fencing materials: The fencing materials used mainly constituted of broad leaved shrubs and trees which was also collected as fuel wood hence was valued at the market prices available for broad leaved or hard wood in fuel wood category for right holders.

Valuation of compost material: The compost material constituted mainly of shrubs, tree leaves and grass materials. The compost material which mainly provided bedding facility to the livestock, was valued at local market prices. The total quantity collected was valued @ 0.75/kg as charged by the local people for the sale and purchase of compost.

RESULTS AND DISCUSSION

Rural households depended on forests for the daily needs of fuel wood, fodder, timber, wood for agricultural implements, compost materials, fencing, staking and grazing of animals etc. It is imperative to look at the socio-economic profile of the households to value the economic dependence on forest resources.

Dependence on Forest Resources and Quantity Collected

Forests made direct contributions to rural people in fulfilling their subsistence needs of fuel wood, fodder, timber and other forest products and grazing of livestock in forests (Table 1).

In addition, forests directly contributed to the annual income of especially the marginal and small farm size households and those belonging to the scheduled caste households who collected minor forest produce like *Guchhi*, *Kuth* and *Karu* etc. for sale in the market. 93 per cent of the households depended on forests for the supply of fuel wood which mainly served three purposes viz. cooking, space heating and water heating. High and mid hill zones witnessed higher requirement of fuel wood for space and water heating due to climatic conditions such as heavy snow fall and low temperature whereas low hill zone mainly demanded fuel wood for cooking only. 95 per cent collected timber from forests for various purposes like construction and furniture making.

Table 2. Average Quantity of Products Collected from Forests

Zone	Category	Fuel wood (kg/day)	Fodder (kg/day)	Timber (Cu m/annum)	Compost (kg/annum)	Minor Produce (kg/annum)	Wood Agri. Implements (Cu m/annum)	Fencing Material. (kg/annum)	Staking Material (kg/annum)
Low Hill Zone	Marginal	11.8	24.0	1.02	41	-	0.21	10	-
	Small	11.4	57.0	1.65	30	-	0.35	15	-
	Medium	10.3	60.2	1.58	17	-	0.50	17	-
	Large	10.0	65.0	2.00	-	-	-	20	-
	SubTotal	11.7	56.4	1.06	40	-	0.22	10	-
	General	11.6	59.1	1.10	34	-	0.20	11	-
	SC	12.1	49.2	0.95	55	-	0.30	9	-
Mid Hill Zone	SubTotal	11.7	56.4	1.06	40	-	0.22	10	-
	Marginal	28.6	58.4	0.76	818	0.72	0.39	14	42
	Small	31.2	67.1	1.15	637	0.16	0.60	15	56
	Medium	24.5	55.8	1.65	575	0.03	0.75	21	28
	Large	21.5	70.0	1.50	300	-	0.50	30	0
	SubTotal	28.6	59.2	0.86	783	0.62	0.43	14	42
	General	27.9	58.8	0.87	868	0.56	0.46	14	44
High Hill Zone	SC	30.7	60.4	0.83	540	0.76	0.34	15	38
	SubTotal	28.6	59.2	0.86	783	0.62	0.43	14	42
	Marginal	34.8	63.5	1.41	522	22.51	0.54	38	57
	Small	33.9	66.1	1.76	439	14.31	0.63	44	51
	Medium	29.9	62.0	2.03	422	10.56	0.61	44	39
	Large	27.5	63.3	2.50	333	-	0.33	33	17
	SubTotal	34.3	63.7	1.51	503	20.53	0.55	39	55
Overall	General	34.6	64.2	1.54	500	19.87	0.55	39	55
	SC	30.6	58.1	1.10	543	29.05	0.57	33	62
	SubTotal	34.3	63.7	1.51	503	20.53	0.55	39	55
	Overall	25.3	59.8	1.13	465	10.6	0.41	21	34

Note: Kg-kilogram, cu m- cubic meter, Agri.- agricultural

The percentage of households depending on forests for fodder, wood for agriculture implements, fencing material, compost material, staking material, minor forest produces and other wood material for artisan activities, was 64, 80, 79, 78, 56, 50 and 3 per cent respectively. In addition, 71 per cent of the households in the overall study area depended on forests, for grazing of their animals. All the households in high hill zone depended on forests for the collection of fuel wood and timber whereas, 99 per cent collected wood for agriculture implements and 91 per cent demanded compost material from forests.

The percentage of the households depending on forests for other products like fodder, fencing material, staking material, and other products was 74, 85, 88, and 3 per cent respectively whereas, 80 per cent of the total households used forests for grazing of animals. 81 per cent of the households collected minor forest produce (*Kuth* and *Karu*) for sale in the market. Mid hill zone witnessed the highest dependence on forests due to the higher availability of forest area in this zone. 100 per cent of the households collected fuel wood and wood for agriculture implements from forests and the percentage for timber, fodder, fencing material, staking material, compost material and other products, was 97, 68, 78, 74, 98 and 4 per cent respectively. 87 per cent grazed animals in forests and 63 per cent collected minor forest produce (*Guchhi*) from forests for the sale in the market to supplement their annual income.

The dependence on forests was the lowest in low hill zone where 78 per cent of the households were dependent on forests for fuel wood remaining were purely dependent on alternate sources like LPG and kerosene. Moreover, requirement of fuel wood for space and water heating was not reported by these households which constituted the major use of fuel wood in other two zones. 89 per cent collected timber under Timber Distribution rights. The percentage for the fodder, fencing material, compost material and other products, was 47, 75, 38 and 1 per cent respectively. Only 42 per cent depended on forests for grazing of their animals. None of the households reported the collection of staking material and minor forest produces from forests. There existed inter-zonal variations in the nature and extent of economic dependence on forests in Himachal Pradesh. Nature and extent of the economic dependence on forest resources was influenced by the climatic conditions prevailing in different zones, consumption pattern and the socio-economic features of the households, and largely by the type and availability of the forest resources in different regions. However, the proportion of the quantity collected from forests to the total quantity demanded varied across the zones. The proportion of fuel wood collected from forests was highest in the mid hill zone due to the greater availability in the forests whereas, the proportion of timber and fodder was the highest in low hill zone because of the smaller size of land holding largely devoted to the cultivation and crop farming (Fig. 1).

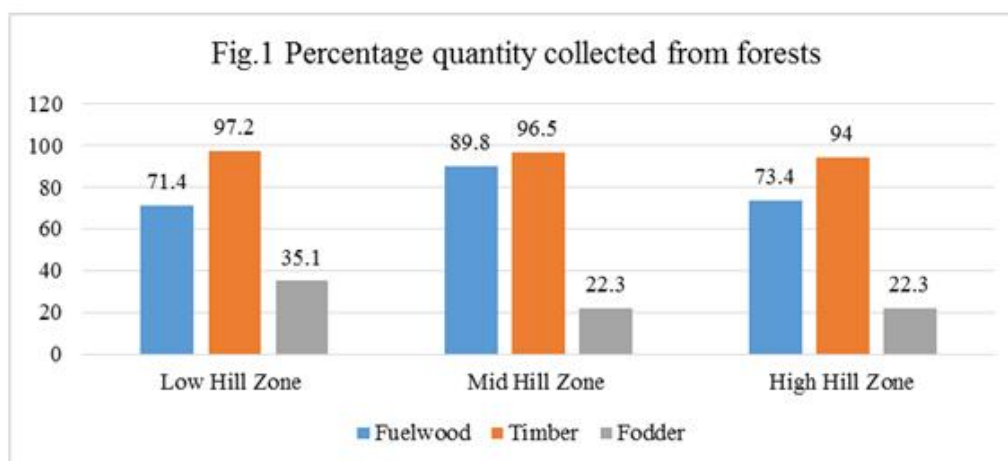


Fig. 1. Percentage of quantity collected from forests

Table 3. Valuation of Various Products Collected from Forests

Category	Percentage to Total Value						Average Value (Rs./annum)	
	Fuel wood	Fodder	Timber	Agri. Imp.	Grazing	Others		
Low Hill Zone	Marginal	37.1	12.6	45.7	3.1	1.3	0.2	22190.52
	Small	29.5	7.1	54.8	4.2	4.1	0.3	26713.11
	Medium	27.9	6.6	57.9	7.3	-	0.3	21787.04
	Large	30.4	0.0	69.3	0.0	-	0.4	14581.00
	Total	36.6	12.2	46.4	3.2	1.4	0.2	22319.92
	General	35.0	12.0	48.6	2.8	1.3	0.2	22498.82
Mid Hill Zone	SC	40.6	12.5	40.7	4.3	1.6	0.3	21858.54
	Total	36.6	12.2	46.4	3.2	1.4	0.2	22319.92
	Marginal	42.3	3.4	40.2	2.2	8.5	3.3	55211.38
	Small	36.0	3.2	47.8	2.9	8.7	1.4	67318.79
	Medium	25.0	0.4	65.7	3.4	4.5	0.9	69783.70
	Large	27.9	0.0	66.6	3.6	1.2	0.7	44463.40
High Hill Zone	Total	40.2	3.2	43.0	2.4	8.2	2.9	57309.41
	General	39.1	2.9	43.9	2.6	8.5	3	56356.89
	SC	43.4	3.8	40.7	1.8	7.5	2.9	60011.93
	Total	40.2	3.2	43.0	2.4	8.2	2.9	57309.41
	Marginal	32.3	2.0	54.1	2.3	5.6	3.6	74817.39
	Small	26.6	1.6	58.3	2.6	7.9	3	77570.05
Overall Average Value (Rs)	Medium	21.2	0.3	67.7	2.6	6.4	2	75341.15
	Large	23.0	0.0	72.2	1.4	2.9	0.5	75172.97
	Total	30.8	1.9	55.7	2.3	5.9	3.4	75192.70
	General	30.6	1.9	55.9	2.3	5.8	3.3	76250.73
	SC	32.6	1.2	51.5	3.0	6.5	5.3	61538.99
	Total	30.8	1.9	55.7	2.3	5.9	3.4	75192.70
Overall Average Value (Rs)	18552.0	1948.6	25931.4	1302.9	100.8	3278.9	52504.9	
Overall Percentage	35.3	3.7	49.4	2.5	6.2	2.9	100.0	

Note: '-' the collection was not reported. Others=includes value of compost material, fencing material, minor forest produce and staking material. SC-Scheduled Caste

The quantification of dependence on forest resources highlighted that in terms of size, mid hill zone was better endowed with forest coverage but the high hill zone occupied prime position in terms of the quantity collected from forests (Table 2). It was attributed to the climatic conditions, extensive use of wood in house construction (as per Key Persons wooden houses are considered to be warmer during heavy snowfall), heavy dependence on fuel wood for space and water heating and collection of minor forest produce like kuth, karu etc. in this particular zone. On the contrary, low hill zone reported the minimum collection of fuel wood and other non-timber forest products. Winter season prevails on an average for two months only leading to less requirement of fuel wood. In addition, the collection of minor forest produce and staking material was not reported.

Economic Valuation of Contributions of Forest Resources: Valuation of the forest products revealed that on an average products worth Rs. 52504.91 per household were annually

collected from forests (Table 3). Timber constituted the most valuable forest product and contributed the highest percentage to the total value of forest products used. The average value of timber collected per household was estimated to be Rs. 25931 (49.4 per cent of the total value). Among NTFPs, fuel wood constituted to be the highest valued products with a value of Rs. 18552.01 (35.3 per cent) per annum. The values of Fodder, wood for agriculture implements and minor forest produce collected from forests were estimated to be Rs. 1948.60 (3.7 per cent), 1302.91 (2.5 per cent) and 982.41 (1.9 per cent) respectively. Whereas, staking materials, compost materials and fencing materials made comparatively less contribution to the households and their values were found to be Rs. 100.84, 349.10 and 58.74 per household respectively. The extent of grazing valued at Rs. 3278.88 per household also made a significant contribution to the households in study area. Forest resources made the highest contribution to the households in high hill zone where each household utilized the forest products worth Rs 75192.70 annually. Average value of forest

products used in mid and low hill zone came out to be Rs. 57309.41 and 22319.92 per annum respectively. The highest value of forest resources used in high hill zone was due to higher use of timber for house construction. Being a part of the alpine zone, wooden houses were preferred, which increased the demand for timber for construction purposes. Further, the value of minor forest produce (*Kuth* and *Karu*) collected by households in the high hill zone made a contribution of 2.6 per cent to the total value of forest resources in this zone study area. On the contrary, low hill zone registered the lowest value of all the zones of study area because of being a comparatively warm temperate zone. Additionally, the collection of minor forest produce and the staking material was not reported in this zone which led to the lesser value of forest resources used in this zone. Across the farm size categories, the average value of forest resources per household was noticed to be the least in case of large farm size households in low (Rs 14581.00/annum) and mid hill zones (Rs. 44463.40/annum) whereas, in high hill zone study area the value was minimum in case of marginal farm size household (Rs.74817.39). However, the values in case of other category households showed variation in quantities collected which led to variations in value. For example, in low hill and high hill zone study areas, small farm households had the highest value of forest resources used whereas in mid hill zone study area the value was the highest in medium farm size households.

It was evidenced across the farm size categories that the value of timber showed positive relationship with farm size meaning thereby, that the value increased with the farm size which implies the comparatively higher economic dependence of the large farm households on forest resources for timber as compared to marginal and small farm households. In case of other forest products like fodder, fuel wood, minor forest produce and extent of grazing, the value derived by the marginal farm households was higher as compared to large farm households. This reflects the comparatively better economic conditions of large farm households as compared to marginal households. Across the social strata, the overall value of forest products used by the scheduled caste households was estimated to be lower as compared to general category households in low and high hill zones whereas in mid hill zone, the value of scheduled caste holds was comparatively on higher side. Such findings can be very well interpreted by looking at the product wise valuation. Higher values for scheduled caste households in mid hill zone were because of comparatively more demand for timber by these households over general households. On the contrary, values for NTFPs collected by scheduled caste households was comparatively higher for scheduled caste households only. In low hill zone study area, the value of forest use by the scheduled caste households was Rs. 21858.54/ household/annum against Rs.22498.82/household/annum by the general category households whereas in the high hill zone study area these values were estimated to be Rs. 61538.99 and Rs. 76250.73 for scheduled caste and general households. It can be observed that the scheduled caste households across all the zones of study area, derived comparatively lesser value from timber as compared to general households whereas, the value of other forest products like fuel wood, minor forest produce and value of the extent of grazing was higher in case of scheduled caste households. It implies more economic dependence and the higher contribution of non timber forest produce to the cost saving of scheduled caste households. On the contrary, timber made significant contribution to cost saving in case of general

households. The three zones differed in terms of livestock composition, nature, extent and pattern of economic dependence on forest resources, due to different climatic conditions prevailing in these zones.

Conclusion

Forest resources constituted a major source of livelihood to the rural people in study area. The dependence on forest resources was influenced by the socio-economic features, climatic conditions, availability and quantity and quality of forest resources in the three zones. Poor socio-economic status contributed to higher dependence on forest resources and the value of forest resources varied accordingly. Valuation of the forest products clearly highlights the importance and implications of the forests in terms of the price rural people have to pay for the purchase of substitutes of forest products like LPG, kerosene, feed for livestock etc. from the market in case of depletion and absence of forest resources. These values are also a reminder to the stakeholders that the forests are not free and hence should be used sustainably. However, the estimation of total economic value of forests by previous researchers particularly Verma (2000) present a holistic picture of the real worth of forests in the state, the present study focused on the estimates of direct consumptive value of forests at household level and such micro level assessment of the demand for and valuation of forest products being location specific has implications for forest policy formulation. Further, collection of forest products by the rural people was strictly need based. Hence, the need is to make rural people aware of the values of forest product they collect from forest on daily basis and also involve them in the forest management system so that they not just understand the true worth of forests but become the protectors of their forests.

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