



Perceptions, attitudes and preferences in agroforestry among rural societies of Kashmir, India

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Abstract: People's perceptions, attitudes and preferences in agroforestry have become fundamental elements of sustainable agroforestry management. The study examined the multiplicities and dimensions of people's perceptions about agroforestry values, attitudes towards agroforestry benefits and resources preferences in agroforestry and their socioeconomic determinants in rural societies of Kashmir. The data were collected from 142 households of 5 villages selected employing multi-stage random sampling. Descriptive and analytical statistics were used for the data analysis. Results indicated that the material values (rank 1st to 3rd) of agroforestry were perceived as the most important while the perception of the non-material values (rank 4th to 10th) were adjudged moderately important. People's attitudes towards the tangible benefits (rank 1st to 3rd) of agroforestry were highly favourable whereas attitudes towards intangible benefits (rank 4th to 10th) were indifferent. The rural people expressed higher preferences for fuel wood, fodder, vegetable, fruit, and timber (rank 1st to 5th) while moderate or low preferences for medicine, cottage industry/ handicrafts, fiber/ floss, oilseeds and animals/ birds/ insects *etc.* (rank 6th to 10th). F statistics ($p < 0.05$) showed significant differences between the material and non-material values, tangible and non-tangible benefits and resources groups. Correlation co-efficients (r) confirmed the importance of socioeconomic attributes in influencing people's perceptions, attitudes and preferences in agroforestry. The findings will help to refine and enrich the knowledge-base to provide an effective framework for decisions and policy making to sustain and maintain agroforestry health and services. The integration of people's socio-psychological conditions in sustainable agroforestry management will be effective strategy commensurating the current development and future challenges.

Keywords: Agroforestry, Attitudes, Perceptions, Preferences, Socioeconomic attributes

INTRODUCTION

The sustainable agroforestry management paradigm aims to balance the social, economic, ecological, and cultural needs of present and future generations and to maintain and conserve forest resources besides offering the multiple uses (Nagesha and Gangadharappa, 2006; Roy and Tiwari, 2012). Direct integration of people's perceptions, attitudes and preferences in the decision making process is an important aspect of sustainable agroforestry management, because it can increase the social acceptance of the decisions and reduce differences among stakeholders (Islam *et al.*, 2005; Dagar, 2012). Perceptions of agroforestry values build up enduring concepts of what is good and desirable, or conversely, bad and undesirable, about agroforestry (Banyal *et al.*, 2011; Khandagale *et al.*, 2012; Palett *et al.*, 2013). Agroforestry values can be divided into two categories: material (economic and life supporting) and non-material (socio-cultural, ethical, spiritual, and aesthetic). They can also be classified as either intrinsic or instrumental. Intrinsic values relate to the contribution of action to maintain the health and

integrity of an agroforestry ecosystem or the conservation of species, while instrumental values involve satisfying human needs or wants such as aesthetic, cultural, spiritual values *etc.* These values vary from culture to culture, region to region and societies to societies and over time, whose importance has grown in recent decades (Bijalwan *et al.*, 2011; Ratsimbazafy *et al.*, 2012). The success of long-term sustainable management of forest resources through agroforestry depends on local people's support (Islam *et al.*, 2006). Assessing local people's attitudes, taking into account their needs, aspirations and respecting their opinions should become an adoption and management priority (Kareemulla *et al.*, 2009; Macura *et al.*, 2011). The favourable attitudes of people assure agroforestry promotion and development while unfavourable attitudes create agroforestry non-adoption and failure (Khandagale *et al.*, 2012; Ratsimbazafy *et al.*, 2012). The attitudes influence human behaviors towards agroforestry acceptance and encouragement (Pant, 2011). The forest resources preferences in agroforestry contribute much to understanding of agroforestry planning, implementation and management (Quli and Singh, 2010; Ratsimbazafy *et*

al., 2012). Resources preferences in agroforestry are likely to be influenced by many factors, both on-site, such as household needs, local usage perspectives, livelihood dependency *etc.*, and off-site, such as proximity to marketing infrastructures, cottage industries, centers of population, availability of alternative substitutes *etc.* (Mushtaq *et al.*, 2012; Edwards *et al.*, 2012). To appropriate the forest resources preferences in agroforestry among rural people, focus on structure and function of agroforestry plantations is imperative which is achieved by standardizing the agroforestry management regimes (Rawat and Vishvakarma, 2011). An analysis of people's perceptions, attitudes and preferences in agroforestry is fundamental to agroforestry planning and management, because people's knowledge has the potential to effectively support decision-makers in the management and preservation of forest resources (Reddy, 2011). The agroforestry management initiatives worldwide have embraced ecological management integrated with socio-economic and psychological decisions because the targets of ecosystem services cannot be achieved through environmental understanding alone (Mukherjee, 2013). Moreover, being aware of people's perceptions, attitudes and preferences in agroforestry is important for designing and implementing management policies (Sood *et al.*, 2008). This aspect is particularly significant in valleys in general and the Kashmir valley in particular. The Kashmir valley is characterized by a strong link be-

tween local communities and agroforestry and by particular attention to agroforestry multi-functionality (Banyal *et al.*, 2011). Agroforestry plantations have become a rural way of life in Kashmir valley since time immemorial (Islam *et al.*, 2012). The common agroforestry systems being practiced traditionally in Kashmir valley are agri-silvi-horticulture and home-stead forestry. The woody and fruit tree species most commonly adopted for agroforestry plantations are *Salix alba*, *Populus deltoides*, *Robinia pseudoacacia*, *P. nigra*, *Morus alba*, *Juglans regia*, *Ulmus wallichiana*, *Ailanthus excelsa*, *Malus domestica*, *Pyrus communis*, *Prunus persica*, *P. armeniaca* *etc.* A deeper understanding of people's perceptions, attitudes, and preferences in agroforestry is imperative for framing an appropriate policies and management plans to sustain and maintain agroforestry structure and functions in Kashmir. The present study is an attempt to investigate the multiplicities and dimensions of people's perceptions about agroforestry values, attitudes towards agroforestry benefits and resources preferences in agroforestry and their relationship with socioeconomic factors, as a basis for suggestions of strategies for sustainable management of the agroforestry resources and improvement of the livelihoods of rural societies.

MATERIALS AND METHODS

Study site: The study was carried out in Baramulla and Kupwara districts in north-western region of Kash-

Table 1. Descriptive statistics for socioeconomic characteristics of rural people in Kashmir (N=142).

Characteristic	Mean	Std. Dev.	95% Confidence Interval for Mean		Minimum	Maximum
			Lower Bound	Upper Bound		
Age	41.75	9.53	40.17	43.33	25	56
Education	2.89	0.93	2.73	3.04	2	6
Social participation	1.14	1.20	0.94	1.34	0	4
Family composition	2.90	0.88	2.76	3.05	2	4
Size of land holding	1.15	0.53	1.06	1.24	1	4
Main occupation	2.80	1.20	2.61	3.00	1	6
Housing status	3.57	1.01	3.40	3.74	2	6
Farm power	1.04	0.64	0.94	1.15	0	3
Farm implements	9.64	3.78	9.01	10.27	4	17
Livestock possession	1.91	0.56	1.82	2.00	0	3
Wealth status	8.09	3.36	7.53	8.65	2	15
Gross annual income	50887.32	21134.19	47381.15	54393.49	18000	95000

Table 2. Perceptions about agroforestry values in the rural societies of Kashmir (N=142).

Agroforestry values	Perception			WMS	Mean rank
	Highly important	Moderately important	Least important		
Productive	120 (84.51)	22 (15.49)	00 (0.00)	2.85 ^a	1
Protective	75 (52.82)	52 (36.62)	15 (10.56)	2.42 ^b	5
Social	76 (53.52)	53 (37.32)	13 (9.16)	2.44 ^b	4
Economic	118 (83.10)	24 (16.90)	00 (0.00)	2.83 ^a	2
Human	107 (75.35)	33 (23.24)	02 (1.41)	2.74 ^a	3
Ecological	63 (44.37)	55 (38.73)	24 (16.90)	2.27 ^b	6
Cultural	49 (34.51)	45 (31.69)	48 (33.80)	2.00 ^b	8
Recreational	34 (23.94)	77 (53.23)	31 (22.83)	2.02 ^b	7
Spiritual	45 (31.69)	48 (33.80)	49 (34.51)	1.97 ^b	10
Organizational	45 (31.69)	50 (35.21)	47 (33.10)	1.99 ^b	9

WMS= Weighted mean score, Figures in the parentheses indicate percentages; Means followed by different superscript letters within the column are significantly different ($p < 0.05$)

Table 3. Attitude towards agroforestry in the rural societies of Kashmir (N=142).

Statement	Response category					WMS	Mean rank
	SA	A	U	D	SDA		
Agroforestry helps people to become self-reliant in terms of fuel wood, fodder, timber and other non-timber forest produces (NTFPs)	40 (28.17)	102 (71.83)	00 (0.00)	00 (0.00)	00 (0.00)	4.28 ^a	1
Agroforestry provides employment and income opportunities to the people at their door steps	33 (23.24)	109 (76.76)	00 (0.00)	00 (0.00)	00 (0.00)	4.23 ^a	2
Agroforestry reduces exodus of rural people to urban areas for their livelihood	10 (7.04)	45 (31.69)	38 (26.76)	31 (21.83)	18 (12.68)	2.98 ^b	6
People can improve their socio-economic conditions by adopting the agroforestry based enterprises	19 (13.38)	61 (42.96)	34 (23.94)	25 (17.61)	03 (2.11)	3.47 ^b	4
Agroforestry supplies sufficient raw materials for forest resources based cottage industries and handicrafts	27 (19.01)	112 (78.87)	03 (2.12)	00 (0.00)	00 (0.00)	4.17 ^a	3
Practice of agroforestry has helped in amelioration of the microclimate of the area	00 (0.00)	26 (18.31)	41 (28.87)	51 (35.92)	24 (16.90)	2.48 ^c	10
Agroforestry practices assures maintenance of ecological balance	00 (0.00)	32 (22.53)	44 (30.99)	42 (29.58)	24 (16.90)	2.59 ^b	8
The agroforestry is successful in meeting social, cultural, religious and recreational needs of the people	16 (11.27)	53 (37.32)	41 (28.87)	25 (17.61)	07 (4.93)	3.32 ^b	5
Adoption of agroforestry helps in soil and water conservation	00 (0.00)	23 (16.20)	55 (38.73)	42 (29.58)	22 (15.49)	2.56 ^b	9
Due to agroforestry, the human nutrition and health is improved by increasing quality and diversity of foods	03 (2.11)	36 (25.35)	40 (28.17)	44 (30.99)	19 (13.38)	2.71 ^b	7

SA= Strongly agree, A=Agree, U=Undecided, D=Disagree, SDA= Strongly disagree, WMS= Weighted mean score, Figures in the parentheses indicate percentages; Means followed by different superscript letters within the column are significantly different ($p < 0.05$)

Table 4. Forest resources preferences in agroforestry among rural societies of Kashmir (N=142).

Forest resource	Preference			WMS	Mean rank
	Highly preferred	Moderately preferred	Least preferred		
Fuel wood	142 (100)	00 (0.00)	00 (0.00)	3.00 ^a	1
Fodder	140 (98.59)	00 (0.00)	02 (1.41)	2.97 ^a	2
Vegetable	46 (32.39)	87 (61.27)	09 (6.34)	2.26 ^b	3
Timber	04 (2.82)	67 (47.18)	71 (50.00)	1.53 ^b	5
Fruit	05 (3.52)	105 (73.94)	32 (22.54)	1.81 ^b	4
Fibre/ floss	00 (0.00)	37 (26.06)	105 (73.94)	1.26 ^c	8
Oilseeds	00 (0.00)	28 (19.72)	114 (80.28)	1.20 ^c	9
Medicine	04 (2.82)	44 (30.99)	94 (66.19)	1.37 ^c	6
Cottage industry/ handicrafts	00 (0.00)	41 (28.87)	101 (71.13)	1.29 ^c	7
Animals/ birds/ insects <i>etc.</i>	00 (0.00)	24 (16.90)	118 (83.10)	1.17 ^c	10

WMS= Weighted mean score, Figures in the parentheses indicate percentages; Means followed by different superscript letters within the column are significantly different ($p < 0.05$)

mir province located between geographical coordinates of 24.03°06' N Longitude and 74.26°45' E Latitude at an altitude of 1593 meter above mean sea level. The region is characterized by temperate monsoon type of climate. The mean minimum (January) and maximum (June) temperatures are 29.8° C and -1.92° C, respectively, with average annual precipitation of 1163.2 mm. Land use in the region is mostly dominated by cultivated land, permanent pastures, non-agricultural uses, barren and uncultivable land, other fallows, current fallows, forest land and tree cover and groves. The area studied in the districts was the stretch along Langate Forest Division of Jammu and Kashmir

(Anonymous, 2011).

Sampling: Multi-stage random sampling technique (Ray and Mondol, 2004) was used to select the villages and respondents. The first stage was the random selection of two blocks namely, Langate of Handwara tehsil in Kupwara district and Dangi-waha of Rohama tehsil in Baramulla district. The second stage involved simple random sampling of three villages viz., Yunsu, Chogal and Wahipora from Langate block and two villages viz., Ganipora and Behrampur from Dangi-waha block. A total of 142 households were selected from the sample villages having 10 percent sampling intensity by simple random sampling technique for the

Table 5. Correlation between selected socioeconomic variables with perception, attitude and preference in agroforestry (N=142).

Socioeconomic characteristic	Co-efficient of correlation (r)		
	Perception	Attitude	Preference
Age	- 0.106NS	- 0.149NS	- 0.162NS
Education	0.674*	0.653*	0.516*
Social participation	0.592*	0.534*	0.430*
Family composition	0.513*	0.502*	0.467*
Size of land holding	0.686*	0.692*	0.547*
Main occupation	0.550*	0.595*	0.449*
Housing status	0.402*	0.346*	0.353*
Farm power	0.422*	0.351*	0.344*
Farm implements	0.465*	0.448*	0.360*
Livestock possession	0.550*	0.479*	0.341*
Wealth status	0.386*	0.381*	0.324*
Gross annual income	0.536*	0.592*	0.329*

*= Significant ($p < 0.05$), NS= Non-Significant

field study. The respondents interviewed were either household heads or eldest members.

Collection of data: Data were collected using a well structured pre-tested interview schedule and direct observation (Kumar, 2012). The interview schedule had four sections: (i) information on socio-economic profiles (ii) perceptions about agroforestry values (iii) attitudes toward the agroforestry benefits and (iv) forest resources preferences in agroforestry. The socio-economic characteristics studied were age, education, social participation, family composition, size of land holding, main occupation, housing status, farm power, farm implements, livestock possession, wealth status and gross annual income (Venkataramaiah, 1990). To get the rural people's perception towards the agroforestry values in their daily life, ten broad classes of agroforestry values were incorporated in the schedule and their degree of importance were measured by a 3-point continuum scale namely, very important, moderately important and least important with their respective scores 3, 2 and 1 as per Singha *et al.* (2006). The ranking of agroforestry values was done from 1 to 10 on the basis of the mean score to determine their relative importance. The attitude of rural people towards agroforestry benefits was measured using a scale developed by Sreenath and Veerabhadraiah (1993). The attitude scale was consisted of ten especially collected statements from agroforestry farmers, relevant professionals and available literatures related to the agroforestry benefits. The statements were scrutinized and edited as per criteria set up by Edwards (1969). The respondents were asked to respond to each statement in terms of their agreement or disagreement on five point continuum viz., strongly agree, agree, undecided, disagree and strongly disagree with their respective scores of 5, 4, 3, 2 and 1. Ranking technique based on mean cumulative scores was applied to find out the level of favouritism or un-favouritism towards agroforestry benefits. Forest resources preference was measured employing the scale of Nagesha and Gangadharappa (2006). A set of ten important categories of forests resources was listed in the schedule and the preference

level of each resource was recorded as highly preferred, moderately preferred and least preferred assigning the scores 3, 2 and 1, respectively. The relative preferences of various forest resources were worked out by ranking technique based on mean cumulative scores.

Data analysis: The observed data were analyzed on MS Excel and Statistical Package for Social Sciences (SPSS) software with the level of significance set at $p < 0.05$. The statistical tools viz., frequency (f), percentage (%), average (x), standard deviation, range, coefficient of correlation and F test were applied for analysis of the data as per Snedecor and Cochran (1967). The mean rank score for each item was obtained by multiplying the frequencies with their respective scores, adding them up and dividing by the total number of respondents as follows:

$$\text{Weighted Mean Score (WMS)} = \frac{\sum s_i f_i}{n}$$

where, f_i = frequency of the respondents for ith item

S_i = score of the ith item

$I = 0, 1, 2, 3, 4$ or 5

n = total number of respondents

RESULTS AND DISCUSSION

Socioeconomic characteristics of rural people: The socioeconomic variables averaged for the rural households (Table 1) specified the predominance of middle aged people (41.75 years) having low literacy (2.89), membership of only one organization (1.14), nuclear and large sized families (2.90), marginal sized land holding (1.15), engaged mainly in agriculture (2.80), owning one mixed or *pucca* house (3.57), one pair of bullocks (1.04), low farm implements possession (9.64), 6 to 10 livestock (1.91), low wealth status (8.09) and earning average gross annual income of Rs. 50887.32.

The middle aged people (31-50 years) are the actual earners who are generally economically active, enthusiastic, innovative and hard working in the rural societies (Sinha *et al.*, 2010). The low literacy is due to un-

satisfactory socioeconomic conditions, lack of educational facilities, higher involvement of youths in livelihood earnings and apathy towards higher education (Pal, 2011). The social participation shows the grousing magnitude of interest and willingness of the rural people towards involvement with various formal and informal organizations (Prakash and Sharma, 2008). The prevalence of nuclear and large sized families in the rural households is due to emergent individualism leading to independent life with personal assets and proper accommodation (Kumar *et al.*, 2010). The nuclear and neo-local structure of families in the rural communities advocated early fragmentation of land from generation to generation and among married offsprings resulting in marginal size of land holding (Ajake and Enang, 2012). Agriculture being the prevailing main occupation and back bone of the economy in the area, most of the households either belong to farming families or dependent on farming for their livelihood (Gupta *et al.*, 2009). The unsatisfactory housing status could be attributed to low socioeconomic condition, poverty, lack of infrastructure, rural environment *etc.* (Islam, 2008). To support farming and allied activities possession of at least one pair of bullocks became imperative for rural households (Singh *et al.*, 2007). Similarly, farming and allied activities being major source of livelihood of the households, the possession of minimal farm implements is indispensable (Gupta *et al.*, 2009). Holding good number of livestock could be attributed to the fact that livestock rearing was the most preferred secondary occupation (Pal, 2011). Although different and varied types of domestic materials were possessed by the households, the overall picture was not satisfactory, especially in the context of the improved, modern and prestigious material resources. Poverty, low literacy, lack of knowledge, lack of exposure, infrastructural insufficiency *etc.* is the main reason for such scenario (Islam, 2008). The probable reasons for preponderance of families having medium gross annual income (Rs. 30000 to 60000/ annum) might be that majority of people are either farmer having small sized land holding or petty traders (Bijalwan *et al.*, 2011).

Perceptions about agroforestry values: The local people's perception of the agroforestry values (Table 2) indicated that the productive values (WMS, 2.85) were considered most important among majority (84.51%) of the respondents and assigned 1st rank. This is a fair reflection because the productive values of agroforestry make rural people self-reliant meeting their basic needs in terms of fuel wood, fodder, timber, fruits, fibre, food, vegetables *etc.* Likewise, a substantial majority (83.10%) of the respondents contemplated the economic values (WMS, 2.83) as most important and was rated as 2nd. This is because the economic aids from agroforestry like increased family income, employment opportunities, improvement in livestock possession, supplementary income, decreased farm expenditure *etc.* ease off the livelihood stress in the rural

communities. Regarding the human values (WMS, 2.74) of agroforestry, most of the respondents (75.35%) rated them as most important and ranked 3rd. This could be attributed to the fact that the human values directly contribute to the improvement in education, occupational skill, occupational knowledge, information access, health and nutrition *etc.* in the rural societies. The social values (WMS, 2.44) of agroforestry were perceived as most important (53.52%) and moderately important (37.32%) by the respondents ranking them as 4th, which is consistent due to improvement in food habits, communication exposure, migration check, transformation in nature of occupation *etc.* The respondents rated the protective values (WMS, 2.42) of agroforestry as most important (52.82%) and moderately important (36.62%) giving them 5th rank, which is existed because of its intangible benefits as soil and water conservation, erosion control, flood control, reduction in incidence of pests and diseases *etc.* The productive, economic, human, social and protective services of agroforestry were assigned higher values due to their socioeconomic and life supporting impact to the rural societies, which is in consistent with the previous workers (Kareemulla *et al.*, 2009; Bijalwan *et al.*, 2011).

With respect to the ecological values (carbon sequestration, pollution reduction, biodiversity conservation, protection of wildlife habitat, groundwater recharge, reduction in dependency on natural forest, climate changes *etc.*), recreational values (religious ceremonies, enhancement of landscape, creation of aesthetic venue, religious sacrifices, entertainment opportunities, propitiation of gods, sports, hunting *etc.*), cultural values (maintenance of local cultural heritage, promotion of habits, totems, festivals, taboos, folklore, traditional recipes *etc.*), organizational values (rights or claims, friends, kin, support from trade or professional associations, families, communities, committees, businesses, voluntary organizations, political claims *etc.*) and spiritual values (preservation of spirituals, values, beliefs, customary rituals) provided by the agroforestry to the rural societies, the perceptions expressed by majority of the respondents were moderate having WMS varying between 2.27 to 1.97 and thus, the ranks assigned were 6 to 10 respectively. An explanation for this could be that these agroforestry values are non-material and non-instrumental in nature, the importance realization of which is incomprehensible in the rural societies. Secondly, considerable activities were women oriented, where men attributed a lower importance and assigned lower values as compared to women. The F statistics ($p < 0.05$) showed that the material values of agroforestry (productive, economic and human) were significantly different to the non-material values (protective, social, ecological, cultural, recreational, spiritual and organizational) because the contributions of material values are easily assessable while the non-material values are least observable in the rural societies. The material values of agroforestry

were rated higher as compared to the non-material values, which is similar to the other studies (Nagesha and Gangadharappa, 2006; Banyal *et al.*, 2011).

Attitudes towards agroforestry benefits: As Table 3 demonstrates, the majority of the respondents agreed with the attitude statements namely, agroforestry helps people to become self-reliant in terms of fuel wood, fodder, timber and other non-timber forest products (WMS, 4.28), agroforestry operations gives employment and income opportunities to the people at their door steps (WMS, 4.23) and supply of raw materials for forest resources based cottage industries and handicrafts is sufficient in the area (WMS, 4.17) and ranked them 1, 2 and 3 respectively. This is because that these components were visual in nature which the respondents could directly observe and satisfied to a greater extent. The majority of the respondents expressed indifference towards the attitude statements related to agroforestry viz., people can improve their socio-economic conditions by adopting the agroforestry enterprises (WMS, 3.47), the agroforestry is successful in meeting social, cultural, religious and recreational needs of the people (WMS, 3.32), agroforestry reduces exodus of rural people to urban areas for their livelihood (WMS, 2.98), due to agroforestry, the human nutrition and health is improved by increasing quality and diversity of foods (WMS, 2.71), agroforestry practices assures maintenance of ecological balance (WMS, 2.59), adoption of agroforestry helps in soil and water conservation (WMS, 2.56) and practice of agroforestry has helped in amelioration of the microclimate of the area (WMS, 2.48) and ranked them 4 to 10 respectively. This could be articulated to the facts that these items were intangible to the people and least observable in nature which makes them unable to assess and realize these benefits. The F statistics ($p < 0.05$) showed significant statistical differences between the tangible and intangible benefits of agroforestry which is strictly linked to magnitude of livelihood dependence on forest resources, protective and productive influences of agroforestry, contribution of agroforestry to social, economic, cultural, environmental and rural development, tree consciousness and love of tree among the people, agroforestry based traditional life, indigenous habitat *etc.* A number of studies confirm that people have highly supportive attitude towards tangible benefits of agroforestry, while they attribute a lower importance to intangible benefits (Sreenath and Veerabhadraiah, 1993; Durai *et al.*, 2005; Islam *et al.*, 2006).

Resources preferences in agroforestry: Significant majorities of respondents (100 and 98.59%) expressed higher preference for fuel wood (WMS, 3.00) and fodder (WMS, 2.96) and assigned them the ranks 1 and 2 respectively (Table 4). Fuel wood is the principal traditional source of energy constituting maximum share in total bio-fuels consumption in the rural societies. The fuel wood is consumed mostly for cooking, heating,

cottage industries (bakery, basketry and matting, bamboo works, hotels, brick manufacture, sericulture *etc.*), community functions (festivals, feasts *etc.*) and some other purposes such as marriage, child christening *etc.* Almost all the households depend on fuel wood as they have less access to other energy sources such as LPG, kerosene, coal *etc.* while there is a wide range of fuel wood species in the area. The major forms in which fuel wood is consumed in domestic households and rural industries are billets, twigs, wood shavings, saw dust and even leaves. Similarly, almost all the households procure a major portion of their fodder requirement from agroforests for by grazing livestock, lopping leaf fodder or collecting green herbage. The utilization of fuel wood and fodder is thus, very frequent on daily basis and at higher level. With regards to fuel wood and fodder, earlier studies (Singha *et al.*, 2006; Islam *et al.*, 2015) found that rural people value these resources more than other forest resources.

The preference of vegetable (WMS, 2.26), fruit (WMS, 1.81) and timber (WMS, 1.53) among majority (47.18 to 73.94%) of the respondents were moderate placing them at the ranks 3, 4 and 5 respectively. Vegetables and fruits collected from agroforestry are the major food materials; essential means of nutrition and a source of family income for the rural people, the frequency and volume of utilization of these forest products is quite withstanding. These findings are in conformity with the work of Pandey (2009), who found that vegetable and fruit are the moderately preferred forest resources in agroforestry because these resources were procured from other sources.

Timber is extensively used for various purposes like furniture and fixtures, agricultural implements, fencing, hutments, housing, furniture, mine props, packaging, match wood, sports goods, scaffolding, poles *etc.* Primarily in the rural societies, most of the population depends on agroforestry directly to meet the bulk of timber requirement. In contrast to people living proximate to forests, those living distant to forests assigned a higher preference to timber than other products in agroforestry (Rout and Panda, 2011).

With respect to the medicine (WMS, 1.37), cottage industry/ handicrafts (WMS, 1.29), fiber/ floss (WMS, 1.26), oilseeds (WMS, 1.20) and animals/ birds/ insects *etc.* (WMS, 1.17), most of the respondents (66.19 to 83.10%) have expressed low preference and rated these resources from 6 to 10 ranks because the household consumption or sale of these forest resources is occasional in times of needs. The F statistics ($p < 0.05$) confirmed significant statistical differences among the forest resources groups, which is strictly linked to the diversity and quantity of use of the forest resources accruing the benefits in terms of supply of basic needs, saving of cash resources, safety-net during times of misfortune, habitat and shelter, employment and income generation in agroforestry enterprises, cultural and spiritual benefits and environmental services to the

rural societies. These findings are in line with other studies on resources preferences in agroforestry that focus on people living in rural areas (Singh and Quli, 2011; Sati and Song, 2012).

Correlation analysis: The socio-economic characteristics such as education, social participation, family composition, size of land holding, main occupation, housing status, farm power, farm implements, livestock possession, wealth status and gross annual income had exhibited positive and significant correlation with the perceptions, attitudes and preferences in agroforestry, whereas, the age had shown a non-significant correlation (Table 5). The results signified that the socio-economic variables included in the study are crucial determinants for the perceptions, attitudes and preferences in agroforestry among the rural societies. The magnitude of perceptions, attitudes and preferences in agroforestry varied greatly between low educated and high educated people, marginal farmers and large farmers, bigger families and smaller families, poorer households and wealthier households and low income group and high income group. The extents of perceptions, attitudes and preferences in agroforestry were higher for the households having higher social participation, occupational status, housing status, farm power, farm implements and livestock possession. Contrary to this the families with lower social participation, occupational status, housing status, farm power, farm implements and livestock possession have shown reverse trend.

The heterogeneity in households with respect to economic and social status, perspectives, knowledge systems, values, understanding and objectives are fundamental dimensions of the rural societies. Therefore, policies based up on the assumptions of rural cohesiveness and homogeneity cannot assure the symmetric pattern of perceptions, attitudes and preferences in agroforestry in the rural societies. In this light, it can be inferred that the priorities to increase the levels of perceptions, attitudes and preferences in agroforestry will differ due to different socio-economic capacity of the households in the rural societies. This study confirmed the importance of socio-economic characteristics in people's perceptions, attitudes and preferences in agroforestry, which has been underlined by other studies (Adhikari, 2005; Nagesha and Gangadharappa, 2006; Kareemulla *et al.*, 2009; Bijalwan *et al.*, 2011).

Conclusion

The perceptions of the material values of agroforestry (productive, economic and human) were most important while the non-material values of agroforestry (protective, social, ecological, cultural, recreational, spiritual and organizational) were perceived as the moderately important. People's attitudes towards the tangible benefits of agroforestry were highly favourable whereas attitudes as regards intangible benefits were indifferent. The rural people expressed higher

preference for fuel wood, fodder, vegetable, fruit, and timber while moderate or low preferences were observed for medicine, cottage industry/ handicrafts, fiber/ floss, oilseeds and animals/ birds/ insects *etc.* A robust relationship was exhibited between socio-economic attributes and people's perceptions, attitudes and preferences in agroforestry. As the rural societies are not homogeneous entities that can be isolated and identified by single objective and common interests, prior to devolution programme, policy makers should first acknowledge heterogeneity nature of rural societies rather than starting from a general assumption of cohesiveness and homogeneity. The need to include the human behaviours and socioeconomic background is recommended for designing, constructing and implementing policies in agroforestry development and the policies should consider the differentials in perceptions, attitudes, and preferences in agroforestry according to inequality and heterogeneity of the societies. This study offered useful insights for reinforcing the linkage between human welfare, livelihoods and agroforestry.

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