CONTENTS

	Page
Acknowledgements	i
Abstract agg 196	iv
Thai Abstract	vii
Contents	ix
List of tables	xiv
List of figures	xviii
Appendix tables	xxi
Abbreviations and Symbols	xxiii
CHAPTER I INTRODUCTION 1.1 Statement of the problem	
1.2 Objectives 1.3 Rationale of the study 1.4 Literature review	5 6 8
CHAPTER II RESEARCH METHODS	12
2.1 Scope of the study 2.2 Selection of study area 2.3 Conceptual framework 2.4 Data collection 2.5 Data analysis	A & I & & O

		Page
CHAPTER III	SOCIOECONOMIC AND DEMOGRAPHIC PROFILE OF THE STUDY AREA	25
3.1 General des	scription of study area	25
3.1.1 Physic	al characteristics	25
•	mic, demographic and social characteristics	29
	prization of households by socio-economic status	32
3.2 Land use pa	atterns and farming system	33
3.2.1 Land u	ise	33
3.2.2 Croppi		34
	l raising and tree management	36
3.2.4 Off-fat		36
CHAPTER IV	AGROFORESTRY SYSTEMS AND THE ROLE OF GENDER IN THE STUDY AREA	38
4.1 Agroforestr	y systems	38
4.2.1 Comp	onents of agroforestry system	40
1) C1	op production	40
-	nimal husbandry	41
•	ee growing	43
	relationships existing among components of agro-	45
forestr	ry system	
1) In	teraction among crop, tree and livestock components	51
4.1.3 Impor	tance of tree and its preference	niv 557 Sit
1) Sta	atus of tree plantation	56
2) Tr	ee preference category	62
	odder tree cutting and management	70

91 T	nyiolyjamant of gandon in vanious agreefounceus activities	74
.2.1 1	nvolvement of gender in various agroforestry activities	/4
1) Crop subsystem	75
2		84
3	Tree subsystem	86
.2.2 L	abor use pattern on agroforestry activities by gender	91
1) Crop production	91
		02
	i) Potato	92 94
	ii) Maize iii) Millet	95
	iv) Soybean	96
	v) Wheat	97
	V) Wheat	202
2) Animal husbandry	98
3		102
.2.3 T	lime allocation on daily activities by gender	104
.2.4 D	ecision making	112
1)	Decision making role of gender on various agrofo- restry activities	112
	i) Crop production	113
	ii) Livestock management	115
	iii) Forestry management	118
	iv) Household and other activities	119
2)	Access and control of resources	121

		Page
CHAPTER	V PRIVATE TREE PLANTING PROGRAM OF PAC AND ITS EVALUATION	127
5.1 Private	tree planting program of PAC	127
5 1 1 In	troduction of PAC's tree planting program	128
	itiation of tree planting program in Salle village	130
	Ianagement aspect of tree planting program	131
	avolvement of gender	133
5.2 Evaluat	tion of PAC's private tree planting program	135
5.2.1 O	verall impact of the program on village level	136
1)	Changes in livestock rearing practice from grazing to stall feeding	136
	i) Advantages of stall feeding	137
	ii) Disadvantages of stall feeding	139
2)	Changes in livestock holding	140
3)		142
5.2.2 In	mpact of the program at household level	145
1)	Positive impact	146
2		147
3)		148
	hange in labor use and labor division specially eferring to women	8 151 M
5.2.4 C	hanges in women's overall activities	Univ ¹⁵⁵ sity

	Page
CHAPTER VI CONCLUSION AND DISCUSSION	161
6.1 Conclusion	161
6.2 Discussion	169
6.3 Policy implications and further research	174
5000	
References	176
Appendices	184
Curriculum Vitae	202

LIST OF TABLES

*	: 	Page
Table 1.	Farmers' categories according to socioeconomic status	29
Table 2.	Family size by socioeconomic group	30
Table 3.	Land, tree and livestock holding by socioeconomic group	31
Table 4.	Average size of land types owned by households	34
Table 5.	Sources of income	37
Table 6.	Livestock ownership pattern	43
Table 7.	Average number of trees available on nagiland/ forestland to the farmers of different ethnic group	45
Table 8.	The tree and crop interaction	51
Table 9.	Advantages of tree growing on the private land	52
Table 10.	The negative effects of tree species to field crop	54
Table 11.	Farm tree management	55
Table 12.	Average tree available per household on various types of land	56
Table 13.	Dominating tree species grown on various types of land	59
Table 14.	Tree preference by male farmers through matrix scoring	63
Table 15.	Tree preference by female farmers through matrix scoring	64
Table 16.	Tree species preference by men	65
Table 17.	Tree species preference by women	67
Table 18.	The preferred tree species by gender	68
Table 19.	Ranking of preference criteria for fodder trees by gender	68

		Page
Table 20.	Ranking of preference criteria for fuelwood tree by gender	70
Table 21.	Feeding management practices during dry season	72
Table 22.	Gender participation in agroforestry activities by ethnic group	80
Table 23.	Gender participation in agroforestry activities by economic group	82
Table 24.	Labor use pattern (days/year) for crop production activities by rich Magar/Gurung farmers	92
Table 25.	Labor use pattern (days/year) for crop production activities by medium Magar/Gurung farmers	93
Table 26.	Labor use pattern (days/year) for crop production activities by poor Magar/Gurung farmers	94
Table 27.	Labor use pattern (days/year) for crop production activities by medium Brahmin/Chhetri farmers	95
Table 28.	Labor use pattern (days/year) for crop production activities by poor Brahmin/Chhetri farmers	96
Table 29.	Labor use pattern (days/year) for crop production activities by ethnic group	97
Table 30.	Labor use pattern (days/year) in crop production activities by women of different economic status group	98
Table 31.	Labor use pattern (days/year) for livestock activities by socioeconomic group	101
Table 32.	Labor use pattern (days/year) for forestry/ tree related activities by socioeconomic group	103
Table 33.	Results of t-test (p < 0.05) for labor use pattern	104 Si
Table 34.	Schematic display of activities by month	105
Table 35.	Daily work routine of gender by detail activities during winter season	106

		rage .
Table 36.	Daily work routine of gender by detail activities during moonson season	108
Table 37.	Daily work routine of gender by group of activities during winter season	109
Table 38.	Daily work routine of gender by group of activities during monsoon season	110
Table 39.	Gender related decision making processes concerning agroforestry production by ethnic group	116
Table 40.	Gender related decision making processes concerning agroforestry production by economic group	118
Table 41.	Farmers owning nagiland in Salle village	136
Table 42.	Change in livestock holding by socioeconomic group	141
Table 43.	The tree species distributed from PAC to Salle private plantation scheme	143
Table 44.	Trees planted on nagiland	144
Table 45.	Common farmland trees and shrubs before the scheme	144
Table 46.	Common farmland trees and shrubs after the scheme	145
Table 47.	Impacts of the program on household situation	146
Table 48.	Positive impacts of the program	147
Table 49.	Negative impacts of the program on household situation	148
Table 50.	Farmers' response on solving fodder scarcity problems by tree planting program	149
Table 51.	Reasons for negative impact of tree planting program	Univiso sity
Table 52.	Impact of project on womens' activities	e r 155 e
Table 53.	Changes in womens' overall activities after program with respect to ethnic group	156

		page
Table 54.	Changes in womens' overall activities after program with respect to economic group	158
Table 55.	Change in womens' overall activities due to program	159



LIST OF FIGURES

		Page
Figure 1.	Land use and agroforestry systems	2
Figure 2.	Conceptual model of Nepalese hill farm production system	15
Figure 3.	Map of Nepal showing the eastern hills	26
Figure 4.	Map of Hattikharka VDC showing the study area	27
Figure 5.	Average monthly temperature and rainfall pattern at Salle	28
Figure 6.	Cropping pattern by altitude in Salle village	35
Figure 7.	Transect of the Salle village	39
Figure 8.	Cropping calendar (on Bariland)	41
Figure 9.	Location of different components of agroforestry system	46
Figure 10.	Components of agroforestry system and their interrelationships	50
Figure 11.	Random plantation of trees on terrace bond, bond riser with approximate distance between trees	53
Figure 12.	The popularity scores for different tree species by gender	69
Figure 13.	Availability period of different fodder and fuelwood trees	71
Figure 14.	Fodder scarcity months in Salle	72
Figure 15.	Feeding management practices during dry season	73
Figure 16.	Gender participation in crop production activities	76
Figure 17.	Gender participation in cultivation of different crops	77
Figure 18.	Gender participation in millet production by ethnic group	78
Figure 19.	Gender involvement in soybean cultivation by ethnic group	79

		Page
Figure 20.	Womens' participation in crop production activities by ethnicity	81
Figure 21.	Womens' involvement in cultivation of different crops by economic status	83
Figure 22.	Gender participation in livestock activities by ethnic group	84
Figure 23.	Womens' participation in livestock activities by economic group	85
Figure 24.	Gender involvement in tree activities	86
Figure 25.	Gender involvement in tree activities by ethnic group	87
Figure 26.	Gender participation in tree activities by economic group	88
Figure 27.	Womens' involvement in fodder/bedding material/ fuelwood collection by ethnic group	89
Figure 28.	Womens' involvement in fodder/bedding material/ fuelwood collection by economic group	90
Figure 29.	Time spent by gender on agroforestry and household activities in winter season	1111
Figure 30.	Time spent by gender on agroforestry and household activities monsoon season	111
Figure 31.	Womens' decision making role regarding crop production by ethnic group	113
Figure 32.	Womens' decision making role regarding crop production by economic group	880 ¹¹⁴ m
Figure 33.	Womens' decision making role regarding livestock production by ethnic group	University
Figure 34.	Womens' decision making role regarding livestock production by economic group	e r \117 e

		Page
Figure 35.	Womens' decision making role regarding tree management by ethnic group	119
Figure 36.	Womens' decision making role regarding tree management by economic group	120
Figure 37.	Access of resources by gender in Magar/Gurung ethnic group	121
Figure 38.	Control of resources by gender in Magar/Gurung ethnic group	123
Figure 39.	Resource map drawn by male farmers	124
Figure 40.	Resource map drawn by female farmers	125
Figure 41.	Farmers' response on advantages of stall feeding	138
Figure 42.	Farmers' response on disadvantages of stall feeding	139

APPENDIX TABLES

		Page
Table 1.	Gender participation in crop production activities by ethnic group (per cent of respondents)	185
Table 2.	Gender participation in crop production activities by economic group (per cent of respondents)	186
Table 3.	Gender participation in livestock activities by ethnic group (per cent of respondents)	187
Table 4.	Gender participation in livestock activities by economic group (per cent of respondents)	188
Table 5.	Gender participation in tree growing activities by ethnic group (per cent of respondents)	189
Table 6.	Gender participation in tree growing activities by economic group (per cent of respondents)	190
Table 7.	Gender related decision making processes concerning crop production by ethnic group (per cent of respondents)	191
Table 8.	Gender related decision making processes concerning crop production by economic group (per cent of respondents)	192
Table 9.	Gender related decision making processes concerning livestock production by ethnic group (per cent of respondents)	193
Table 10.	Gender related decision making processes concerning livestock production by economic group (per cent of respondents)	194
Table 11.	Gender related decision making processes concerning tree management by ethnic group (per cent of respondents)	niv ₁₉₅ S r v e
Table 12.	Gender related decision making processes concerning tree management by economic group (per cent of respondents)	196

		Page
Table 13.	Gender related decision making processes concerning household and other activities by ethnic group (per cent of respondents)	197
Table 14.	Gender related decision making processes concerning household and other activities by economic group (per cent of respondents)	198
Table 15.	Variables considered during the survey	199
Table 16.	Scientific name of tree species	200

ABBREVIATIONS AND SYMBOLS

APROSC : Agricultural Project Services Centre

Bariland : Dry upland area cultivated normally with maize

Chulo : Stove

Ek hall goru: One pair of oxen

FRP : Forestry Research Project

Ghee : A type of butter made from milk

ICIMOD : International Centre for Integrated Mountain Development

Jand : Alcoholic drink made from millet, maize etc

Kanjihouse: Animal pound

KHARDEP: Koshi Hill Agricultural Development Project

Khetland: Lowland wet terrace area cultivated with rice

Khole: Feed prepared for animals mixing leaves of vegetables and grains

Khola: Stream

msl : Metre above sea level

Nagiland: Upland grassland

NARC: National Agricultural Research Centre

NGO: Non-governmental Organization

Pandera : Water spring

PAC : Pakhribas Agricultural Centre

PRA : Participatory Rural Appraisal

RRA : Rapid Rural Appraisal

Terai : Low altitude area (< 500 msl)

VDC: Village Development Committee