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CONTRIBUTION OF WOMEN IN AGROFORESTRY PRACTICES OF WEST TRIPURA, NORTH-EAST INDIA

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Abstract: The adoptability and compatibility of agroforestry practices has provided better welfare of the society for overall community development. Women's participation is also fundamental for maintaining the agricultural production and other management activities. Therefore, the present study was made to understand the variation in inter and intra-cultural practices of agroforestry systems by identifying different roles played across the social sector and to find out the economic benefits from different components of the system. It was found that both the communities cultivate and manage tree species, agricultural crops, livestock and other livelihood components. This investigation also shows intercultural variations of different communities in agroforestry system. Women in tribal community are more active in field than non-tribal but earn less due to lack of market and transport facility. The return from other livelihood components by tribal community was highest. However, *Areca catechu* L fruits offered more remuneration followed by *Cocos nucifera* L, *Artocarpus heterophyllum* Lam. and *Tamarindus indica* L. Marketing, production and preparation, harvesting, education of children, household work, child care, work distribution, protection and management were also identified where women were mostly involved. Thus, women are seen to play significant activities in fulfilling the family needs by involving in various works. The components preferred by women in agroforestry must be introduced and practiced in a sustainable way to get higher benefits. For empowering women in the state, their contribution in agroforestry should be encouraged.

Keywords: Community; Gender; Livelihood; Sustainable; Utilization.

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INTRODUCTION

Agroforestry was identified as a distinct discipline in agricultural science due to the benefits obtained from suitable combinations of woody perennials and annual crops combining with animal husbandry (Verheij, 2003). It is the most self-sustaining and sound system as it involves the growing of crops either together or in rotation maintaining the ground cover permanently (Martin and Sherman, 1992). It helps in increasing the output and household earning but also intensifying the tree cover on private lands (Rahman *et al.*, 2012). The system's adoptability and compatibility with the

cultural practices provides better welfare of the society and overall community development. Therefore, it is essential to approach agroforestry with social science knowledge with effective social or organizational technologies. Participation of women is fundamental to agricultural production and is responsible for maintaining the small stock husbandry and larger livestock. Women are also the primary users of various forest products from fuel wood collection to the knowledge about the medicinal value (Ahlawat and Hasumati, 2009). Women group are considered to be imperative in the agroforestry system due to some reasons. They perform most of the work in the initial

stages of establishment and incur diverse benefits by the low cost inputs in the system. A woman in the family performs the influential role in absence of man which provides an opportunity to manage the system (Kiptot and Franzel, 2011). The prevalence of women in using and managing plant resources (Reyes-Garcia *et al.*, 2010) does raise the requirements in bringing the women's needs in priority (Molden *et al.*, 2010). According to Kiptot and Franzel (2011) women are lacking behind; as the system is knowledge intensive and require skills for management; lack of planting materials and also because of cultural, sociological and economic factors. In Asia, women possess less than 11% of the total land which is less than the global average of 20% (FAO, 2010). Miller (1999) have precisely mentioned "gender relations undergo changes from both external and internal pressures, while interventions such as agroforestry can create further changes, whether exacerbating or ameliorating social problems". The inequality in gender activities is hampering the production and leading to poverty. The study on the intra-cultural variation provides the different key roles played by the society in procuring and managing natural services and products (Akpabio and Ibok, 2009; Reyes-Garcia *et al.*, 2010). This will help in identifying the specific requirements and constraints for implementing strategies in maintaining sustainability in management and conservation (Khadka *et al.*, 2014). The study of role of women in the traditional agroforestry system has become very popular as the differences are seen in the division of labor and management and acquiring various types of products. Many had brought a successful finding on the contribution of women in the success of any system from planting to final destination for self-use or for sale (Akpabio and Ibok, 2009; Reyes-Garcia *et al.*, 2010; Asse and Lassoie, 2011; Mendez *et al.*, 2011; Rahman *et al.*, 2012; Brandt *et al.*, 2013). With 2/3rd of total Indian population in rural areas the input by women in agricultural and allied activities is a factor of vital importance (Kishtwaria *et al.*, 2009). An examination of literatures does not provide any existence of gender based study in the present

study area. Therefore, the present study was made to understand the variation in inter and intra cultural practices of agroforestry systems by identifying different roles played across the social sector by comparing two communities of Tripura. Another attempt will also be made to find out the economic benefits from different components of the system.

EXPERIMENTAL

Study site: The present study was executed in the nine villages of West district in Tripura which lies approximately between 23°16' to 24°14' N latitude and 91°09' to 91°47' E longitude. The West Tripura district is bounded by Bangladesh in North, Khowai district in East and South by Sipahijala district. The total area of the district is 3544 sq. Kms with its district head quarter at Agartala. The selected villages were Rajdharnagar, Nandannagar, Katachara, Simna, Matai, Jagannathpur, Muddypara, Kubrapara and Champaknagar situated in Mohanpur and Jirania blocks. All the villages were randomly selected and are remotely located. Two distinct groups of community mainly Tribal and Non-tribal were chosen for studying the pattern of the contribution by women. The study area is depicted in figure 1.

Data collection: Detailed survey was conducted for primary data collection from September 2014 to February 2015. A sample of 60 households was purposely selected from the selected villages which covered approximately 42% of the total household populations in the villages. The survey was done based on the willingness to participate by the respondents and 30 households each for Tribal and Non-tribal community was selected. A semi-structured and structured questionnaire was developed to investigate the socio-economic status of the households surveyed and to identify the contribution of women in the agroforestry system. It consisted of information like age, education status, number of family members and income type. The woman group was mainly targeted for the interview. Analysis of data was done in Microsoft excel 2007.

RESULTS AND DISCUSSION

Household characteristics of the area: The study was undertaken in 60 households (30 household for each community). The household characteristics of the surveyed villages were illustrated in Table 1, the respondents' age, no. of members including male and female. The income type of the study area and household percentage is shown in Figure 2.

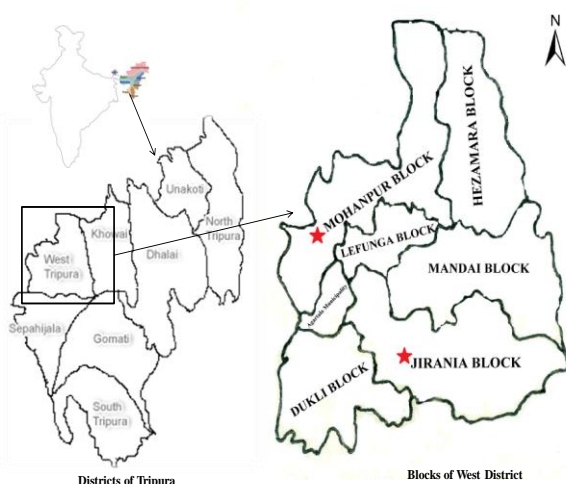


Figure 1. Maps of study area (Star mark shows the blocks of study area)

Table 1: Household characteristics of the Surveyed villages (Mean ± SD)

Particulars	Non-tribal	Tribal
Age	37 ± 5	35 ± 6
No. of Family member	11 ± 4	9 ± 3
Male member	6 ± 3	4 ± 2
Female member	5 ± 3	5 ± 2

Cultivation of different plants and other livelihood components: The communities were found to cultivate and grow many crops

and tree species besides rearing many other components like pisciculture, piggery, bee keeping, cattle, hens, ducks etc. The name of the crops, trees and other livelihood components along with local and family names and purpose(s) are listed in Table 2. The plant species belonged to 25 families mostly to Solanaceae with four species whereas, Araceae, Fabaceae and Rutaceae with three species each. Anacardiaceae, Araceae and Poaceae with two species each and the rest of families consisting single species. The other domestic animals consisted of 8 species belonging to seven families viz. Agaricaceae, Anatidae, Apidae, Bovidae, Cyprinidae, Phasianidae and Suidae.

Distribution of labor: From the study it was found that 70% labor days per week were done by tribal women as compared to men (30%). But non-tribal men and women put equivalent labor days per week (50%) compared to tribal (Figure 3).

Intercultural patterns of contribution by women: The activities recognized (Figure 4) were seen to be involved differently across the communities. 17% of the non-tribal women were seen to do marketing work and tribal women in planting and management (33%). Tribal women were witnessed to be engaged more (33%) than Non-tribal (17%) in production and protection. Harvesting of the resources and housework was equally carried out showing the preferences in different communities. The contribution of women in educating child (83%) and child care (67%) was seen higher among the Non-tribal community than the tribal community.

Table 2. List of Cultivated Species by Two Communities

Scientific Name	Crops			Non-Tribal	Tribal
	Local name	Family name	Purpose(s)		
<i>Abelmoschus esculentus</i> Moench	Vendi	Malvaceae	Vegetable	+	+
<i>Arachis hypogaea</i> L.	Nut	Fabaceae	Fruit	-	+
<i>Capsicum frutescens</i> L.	Lonka	Solanaceae	Edible	+	+
<i>Colocasia esculenta</i> (L.) Schott	Mukhi	Araceae	Vegetable	+	+
<i>Colocasia</i> sp.	Loti	Araceae	Vegetable	+	-
<i>Lens culinaris</i> Medik	Dal	Fabaceae	Edible	-	+
<i>Lycopersicon esculentum</i> Mill.	Tomato	Solanaceae	Vegetable	+	+

<i>Momordica charantia</i> Descourt.	Karala	Cucurbitaceae	Vegetable	-	+
<i>Musa paradisiaca</i> L.	Kachkala	Musaceae	Vegetable	+	-
<i>Oryza sativa</i> L.	Dhan	Poaceae	Staple food	+	+
<i>Oryza</i> sp.	Bhinnidhan	Poaceae	Edible	-	+
<i>Pisum sativum</i> L.	Motorsuti	Fabaceae	Vegetable	-	+
<i>Solanum melongena</i> L.	Begun	Solanaceae	Vegetable	+	+
<i>Solanum tuberosum</i> L.	Aalo	Solanaceae	Vegetable	+	+
Trees					
<i>Aegle marmelos</i> (L.) Correa	Bel	Rutaceae	Fruit	+	+
<i>Anacardium occidentale</i> L.	Cashew	Anacardiaceae	Fruit	-	+
<i>Annona squamosa</i> L.	Aatafal	Annonaceae	Fruit	+	+
<i>Areca catechu</i> L.	Supari	Arecaceae	Fruit	+	+
<i>Artocarpus heterophyllus</i> Lam.	Kathal	Moraceae	Vegetable, fruit	+	+
<i>Borassus flabellifer</i> L.	Tal	Arecaceae	Fruit	+	+
<i>Carica papaya</i> L.	Pepe	Caricaceae	Vegetable, fruit	+	+
<i>Citrus maxima</i> (Burm.) Merr.	Jambura	Rutaceae	Fruit	+	-
<i>Cocos nucifera</i> L.	Narikal	Arecaceae	Fruit	+	+
<i>Elaeocarpus floribundus</i> Blume	Jalpai	Elaeocarpaceae	Fruit, pickle	+	-
<i>Emblica officinalis</i> Gaertn.	Amlaki	Euphorbiaceae	Fruit, pickle	+	+
<i>Feronia elephantum</i> Correa	Kodbel	Rutaceae	Fruit, pickle	+	-
<i>Gmelina arborea</i> Roxb.	Gamai	Lamiaceae	Furniture	-	+
<i>Ipomoea batatas</i> (L.) Lam	Rangaalo	Convolvulaceae	Edible	-	+
<i>Litchi chinensis</i> Sonn.	Lichu	Sapindaceae	Fruit	+	+
<i>Mangifera indica</i> Linn.	Aam	Anacardiaceae	Fruit, pickle	+	+
<i>Manilkara zapota</i> (L.) P. Royen	Sabeda	Sapotaceae	Fruit	+	+
<i>Psidium guajava</i> L.	Payara	Myrtaceae	Fruit	+	+
<i>Shorea robusta</i> C.F. Gaertn.	Sal	Dipterocarpaceae	Construction	+	+
<i>Tamarindus indica</i> L.	Tetul	Caesalpiniaceae	Fruit, pickle	+	+
<i>Tectona grandis</i> L.f.	Segun	Verbenaceae	Construction	+	+
<i>Ziziphus jujuba</i> Lam.	Kul	Rhamnaceae	Fruit, pickle	+	+
Other livelihood components					
<i>Agaricus bisporus</i> J. E. Lange	Mushroom	Agaricaceae	Edible	+	-
<i>Apis mellifera</i> Linn.	Honey bee	Apidae	Honey	+	-
<i>Artiodactyla suidae</i>	Pig	Suidae	Meat	-	+
<i>Bos taurus</i>	Cow	Bovidae	Milk	+	-
<i>Cairina moschata</i>	Duck	Anatidae	Egg	+	-
<i>Capra hircus</i>	Goat	Bovidae	Meat	+	+
<i>Gallus domesticus</i>	Hen	Phasianidae	Egg	+	-
<i>Labeo rohita</i>	Fish	Cyprinidae	Edible	+	+

Table 3. Annual Income and income per Household from Trees, Crops and other livelihoods components

Species Name	Non-Tribal			Tribal			Income from trees
	% of Household	Total Annual Income (INR)	Income per household (INR)	% of Household	Total Annual Income (INR)	Income per household (INR)	
<i>Aegle marmelos</i> (L.) Correa	30	5500	611	13	5100	1275	

<i>Anacardium occidentale</i> L.	-	-	-	13	4410	1103		
<i>Annona reticulata</i> L.	17	1950	390	20	3820	637		
<i>Areca catechu</i> L.	90	137750	5102	70	154300	7348		
<i>Artocarpus heterophyllus</i> Lam.	40	11350	946	27	7500	938		
<i>Borassus flabellifer</i> L.	-	-	-	13	4380	1095		
<i>Carica papaya</i> L.	33	2650	265	23	7580	1083		
<i>Citrus maxima</i> (Burm.) Merr.	10	3200	1067	-	-	-		
<i>Cocos nucifera</i> L.	100	71350	2378	63	55750	2934		
<i>Elaeocarpus floribundus</i> Blume	53	12400	775	-	-	-		
<i>Feronia elephantum</i> Correa	33	8700	870	-	-	-		
<i>Litchi chinensis</i> Sonn.	33	5700	570	43	6900	531		
<i>Mangifera indica</i> Linn	73	31150	1416	57	30600	1800		
<i>Manilkara zapota</i> (L.) P. Royen	33	5580	558	37	6850	623		
<i>Emblica officinalis</i> Gaertn.	13	5450	1363	20	9820	1637		
<i>Psidium guajava</i> L.	-	-	-	17	3700	740		
<i>Tamarindus indica</i> L.	20	11300	1883	30	15750	1750		
<i>Ziziphus jujuba</i> Lam.	30	1900	211	27	4650	581		
Total		315930	18405		321110	24075		
<i>Abelmoschus esculentus</i> Moench	50	1670	111	33	3390	339		Income from crops
<i>Arachis hypogaea</i> L.	-	-	-	43	4330	333		
<i>Colocasia esculenta</i> (L.) Schott	40	17602	1467	37	15602	1418		
<i>Colocasia</i> sp.	63	7780	409	-	-	-		
<i>Capsicum frutescens</i> L.	33	2640	264	-	-	-		
<i>Lens culinaris</i> Medik	-	-	-	53	5370	336		
<i>Lycopersicon esculentum</i> Mill.	63	5800	305	53	16950	1059		
<i>Momordica charantia</i> Descourt.	-	-	-	37	3340	304		
<i>Musa paradisiaca</i> L.	27	2150	269	-	-	-		
<i>Oryza sativa</i> L.	100	32850	1095	57	31350	1844		
<i>Oryza</i> sp.	-	-	-	20	4850	808		
<i>Psidium guajava</i> L.	-	-	-	40	4720	393		
<i>Solanum melongena</i> L.	87	2670	103	43	4540	349		
<i>Solanum tuberosum</i> L.	90	23430	868	57	27750	1632		
Total		96592	4891		122192	8815		
<i>Agaricus bisporus</i> J. E. Lange	33	10600	1060	-	-	-	Income from other livelihoods	
<i>Apis mellifera</i> Linn.	20	8500	1417	-	-	-		
<i>Artiodactyla suidae</i>	-	-	-	37	913000	83000		
<i>Bos taurus</i>	63	8980	473	-	-	-		

<i>Cairina moschata</i>	33	5510	551	23	3970	567
<i>Capra hircus</i>	7	9500	4750	10	38000	12667
<i>Gallus domesticus</i>	63	12800	674	27	5950	744
<i>Labeo rohita</i>	43	115750	8904	30	90000	10000
Total		171640	17829		1050920	106978

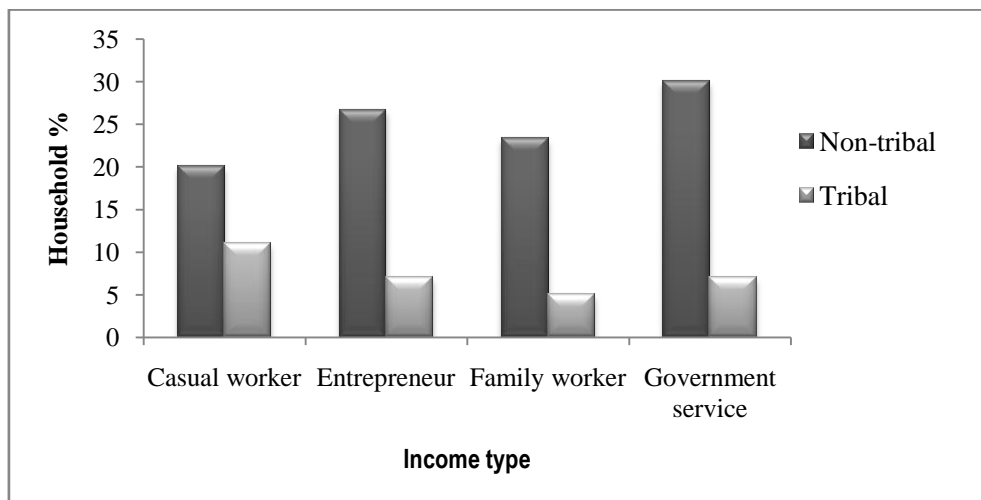


Figure 2: Income type of the study area

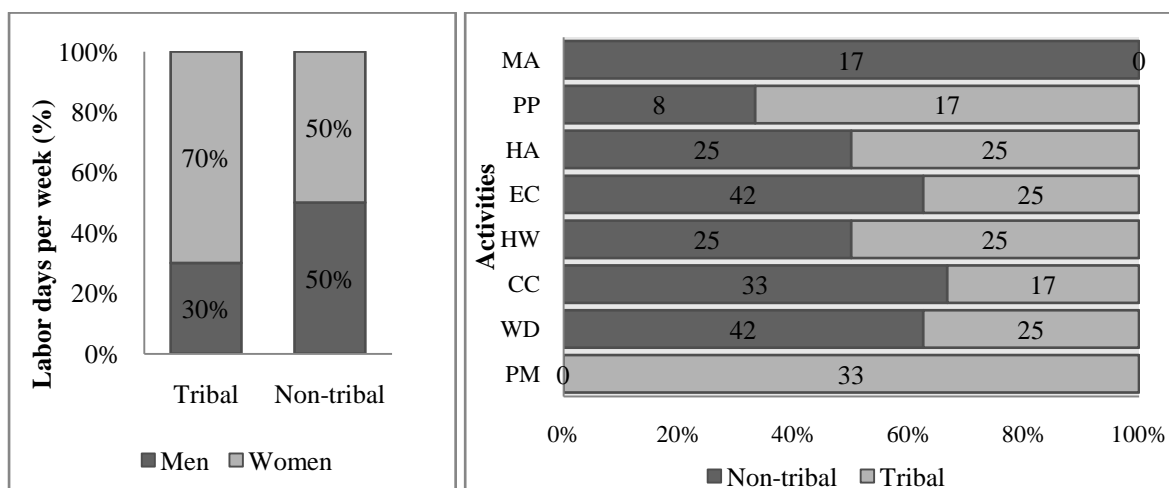


Figure 3. Distribution of Labor among the Genders Figure 4. Different Activities across the Community

Note: MA: Marketing, PP: Production and Preparation, HA: Harvesting, EC: Education of Children, HW: Housework, CC: Child Care, WD: Work distribution, PM: Protection and Management.

Table 3 specifies the list of the trees, crops and other livelihood components along with the annual production and income per household. The total income from the sale of the products produces from trees was 3,15,930 INR in Non-tribals and for Tribals it was 3,21,110 INR. Both communities earn maximum income from the sale of the products from *Areca catechu* L., *Cocos nucifera* L., *Artocarpus heterophyllus* Lam. and *Tamarindus indica* L. In case of crops the parts sold were stem, tuber and fruits which provides income of 4,891 INR per household

and 8,816 INR per household income of non-tribal and tribal community. Different households of both the communities were found to possess interest in rearing and cultivating other livelihood components. Cattle (cow), mushroom cultivation and bee keeping for honey production were seen exclusively in the Non-tribal community. Whereas, the dominant component found in the Tribal houses was rearing of pig in their compound providing them maximum income (9,13,000 INR). The occurrences of pond in their land use

guarantee their success in practicing pisciculture. The data also depicts that the maximum income was from the selling of fish in both the communities.

The results above show clearly that the difference in the two communities in the agroforestry practices can be easily discerned from the annual crops cultivated and from the perennial trees grown. The production of crops, trees and other livelihood components including cattle offers them source for income. The income from the sale of crops, vegetables, fruits, milk, meat etc. offers them an opportunity to meet their family's requirements. The intercultural variation was observed. Women from tribal community were seen to be engaged more in agricultural and agroforestry activities as tribal men were mostly found to be a casual worker in other's agricultural land. So to make their ends meet, contribution in the agroforestry and in other land uses were more. But among non-tribal community casual worker were least as they were government and private employees as the income status of most of the family was optimum as such equal contribution by both genders was observed. The equal involvement of sharing decision was reported in other studies also (Halbrendt *et al.*, 2014). Most of the non-tribal community was employed under MGNREGA (Mahatma Gandhi National Rural Employment Generation Act, 2005) as compared to tribal community. The other occupations where both communities were engaged are entrepreneur. They usually carry out business on groceries and vegetables from their field. This is the source of income besides a government employee or a casual worker. Nevertheless as a whole male member was found to perform outside work more and women involved in the interior household and other works. Likewise marketing was found to be mostly done by men whereas female members were mostly taking care of the child for their education and health as well. The same state of affairs was observed from other region as well where men travel outside and women get an equal opportunity for working inside for household activities (Kabir and Webb, 2009). Men were also involved in production and preparation than women.

Amongst the activities both the members were equally seen in harvesting.

On the other hand the woman contribution pattern in both the communities shows that non-tribal women mostly do the marketing activity besides child care and tribal women mostly take care of the production and management and harvesting. It is thus clear that non-tribal perform internal activity more than tribal, showing difference in norms and beliefs. From the current study it can also be stated that non-tribal women does not involve children in their field and are more concerned in their education and care. Generally the nursery raising and forest management and protection activities are mostly favoured in the community which infers the concerns on the development work either for income generation or for the betterment of the environment. As such environment related development activities with proper utilization and involvement of labors from the community will ensure success. Women were involved in certain activities under developmental work such as construction of roads and building fences, as a management strategy against man-animal conflict. Among different activities personal use was observed by women from their kitchen garden. The small amount obtained from kitchen garden is utilized in making leaf products by non-tribal community, whereas tribal women make use in making their traditional dresses for themselves and for their children. The economic status from the sale of products is confirmed from the total annual income generation from crops, vegetables, fruits, milk, meat, mushroom etc. whereas, vegetable cultivation, poultry rearing and cattle rearing were some secondary sources of income from homegarden in Bangladesh (Akhter *et al.*, 2010). An observation made on the source of income from two communities infers that maximum income is made from sale of tree products (3,15,930 INR) with 18,405 INR per household than from sale of other livelihood components (1,71,640 INR) with 17,829 INR per household and from crops (96,592 INR) with 4,891 INR per household. It is different from tribal community where the maximum income is gained from other

livelihood components (10,50,920 INR) with 1,06,978 INR per household, than from tree products (3,21,110 INR) with 24,075 INR per household and crops (1,22,192 INR) with 8,815 INR per household. Among the tree species fruits of mainly *A. catechu* offered highest return, followed by *C. nucifera*, *A. heterophyllum* and *T. indica* provide in both communities. The total income from all these components indicate that tribal community earn more (12,05,222 INR) than non-tribal community (5,84,162 INR). This increase in the income in tribal community is due to their adaptation of pig in their household, which offers them huge income.

CONCLUSION

Women are playing significant activities in fulfilling the family needs by involving in various agroforestry practices. The involvement of female member, depending on the status of the family, must be counted for obtaining benefits. The participation of women in conservation management shall being benefit for overall conservation of forest resources. The components which offer higher benefits must be introduced and practiced in a sustainable way. The problems and recommendations raised must be heard and put into action for better development and to ensure better health and harmony.

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