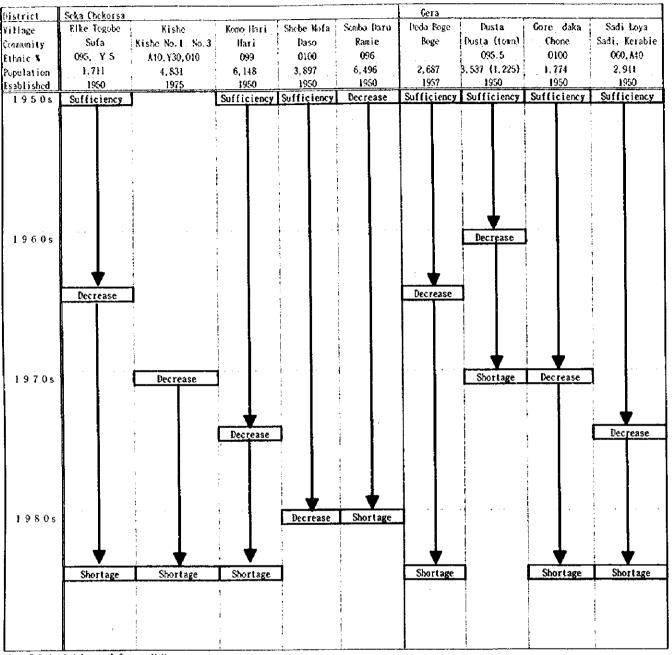
Appendix Tab. 26

Time table for the decrease of firewood supply in the surveyed villages



Note: Ethnic A; Amhara, 0; Oromo, Y; Yem

Population: The 1991 Census of Population and Housing, 1996

Appendix Tab. 27 Preference ranking of species collected for firewood

					764640		in rd	
			First		Second			
			Ower vitians	Common name	scientific name	common name	scientific name	common name
District	Village	Community	SCIETLILO MANG		۱			Tiranitoo
2012	1,7; 2,4 2	NO 1 No 3		Hada		Soyaama		אַר רַיּבּיר רַיּבּיר רַיִּבּיר רְיִבּיר רְיִבּיר רְיִבּיר רְיִבְּיר רְיִבְירִי רְיִבְּיר רְיבְיר רְיבְייי רְבְייי רְבְייי רְבְייי רְבְייי רְבְייי רְבְייי רְיבְייי רְבְייי רְבְייי רְבְייי רְבְייי רְבְייי רְבְייי רְבְייי רְבּייי רְבּייי רְבּייי רְבּייי רְבּייי רְבּייי רְבּייי רְבּייי רְייי רְבּייי רְבּייי רְבּייי רְבְייי רְבְייי רְבְייי רְבּייי רְבְייי רְבְייי רְבְייי רְבּייי רְבּייי רְבְייי רְבְייי רְבּייי רְבְייי רְבּייי רְבְיייי רְבְיייי רְבְייי רְבּייי רְבּייי רְבּיייי רְיייי רְייייי רְייייי רְיייי רְיייי רְייייי רְייייי רְיייייי רְייייי רְייייי רְייייי רְיייייי רְיייייי רְיייייי רְיייייי רְייייי רְייייי רְייייי רְיייייי רְייייייי רְיייייייי
Seka Nishe	N 1 Spe	W. 1 .W.			:		Lombo.	1.eommon 1
Chekorsa	Chekorsa Komo Hari	Hari	Erytrina Brucei	Waleenso	Myrica salicitolia	wejjii	Compo	
		0.00	Calric africans	Cheke	Myrica salicifolia	Rejjii	Maytenus senegalensisi Komboolca	Komboolca
	Sombo Daru	D THE TO				0.000	Biospyros abyssinica	Lokko
	Vanga Deo	<u>D</u> eo	Prunus africanus	Homi	Maesa Tanceorara	. Kood		1
		c	Marian calicifolia	Reilli	Maesa lanceolata	Abayi		Nussayie
	Elke logobe	busasie	WALLCH SHILLIAM					C
Cros	Dodo Dogo	Rome	Pysium africana	Omoo	Bersama abyssinicus	Lolchi isa	EKEDETGIA CAPEIISIS	2
3	nego poke	1		Wandoo	Allophins abvsinicus	Sehor	Sygysium guinegnse	Baddessae
	Dusta	Dusta lown	Macaranga Tophios Ligha	"augoo				Thorn.
		9004 <u>0</u>	Macaranga lophostigna	Wangoo	Millettia ferruginea	Askra	Maesa lanceolata	AUAy 1
	core naka	anona			the same of the sa	TO DO DO	Allophylus abvssinicus (Sehoo	Sehoo
	Sadi Lova	Sadi, Roya	Olea welwitschii	Cagana	Macaranga Tophost Igna ("augoo	illatige.		

Appendix Tab. 28 Production of seedlings in the nurseries of DADO (1996)

			Š	Seka Chekorsa				Gera			
dnoza	species	Kachama	Sibe	Dato	Sombo	subtotal	Kola Bucha	Wanja Kersa	Gure Genji	subtotal	total
Tree	Acacia decurrens	450	2,916	1,231	2,000	6,597	0	0	0	ō	765,9
Tree	Acacia saligna	300	1,450	2,316	2,000	990,9	0	0	0	\$	990'9
Tree	Albizia spp	195	313	0	0	80\$	0	0	0	0	\$08
Tree	Cordia africana	0	100	0	0	100	0	0	0	8	18
Troc	Cupressus lusitanica	0	3,483	10,205	8,400	22,088	0	0	0	0	22,088
Tree	Eucalyptus Spp	36,090	54,380	45,971	77,050	213,491	75,000	100,000	48,000	223,000	436,491
Tree	Grevillea robusta	0	1,157	0	0	1,157	0	0	0	Ó	1,157
Tree	Hagenia abyssinica	245	400	1,405	1,280	3,330	0	0	0	<u>ক</u>	3,330
Tree	Leucaena leucocephala	0	1,149	723	1,000	2,872	0	0	0	0	2,872
Tree	Milletia ferruginea	0	8	0	1,200	1,250	0	0	0	0	1,250
Trose	Susbania saspensis	0	1,162	0	0	1,162	0	0	0	o	1,162
	subtotal	37,280	66,560	61,851	92,930	258,621	75,000	100,000	48,000	223,000	481,621
Fruit	Аппопа типсата	0	450	869	0	1,148	0	0	0	0	1,148
Fruit	Avocado	0	137		0	137	0	0	0	Ö	137
Fruit	Papaya	0	150	1,200	400	1,750	0	0	0	٥	1,750
	subtotal	0	737	1,898	400	3,035	0	0	0	0	3,035
Coffee	Coffee arabico 7440	170,242	0	0	272,252	442,494	0	1	0	Ο	442,494
	total	207,522	67,297	63,749	365,562	704,150	75,000	100,000	48,000	223,000	927,150

Average number of seedlings (per household) received from DADO nursery Appendix Tab. 29

		Ajimmano		Seka Chekorsa	ckorsa			Gera		Community
District	Village	Communic				Camp	Vola Bucha	Wania Kersa	Gure Genii	average
			Kachama	2 5	Dato	COLLIGO	Noia Durina			167
Seka	Atro Sufa	Atro Sufa				167				407
Chekorsa	Beke	Beke			_	704				161
	Bidaru Tuli	Bidaru Tuli			161					36
	Boba Roge	Boba Roge			35					301
	Buyo Kofe	Buyo Kofe	322	224	e e					385
	Deto Kersu	Deto Kersu			385					131
	Elke Tonjo	Elke Tonjo		131						808
	Gibe Baso	Gibe Baso		808						194
	Kusaro Gibe	Kusaro Gibe	194			901				001
	Liluchaha	Liluchaha								362
	Meti	Meti		216	637					307
	Sebeka Debive	Sebeka Debiye				39.1				224
	Sekala Gecnefo	Sckala Geenefo		224						¥
	Shashamanee	Shashamanee				183				761
	Sonbo	Sonbo				<b>7 7</b>				211
	Sonbo Daru	Sonbo Daru	_							356
	Wushanea Koche	Wushanea Koche		348	359					317
	Seka Chekorsa	Seka Chekorsa District average							009	
Gera	Chira	Chira town							480	
	Chira	Gure Kaso					-		* \$	
	Chira	Gure Genji							908	800
	Chira	Werware						000 [		
	Kacha Handaracha	Kachotula					_	1,667		1,667
	Kacho Handaracha	Anderacha					?			3,500
	Kola	Kola Bulcha					3,200	7 0		1.667
	Kola	Kenbibit					00.1	1,000		1.000
	Sedi Loya	Loya yukro					1 223			1,333
	Wanja Sulaja	Kola Sulaja						833	***	833
	Wanja Sulaja	Wanja Kersa								1.042
	Gera Dist	Gera District average						7 1 052	20 484	
	average of th	average of the each nursery	308	413	3 375	5 251	7,077			

Appendix Tab. 30 Percentage of DADO nursery seedling recipients by village (1996)

District	Village	total no.of	no.of	percentage
District	Village	household	household received seedlings	%
Seka	Atro Sufa	802	23	2.9
Chekorsa	Beke	923	43	4.7
	Bidaru Tuli	976	10	1.0
	Boba Roge	1,367	21	1.5
	Buyo Kofe	1,523	138	9.1
	Deto Kersu	1,552	58	3.7
	Elke Tonjo	681	20	2.9
	Gibe Baso	610	50	8.2
	Kusaro Gibe	806	13	1.6
	Liluchaha	1,108	21	1.9
	Meti	888	29	3.3
	Sebeka Debiye	635	15	2.4
	Sekala Geencfo	1,166	15	1.3
	Shashamanee	1,150	20	1.5
	Sonbo	932	150	16.
	Sonbo Daru	1,495	100	6.
	Wushanea Koche	962	100	10.4
	subtotal	17,576	826	4.
Gera	Chira	1,162	82	7.
	Kacho Handaracha	250	40	16.
	Kola	1,057	27	2.
	Sedi Loya	626	25	4.
	Wanja Sulaja	938	4:	4.
	subtotal	4,033	214	5.
	total	21,609	1,040	4.

Appendix Tab. 31 Result of homestead plantation survey

species ranking of purpose needs of provide	eds seedlings	<u> </u>	0	0	0	<u> </u>		0	<b>©</b>		<b>©</b>	<u></u>	<b>©</b>	<u> </u>	<u> </u>	<b>©</b>	
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Note:paricipant F; fater, H.H;house hoad, W;wife, C;children, E;omplment, DA:development agent

species Ca; Ecamaidulensis, S; Esaligna, Ci; Ecitriodra

ranking of purpose Fifirewood, Hisonstruction wood for house

Appendix Tab. 32 Preference ranking of species to be planted for firewood

District	Village	Community	First	Second	Third
Seka	Kishe	No.1,No.3	Cupressus lusitanica	Eucalyptus spp.	Millettia ferruginea
Chekorsa	Komo Hari	Нагі	Eucalyptus spp.	Cupressus lusitanica	Hagenia abyssinica
	Sombo Daeu	Ramie	Eucalyptus spp.	Cupressus lusitanica	Millettia ferruginea
	Elke Togobe	Busasie	Eucalyptus spp.	Maesa lanceolata	Cupressus lusitanica
Gera	Dedo Boge	Boge	Eucalyptus spp.	Cupressus lusitanica	indigenous spp.
	Dusta	Dusta town	Eucalyptus spp.	_	
	Gore Daka	Chone	Eucalyptus spp.	_	
	Sadi Loya	Loya,Sadi	_		_

Note: "-- " No answer.

Appendix Tab. 33 (1) Production models for timber and Transmission pole production

1) Transmission pole/Timber Species:Group 2, Eucalyptus grandis/Eucalyptus saligna Plants/ha: 1,600

Site class: 24 m³/ba Preduction model No. 7

Produc	Production model No. 7	Š									Ī					9	1,4	_	3	
			C. A (12.2						Volume, m³/ha	n³∕ha			Increment		Thinned	Thinned/Kemoved, m/ha		1	cus/ha	
			STEMS/ DA			ľ									•••	•••	•••		••	
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		- 000			"him		Volume/			Thinn	After	norement	Amunuk Tamunuk	Annual	••	••	•••			
	ree	c C	••	•			,						THOMOTOR	4	<u>.</u> .	Suc.	Small: F	1011	Sranches :	
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o.		30	150		.001	Ö	1.4100	211.5	211.5	8	9	71.5	5.4		13.45		0 70	1	4	7
1	ı	ļ																		

Species:Croup 3, Cupressus lusitanica/Grevillea robusta/Pinus patula Plants/ha: 1,600 2) Timber

Site class: 24 m<sup>3</sup>/ha

Produc	Production model No. 9	el No. 5															; ,			
				St	Stems/ha			<b>~</b>	Volume, m³/ha	-²/ha			norement		Thinne	Thinned/Removed, m'/ha	m'/ha	٢.	Tons/ha	
							,		••••	•••••	4	Increment	Annual	, lenna			••••		****	
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~4			1440	•••	•••			•••	•••				,			••••	• • •		· • • •	
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00	12.6		1310	570	4.	740	0.1031	135	48	36	82	75	25.0	41. 7	·		 O	ō	3	) >
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38	_	38.3	350	•			1. 1000	5	5											

Source: The Orgut-Swedforest Consortium, Forest Products Pricing and Marketing Study Vol. 2, Ministry of Agriculture, 1990

Appendix Tab. 33 (2) Production models for Eucalyptus globulus Special

1) Fuelwood regime
Species: Eucalyptus globulus
Plants/ha: 4,444 (1.5 by 1.5)

Thinn. (a) thinn. (b) thinn. (b) thinn. (c) thinn. (c) thinn. (c) thinn. (c) thinn. (c) thinn. (d) thinn. (d) thinn. (d) thinn. (e)	Proposicilos moste, special	LIOII PIV		Stems/ha					Volume, m2/ha	r³/ha			Thinne	Thinned/Removed.	1, m <sup>3</sup> /ha		Tons/ha	
Delight   Deli		Tree	DBH			Thinn.		Volume/	,		Thinn.	é		ç E		١	Branches	
1.		neight (m)	(E)	••••	hinn.	rate (%)	After thinn.	tree (m <sup>3</sup> )	Before thinn,	Thinn.	rate (%)	Alter thinn	Sawlogs			Poor	and tops	Twigs
5.0         3.2         4000         77         9           7.0         4.9         3300         53         100         4.6           10.2         7.0         3500         125         100         4.6           11.7         8.0         3500         125         100         4.6           13.1         9.0         3500         125         6.7         110         5.7           13.1         9.0         3500         125         80         15.6         117         5.7           14.5         10.0         3500         235         117         5.7         117         5.7           18.3         12.5         3300         235         236         80         155         6.7           18.4         10.0         3300         236         236         6.7         17.3           18.2         3300         2300         2300         230         17.0         18.6         5.2           18.4         11.0         3300         230         230         13.0         2.8         1.0         1.0         1.0         1.0         1.6         5.3         1.0         1.4         6.2         1.2         1.				44													••••	
5.0         3.2         3900         5.3         4.6         4.6         4.6         4.6         4.6         4.6         4.6         4.6         4.6         4.6         110         5.2         110 <td></td> <td></td> <td></td> <td>4000</td> <td>••••</td> <td></td> <td></td> <td></td> <td><u> </u></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>, 4 ( • )</td> <td></td>				4000	••••				<u> </u>								, 4 ( • )	
7.0         4.9         3800         75         38           10.8         7.0         3600         4.6           11.7         8.0         3500         123         100         4.6           13.1         9.0         3500         125         23         100         4.6           13.1         10.0         3500         107         7.3         8.2         117         5.7         135         6.2           17.1         11.7         3400         2500         256         156         100         186         6.7         100         186         6.2           18.3         12.5         3300         2500         2560         286         6.2         7.8         6.2         7.8         7.9         7.0         186         6.2         7.8         7.4	8	5.0	3.2	3900	••••				27						••••		•	
10.2   7.0   3500   97   123   40   110   5.2   100   4.6   11.7   11.7   10.0   3500   11.0   5.2   100   4.6   11.0	က	7.0	4.9		••••				ES 6									
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14.5   10.0   3500   1.5   1.5   1.0   1.5   1.0   1.5   1.5   1.0   1.5   1.5   1.0   1.5   1.5   1.0   1.5   1.0   1.5   1.5   1.0   1.5   1.0   1.5   1.0   1.5   1.0   1.5   1.0   1.5   1	7-		0.6		••••				150		,,,,				 2	117	5.7	φ.
15.8   10.9   3400   15.5   6.7     17.1   11.7   3400   15.5   6.7     18.3   12.5   3300   170   170     18.3   12.5   3300   170   170     18.3   12.5   3400   15.5     18.3   18.5   18.5   18.5     18.3   18.5   18.5   18.5     18.3   18.5   18.5   18.5     18.3   18.5   18.5   18.5     18.3   18.5   18.5   18.5     18.3   18.5   18.5   18.5     18.3   18.5   18.5   18.5     18.3   18.5   18.5   18.5     18.3   18.5   18.5   18.5     18.3   18.5   18.5     18.3   18.5   18.5     18.3   18.5   18.5     18.3   18.5   18.5     18.3   18.5   18.5     18.3   18.5   18.5     18.3   18.5   18.5     18.3   18.5   18.5     18.3   18.5   18.5     18.3   18.5   18.5     18.3   18.5   18.5     18.3   18.5   18.5     18.5   18.5   18.5     18.5   18.5   18.5     18.5   18.5   18.5     18.5   18.5   18.5     18.5   18.5   18.5     18.5   18.5   18.5     18.5   18.5   18.5     18.5   18.5   18.5     18.5     18.5   18.5     18.	90	14.5	10.0		••••				177						3 5	135	6.2	ශ්
17.1     11.7     3400     235     7.3       18.3     12.5     3300     286     6.2       19.4     13.3     3300     186     6.2       Coppice stand Fuelwood regime     11000     500     31     15     6       5.0     3.2     10500     5500     31     15     6     0     2.8       7.0     4.9     5000     50     2.8       10.2     7.0     4800     86     86     6.0       10.2     7.0     4600     112     6.0     6.0       11.7     8.0     4600     2.8     1.41     7.0       13.1     9.0     4600     2.0     2.0     2.8       14.5     10.0     4400     2.0     2.0     2.8       17.1     11.7     4400     2.0     2.0     2.8       18.3     12.5     4200     2.0     2.9     2.0	ō	15.8	10.9		••••		••••		205						2 8	155	6. 7	7.
18.3   12.5   3300   19.6   286   10.0   186   6.2   19.4   13.3   3300   19.6   6.2   19.6	20	17.1	11.7				• • • • •		235		••••				3 8	170	63	7.
Coppice stand Fuelwood regime  11000 5.0 3.2 10500 5500 500 7.0 4.9 5000 86 8.7 6.0 4800 112 11.7 8.0 4600 13.1 13.1 9.0 4600 6.5 14.5 10.0 4600 6.5 15.8 10.9 4400 6.5 16.8 10.9 4400 6.5 17.1 11.7 4400 195 18.3 12.5 4200	11	18.3	12.5	3300	••••				260						100	186	6.2	σċ
Coppice stand Fuelwood regime         11000         5000         31         15         16         5         0         2.8           7.0         4.9         5000         500         86         86         86         112         86         112         112         112         26         115         5.3           10.2         7.0         4800         112         141         46         127         6.0         6.0         115         5.3           11.7         8.0         4600         173         204         81         154         7.0         6.5           14.5         10.0         4600         235         204         81         154         7.0           15.8         10.9         4400         270         299         104         87         7.4           18.3         12.5         4200         299         299         7.8         7.4		19.4	13.3	3300					286									
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7.0     4.9     5000       8.7     6.0     4800       10.2     7.0     4800       10.2     7.0     4800       11.7     8.0     4600       13.1     9.0     4600       13.1     9.0     4600       13.1     9.0     4600       13.1     9.0     4600       15.8     10.9     4400       17.1     11.7     4400       18.3     12.5     4200	8	5.0	 —	10500	2200		2000				••••	01		••••	·	•		
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11.7     8.0     4600       13.1     9.0     4600       13.1     9.0     4600       14.5     10.0     4600       15.8     10.9     4400       17.1     11.7     4400       18.3     12.5     4200       18.3     12.5     4200	Ŋ	10.2	7.0						112						36	115	er.	9
13.1     9.0     4600       14.5     10.0     4600       15.8     10.9     4400       17.1     11.7     4400       18.3     12.5     4200       18.3     12.5     4200	9	11.7	8.0						141		••••				3 4	197	9	
14.5     10.0     4600       15.8     10.9     4400       17.1     11.7     4400       18.3     12.5     4200       18.3     12.5     4200	7	13.1	9.0						173					••••	2 0	136	9	7.
15.8     10.9     4400       17.1     11.7     4400       18.3     12.5     4200	∞	14.5			••••				204	•••				••••	6 6	3 2		
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Appendix Tab. 33 (3) Production models for indigenous species

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Production model No.13
Species:Group 4. Juniperus procera/Podocurpus gracior
Plants/ha: 2,500
Site class: 12 m²/ha. For Timber

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		_		S	tems/ha				VOLUME, MY COM	M / Clf							•			
		hav	· ·		Thin		volume/		•••	Thin		Increment	Annua	Annual			•••			
	rec	read To a	,,,				tree	Refore	•••	TATO	After	•••	increment,	growth	•••	Trans.	Small:	rei-	Sranches	
	height	1	Selore	Think	rate (%)	The second	ૃ	th (B)	Thirm	8	thin	(m <sub>3</sub> )	(m)	rate(%)	Nawlogs pole poles wood	pole	poles		and tops :	Twigs
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7																				

Production model No.15 Species:Group 5\_ Aningeria udelfi-friderici/Cordia africana/Crotan macrostachyus/Ekebergia rueppellana Plants/hm: 2,500

		ľ			4				Volume m3/ha	13/h2		_	Increment		Thime	Thinned/Removed	i ne /ha	Ţ	ed/sco	
				8	Stems/ha				1000	7 12		1					-		 !	
		1000			Physical Parts		Volume/			Thim		Increment	Annual	Annual						
-	2017	5	Barran	• • •	4		tree	Before		rate	After	_	increment	growth	Trans. Puel Branches	Trans.	. Po	el- Br	sacpus	
		(m)	• • • •			thinn	(m <sub>3</sub> )	thinn	Thim	(%)	thim			rate(%)	Saviors	300	poles w	500	Saor	Twigs
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ç	25.1 41.6	41.6	400		20	200	0.9250	5	<b>3</b>	24:		277	· · ·	3	3 ;		••	2 4		
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Ç	0 07 70 0	ç	200		900	•	3	292	2		-									

Production model No.16 Species:Group 6\_ . Hagenia abyssinica/ Olea welwitschil/ Prgeum africana/ suzygium guineense Plants/ha: 2,500

-			`					Ve.1	3/h			Increment		Thinne	Thinned/Removed, m3/ha	n³/ha	Tons/ha	
_			1	COMS/DA				2010	277							•		
-	DRH			Thinn	 	Yo'\ume/			Thim		Increment	Annual						
height		Before		rate	After	tree	Before		rate	After	, , , , , , , , , , , , , , , , , , ,	Increment	growth	1	growth Trans, Fuel-	Fuel-	- Branches	Twies
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8	67 6.6								•				0.40			Ş	564	2:
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Source: The Orgut-Swedforest Consortium, Forest Products Pricing and Marketing Study Vol. 2, Ministry of Agriculture, 1990

#### Appendix Tab. 34 Computation of allowable timber harvest volume

Timber Production area (Gera Forest from Compartment 1 to 15) 26.500ha Standing volume 320.4 m/ba Incremental yields (EFAP Annex 1.3 Table 2, Attachment Table 2.1) 0.98 m//ba/year Incremental rate 0.306% 1 : Cutting cycle s : Selective cutting rate p: Incremental rate  $(m - m \cdot s) 1.0 p^{3} = m$  $(1-s)1.0p^{1}=1$ 1.0 p  $^{1} = \frac{1}{1-s}$  $1 \cdot \log 1.0 p = \log 1 - \log (1 - s)$  $1 = \frac{-\log(1-s)}{\log 1.0p}$  $1 = \frac{-\log 0.8}{\log 1.00306} = \frac{0.09691}{0.001327} = 73$  $26.500 \div 73 \div 363(b_a)$  $320.4 \times 0.2 \times 363 = 23.261 (m)$  $1 = \frac{-1000.9}{1001.00306} = \frac{0.04576}{0.001327} = 34.5 = 35$ 

Estimation of illegal felling volum by encroachment
Encroachment area: 263ha (Within Gera Forest, F1)

Encroachment area (Within F1, Tuber production area) =  $\frac{\text{Timber production area}}{\text{Within Gera Forest, F1}}$ =  $263 \cdot \frac{26,500}{57,600} = 121 \text{(ha)}$ 

On the assumption that 70% of the encroachment will be prevented when the Management Plan is carried out.

 $121 \times 0.3 = 36.3 (ha)$  $320.4 \times 36.3 = 11.630 (ml)$ 

26,500 ÷ 35 = 757 (ha)

 $320.4 \times 0.1 \times 751 = 24.254 (m)$ 

Appendix Tab. 35 (1) Felling volume calculation for existing forest plantation

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Appendix Tab. 35 (2) Felling volume calculation for existing forest plantation

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Appendix Tab. 35 (3) Felling volume calculation for existing forest plantation

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Appendix Tab. 35 (4) Felling volume calculation for existing forest plantation

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Appendix Tab. 35 (5) Felling volume calculation for existing forest plantation

	Apea         Platinal         Nemary         Apea         The Apea         Apea         Apea         Appea         Appea         The	MAA.I. May Jana May Jana 15,64 16,87 21,29 21,29 21,29 21,29 21,444 22	Stoom Volume , he after after thinn Area s thinn An(m) (0n)	A Paris	Thirm / ha Volume after
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445,5   1980   9   640   17   10   74.2   3,599   14   14   15   17   10   12   165,5   1,404   13,79   17   17   17   17   17   17   17	15.7 19HK \$ 640 17 10	N.24		15	2
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Appendix Tab. 35 (6) Felling volume calculation for existing forest plantation

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2         16 C. Latinemera         5.0         1.900         1.0         5.0         4.000         4.000         1.0         5.0         1.900         1.1         5.0         1.0         5.0         1.900         1.0         5.0         5.0         5.0         5.0         5.0         5.0         5.0 <td>ļ</td> <td></td> <td>52 C. tuxtlan</td> <td>-1</td> <td></td> <td><u>~</u></td> <td>Ę.</td> <td>3</td> <td>-</td> <td></td> <td>4</td> <td>2</td> <td>3</td> <td></td> <td></td> <td>t</td> <td></td> <td></td> <td> -</td> <td>12</td> <td></td> <td></td> <td></td>	ļ		52 C. tuxtlan	-1		<u>~</u>	Ę.	3	-		4	2	3			t			-	12			
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3. 31 C. Laudenderen, 186. 1. 1994         34. 100 C. Laudenderen, 1902         36. 11 C. Laudenderen, 1902         20         40.7 2. 27. 27. 27. 27. 27. 27. 27. 27. 27	ᆛ	-	Zy C. luster	1	*				1	7			5	4		ğ	:			ន			
3   11 C. Declembro,   13, 31   1940   11   12   200   14   12   21   12   201   13, 21   20   1300   20   20   20   20   20   20   20	-	-	30 (03/08)	_	_	1		9	7	5			╗				66	ļ		2,2			
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3         17] C. Lustientide         4,1         19465         11         10,27         19         20           3         18] C. Lustientide         4,1         1946         11         13,28         19         20           3         18] C. Lustientide         7,5         1946         11         13,28         14         12,98         19         20           3         15] C. Lustientide         7,1         1946         1,1         14,28         14,49         17         149         17         19           6         2.0         Lustientide         7,1         1,440         1,4         1,1         13,28         1,49         17         18         20           6         2.0         Lustientide         2,1         1,440         1,4			16 C. Austral.	_1	3	; 9	- 40 - 40	17		2; 2;	- 8	77.15	2			†	3 8			5			
3         118 C. Austranica         2.7         Vanie         11         100.0         15         14         100.0         15         14         100.0         15         14         100.0         15         15         15         20	٠	٤.	17 C. luxim	_1	5	=	1.367	2	٦	13.0		0.77	2			t	3			1.6			l
3         19 C. Iusilianica         7.6. Livinatica         7.6. Livinatica         7.6. Livinatica         7.6. Livinatica         7.7. Livinatica			18 C. 105100	_2	3	=	8	15	┙	102.0		175	4			t	3 8			,			
3   14   C. havianica   3,4   1966   11   1,450   14   11   132   342   1236   19   20   20   20   20   20   20   20   2		۲.	19 C. luxla		₹	=	8		1	S.			-			t	3					ļ	
3         15 C. Nuclianica         4,1         1986         13         15,2         12,03         19         20         12,03         13         15         12,04         13         14         13         13         13         13         13         13         13         13         13         13         13         14         15         14         15         14         15         14         14         15         14         15			14 C. /LN/m	_	3	=	<b>2</b>	-	1	777		*	<u>,</u>			Ì	 			į			
6         32/2 (solitantical No. 1941)         14.00         7         5         29.9         4.1         17.0         1.6 </td <td>,</td> <td></td> <td>15 C. hisvini</td> <td></td> <td>₹</td> <td>3</td> <td>22 1</td> <td>1</td> <td>1</td> <td>22</td> <td>_1.</td> <td>2 62</td> <td><u>.</u></td> <td></td> <td></td> <td>1</td> <td>3</td> <td></td> <td></td> <td>,</td> <td> </td> <td>ļ</td> <td></td>	,		15 C. hisvini		₹	3	22 1	1	1	22	_1.	2 62	<u>.</u>			1	3			,		ļ	
6         27 C. Austrantea         2.1         1947         10         1,520         11         13.20         14         19         19           6         29 C. C. Lationnica         6.9         13 C. Lationnica         6.0         13.20         14         19         19           6         31 C. Lationnica         4.3         1.347         10         580         15         6.0         11         1.2         170.7         4.046         15.52         19         20         20         20         20         11         1.2         10         11         1.2         10         11         1.2         10         11         1.2         10         11         1.2         10         11         1.2         10         11         1.2         10         11         1.2         10         11         1.2         10         11         1.2         10         10         11         1.2         10         11         1.2         10         10         11         1.2         10         11         1.2         10         11         1.2         1.2         1.2         1.2         1.2         1.2         1.2         1.2         1.2         1.2         1.2	Н	*	32 C. lustim			_	8 -	. [	ŕ	000		3				t	<u>.</u>			ş		١	
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Appendix Tab. 35 (7) Felling volume calculation for existing forest plantation

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3   22   E. antigene   2.5   1989   11,100   15   20   297.0     3   24   E. antigene   0.05   1989   1,100   15   20   297.2     3   25   E. antigene   1.4   1989   1,100   15   20   297.2     3   27   E. antigene   1.4   1989   1,100   15   20   297.2     4   2   2   2   2   2   2   2   2   2	25.00 20.00		13		***
3   2.4   E. sustanos   6   1989   8   1,100   15   20   287.2     3   2.6   E. sustanos   1.4   1989   8   1,100   15   20   287.2     3   2.6   E. sustanos   1.4   1989   8   1,100   15   20   287.2     4   2   2   2   2   2   2   2   2   2	18.5 35.6 37.8 17.7 10.8 11.3	4	30 105 40 660	11	31
3         2/5 (E. milligene         O.N.         Lumb         6         1100         115         20         297.2           3         2/2 (E. milligene         1,4         1489         8         1,100         115         20         297.2           3         2/2 (E. milligene         3,4         1989         8         1,100         115         22         303.1           3         2/2 (E. milligene         2,7         1989         8         1,100         115         22         303.1           3         3/2 (E. milligene         2,2         1984         3         1,100         115         23         303.1           3         3/2 (E. milligene         2,2         1984         13         1,00         13         24.0         27.0           3         3/3 (E. milligene         2,2         1984         1,140         11         13,00           4         3/3 (E. milligene         2,2         1984         1,140         11         13,00           5         4/3 (E. milligene         2,2         1984         1,140         11         13,00           6         7/3 (E. milligene         2,2         1984         13         1,140         11 <td>28.5 20.1 10.9 11.1</td> <td>-</td> <td>241 40 560</td> <td></td> <td>21</td>	28.5 20.1 10.9 11.1	-	241 40 560		21
3   20   E. caligna   3.4   1989   8   1,100   15   20   277.2   3   3   20   E. caligna   3.4   1989   8   1,210   35   22   303.1   3   3   25   E. caligna   3.5   1989   31   31   31   32   33   33   32   E. caligna   3.5   1989   32   33   33   32   E. caligna   3.5   1989   32   33   33   33   E. caligna   3.5   1989   32   33   33   E. caligna   3.5   1989   32   33   33   E. caligna   3.5   1989   32   33   33   E. caligna   3.5   1989   32   33   33   E. caligna   3.5   1989   32   33   33   E. caligna   3.5   1989   32   33   33   E. caligna   3.5   1989   32   33   33   E. caligna   3.5   1989   32   33   33   E. caligna   3.5   1989   32   33   33   E. caligna   3.5   1989   32   33   33   E. caligna   3.5   1989   32   33   33   33   E. caligna   3.5   1989   32   33   33   33   33   33   23   2	28.5 10.9 11.7		0,8 10 10 WR 40 680 285	11	7.5
3         7.7 E. Sundigner         5.4         1989         8         1.210         1.5         22.30.1.1           3         7.8 E. sundigner         3.6         1989         8         1.210         1.5         22.30.1.1           3         7.8 E. sundigner         2.7         1989         1.7         1.00         1.6         22.3         30.1.1           3         1.8 E. sundigner         1.2         1.985         1.7         1.180         1.3         1.6         1.0.4           3         1.8 E. sundigner         2.7         1.989         1.7         1.180         1.3         1.6         1.0.4           3         4.8 E. sundigner         2.7         1.989         1.7         1.180         1.3         1.6         1.0           5         7.5 E. sundigner         2.7         1.989         1.7         1.180         1.3         1.0         1.0           6         3.8 E. sulfigner         2.4         1.989         1.180         1.1         1.0         1.1         1.0         1.1         1.0         1.0         1.1         1.0         1.0         1.0         1.0         1.1         1.0         1.0         1.0         1.0         1.0	11.7 10.8 11.7		10 30 171 40		12
3   27   E. saulgens   3, 4   1940   12   12   12   12   12   12   12   1	28.20		10 30 695 40 728		12
3   72   E. saligna   3,5   1999   13   14   145   14   14   14   14   14   1	2 0 11 E		10 10 151 40 564	11	17
3   32   Expendion   2.7   1944   13   1,070   16   12   1,045   13   14   1,070   16   12   1,045   13   14   1,070   15   1,045   13   14   1,045   13   14   1,045   13   14   1,045   13   14   1,045   13   14   1,045   13   14   1,045   13   14   1,045   13   14   1,045   13   14   1,045   13   14   1,045   13   14   1,045   13   14   1,045   13   14   1,045   13   14   1,045   13   1,045   14   1,04	3 2 2	4044	31.	91	
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3   53   E. principles   20   1488   1   140   11   12   95.2     3   51   E. principles   14   1492   15   566   20.6   22.5   272.0     4   7   C. sulgimum   24   1498   11   1657   12   17   194.5     5   7   C. sulgimum   24   1982   15   1,800   6   9   47.0     6   8   E. principles   142   1982   15   1,800   6   9   47.0     6   14   E. sulgimum   12   1992   13   1,800   6   9   148.4     6   17   E. sulgimum   12   1992   13   1,800   7   10   13.1     6   20   E. sulgimum   12   1993   4   87.0   7   10   47.1     6   23   E. sulgimum   13   1983   4   87.0   7   10   47.1     6   24   E. sulgimum   14   1984   17   1,000   27   27.4   17.1     7   25   E. sulgimum   14   1984   17   1,000   27   27.4   17.1     8   28   E. sulgimum   14   1984   17   1,000   27   27.4   17.1     9   28   E. sulgimum   14   1984   17   1,000   27   27.4   17.1     18   28   E. sulgimum   18   1984   17   1,000   27   27.4   17.1     19   28   E. sulgimum   18   1984   17   1,000   27   27.4   17.1     19   28   E. sulgimum   18   1984   17   1,000   27   27.4   17.1     19   28   E. sulgimum   18   1984   17   1,000   27   27.4   17.1     19   28   E. sulgimum   18   1984   17   1,000   27   27.4   17.1     19   28   E. sulgimum   18   1984   17   1,000   27   27.4   17.1     19   28   E. sulgimum   18   1984   17   1,000   27   27.4   17.1     19   28   E. sulgimum   18   1984   17   1,000   27   27.4   17.1     19   28   E. sulgimum   18   1984   17   170   19   27   27.0     19   28   E. sulgimum   18   1984   17   1,000   27   27.4   17.1     19   28   E. sulgimum   28   1,000   27   27.4   17.1     19   28   E. sulgimum   28   1,000   27   27.5   270.5     20   20   20   20   20   20   20	48 21.3	91	19	KI.	A CAND AN AL
8         S. E. Crimetis         14         1902         15         65         20, 20         22.53         290.00           6         7         C. cuilgrae         24         1944         11         856         16         16         21         101.0           6         8         G. cuilgrae         24         1944         13         16         17         159.5           6         9         G. cuilgrae         8.6         1942         15         170         6         17         15         17         154.6           6         11         G. cuilgrae         8.6         1942         15         100         17         10         10         10         10         10         10         10         15		10	11	12	70.4 E3 30 1087 40 084 17.07
5         1.2 E. mulipme         9.4         1.9895         11         856         12         101.0           6         3 E. principular         24         1.984         11         1.65         12         159.5           6         3 E. principular         3.4         1.982         15         1.800         6         9         4.2         1.984           6         1.4 E. pulminulum         3.4         1.982         15         1.800         6         9         4.2         1.845           6         1.5 E. pulminulum         3.2         1.942         15         1.800         5         10         30.1           6         1.7 E. commidtationnulum         8.4         1.979         2.1         1.400         11         15         1.800           6         2.1 E. colliforum         1.2         1.943         1.8         1.8         1.8         1.8         1.8         1.8           6         2.5 E. colliforum         1.3         1.944         1.3         1.940         9         1.1         1.0         1.1         1.0           6         2.5 E. colliforum         1.3         1.944         1.3         1.2         3         1.2         3<		16	17.	13,6 18 30 1537 40 330 284	35
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Felling volume calculation for existing forest plantation Appendix Tab. 35 (8)

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Appendix Tab. 35 (9) Felling volume calculation for existing forest plantation

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Appendix Tab. 36 (1) Yearly reforestation plan (Belete Forest)

		Remarks									Pinus patula, yearl1	Cupressus lusitanica	Pinus patula	Cupressus lusitanica	Pinus patula, year!!					
		Tostl	213	22	61	566	78	156	52	1,153	·	4	2	4			ę	17	1,170	
		year 10						110		110				4				4	114	
	Ì	year 9					78	9		124		4						4	128	
١	l	year 8	73	12						100									100	
	Ì	year 7	110							110									110	
		year 6	8		61	88				117							မ	7	124	(0.8ha)
	Plant plan	year 5				120				120			8				***	2	122	Belete (0.8ha)
	e.iq	year 4				120				120									120	
		year 3				120				120									120	
		Jegt 5				120	2			120									120	l 1
		year l				9	:		52	112									211	
		Area evailable to plant (ha)	213	12	61	566	78	156	52	1,153		4	2	4		1	9	21	1,170	
		Area available to plant (t)	80	80	100	70	80	80	08											
		Туре	æ	£	<u>R</u>	82	£	33	£.		P.C.	집	<u>5</u>	ಕ್ಕ	占	ೱ	ձ			
	dition	Soil type	СМд	18.0 CMd	40.4 CMd	30.0 CMd, NTh, CMe	29.3 NTh-CMd, NTh		40.0 NTh . NTh-CMd		1.0 Omu	8.3 Cita	1.9 Cmu		19.3 NTh.NTh-CMd	43.3 CMd. CNd-NTh	43 o CMa CN4-NTb			
	Site condition	Slope (%)	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	18.0	40.4	30.0	29.3	27.2	40.0		1.0	8.3	1	8.7	19.3	43.3	42.0			
		Elevation (min.)(m)	1.620	l	ŀ		1		1		2,040		1	1		l .	1			
Belete		Elevation (max.)(m)	1.940		<u> </u>	L		<u> </u>			2.120	<u> </u>	ļ	2 120		<u> </u>	<u> </u>	ـــــ		
-		Area (ha)	266.0	İ			L	L		-			ļ.					"	1 572 5	Nursery setablishment
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рате	É	Compartment No.	8	8	8	8	ខ	69	8		8	S	3	3 8	6	8	3 8	1		Nurser
Forest name		Forest / None-forest	(tı	. (t.	Ĺ	Ĺ	a	Û		Culting	T T	. (ı	. [1	. (1	ţı	ū	ن د	ָר (מַּנְיּנְיִינְיִינְיִינְיִינְיִינְיִינְיִי		

Appendix Tab. 36 (2) Yearly reforestation plan (Gera Forest)

Appendix Tab. 37 Tending work plan for existing plantations

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+	Age rks (hg)	ž		    *	2	  :	<u>†</u>	†	g	8	8	S.	12	7.7	24	*		=	× 2	†  -	22	12	5			Weeding	BCC+858	<u>¥</u> 1	E C
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×	remarAnea se rks (he)	14	-  -	<u> </u>	  -  -	+		-	<u> </u>	=	<u> </u>	13	61	22	7			18	2	<u> </u>	18	2	7.4	٥		Weeding	MCCW25	18	III
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Appendix Tab. 38 Check list of tree species for planting in social forestry

Tree species		uses	20.	-		Ē.	programmes	
	fuelwood	poles	fruit	honey	school	family	buffer zone	apiculture
Acacia albida	*			#		*		*
Acacia decurrens	*	•		-	•	+		*
Acacia saligna	*			•		•		*
Albizia schimperiana	*					•		
Aningeria-addfi federicii				*				*
Аппопа типісата			*		*	•		
Citrus-orange, mandarin			•		*	*		*
Cordia africana								*
Cupressus lusitanica		*				*	*	
Eriobotrya japonica, loquat	*	*	*	*	•	*		+
Eucalyptus, grandis	*	*			*	*	*	
Eucalyptus, saligna	*	*			•	•	*	
Eucalyptus. citriodora	+	*				*	•	
Gatama				*				•
Grevillea robusta	*				*	•		
Hagenia abyssinica	#	*			*	*		
Leucaena leucocephala	*					*		
Maesa lanceolata	<b>.</b>				*	•		
Millettia ferruginea	*				*	*		
Ocotea kenyensis	•							
papaya			*		*	•		
Persea americana, avacado			*		*	*		
Sesbania sasban		*			*	<b>*</b>		

Appendix Tab. 39 Average number of household in communities selected for social forestry (scale of community participation)

Social forestry	District	Village	No.of	No. of	AveNo.of
			H.Hold	Community	H.Hold
School nursery	Seka Chekorsa	Sombo	932	9	104
	Gera	Chira	536	8	67
Family planting	Seka Chekorsa	Kishe	1,033	5	207
		Sombo Daru	1,495	16	93
	Gera	Chira	536	8	67
		Wegecha	531	4	133
Buffer zone planting	Seka Chekorsa	Elke Togobe	1,534	14	110
		Komo Hari	1,352	12	113
	Gera	Gore Dako	370	3	123
		Dusta	784	8	98
		Dedo Boge	660	8	83
Total			9,763	95	103

Appendix Tab. 40 Numeration for the cost of school nursery (per site)

year	items of	progress	amount	unit cost	sum of cost
	expenditure	detail		(Birr)	(Birr)
1	committee	no. of meetings	12times	100	1,200
		allowance	10persons*8times	70	5,600
	equipment&tools				10,000
	seed collection		10persons*10days	4	400
	subtotal				17,200
2	construction	creating nursery bed	0.25ha	1,500/ha	375
	operation	whole of nursery work			10,000
	wages	salary for DA	2persons	600/m, m.	14,400
	building	office & storehouse	1	800	800
	subtotal				25,575
	total				42,775

## Appendix Tab. 41 Numeration for family planting extension (per site)

year	items of	progress	amount	unit cost	sum of cost
	expenditure	detail		(Birt)	(Bin)
1 (for 6 month)	equipment&tools				10,000
	subtotal				10,000
2 (for 1 year)	construction	creating nursery	0.2ha	1,500/ha	300
	operation	nursery work	60,000	0.2/seedling	12,000
	building	office	1	800/building	800
		potting house	1	300/building	300
		store house	1	1,000/building	1,000
	subtotal				14,400
	total				24,400

Appendix Tab. 42 (1) Numeration for the cost of buffer zone planting (Dedo Boge)

year	items of	progress	amount	unit cost	sum of cost
	expenditure	detail		(Birr)	(Birr)
1	draft programme-	meeting allowance	5persons*6times	(Birr) sons*6times 100 100days 50	3,000
	formulation cost	Processing fee (survey~mapping)	100days	50	5,000
	research & explana-	per diem	5persons*20days	50	5,000
	tory meeting	expendables			1,000
	subtotal				14,000
2	construction	creating nursery by man power	0.5ha 1,500/ha	750	
	operation	nursery work	374,362	0.2/seedling	74,872
	building	office	1	800/building	800
		potting house	1	300/building	300
		guidehouse, storage house	1	1,000/building	1,000
	subtotal				77,722
	total				91,722

Note: When it will be provide construction and operation of nursery are provided through such work groups as Debo by communityr) esidents, cost of nursery construction and operation will be not necessary.

Appendix Tab. 42 (2) Numeration for the cost of buffer zone planting (Dusta, Gore Dako)

year	items of	progress	amount	unit cost	sum of cost
	expenditure	đetail		(Bin)	(Birr)
1	draft programme-	meeting allowance	5persons*6times	100	3,000
	formulation cost	processing fee (survey~mapping)	100days	50	5,000
	research & explana-	per diem	5persons*20days	50	5,000
	tory meeting	expendables			1,000
<del></del>	subtotal				14,000
2	construction	creating nursery by man power	0.4ha	1,500/ha	600
	operation	nursery work	351,965	0.2/seedling	70,392
	building	office	1	800/building	800
		potting house	1	300/building	300
		guidehouse rest & strage house	1	1,000/building	1,000
	subtotal				73,092
	total				87,092

Note: When it will be provide construction and operation of nursery are provided through such work groups as Debo by communityr) esidents, cost of nursery construction and operation will be not necessary.

Appendix Tab. 42 (3) Numeration for the cost of buffer zone planting (Elke Togobe)

sum of cost	unit cost	amount	progress	items of	year
(Bi <b>rr</b> )	(Віп)		detail	expenditure	,
3,000	100	5persons*6times	meeting allowance	draft programme-	1
5,000	50	100days	processing fee (survey~mapping)	formulation cost	
5,000	50	5persons*20days	per diem	research & explana-	
1,000			expendables	tory meeting	
14,000				subtotal	
300	1,500/ha	power 0.2ha 1,50	creating nursery by man power	construction	2
19,198	0.2/seedling	95,990	nursery work	operation	
800	800/building	1	office	building	
300	300/building	1	Potting house	33333	
1,000	1,000/building	1	guidehouse, rest & storage house		!
21,598				subtotal	
35,598				total	

Note: When construction and operation of nursery are provided through such work groups as Debo by communityr) esidents, cost of nursery construction and operation will be not necessary.

Appendix Tab. 42 (4) Numeration for the cost of buffer zone planting (Komo Hari)

year	items of	progress	amount	unit cost	sum of cost
, -	expenditure	detail		(Birr)	(Birr)
1	draft programme-	meeting allowance	5persons*6times	100	3,000
	formulation cost	Processing fee (survey~maping)	100days	50	5,000
	research & explana-	per diem	5persons*20days	50	5,000
	tory meeting	expendables		l	1,000
	subtotal				14,000
2	construction	creating nursery by man power	0.1ha	1,500/ha	150
-	operation	nursery work	54,395	0.2/seedling	10,879
	building	office	i	800/building	800
	1	potting house	1	300/building	300
		guidehouse,rest&storage house	1	1,000/building	1,000
	subtotal				13,129
	total				27,129

Note: When construction and operation of nursery are provided through such work groups as Debo by communityr) esidents, cost of nursery construction and operation will be not necessary.

Appendix Tab. 43 Numeration for the cost of traditional apiculture improvement

items of	detail	amount	unit cost	sum of cost
expenditure		<u> </u>	(Bin)	(Bin)
commitee cost	No. of place	3times	100	300
	allowance	Spersons*3times	100	1,500
research &	per diem	5persons*60days	50	15,000
development	expendables			5,000
guidance &	per diem	5persons*60days	50	15,000
extension	publishing booklet	1,000copies	20	20,000
	expendables		·	5,000
total				61,800

### Appendix Tab. 44 Grounds for cost estimation of felling & sales (natural forest)

- 1 Survey for trees to be felled
  - Number of upper story of Fl forest: 456/ha
  - Proportion of commercial species in the above number: 43.7%
  - Number of commercial species : 456×0.437 = 199/ha
  - Number of felling tree: 199×0.2(felling rate) = 40/b2
  - Fellig volume per ha: 320.4×0.2=64.08 m/ha
  - Survey area: 11,630 + 64.08 = 182ha
  - Efficiency of the survey: 40 trees/1 group, 1 day  $\rightarrow$  1 ha/1 group, 1 day 4(Birr/day)  $\times 2 \times 182 = 1,456$ (Birr)
- 2 Measurement of felled trees
  - Efficiency of measurement: 20 trees/1 group, 1 day $\rightarrow$ 0.5 ha/1 group, 1 day 4(Birr/day) × 2 × 182 ÷ 0.5 = 2,912(Birr)

Appendix Tab. 45 Cost estimation for felling in forest plantation

Felling Arca (ha)									,		,	·	:	
			Year	<b>,4</b>	7	m	4	S	9	_	×o	2	⊇;	Tener
Tree species	Year	Work type	Harvest (m²)									,	1	2 2 2
Cupressus lusitanica	90	Thiming 1	48	72.3	9.2			69.4				160.0	192.0	502.9
Pinus patula	12	Thimming 2	*		88.7		40.7	39.8	54.2	7.5	18.3	28.5		328.3
Grevillea robusta, etc.	<u></u>	Thunning 3	88			53.6		12.5	30.8	102.3	4.4	37.8	89.2	400.6
	26	Main harvest	386				1.9				4.0	4.0	0.9	15.9
Eucalvotus spp.	4	•	14					\$4.0	<b>\$</b>	0.89	79.0	85.0	0.06	440.0
33	9	Thinning 2	33		19.6		20.4			107.6	2	0.89	79.0	385.9
	6	Thinning 3	55	9.5	17.7		30.3		23.8				54.0	135.0
	13	Thinning 4	99			35.1	13.5	19.4	00 4					76.4
	18	Main harvest	212					7.3						5.7
Hagenia abyssinica				İ			1.0				,			0.1
Juniperus procera		Thinning	•					,			0:1			2.0
Mixed		Thinning						0.1						1.0
		:												
Felling Cost (Birr)					:						ľ	•	į	
			Year	_	7	m	4	'n	9	7	∞	6	0	Total
Tree species	Year	Work type	Unit price											
,	٥	Thinning	160	11 568	1 477			191				25,600	30,720	80,464
Diamis mortile	. 5		081	9 108	15,966		7.326	7.164	9,756	1,350	3,294	5,130		59,094
Carrillan actuate ato	1 00		290			15.54		3,625	8,932	29,667	21,576	10,962	25,868	116,174
Ore villed roundly, etc.	2, 2		096			L !	1,824				3,840	3,840	5,760	15,264
Heroni maria can	4	╀	44					2,376	2,816	2,992	3,476	3,740	3,960	19,360
Theres app.	· •	Thinning 2	110	3,003	2.156		2,244			11,836	7,020	7,480	8,690	42,449
	0		185	1,702	3,275		2,606		4,403				066.6	24,975
	13	Thinning 4	700			7,020	2,700	3,880	1,680				-	15,280
	18	_	710					5,183						5,185
Hagenia abyssinica		Thinning	081				180				ç			08 5
Juniperus procera	_	Thinning	180					•			7			180
Mixed		Thinning	180					180						No r
							77.0	00000	100	20020	222.26	\$10.00	20.200	355 226
Total		Thirning Main harvest	ï	25,381	22,869	22,564	18,056 1,824	28,329 5,183	7,587	45,045	3,840	3,840	5.760	20,447

# Appendix Tab. 46 The computation table based on the crop table for the average price of harvested wood

1) Transmission pole/Timber

Species:Group 2, Eucalyptus grandis/Eucalyptus saligna

Plants/ha: 1,600 Site class: 24 m<sup>3</sup>/ha Production model No: 7

	tion mod Tree	DBH				Thinned	/Removed			
Age	height (m)	(ca)	Operaton		Sawlogs	Trans. pole	poles	Fuel- wood		Unit price
				Unit price	125. 4	102.0	77, 8	46. 8	Sub total	(Birr/ m³)
4. 0	13. 8	12. 4	Thinning 1	Birr			6. 0 466. 8	8. 0 374. 4	14. 0 841. 2	60. 1
6.0	18. 2	16.8	Thinning 2	m³ Birr	4. 5 564. 3		16.5 1,283.7	12.0 561.6	33. 0 2, 409. 6	73. 0
9. 0	23. 1	23. 9	Thinning 3	3 Birr	7.7 965.6		25. 4 1, 976. 1	22. 0 1, 029. 6		72. 1
13. 0	27.0	32.5	Thinning 4	m³ Birr	15.0 1,881.0					84. 4
18.0	30.1	38.5	Final Felling	<sub>0</sub> 3 Birr	74. 0 9, 279. 6					95. 9

2) Timber

Species:Group 3, Cupressus lusitanica/Grevillea robusta/Pinus patula

Plants/ha: 1,600 Site class: 24 m<sup>3</sup>/ha

7	tion mod					Thinned	/Removed			
Age	Tree height (m)	(cm)	Operaton		Sawlogs	Trans. pole	poles	Fuel- wood		Unit price
				Unit price	193. 8		77.8	14.8	Sub total	(Birr/
8. 0	12.6	17.8	Thinning 1	m³ Birr	3.0 581.4		8. 0 622. 4	37. 0 547. 6	48.0 1,751.4	36.5
12. 0	17.7	24.4	Thinning 2	m³ Birr	27. 0 5, 232. 6		5. 0 389. 0	22. 0 325. 6	54. 0 5, 947. 2	110. 1
18.0	22.5	32. 2	Thinning 3	3 Birr	65.0 12,597.0		5. 0 389. 0	18. 0 266. 4	88. 0 13, 252. 4	150. 6
26.0	<b>25.</b> 5	3 <b>8</b> , 3	Final felling	a <sup>3</sup> Birr	328.0 63,566.4		8. 0 622. 4	50. 0 740. 0		168. 2

Source: The Orgut-Swedforest Consortium, Forest Products Pricing and Marketing Study Vol.2, Ministry of Agriculture, 1990

Stumpage price (Source: FWCD(Oromia) ) Birr/m Cyprus / Indigenous pine Eucalyptus Sawlog 292.1 193.8 125.4 Logging & Skidding 38.8 42.2 38.8 Fuelwood 54.8 14.8 46.8

Appendix Tab, 47 Revenue estimation from forest plantation products

Harvest (m <sup>3</sup> )				ļ			-			1	×	O	101	Total
			Year		7	m	4	n	9	•	•	•		
Tree species	Ϋ́c	Work type	Harvest					ļ						
			87	2014	583			3,315	1			7,680	9216	25,708
Cupressus lusitanica		, Summer	P V	7067	700 7		6712	4.725	4.685	089	1.164	2,236		31,092
Pinus patula		7 Smunner	* 8	7,575	1000	000		1 307	5.018	11 347	8.616	7.532	14,413	55,635
Grevillea robusta, etc.		Thinning 3	88 6			700.0	1 443	100,41			5.063	3,423	4,011	14,050
	92	Main harvest	386				Chr.	736	200	650	1,106	190	1260	6,160
Eucalvotus sop.	4	Thinning 1	14				!	967	920	400	7,100	2,2,4	2,607	19.723
	9	Thinning 2	33	3,366	1,711		1,067			0,010	4,114	1,1	0.00	10,698
-	_	Thinning 3	55	518	2,106		2,203		2,901				0,5,3	10.353
-	_	Thinning 4	9			3,638	2,261	3,461	993					70° C
		Main harvest	212	į				2,495					+	2,43 A1
Hacema abvssinica		Thinning					41				7			
		Thimping	-								191			• •
Juniperus procera		Thinning						28						Š
DOMIN'S														
Income (Birr)	ļ							,		r	0	0	G.	Total
			Year	٦,	7	w	4	n	٥	•	0	•	•	
Tree species	Year	Year Work type	Unit price					,			:			
Curresens lusitanica	~	Thinning 1	36.5	106,361	21,280			120,998			79.00.	280,320	336,384	865,343
Pinus patula	12	Thinning 2	110.1	484,000	770,039		738,991	465,173	515,819	/4,808	128,150	+01.0+2	2005-021-0	0 278 621
Grevillea robusta etc.	18	18 Thinning 3	150.6			979,201		196,834	891,251	1,708,858	1,297,570	715,4517	865,011,2	2,576,051
	26	26 Main harvest	168.2				261.209				166,168	213,749	ACT 27	270.217
Eucalvotus soo.	4	Thinning 1	60.1					45,436	23,850	C17,70	1,4,00	616,17	100 311	1 439 779
	9	Thunning 2	73.0	245,718	124,903		77,891		\$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	407,700	27.5	ALO, CAL	214 127	771 726
	٥	Thinning 3	72.1	37,348	151,843		158,836	000	701,607					873,792
	13		4.78			307,047	190,828	292,108	85,809					238.273
	38		95.5					238.273						7200
Hagenia abyssinica		Thuming	54.8				2,247				10.467			10 467
Inninerus procera		Thinning	<u>∞</u> .					•			70,01			7 380
Mixed		Thinning	110.0					6,380						Acc.o
								ŀ					1000	
		Thinning		873,427	1,068,065 1,286,248	1,286,248	1,168,793		1,753,891	2,323,909	1,656,840	1,896,154	2,987,156	7 601 478
Tota!		Main harvest					261.209	238,273			/AC-100	717.149	000,410	4,001.470

Appendix Tab. 48 Cost estimation for tendin work by year

Total	•						\$82	: 												Total			108,420							بند	_	_		: -	:			-	1.471,19%
10	2.	246	263	252	254	255	192	\$	82	×	32	82	×7	84	× ×	S	2 8	•		2		33,456	13,676	15,120	25,400	30,68	26.880	11,152	4,524	5,040	5,100	15,088	9009	5,880	5,950	8.100	7,110		219.166
c	•	263	252	254	269	235	160	87	**	× ×	06	87	84	ž	8	č	3 %	8		0		35,768	13,104	15,240	26,900	28,200	-					ļ						- 1	216,220
~	0	252	254	502	255	205		<b>7</b> %	\$	Ş	×	2 2	Ý	8	× *	§ §	2 3	Ė		~	•	34.272	13,208	16,140	25,500	24,600		11,424	4,420	5,400	5.100	15.456	5.950	638	5,930	7,110	5,760		186,590
1	•	255 44	592	255	235	192	1	83	8	5	į	ž	6	2 3	3 6	2 5	8 3	40		-	•	34.544	13.988	15,300	23,500	23,040		11,560	4,680	5,100	4.740	15,640	6300	5.950	5,530	6120	4,860		180,852
	9	569	255	235	205	160	7	8	. ×	9 6	N 0 7	\$ 8	> 0	ું ક	λ (	ž,	\$				•	288 25	13.260	14.100	20,500	19.200	1.960	12,240	4,420	4 740	4.080	16.560	5950	5.530	4 760	92.4			169.644
-	'n	255	235	205	193	}	7	×	è é		ŝ	t s	c i	ž (	× :	<b>3</b> :	¥			١	•	24 680	12,220	12,300	19,200		096	11.560	4.108	4 080	3.840	15.640	5 530	4760	4 480	96,4	Port.		139,218
	4	235	202	25	92	}	126	02	2 8	3 3	3 3	7, 8	5 5	œ ;	\$ :	¥					4	21000	10,660	11 520	000	2242	17640	10.744	3 536	1 840	1240	14 536	4.760	4.480	780	201.00			136,696
ľ	, es	205	162	9		9	÷ ≃	8	8 3	3 ;	40		× ;	3	\$4					:	<b>₽</b>	000 LG	0.08477	0090	3	4 880	2,520	9.748	3 328	2.040	4	19 512	44.44	2,200	8				92,452
	7	165	3 5	3		7	<u> </u>		3	*			\$	X							71	211.74	211,07.	740,0		1 690	7.420	× 704	808	1		Year 11	2 790	\o\*:					70.600
	-	651	3		Ç	į	971		ŧ.		,		¥.									3,0	21,760		000	2007	30.5	7.344	1			7600	06%						092.65
	Year	iii j	2 1	2 1	1 .	a .	<b>a</b> 1	2	<b>E</b> .	2	þа	큠	ья	ha	ha	ha	æ	ha			Year !-:	i i	<u>8</u> 5	7 6	3 3	3 2	2 5	75.	Ş	4 6	3 8	8	ž	2 8	5 8	2 5	2 8	2	
		Work type	Planting, weeding, auxiliary planting	Weeding	Clumber cutting, improvement teiting	Access pruming	Access pruning	High pruning	Planting, wooding, auxiliary planting	Weeding	Climber cutting, improvement felling	Climber cuting, unprovement felling	Planting, weeding, auxiliary planting	Weeding	Weeding	Weeding	Climber cuting	Bunning	(climber cutting, improvement felling)			Work type	Planting, weeding, auxiliary planting	Weeding	Climber cutting, improvement felling	Access pruning	Access pruning	High pruming	Planting, wecoing, auxiliary planting	Weeding	Climber cutting, unprovement felling	Climber cutting, improvement felling	Planting, wooding, auxiliary planting	Weeding	Wooding			(vil.)	Clance catalog maps come
		Year		(	11	<del>ر</del>	\$	×		-	73	3		•	7	•	- →	1		Birr)		Year		. <del>-</del>	- 63	m	٠٠ ·	<u>*</u>			~			_	"	6	**	7	
Area of Tending Works		Tree species	Cupressus lusitanica	Pinus panula	Grevillea robusta, etc.				Eucalypius spp.				Indigenous tree species							Cost of Tending Works (Birr)		Tree species	Cupressus lusitanica	Pimus patula	Grevillea robusta, etc.				Eucalyptus spp.		٠		Indigenous tree species						

## Appendix Tab. 49 Grounds for cost estimation of road improvement

```
Extension of roads improvement: 47 km (5 Roads)
      Surface grading : 60% → 27.6 "
      Graveling : 20 \mu \rightarrow 9.2 \mu
1 Surface grading by bulldover
      1km/4 hours (1 day)
      27.6km ÷ 1km = 27.6 days 4 hours × 27.6 days = 110.4 hours
      110.4 × 400 (Birr/hour) = Birr 44, 160
2 Graveling (3m in width × 0.2m thickness of graveling)
      0.6 \,\text{m}/\text{m} \times 9.2 \,\text{km} \times 1,000 = 5,520 \,\text{m}
      5,520 m × 3 lon/m = 16,560 ton 16,560 ton ÷ 6 ton = 2,760 (torries)
      140(Birr/1 lorry) × 2.760 = Birr 386,400
3 tabourers
      20 m/1 day (5 labouters/1 group)
      (27.6+9.2) km × 1,000 ÷ 20 = 1.840 days
      1,840 × 4 (Birr/day) × 5 (labourers) = Birr 36,800
4 Simple bridges (10m in length × 3m in width, 2 bridges)
      8 logs (8.72 m) 8.72 × 364 (Birr/m) = Birr 3,200
                   400 (Birr/hour) × 4 hour = Birr 1,600
      bulldozes
                   10(labourers) ×3(days) ×4(Birr/day) = Birr 120
      3.200+1.600+120=Birr 4.920 4.920\times 2=Birr 9.840
```

Total: 44,160+386,400+36,800+9,840=Birr477,200

Appendix Tab. 50 Construction cost examples of DA house

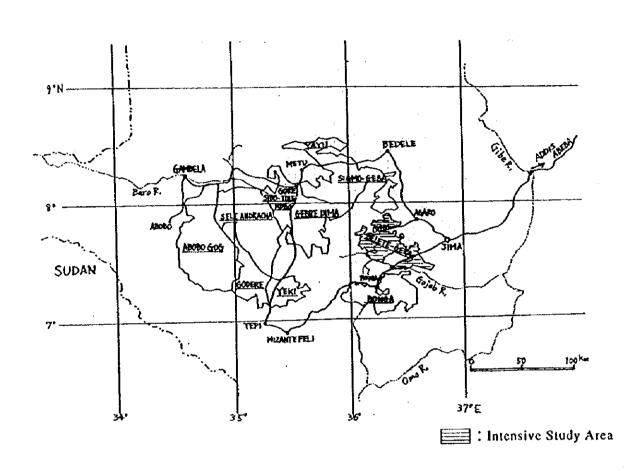
				Unit : Birr
Location		Helo Seboka	Kachama	Sedi Loya
Class		Standard	High	Standard
Const.year	G.C. year	1,997	1,993	1,996
Period of const.	month	4	4	9
Life of house	years	30	35	?
Total cost	Βίπ	13,420	19,659	14,092
Breakdown	Material cost	8,867	14,659	8,789
	poles	244	0	-
	iron roofing	2,584	2,584	-
	clay for wall	100	2,000	•
	brick	700	1,440	-
	cement	847	2,825	-
	paint	190	500	•
	others	4,202	5,310	
	Laber cost	4,553	5,000	5,303

Appendix Tab. 51 Revenue and expenditure

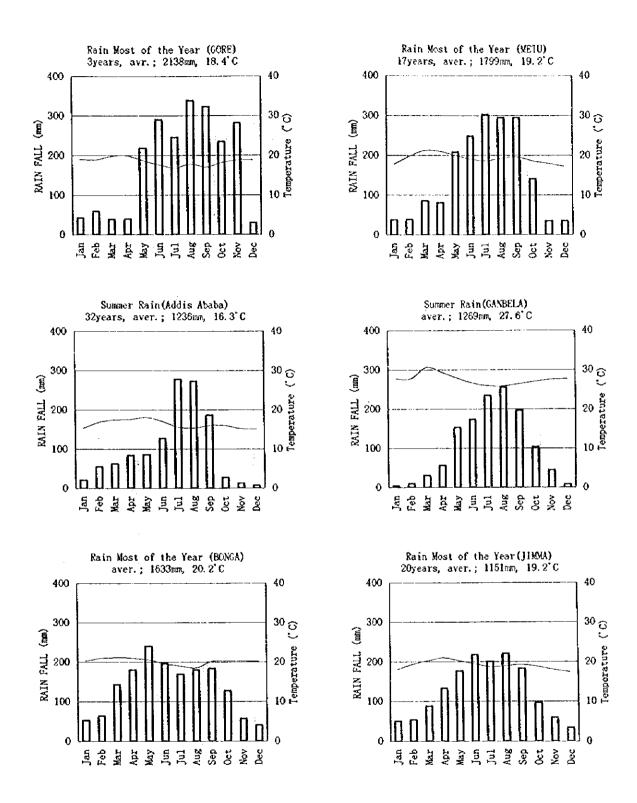
Expenditur										(Unit: th	(Unit: thousand Birr)
Droiser commonum	First vear	Second year	Third year	Fourth year	Fifth year	Sixth year	Seventh year	Eighth year	Ninth year	Tenth year	Total
Prevention of		30	30	30	10	10	10	10	10	10	180
encroachment	30	35	32	32	53	45	71	61	88	125	581
Reforestation and	\$04	454	485	603	637	681	999	671	726	402	6,136
protection						Ş	5	63	37	25	684
Social forestry	103	118	61	112	10	5	3	2,		,	. 2,2
Facilities	465	347	337	121	91		4			r)	545,1
Others	1 430	829	675	421	287	1,347	1,077	757	237	437	7,497
Subtota?	2.571	1.813	1,620	1,369	1,064	2,136	1,890	1,551	1,098	1,309	16,421
Staff salanes	406	504	504	504	505	504	504	504	504	\$05	4,996
Total (a)	3,031	2,317	2,124	1,873	1,568	2,640	2,394	2,055	1,602	1,813	21,417

Revenue

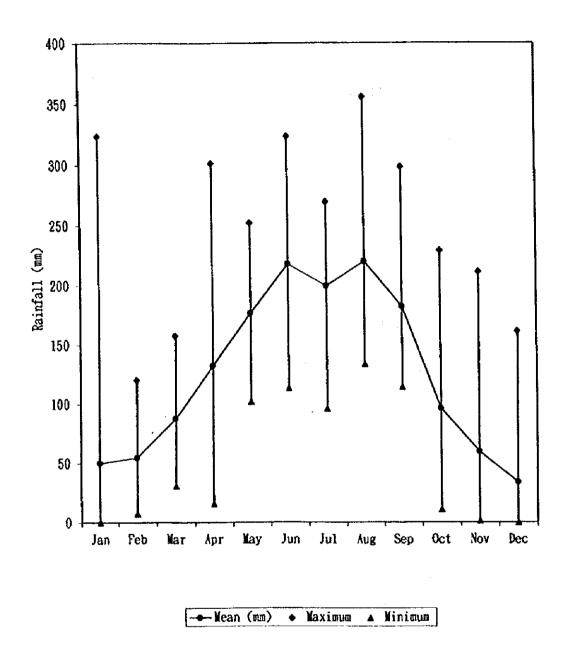
	-	_		_	_		•	-	1	7	Total
Project component		First year Second year	Third year	Fourth year	Fifth year	Sixth year	Seventh year	Ergnin year	numm year	CHUI YOU	100
Natural forests		1.168	1.461	1,753	2,045	2,045	2,045	2,045	2,045	2,045	17,528
Tatura Michael	8773	8901	1 286	1.430	1365	1.754	2,324	2,509	2,472	3,662	18,743
rotest piantauous	240	8901	1 286	1.169	1.127	1.754	2,324	1,657	1,896	2,987	16,141
I manuag	C/0	***		261	238			852	576	579	2,602
Main narvest	27.0	2236	7747	3 183	3 410	3.799	4,369	4,554	4,517	5,707	36,271
Total (0)	1.,/49	00,4	·	- } -			<b>-</b>	•	•		
Deduction	\ \lambda282	Δ81	623	1,310	1,842	1,159	1,975	2,499	2,915	3,894	14,854
(5-a)	<del></del>						_	••	_		



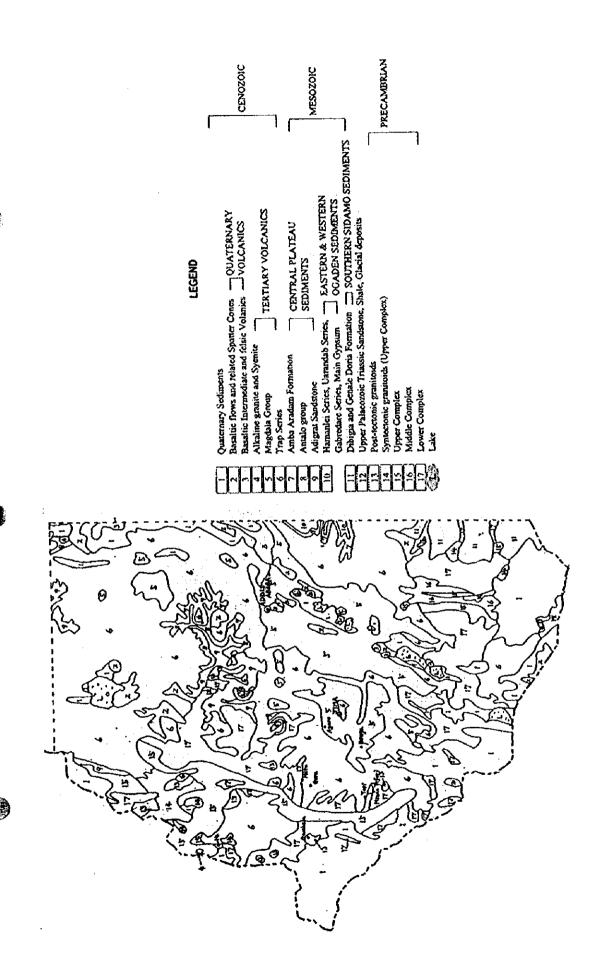
Appendix Fig. 1 The map of Study Area (10 NFPAs)



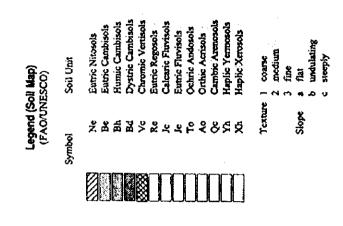
Appendix Fig. 2 Average monthly precipitation and temperature

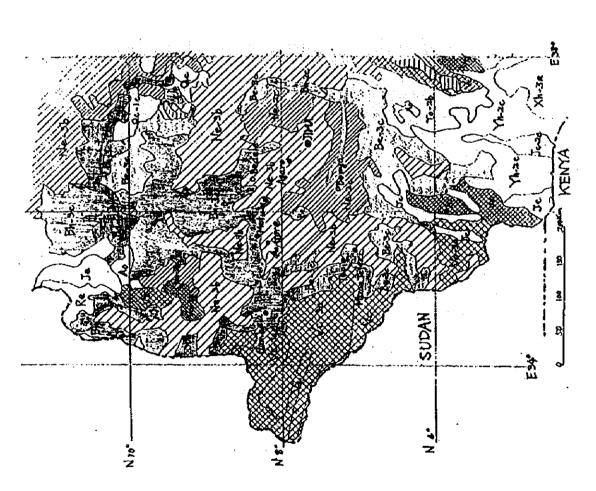


Appendix Fig. 3 Monthly total precipitation in Jimma, from 1976 to 1995



Appendix Fig. 4 Geology Map of southwest Ethiopia



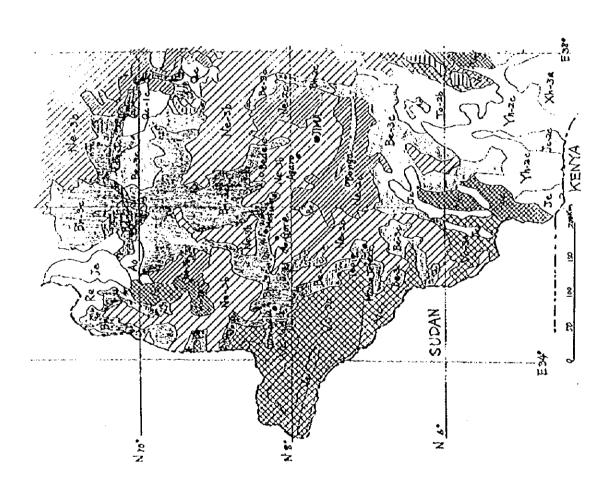


Appendix Fig. 5 Soil Map of southwest Ethiopia

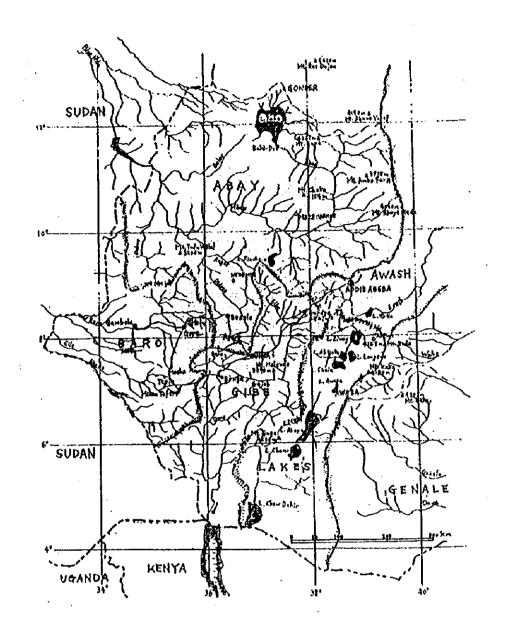
Legend (Soli Map)
(FAO/UNESCO)

Symbol Soil Unit

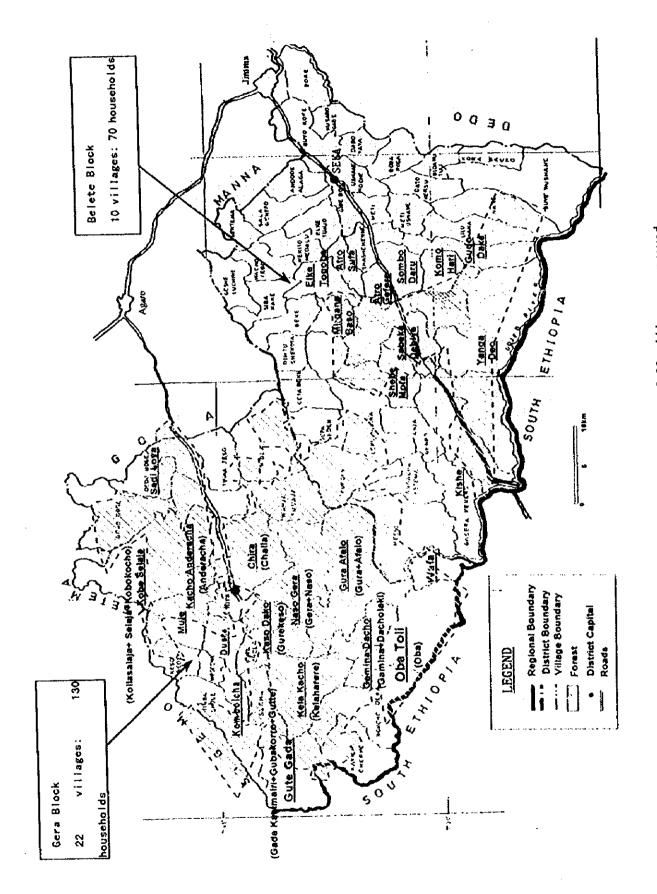
Ne Eutric Cambisols
Bh Humic Cambisols
Bc Dystric Cambisols
C Chromic Vertisols
C Calcaric Fluvisols
C Calcaric Fluvisols
C Calcaric Fluvisols
C Calcaric Fluvisols
C Calcaric Fluvisols
C Calcaric Fluvisols
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C Cambis Amolic Articols
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Appendix Fig. 5 Soil Map of southwest Ethiopia



Appendix Fig. 6 Drainage and river basin (Southwest Ethiopia)



Appendix Fig. 7 Locations of 32 villages surveyed

Profite No.	Location			Date	Weather		Surveyor	
						\\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\		
Land form			S	Soil Profile Store	Slope	Land use or Vegetation	retation	
Parent Material		Drainage		Moisture Condition		Grounds	Groundwater table (m)	
1. Horison symbol			1	12	Ħ	×	٨	<b>F</b>
2. Depth of top and bottom of horizon	om of borizon		1	-	1	-		1
3. Boundary of borizon			p 18 2 e	2 C 22 d	a c g d	₽ C 18 G	D 28 0 4	2
4. Form of boundary			q i 🗚 ß	3 w i b	d i w a	>	A	
S. Colour	· wet							
	· dry							-
6. Mottling	- abandance		n o j	ii c iii	u o j	f c B	8	E .
	· size			, a		t B		
	· contrast		f d p	4 P F	d p )	d P J		d P
	· colour		***************************************	***************************************				- 1
7. Texture	· fine carth		S 1 S	S 1 S	2 IS T S	SLSic	S 1 Si C	
			SLSC	SLS	2 1 S C	S 1 S C	SLSC	SLSC
	· large particle - Size (cm)	(cm)						
	•	*						
8. Structure	• grade		# B	8 88 1	s u w [	n &	5 A A	7 × B ×
	· type		VEDSORV	pebspgv	A M d s q D d	pebspgw	pebapgy	* * * * * * * * * * * * * * * * * * *
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9. Considence	- wet - stickness	cocae	S	5x 52 5x	SW S SH SH		८५ ८ ८३ १५	Sr S Su Su
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	· moist		lo, M, fr, Ft, VF, eF	10, M, ft. Ft. VF. eF	la, vf., ft., Fi. vF. ef	lo, vf. fr. Fi. vF. eF	lo, vf. fr. Fi, vF. eF	10, vf. fr. fr. vf. eF
	· day		lo, S, s.H, H, v.H, e.H	b, S, 1H, H, vH, eH	lo, S, sH, H, vH, eH	lo, S, EH, H, vH, eH	b, S, s.H, H, v.H.,e.H	10, S, s.H, H, v.H, e.H
10. Others (Othans, Cement pH, Roots, Humus Dip	Others (Cutans, Cementation, pores pans, Efflorescene, pH, Roots, Humus Dip, Ben. Hardness (mm), etc.)	נספטור. פנג)						

Appendix Fig. 8 (2) Soil profile chart

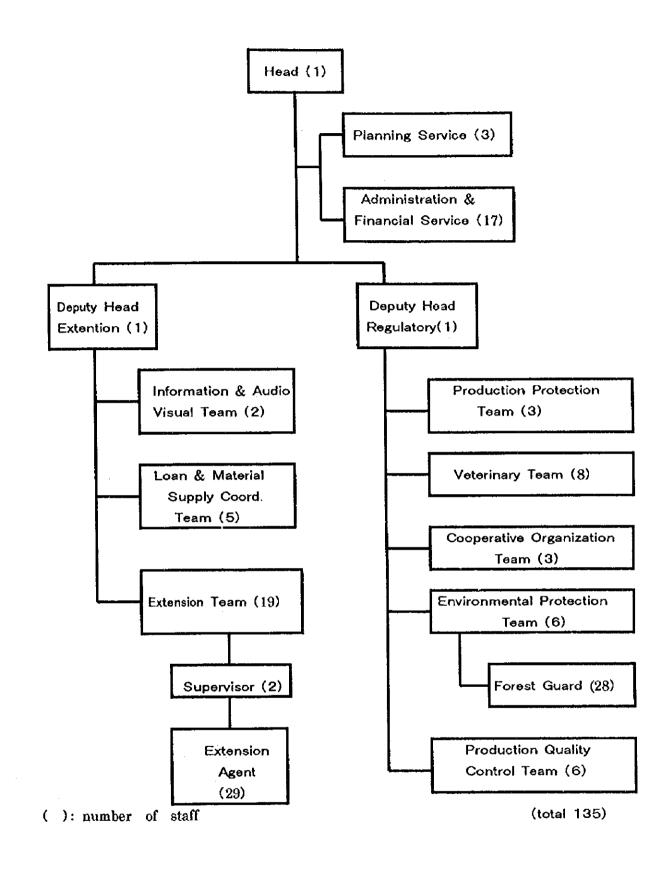
Soil Profile

Profile No. 27 Location Belett.	E / Tugo Michi	7 Dete Jan. 11 - 97	-97 Weater Fine	Sine	Surveyor TESEA	Surveyor HIYOSHI TAKATOH
1		Elevation 2365an	Store 15-30°	<b></b>	Land use or Vegetation Natural forest	forest
	Drainage Well	Mointure Condition	Wet	Crounder	Groundwater table (m)	_
1. Horison symbol	1 A,	n Az	в В+,	W B+2	v 873	" C
2. Depth of top and bottom of horizon	8-0	3-14	15- 40	0E - 07	001 - 02	100
3. Boundary of barison		0 0	9 (D) 7	9 (O)	P (1) > •	2 (O E
4. Form of boundary	, ©	9 . 9	• •	•	٠ 🛞 ۽	• 📀 :
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λ.p.	V V 9	2/ 1/2		2	×/ ×/ ×-	258%
6. Mottling . abundance	) j	# P P	f c B	un >	tt o	E .
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· contrast	d p	7	T	d p	d p	f d p
· colour	· > > > > > > > > > > > > > > > > > > >	***************************************				
7. Texture . time earth	.S 1, S	7 S	S 1 Si C	3 . S . S	2 15 T S	SLSiC
	O 85 T 8		2 2 2 2	SUSIC	SLSC	SZSIC
· large particle - Size (cm)		0.1~T	7.7	2:2	ソンプ	イバウ
•	*	***************************************				
8. Structure · grade	8 E	s E E	# E	* (%)	• • •	• • •
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9, Consistence - wet - socimos			BS (60 S vS	S & & &	8 <b>6</b> 0 8 8	જ ટ્રજીઝ
- plasticity	d^ d d @		# ⊕ ₩	다. (요) 4:4 4:4 4:4 4:4 4:4 4:4 4:4 4:4 4:4 4:	₽ ₽ ⊕	α α (P) γγ
moint.	la of fr. Fr. vF. eF	, eF b, vf, fr, Fi, vF, eF	la, ví, fr. Fi, vF, eF	la, vd. fr, Fi, vF, eF	lo, vf. fr. Fr. vF. eF	lo, vf, fr, Fi, vF, eF
· dry	10, S, a.H. H, v.K, e.H	eh lo, S. s.R. N. vH, eH	lo, S. aH, H. vH. eH	b, S, eH, H, vH, eH	b, S, 1H, H. vH, eH	lo, S, s.H. H. v.H. e.H
10. Others (Cutara, Cementation, pores para, Efforencenc, pH, Roots, Huma Dip, Ben, Hardness (mm), etc)	Foot-af	Rest - cas	Rut-c(F)	Rut-funt	Root - few ( ) Root - vary few ? Root - way few	Rest-very free
	· · · · · ·			25×30mm	B	Later In
				nite Rule	Mita hale	
	Handness	Handware	Herduns	Hardnass / 6 mm	Hardness (9 mm	Herdness
	PA STOS	- pH 4.87	F9.4 Hd	PH 4.76	PH 4.97	79% Hd

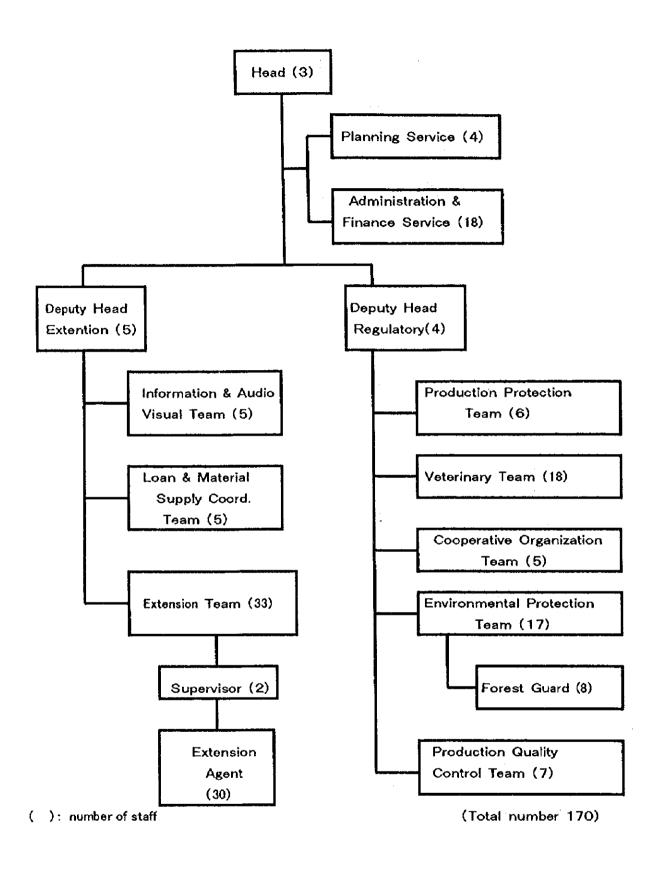
Appendix Fig. 9 (1) Soil profile

		Location 4	Mish. + Seuls	The state of the s	Belox
1. Maytenus undata 2. Ficus sur	4. Syzygium guineense	6. Hagenia abyssinica 7 Ekebergia capensis	8 Octea Kenyensis 9 Polyscias ferrunginea	11 Vapris dainallii 12. Measa lanceolata	13. Croton macrostachyus 14. Podocarpus gracillior 15. Albizia gunmitera
		机大			

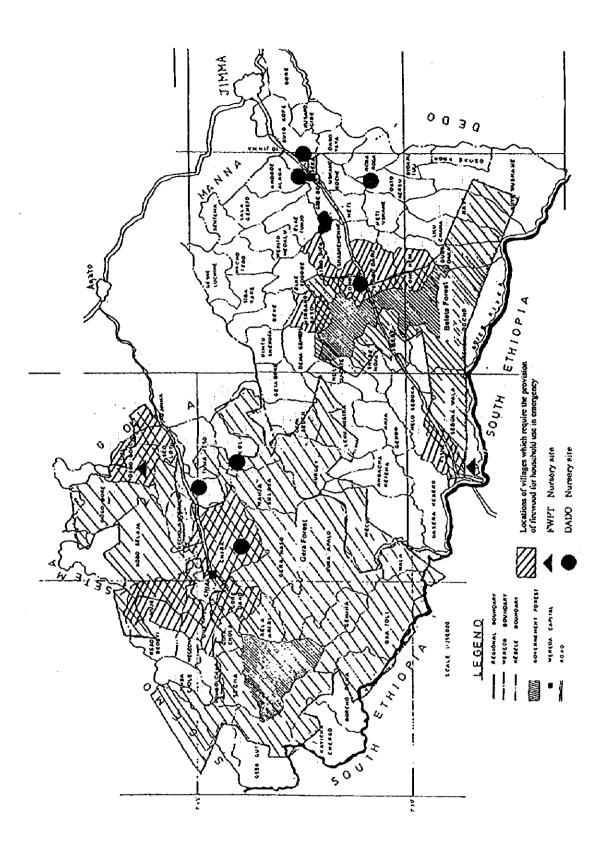
Appendix Fig. 9 (2) Soil profile



Appendix Fig. 10 Organization chart of Seka Chekorsa district agriculture development office (June 1997)

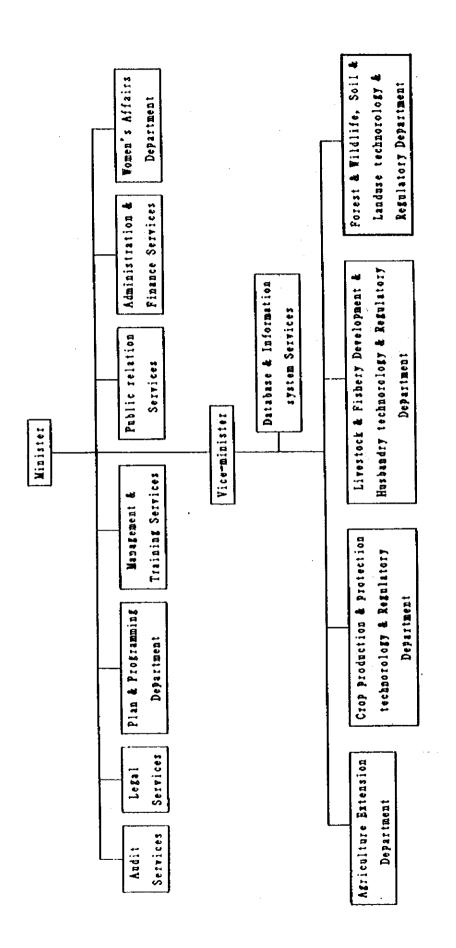


Appendix Fig. 11 Organization chart of Gera district agriculture development office (June 1997 plan)

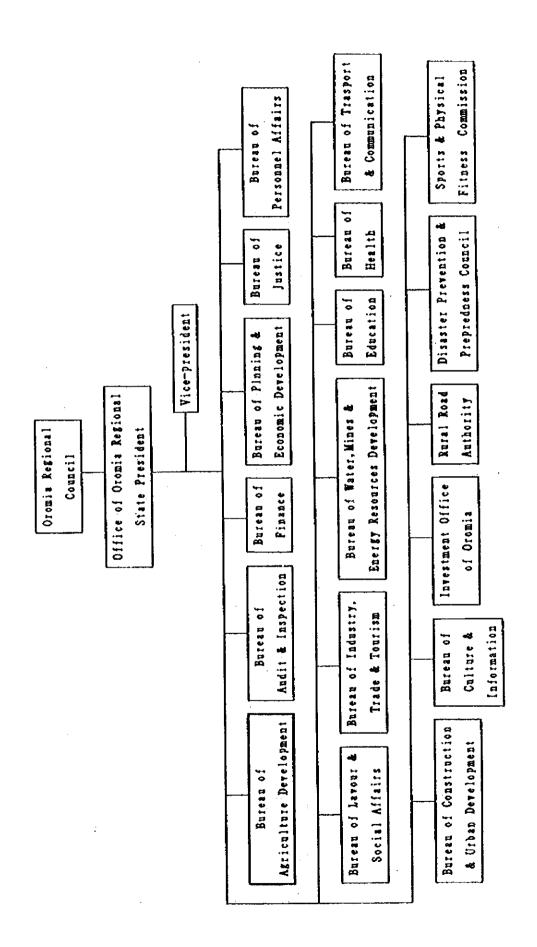


Note: This village map is prepared solely for the convenience of local community survey and social forestry survey.

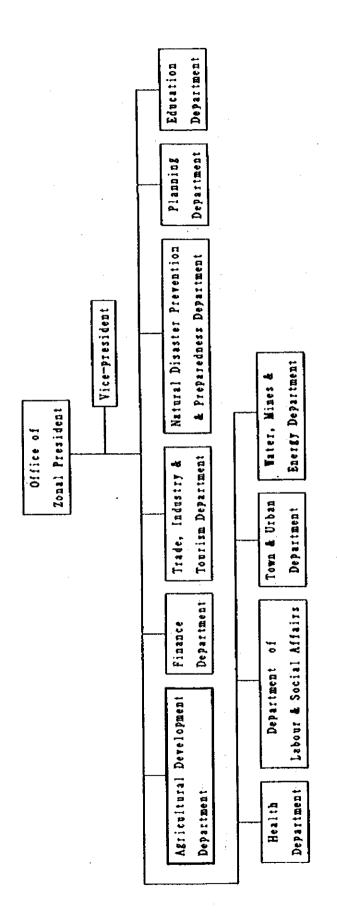
Appendix Fig. 12 Villages with urgent need to secure firewood for household consumption and locations of existing nursery Sites



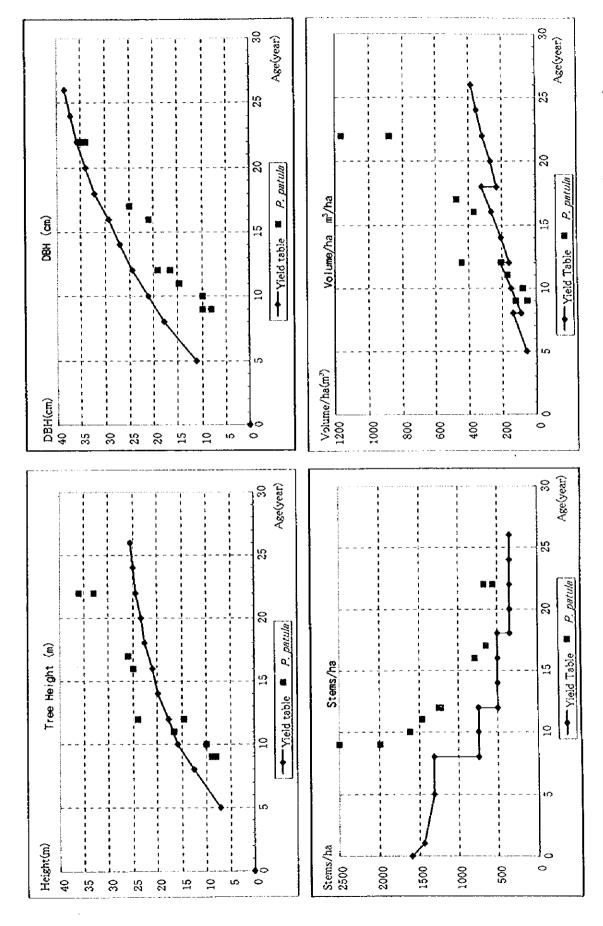
Appendix Fig. 13 Organizational structure of MoA



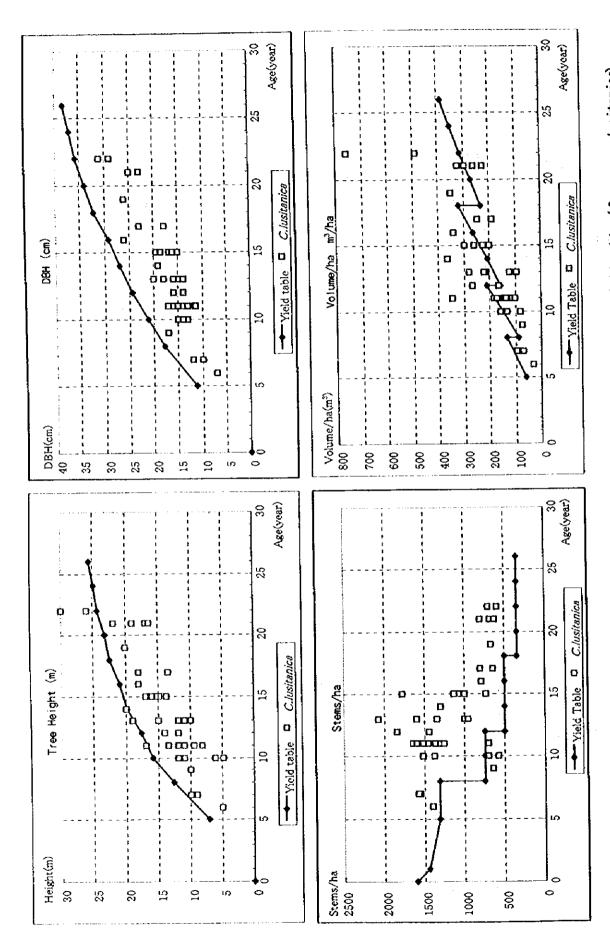
Appendix Fig. 14 Administrative structure of Oromia Region



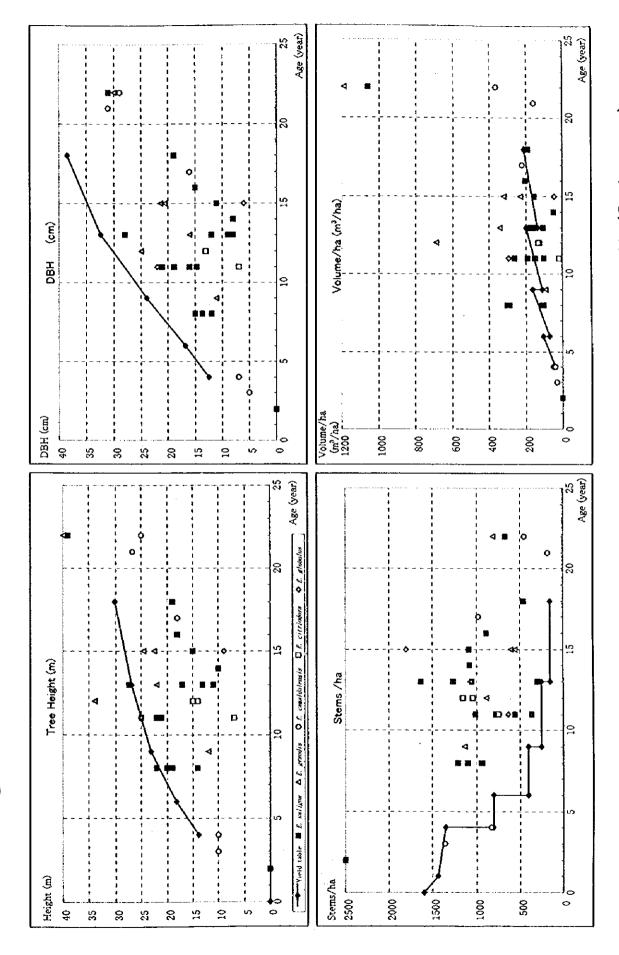
Appendix Fig. 15 Administrative structure of the zones within the Oromia Region



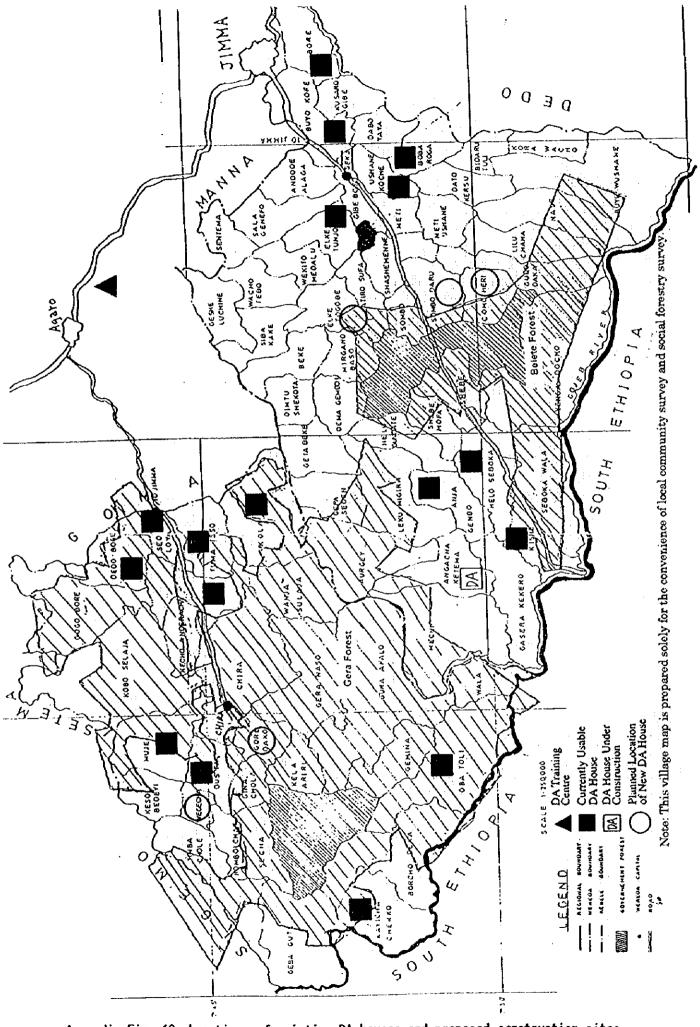
Appendix Fig. 16 Results of standard plot survey in forest plantation and existing yield table (Pinus patula)



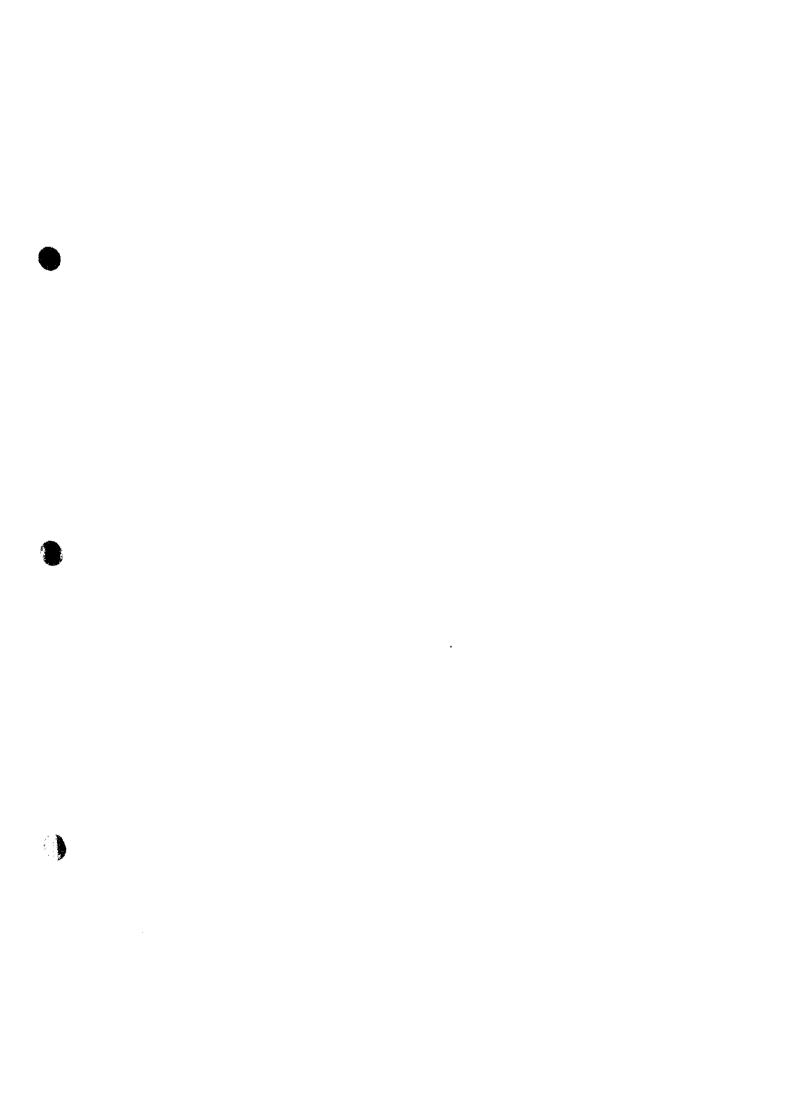
Appendix Fig. 17 Results of standard plot survey in forest plantation and existing yield table (Cupressus Jusitanica)



Appendix Fig. 18 Results of standard plot survey in forest plantation and existing yield table (Eucalyptus spp.)



Appendix Fig. 19 Locations of existing DA houses and proposed construction sites (122)



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