Tables

Table 1.6.1 Member List of JICA Study Team and Counterpart Personnel

JICA Study Team

Mr. Nobuo Sambe	Team Leader
Mr. Keiji Nakaoka	Agricultural Infrastructure / Farm Road
Mr. Hisashi Ishikawa	Agriculture / Extension System / Livestock
Dr. Itaru Kozaki	Horticulture
Mr. Akeshi Mori	Marketing / Agro-processing
Mr. Hiroyuki Sasaki	Construction Machinery and Equipment
Mr. Seiji Itaya	Rural Socio-economy / Environmental Impact Examination
Mr. Yoshiharu Toyama	Light-load Bridge
Mr. Tetsuo Mori	Coordinator

Counterpart Personnel (MOA)

Dasho Sangay Thinley	Overall Supervision, Secretary, MOA
Mr. Karma Tashi	Chief Field Counterpart, EPO, RNRRC-East, Khangma, MOA
Ms. Deki Pema	Coordinator (National), PPD, MOA
Mr. Dorji Rinchen	Marketing/Agro-processing, AMS, PPD, MOA
Mr. Nedrup Tsewang	Construction Machinery and Equipment, DRDS, MOA

Counterpart Personnel (Lhuntse Dzongkhag)

Mr. S.D. Thapa	Dzongkag Coordinator, Socio-economy, Planning Officer
Mr. H.R.Ghalley	Agricultural Infrastructure, Dzongkhag Engineer
Mr. O.N.Giri	Agricultural Infrastructure, Dzongkhag Engineer
Mr. Deepak Rai	Agriculture, Horticulture, Extension Assistant Dzongkhag Coordinator, Dzongkhag Agriculture Officer
Mr. B.B.Shangshon	Livestock, Dzongkhag Animal Husbandry Officer, Lhuntse Dzongkhag
Mr. Nima Tshering	Environment, Dzongkhag Forest Officer

Counterpart Personnel (Mongar Dzongkhag)

Mr. Chimi Tshewang	Dzongkag Coordinator, Statistic Officer
Mr. Melam Zangpo	Socio-economy, Planning Officer
Mr. Penden Norgey	Agricultural Infrastructure, Dzongkhag Engineer
Mr. Tandin Dorji	Agriculture, Horticulture, Extension, Assistant Coordinator Dzongkhag Agriculture Officer
Mr. Dorji Wangchuk	Livestock, Dzongkhag Animal Husbandry Officer
Mr. Rinchen	Environment, Dzongkhag Forest Officer

Table 3.1.1 Population and Households in the Study Area

Dzongkhag	Gewog	Nos. of Villages	Area (km^2)	Population	Nos. of Households	Average Family Size
Lhuntse	Gangzur	25	536	3,487	459	7.6
	Jaray	9	136	1,360	216	6.3
	Khoma	17	653	2,400	323	7.4
	Kurtoe	18	991	1,692	200	8.5
	Menbi	27	89	3,142	405	7.8
	Metsho	27	217	2,142	244	8.8
	Minjay	13	138	2,219	266	8.3
	Tsenkhar	20	130	2,984	403	7.4
	sub-total	156	2,888	19,426	2,516	7.7
Mongar	Balam	4	27	1,614	181	8.9
	Chali	8	42	1,952	262	7.5
	Chaskhar	8	53	3,095	401	7.7
	Drametse	15	79	4,734	534	8.9
	Drepong	5	51	1,733	217	8.0
	Gongdue	8	187	3,246	333	9.8
	Jurme	5	55	2,141	260	8.2
	Kengkhar	7	100	3,178	384	8.3
	Mongar	9	77	4,544	461	9.9
	Ngatshang	8	71	2,615	268	9.8
	Saleng	11	462	2,718	293	9.3
	Serimuhang	7	302	2,593	269	9.6
	Silambi	6	163	2,812	311	9.0
	Thangrong	7	69	2,228	274	8.1
	Tsakaling	16	72	3,132	332	9.4
	Tsamang	4	144	1,803	186	9.7
	sub-total	128	1,954	44,138	4,966	8.9
	Total	284	4,842	63,564	7,482	8.5

Source: Ninth Plan (2002-2007), Renewable Natural Resources Sector, MOA and Dzongkhag and Interview survey.

Table 3.2.1 Climate Conditions

Humidity

Station name	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave.
Lingmithang	88.7	85.4	81.2	78.8	81.0	84.2	87.6	85.3	83.3	82.3	80.9	85.8	83.7
Yadi	84.0	80.3	66.0	79.3	83.9	85.3	90.5	88.8	88.3	84.6	80.5	81.7	82.8
Mongar	56.2	56.2	59.2	60.7	62.6	76.6	73.2	76.2	75.1	70.8	66.9	64.9	66.5
Sherichu	68.9	52.6	59.1	58.5	64.7	79.7	80.6	78.5	81.2	72.5	68.4	66.2	69.2
Tangmachu	83.1	82.0	81.5	80.2	82.6	84.0	89.3	90.2	89.0	86.3	83.0	81.8	84.4
Autsho	86.1	81.8	78.8	75.1	81.1	85.4	88.2	88.3	87.5	83.1	81.0	82.9	83.3
Dhungkhar	80.6	78.4	78.9	80.8	82.6	84.4	86.4	89.2	86.9	82.6	79.8	79.0	82.5
Khomachu	80.6	76.8	79.3	78.6	82.9	83.6	85.1	87.9	86.4	82.1	78.8	79.8	81.8

Temperature (Average of max)

Station name	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave.
Lingmithang	22.4	23.8	27.1	29.6	31.3	32.3	31.9	31.9	30.2	30.0	27.0	24.1	28.5
Yadi	14.9	15.8	16.9	21.7	23.4	24.9	25.1	25.2	24.6	23.0	19.6	16.5	21.0
Mongar	16.0	17.9	21.3	24.2	26.0	26.6	24.1	26.9	26.3	24.2	20.6	17.2	22.6
Sherichu	18.6	14.9	14.2	19.6	22.9	30.1	29.8	30.8	29.0	26.9	22.6	20.0	23.3
Tangmachu	14.5	15.4	19.7	23.3	25.4	26.6	27.0	27.3	25.7	23.8	20.7	16.5	22.2
Autsho	19.3	20.9	24.6	27.9	29.7	30.4	30.1	30.3	29.4	28.0	24.8	21.3	26.4
Dhungkhar	19.3	20.2	22.1	24.3	26.4	27.2	28.3	28.0	27.1	24.6	21.5	19.2	24.0
Khomachu	17.3	19.3	22.9	26.1	27.3	28.7	28.9	29.2	28.3	26.6	23.1	18.7	24.7

Temperature (Average of min)

Station name	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave.
Lingmithang	8.7	10.9	13.5	17.0	20.2	22.5	23.0	22.1	20.6	18.0	12.3	9.4	16.5
Yadi	6.3	7.1	7.9	12.6	15.8	18.4	18.6	18.1	17.7	13.8	9.2	7.0	12.7
Mongar	6.5	8.0	11.2	14.5	16.6	19.0	18.4	18.7	17.7	14.4	10.6	7.9	13.6
Sherichu	11.7	6.5	9.2	12.7	15.8	23.3	21.8	23.8	21.2	19.7	16.0	12.3	16.2
Tangmachu	4.8	6.4	8.9	9.5	13.0	16.1	16.9	17.0	17.0	11.4	7.0	4.8	11.1
Autsho	7.6	9.4	13.0	15.6	18.7	20.6	20.9	21.1	19.8	16.5	12.4	9.0	15.4
Dhungkhar	2.1	3.6	7.6	10.1	12.8	15.6	16.8	16.6	15.6	11.6	7.2	3.4	10.3
Khomachu	7.1	8.6	11.4	15.0	16.9	19.4	19.7	19.3	18.7	15.3	10.9	7.7	14.1

Rainfall (Total)

Station name	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Lingmithang	13.3	17.6	34.2	57.1	94.6	175.8	221.2	166.0	117.6	45.9	4.9	4.5	953
Yadi	12.8	29.9	34.0	70.5	96.9	162.7	228.4	161.7	98.1	39.4	10.2	4.3	949
Mongar	8.3	24.9	34.5	54.3	88.1	143.5	205.2	191.9	86.4	49.8	7.3	4.0	898
Sherichu	4.7	21.3	78.3	21.7	113.6	174.9	172.8	179.1	108.3	42.7	22.9	0.0	940
Tangmachu	10.2	22.2	30.7	50.9	114.0	141.2	188.4	126.2	115.4	45.9	11.5	3.8	860
Autsho	12.4	19.3	50.7	70.3	114.4	181.8	247.7	177.6	121.9	60.6	17.8	11.7	1,086
Dhungkhar	15.2	27.6	60.2	112.3	188.3	207.9	269.9	287.8	199.1	98.4	18.3	9.1	1,494
Khomachu	6.5	16.8	32.1	71.5	105.1	120.9	153.1	170.0	101.6	39.5	8.2	4.8	830

Sorce: Department of Power, Ministry of Trade and Industries

Notes: 4 stations in Mongar Dzongkhag (Lingmithang, Yadi, Mongar and Sherichu) and 4 stations in Lhuntse Dzongkhag (Tangmachu, Autsho, Dhungkhar and Khomachu).
Altitude of each stations are, 700 m (Lingmithang), 1,580 m (Yadi), 1,600 m (Mongar), 705 m (Sherichu), 1,750 m (Tangmachu), 800 m (Autsho), 2,010 m (Dhungkhar) and 1,230 m. (Khomachu).
Data are average of monthly average of ten years.

Table 3.3.1 Present Land Use

		Lhuntse		Mongar		Total	
		Area (ha)	Ratio (%)	Area (ha)	Ratio (%)	Area (ha)	Ratio (%)
1	Forest	217,351	75.3%	172,258	88.5%	389,609	80.6%
2	Pasture						
	Natural pasture	9,452	3.3%	1,395	0.7%	10,847	2.2%
	Improved pasture	0	0.0%	156	0.1%	156	0.0%
	Subtotal	9,452	3.3%	1,551	0.8%	11,003	2.3%
3	Agriculture						
	Wet land	944	0.3%	627	0.3%	1,571	0.3%
	Dry land	2,383	0.8%	7,077	3.6%	9,460	2.0%
	Tseri land	3,289	1.1%	5,904	3.0%	9,193	1.9%
	Mixed land	6,196	2.1%	5,408	2.8%	11,604	2.4%
	Subtotal	12,812	4.4%	19,016	9.8%	31,828	6.6%
4	Horticulture	0	0.0%	0	0.0%	0	0.0%
5	Settlement	36	0.0%	91	0.0%	127	0.0%
6	Others	49,109	17.0%	1,821	0.9%	50,930	10.5%
	Total	288,760	100.0%	194,737	100.0%	483,497	100.0%

Source: Land Cover Maps of Lhuntse and Mongar Dzongkhags (1/100,000), MOA

Table 3.3.2 Agriculture Land Area by Data Sources

(Unit: ha)

Dzongkhag	Lhuntse			Mongar		
Data source	*1	*2	*3	*1	*2	*3
Agricultural land						
Wet land	926	812	944	495	500	627
Dry land	1,296	1,371	2,383	3,112	3,055	7,078
Kitchen garden	105	49	-	146	45	-
Tseri land	1,748	1,030	3,289	1,595	1,263	5,904
Mixed land *4	-	-	6,196	-	-	5,408
Subtotal	4,075	3,262	12,812	5,348	4,863	19,017
Horticulture land	0	14	0	191	64	69
Pasture land	871	790	2,480	523	367	300
Total	4,946	4,066	15,292	6,062	5,294	19,386

Data sources *1: Land registration record
*2: RNR Statistics 2000
*3: Land Cover Maps Lhuntse and Mongar Dzongkhags (1/100,000), MOA
*4: Mixed Land Use of Wet, Dry and Tseri Lands

Table 3.3.3 Land Tenure Status and Cultivated Land Size Distribution

(Unit: %)

	Lhuntse Dzongkhag		Mongar Dzongkhag	
	Wet land	Dry land	Wet land	Dry land
Land tenure status (% of land area)				
Own and operated	79.5	78.7	89.5	83.1
Leased in	5.0	1.6	1.8	1.3
Leased out	7.4	2.4	2.9	2.2
Left fallow	8.1	17.3	5.9	13.4
Cultivated land size (% of households)				
< 0.4 ha	24.7	14.1	62.7	10.8
0.4 - 1.2 ha	52.7	49.0	28.2	64.8
1.2 - 2.0 ha	15.0	23.0	4.5	18.2
2.0 - 2.8 ha	2.3	8.2	1.3	3.7
2.8 - 4.0 ha	1.8	2.4	0.0	1.3
4.0 - 10.0 ha	3.6	1.6	0.0	1.2
> 10.0 ha	0.0	1.7	3.2	0.0

Source: RNR Statistics 2000

Table 3.3.4 Food Crop Production in the Study Area

		Lhuntse	Mongar	Total	National
Paddy	Area (ha)	750	440	1,190	19,148
	Production (ton)	2,918	1,445	4,363	68,573
	Yield (kg/ha)	3,890	3,287	3,667	3,581
Maize	Area (ha)	1,093	3,092	4,185	31,137
	Production (ton)	3,158	10,565	13,722	77,298
	Yield (kg/ha)	2,890	3,417	3,279	2,483
Other cereals	Area (ha)	147	461	608	15,882
	Production (ton)	242	584	826	12,767
	Yield (kg/ha)	1,646	1,267	1,359	804
Cereals Total	Area (ha)	1,990	3,992	5,982	66,167
	Production (ton)	6,318	12,593	18,911	158,638
	Yield (kg/ha)	3,175	3,154	3,161	2,398
Mustard seed	Area (ha)	39	78	117	3,450
	Production (ton)	17	45	63	1,696
	Yield (kg/ha)	440	580	533	492
Soybean	Production (ton)	30	63	93	577

Source: RNR Statistics 2000, MOA

Table 3.3.5 Production of Major Horticultural Crops in the Study Area

	Lhuntse		Mongar	
Vegetables	Planed area (ha)	Production (ton)	Planted area (ha)	Production (ton)
Total	-	667	-	3,218
Potato	38	332	241	2,132
Chili	57	151	53	154
Radish	14	55	62	340
Tree crops	No. of Trees (1,000 tree)	Production (ton)	No. of Trees (1,000 tree)	Production (ton)
Total	11.00	197	51.88	1,206
Apple	1.29	11	1.42	12
Orange	4.81	60	24.58	594
Walnut	1.66	18	7.09	51
Peach	1.44	39	4.99	232
Mango *	-	-	8.14	-

Source : RNR Statistics 2000, and Mango *: Mongar Dzongkhag

Table 3.3.6 Livestock Animals and Livestock Production

		Lhuntse Dzongkhag *			Mongar Dzongkhag *		
Rearing number of livestock animals	Unit	Total	Per HH	HH ratio	Total	Per HH	HH ratio
Cattle	head	14,089	5.6	78%	26,635	5.4	83%
Yak	head	44	0.0	1%	0	0.0	0%
Horses/Mule/Donkey	head	1,950	0.8	41%	2,655	0.6	34%
Sheep/Goat	head	286	0.1	1%	446	0.1	5%
Pigs	head	1,617	0.6	40%	4,398	0.9	47%
Poultry	head	9,577	3.8	78%	17,564	3.5	73%
Livestock products	Unit	Total		Per HH	Total		Per HH
Milk	liter	1,098,000		436	2,055,000		414
Butter	kg	76,000		30	125,000		25
Cheese	kg	115,000		46	179,000		36
Egg	piece	920,600		247	1,405,400		283
Productivity	Unit						
Milk (per milking cow)	kg	393			391		
Local	kg	362			358		
Improved	kg	616			667		
Egg (per total poultry)	piece	65			80		

Note * per HH: average number of animals of per total household,
HH ratio: Percentage of rearing household total households
Source: RNR Census 2000

Table 3.3.7 Cropping System of Major Crops

Crop	Growing season	Farming practices	Inputs
Paddy	Nursery: Apr/May Transplanting: Jun/Jul Harvesting: Oct/Nov	Majority is local variety; dry nursery; transplanting; manual threshing in the farm after several days drying	Generally used FYM, less used chemical fertilizer, some of farmers use herbicide for reduction of labor requirement of weeding
Maize	Sowing: Mar/Apr/May Harvesting: Aug/Sep	Improved variety is planted, farming practice provided by manual	Generally used FYM, less used chemical fertilizer
Other cereal crops	Summer cropping: Apr - Oct Winter cropping: Sep - Apr	Generally extensive farming practices	Generally no used inputs
Beans (Soya /Rajma beans) / Mustard	Summer cropping: Apr/May/Jun - Sep/Oct Winter cropping: Sep/Oct - Mar/May	Generally extensive farming practices	Generally no used inputs
Vegetables	Sawing: Feb - Jul Harvesting: Jun - Dec	Most of vegetable planted in kitchen garden except for some of potato	Generally used FYM and chemical fertilizer, seed provided from DSC through Commission Agents
Fruit tree	Perennial	Generally poor management (pruning, thinning)	Usually no use of input, Saplings supplied from DSC through Commission Agents

Table 3.3.8 Farm Household Economy

(Unit: Nu.)

Cash Income Expenditure

	Study Area	Lhuntse	Mongar	Study Area	Lhuntse	Mongar
Income						
Food crop	3,400	7,700	1,200	12%	26%	5%
Horticulture crop	4,600	1,900	5,900	16%	6%	22%
Livestock	6,100	6,200	6,000	22%	21%	22%
Agriculture/livestock total	14,100	15,800	13,200	50%	53%	49%
Off farm income	14,100	14,100	14,100	50%	47%	51%
Total Income	28,200	29,900	27,300	100%	100%	100%
Expenditure						
Production Cost	9,300	8,400	9,800	33%	28%	36%
Living expenditure	18,900	21,500	17,500	67%	72%	64%
Staple food	3,200	4,800	2,300	11%	16%	8%
Other food	2,200	2,600	2,000	8%	9%	7%
Food total	5,400	7,400	4,300	19%	25%	16%
Other living expenditure	13,500	14,100	13,200	48%	47%	48%
Total Expenditure	28,200	29,900	27,300	100%	100%	100%
Including self-consumption of own-products						
Income						
Food crop	15,400	19,700	13,200	30%	37%	26%
Horticulture crop	7,800	5,100	9,100	15%	10%	18%
Livestock	13,700	13,800	13,600	27%	26%	27%
Agriculture/livestock total	36,900	38,500	36,000	72%	73%	72%
Off farm income	14,100	14,100	14,000	28%	27%	28%
Total Income	51,000	52,600	50,100	100%	100%	100%
Expenditure						
Production cost	9,300	8,400	9,800	18%	16%	20%
Living expenditure	41,700	44,300	40,300	82%	84%	80%
Food expenditure	28,200	30,200	27,100	55%	57%	54%
Other expenditure	13,500	14,100	13,200	26%	27%	26%
Total Expenditure	51,000	52,600	50,100	100%	100%	100%

Source: Farm household survey, conducted by the Study Team (2002)

Table 3.3.9 Food Production and Food Security in the Study Area

	Unit	Lhuntse	Mongar	Total
Cereal crop production (rough grain)				
Paddy	ton	2,918	1,445	4,363
Maize	ton	3,158	10,565	13,722
Other cereals	ton	242	584	825
Total	ton	6,318	12,593	18,911
Food cereals that are excluded seed use and losses				
(15 - 20 % of the production, assuming to be 17.5 % for seed and losses)				
Rice	ton	2,408	1,192	3,600
Maize	ton	2,605	8,716	11,321
Other cereals	ton	199	481	681
Total	ton	5,212	10,389	15,601
Food grain (milling recovery rates are 60 % for paddy, and 80 % for maize and others)				
Rice	ton	1,751	867	2,618
Maize	ton	2,526	8,452	10,978
Other cereals	ton	193	467	660
Total	ton	4,470	9,785	14,256
Per capita milled grain (Population, Lhuntse: 19,426, Mongar: 44,138)				
Rice	kg	90	20	41
Maize	kg	130	191	173
Other cereals	kg	10	11	10
Total	kg	230	222	224

Source: JICA Study Team, and Cereal production: RNR Statistics 2000

Table 3.4.1 Road Details in Bhutan (as of June, 2001)

Unit= Length in km

No.	Name of Dzongkhag	Black topped	Not black topped	Agency												Total of Various Categories of Road(km)					Grand Total
				Project Dantak			DoR				DoF	Dz. Adm.	Agr. & AH	DoE	DoT	DoP						
1	Sarpang	120.44	134.65	0.00	0.00	0.00	120.44	0.00	0.00	38.50	93.25	2.40	0.00	0.30	0.20	0.00	120.44	0.00	0.00	41.40	93.25	255.09
2	Dagana	4.00	114.36	0.00	0.00	0.00	0.00	87.00	0.00	16.86	0.00	13.00	0.00	1.50	0.00	0.00	0.00	87.00	0.00	31.36	0.00	118.36
3	Tsirang	91.20	16.48	0.00	0.00	0.00	62.00	0.00	1.50	24.00	6.48	10.00	0.00	0.50	3.20	0.00	62.00	0.00	1.50	37.70	6.48	107.68
4	Zhemgang	150.35	89.36	0.00	0.00	0.00	144.00	0.00	1.15	30.80	58.16	0.00	0.00	2.20	3.40	0.00	144.00	0.00	1.15	36.40	58.16	239.71
5	Trongsa	167.00	31.26	0.00	0.00	0.00	167.00	0.00	0.00	0.00	10.71	0.00	18.40	0.80	1.35	0.00	167.00	0.00	0.00	20.55	10.71	198.26
6	Bumthang	132.60	102.00	0.00	0.00	0.00	122.00	0.00	0.00	25.00	47.60	13.30	25.50	0.90	0.00	0.30	122.00	0.00	0.00	65.00	47.60	234.60
7	Haa	58.00	42.08	16.00	25.60	16.00	0.00	0.00	0.00	8.60	32.98	0.00	0.00	0.90	0.00	0.00	16.00	25.60	0.00	25.50	32.98	100.08
8	Samtse	80.80	45.70	0.00	0.00	0.00	0.00	108.80	0.00	14.90	0.00	0.00	0.00	2.30	0.50	0.00	0.00	108.80	0.00	17.70	0.00	126.50
9	Paro	164.78	71.30	103.00	36.40	0.00	0.00	0.00	0.00	12.26	5.19	7.52	49.54	5.67	16.50	0.00	103.00	36.40	0.00	91.49	5.19	236.08
10	Chukha	320.46	134.03	150.00	0.00	0.00	63.00	0.00	15.72	45.00	33.02	11.00	0.00	1.00	26.26	109.49	213.00	0.00	15.72	192.75	33.02	454.49
11	Thimphu	221.51	131.97	47.00	0.00	0.00	64.00	0.00	69.14	39.67	110.36	0.00	15.50	6.15	0.16	1.50	111.00	0.00	69.14	62.98	110.36	353.48
12	Wangdue	154.25	112.97	0.00	0.00	0.00	150.76	0.00	0.00	51.55	39.00	0.00	0.00	0.30	0.72	24.89	150.76	0.00	0.00	77.46	39.00	267.22
13	Punakha	31.27	69.70	0.00	0.00	0.00	9.00	0.00	0.00	71.27	1.95	0.00	11.50	0.95	6.30	0.00	9.00	0.00	0.00	90.02	1.95	100.97
14	Trashigang	165.50	96.30	121.00	0.00	0.00	20.00	5.00	0.00	89.00	8.50	10.00	0.00	7.50	0.00	0.80	141.00	5.00	0.00	107.30	8.50	261.80
15	S/Jongkhar	120.30	82.25	59.00	0.00	0.00	1.80	55.00	0.00	0.00	29.90	50.50	0.00	6.35	0.00	0.00	60.80	55.00	0.00	56.85	29.90	202.55
16	Mongar	205.00	87.55	0.00	0.00	0.00	177.00	21.00	0.00	33.00	34.75	0.00	2.50	0.60	5.20	18.50	177.00	21.00	0.00	59.80	34.75	292.55
17	Pemagatsel	37.90	28.40	0.00	0.00	0.00	0.00	23.00	0.00	19.30	17.60	2.00	0.00	0.10	4.30	0.00	0.00	23.00	0.00	25.70	17.60	66.30
18	Lhuntse	43.95	17.00	0.00	0.00	0.00	0.00	43.00	0.00	10.95	0.00	0.00	0.00	0.00	0.00	7.00	0.00	43.00	0.00	17.95	0.00	60.95
19	Tashiyangtse	52.90	2.20	0.00	0.00	0.00	0.00	40.00	0.00	8.00	0.00	4.00	0.00	3.10	0.00	0.00	0.00	40.00	0.00	15.10	0.00	55.10
20	Gasa	0.00	7.30	0.00	0.00	0.00	0.00	0.00	0.00	7.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.30	0.00	7.30
	Total	2,322.21	1,416.86	496.00	62.00	16.00	1,101.00	382.80	87.51	545.96	529.45	123.72	122.94	41.12	68.09	162.48	1,597.00	444.80	87.51	1,080.31	529.45	3,739.07

Note: N.H. National Highway
D.R. District Road
F.R. Feeder Road
U.R. Urban Road
DoF Department of Forest
Dz. Dzongkhag
Adm. Administration
Agr. Agriculture
AH Animal Husbandry
DoE Department of Education
DoT Department of Tele-communication
DoP Department of Power

Table 3.4.2 Road Details in the Study Area (as of June, 2001)

Unit= Length in km

Name of Road	Black topped	Not black topped	Year of Construction	Agency														Total of Various Categories of Road(km)					Grand Total
				Project Dantak			DoR				DoF	Dz. Adm.	Agr. & AH	DoE	DoT	DoP								
				N.H.	D.R.	F.R.	N.H.	D.R.	U.R.	F.R.	Forest Road	F.R.	F.R.	F.R.	F.R.	F.R.		N.H.	D.R.	U.R.	F.R.	Forest Road	(km)
Lhuntse																							
1) Galakpa - Lhuntse Road (Part of Mongar - Lhuntse road)	43.00	-	1980	-	-	-	-	43.00	-	-	-	-	-	-	-	-	-	-	43.00	-	-		43.00
2) Feeder road to Tangmachu	-	10.00	1986	-	-	-	-	-	-	10.00	-	-	-	-	-	-	-	-	-	-	10.00		10.00
3) Thimyyul Power project road	-	7.00		-	-	-	-	-	-	-	-	-	-	-	-	7.00	-	-	-	-	7.00		7.00
4) Forest road	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-
5) Approach road to Royal Guest House	0.95	-		-	-	-	-	-	-	0.95	-	-	-	-	-	-	-	-	-	-	0.95		0.95
Total	43.95	17.00		0.00	0.00	0.00	0.00	43.00	0.00	10.95	0.00	0.00	0.00	0.00	0.00	7.00	0.00	43.00	0.00	17.95	0.00	60.95

Note: It is not shown that Rongmanchu forest road has been constructed about 7km.

Name of Road	Black topped	Not black topped	Year of Construction	Agency														Total of Various Categories of Road(km)					Grand Total
				Project Dantak			DoR				DoF	Dz. Adm.	Agr. & AH	DoE	DoT	DoP								
				N.H.	D.R.	F.R.	N.H.	D.R.	U.R.	F.R.	Forest Road	F.R.	F.R.	F.R.	F.R.	F.R.		N.H.	D.R.	U.R.	F.R.	Forest Road	(km)
Mongar																							
1) Thrimsingla- Kurizampa Highway	84.00	-		-	-	-	84.00	-	-	-	-	-	-	-	-	-	-	84.00	-	-	-		84.00
2) Kurizammpa - Haylong Highway (part of Mongar - Tashingang	93.00	-		-	-	-	93.00	-	-	-	-	-	-	-	-	-	-	93.00	-	-	-		93.00
3) Gangola - Galakpa road (part of Mongar - Lhuntse road)	21.00	-	1980	-	-	-	-	21.00	-	-	-	-	-	-	-	-	-	-	21.00	-	-		21.00
4) Feeder road to Drametse	-	18.00	1980	-	-	-	-	-	-	18.00	-	-	-	-	-	-	-	-	-	-	18.00		18.00
5) Feeder road to Chaskhar	-	11.00	1988	-	-	-	-	-	-	11.00	-	-	-	-	-	-	-	-	-	-	11.00		11.00
6) App. road to Korila Repeater Station		0.76	1992												0.76						0.76		0.76
7) App. road to Thrimsingla R/Station		4.44	1992												4.44						4.44		4.44
8) App. road to Khalamzi Power House		1.50														1.50					1.50		1.50
9) App. road to Kurichhu Power Plant	7.00	-														7.00					7.00		7.00
10)Yadi-Shershong road		4.00								4.00											4.00		4.00
11) App. road to Mongar High School		0.10												0.10							0.10		0.10
12) App. road to Yadi Primary School		0.50												0.50							0.50		0.50
13) Feeder road to Wengkhar		2.50											2.50								2.50		2.50
14) Haul road to Kurichhu Hydro-Power Project	-	10.00		-	-	-	-		-	-	-	-	-	-	-	10.00	-	-	-	-	10.00		10.00
15) Forest road		34.75									34.75											34.75	34.75
Total	205.00	87.55		0.00	0.00	0.00	177.00	21.00	0.00	33.00	34.75	0.00	2.50	0.60	5.20	18.50	177.00	21.00	0.00	59.80	34.75	292.55

Table 3.4.3 Present Situation of the Construction Equipment (Paro Valley Project, 1989 - 1994) (1/3)

Equipment	Machine Model / (User No)	Main Spec.	Delivery Year	Working hours or Distance (km)	Machine condition	Workability from now	*Standard life time
Bulldozer	D83E-1 (No.1)	205 HP	1990	?	■	--- (Paro)	9.9 years
	D63E-1 (N0.2)	140 HP	1990	5,450.6 H	■	1 year (Trashigang /Galing)	
	D63E-1 (No.3)	140 HP	1990	5,350.3 H	■	6 months (Bumthang)	
	D63E-1 (No.4)	140 HP	1990	4,890.6 H	◎	1 year (Bumthang)	
	D63E-1 (No.5)	140 HP	1990	5,980.5 H	■	1 year (Trashigang)	
	D85A-18 (No.6)	225 HP	1995	4,970.5 H	◎	2 year (Paro)	
	D65E-12 (No.7)	180 HP	1995	6,584.0 H Abnormal wear (sprocket, roller)	◎	2 year (Mongar /**Chaskhar**)	
Dozer Shovel	**D21S (No.8)**	39.5 HP	1990	3,225.8 H	X	--- (**Paro**)	9.0 years
Hydraulic Excavator	**PC200-5 (No.1)**	123 HP 0.8 m^3 (Heaped)	1990	---	X	--- (**Paro**)	7.1 years
	PC200-5 (No.2)		1990	---	■	--- (Trashigang)	
	PC200-5 (No.3)		1990	?	■	--- (Paro)	
	PC200-5 (No.4)		1990	? Under repair (Undercarriage unit exchange)	■	(**Paro**)	
	PC200-5 (No.5)		1995	5,400.0 H Boom cracked	■	1 year (**Chaskhar**)	
	PC200-5 (No.6)		1995	?	◎	1 year (Trongsa /Chenjibi)	
	PC60-5 (No.1)	54 HP 0.28 m^3 (Heaped)	1990	11,360.2 H	▲	--- (Paro)	
	PC60-5 (No.2)		1995	11,360.2 H	■	1 year (Paro)	
	PC05-6 (No.1)	12.8 HP	1990	---	X	--- (**Paro**)	
	PC05-6 (No.2)		1990	---	X	--- (**Paro**)	
Dump Truck	BG-1 (0051) No.1	275 PS 8 m^3 (12 ton) 6 x 4	1990	---	○	2 years (Paro)	7.5 years
	BG-1 (0052) No.2		1990	---	X	--- (Paro)	

Table 3.4.3 Present Situation of the Construction Equipment (Paro Valley Project, 1989 - 1994) (2/3)

Equipment	Machine Model / (User No)	Main Spec.	Delivery Year	Working hours or Distance (km)	Machine condition	Workability from now	*Standard life time
Dump Truck	BG-1 (0053) No.3		1990	?	○	1 year (Bumthang)	
	BG-1 (0054) No.4		1990	---	△	1 year (Bumthang)	
	BG-1 (0055) No.5		1990	55,251.6 km	○	1 year (Paro)	
	BG-1 (0056) No.6		1990	---	○	1 year (Bumthang)	
	BG-1 (0236) No.7		1995	?	◎	1 year (Paro)	
	BG-1 (0237) No.8		1995	68,689.9 km	○	2 years (Bumthang)	
	BG-1 (0238) No.9		1995	?	△	1 year (Bumthang)	
	BG-1 (0239) No.10		1995	?	◎	2 years (Bumthang)	
	BG-1 (0240) No.11		1995	?	◎	2 years (Bumthang)	
Truck (Self Loader)	BG-1 (0059) No.1	315 PS 6 x 4	1990	---	△	3 month (Paro)	8.3 years
Cargo Truck	BG-1 (0057) No.1	275PS Crane: 6 t	1990	---	■	1 year (Bumthang)	8.3 years
Mixer Truck	**BG-1 (0060) No.1**	160 PS 4 x 2 3.4 m^3	1990	---	▲	6 months **(Paro)**	8.6 years
	BG-1 (0134) No.2		1994	?	▲	1 year (Bumthang)	
	BG-1 (0135) No.3		1994	?	▲	6 month **(Paro)**	
	BG-1 (0210) No.4		1994	?	▲	1 year **(Paro)**	
Oil Tanker (3,000lit)	BG-1 (0061) No.1	158 HP 4 x 2	1990	13,801.2 km	◎	1 year (Paro)	8.3 years
Mobile Workshop	**BG-1 (0058) No.1**	160 PS 4 x 2	1990	52,869 km	▲	1 year **(Paro)**	8.3 years

Table 3.4.3 Present Situation of the Construction Equipment (Paro Valley Project, 1989 - 1994) (3/3)

Equipment	Machine Model / (User No)	Main Spec.	Delivery Year	Working hours or Distance (km)	Machine condition	Workability from now	*Standard life time
Wheel Loader	**WA70-1 No.1**	55 HP 0.8 m^3	1990	2965.5 H	X	--- **(Paro)**	9.4 years
	WA100-1 No.2		1994	5,400 H	△	1 year **(Bumthang)**	
	WA100-1 No.3		1994	?	○	1 year (Paro)	
	WA100-1 No.4		1994	5,859 H Engine damaged	△	1 year **(Bumthang)**	
Vibration Roller	**JV100WA-1 No.1**	130 HP 10.59 t F: Smooth Roller R: Tire	1990	? Engine damaged	△	6 months **(Paro)**	9.8 years
	JV100WA-1 No.2		1995	?	◎	1 year **(Paro)**	
Air Compressor	**PDS390**	105 PS 11 m^3/ min	1990	2,080 H	■	1 year **(Chaskhar)**	10.2 years
Motor Grader	GD511-1 No.1		1994	?	◎	2 years (Bumthang)	11.1 years
Rough Terrain Crane	**TR-250E**	20 t	1990	? Injection pump, starting motor, computer damaged	△	6 months **(Paro)**	8.3 years
Jack Hammer	Toyo TY16	17 kg	1990	---	X	--- (Paro)	4.3 years

(Note)
1)*: Based on the standard coefficients of the Ministry of Public and Construction of Japan.
2)? : Unknown working hours (H) or distance (km)
3)---: Working hour meter or distance (km) meter is damaged.
◎:Workable, ○:Under periodical maintenance, △:Waiting spare parts, ▲:Under repair, ■: workable but sometimes, X: Scrap, **Bold type**: Checked machine

Table 4.1.1 Summary of Zoning by Gewog

Zoning / Gewogs	Index for Zoning							
	1:Living Standard Index	2:Agro-ecology	3:Food Security	4:Special Crops	5:Land Resources	6:Access to Road	7:Access to Export	DEVELOP-MENT STAGE
Lhuntse Dzongkhag								
L1 Gangzur	B	A	B	A	B	C	B	2
L2 Jaray	C	A	C	C	A	C	C	1
L3 Khoma	C	A	B	A	B	C	C	1
L4 Kurtoe	C	A	B	B	A	C	C	1
L5 Menbi	A	A	B	A	B	A	B	3
L6 Metsho	C	A	C	B	A	C	C	1
L7 Minjay	B	A	B	A	B	B	B	2
L8 Tsenkhar	B	A	B	C	A	B	B	2
Mongar Dzongkhag								
M1 Balam	B	A	B	B	C	C	C	2
M2 Chali	A	B	B	B	C	B	B	2
M3 Chaskhar	A	A	B	A	C	A	A	3
M4 Drametse	A	B	B	B	C	C	A	2
M5 Drepong	C	A	C	B	B	C	B	1
M6 Gongdue	C	C	C	B	A	C	C	1
M7 Jurme	C	B	C	B	B	C	C	1
M8 Kengkhar	C	C	C	B	B	C	C	1
M9 Mongar	A	A	B	B	C	A	A	3
M10 Ngatshang	A	B	B	B	C	A	A	3
M11 Saleng	B	B	B	B	C	B	B	2
M12 Serimuhang	B	B	B	C	C	C	C	2
M13 Silambi	C	B	C	C	A	C	C	1
M14 Thangrong	C	B	C	C	B	C	C	1
M15 Tsakaling	B	B	B	C	A	B	B	2
M16 Tsamang	B	B	C	B	C	B	C	2

Table 5.3.1 Priority and Potential Crops Presented by Gewogs in Workshop (1/2)

	Field crops	Fruit / Tree crops	Other horticulture crops	Special crops	Livestock
Lhuntse					
1. Gangzur	1 Paddy, 2 Maize, 3 Wheat	1 Orange, 2 Mango, 3 Apple	1 Chili, 2 Potato, 3 Cardamom		1 Cattle, 2 Pig, 3 Poultry
2. Jaray	1 Maize, 2 Paddy, 3 Wheat, 4 Mustard, 5 Barley, 6 Soybean, 7 Pulse, 8 Buckwheat	1 Apple, 2 Pear, 3 Walnut, 4 Peach, 5 Chestnut, 6 Orange, Mango	1 Chili, 2 Potato, 3 Bean, 4 Pumpkin, 5 Radish, 6 Cabbage	Lemongrass	1 Cattle, 2 Poultry, 3 Pig,
3. Khoma	1 Paddy, 2 Finger millet, 3 Maize, 4 Dry-land rice, 5 Wheat/ Barley/ Buckwheat/ Mustard/ Soybean	1 Orange, 2 Pear, 3 Peach, 4 Mango, Apple	1 Chili, 2 Potato, 3 Cabbage, 4 Tomato		1 Cattle, 2 Pig, 3 Poultry, 4 Horse
4. Kurtoe	1 Paddy, 2 Maize, 3 Wheat, 4 Barley, 5 Soybean, 6 Dry land rice/ Mustard	1 Orange, 2 Pear, 3 Peach, 4 Walnut, 5 Mango, Apple	1 Potato, 2 Chili, 3 Soybean, Radish	Thaecleng, Kertocepa, Nery shig thorme	1 Cattle, 2 Pig, 3 Poultry
5. Menbi	1 Paddy, 2 Maize, 3 Wheat, Mustard, Soybean, Groundnut	1 Orange, 2 Peach, 3 Mango, 4 Walnut, 5 Persimmon	1 Chili, 2 Potato, 3 Chilly, 4 Cardamom		1 Cattle, 2 Pig, 3 Poultry
6. Metsho	1. Maize, 2. Paddy, 3 Wheat, 4 Barley, 5 Soybean, 6 Pulses, 7 Mustard, Buckwheat, Dry land rice	1 Orange, 2 Apple, 3 Peach, 4 Mango, Pear, Walnut	1 Chili, 2 Potato, 3 Vegetables (Radish, Cabbage, Mustard green, Cauliflower), 4 Ginger, Cardamom		1 Cattle, 2 Pig, 3 Poultry
7. Minjay	1 Paddy, 2 Maize, 3 Wheat, Mustard, Soybean	1 Mango, 2 Orange, 3 Peach, 4 Apple	1 Chili, 2 Potato, 3 Ginger, Cardamom		1 Cattle, 2 Pig, 3 Poultry
8. Tsenkhar	1 Paddy rice, 2 Maize, 3 Wheat, 4 Soybean, 5 Barley	1 Mango, 2 Orange, 3 Peach, 4 Apple	1 Potato, 2 Chili, 3 Radish/Bean/Cabbage		1 Cattle, 2 Pig, 3 Poultry
Mongar					
1. Balam	1 Maize, 2 Soybean, 3 Paddy, 4 Barley, 5 Mustard, 6 Wheat	1 Orange, 2 Peach, 3 Walnut, 4 Apple, Mango, Persimmon	1 Potato, 2 Chili, 3 Ginger, 4 Garlic, 5 Onion	Acorus calamus	1 Cattle, 2 Pig, 3 Poultry
2. Chali	1 Maize, 2 Paddy, 3 Barley, 4 Buckwheat, 5 Mustard, 6 Pulses, 7 Soybean,	1 Orange, 2 Mango, 3 Walnut, 4 Pear, 5 Pear, 6 Guava, 7 Banana	1 Potato, 2 Chili, 3 Vegetables (Beans, Radish, Carrot), 4 Sugarcane	Artemesia	1 Cattle, 2 Pig, 3 Poultry
3. Chaskhar	1 Maize, 2 Paddy, 3 Wheat, 4 Mustard	1 Orange, 2 Mango, 3 Plum, 4 Walnut, Apple	1 Potato, 2 Chili, 3 Vegetables (Cabbage, Radish)	Lemongrass, Lac	1 Cattle, 2 Poultry, 3 Pig
4. Drametse	1 Maize, 2 Paddy, 3 Soybean, 4 Pulses, 5 Mustard, 6 Buckwheat, 7 Beans	1 Orange, 2 Mango, 3 Walnut, 4 Apple, 5 Chestnut, 6 Persimmon	1 Potato, 2 Chili, 3 Vegetables	Acrorus	1 Cattle, 2 Horse/ Mule, 3 Pig, 4 Poultry

Note: Names of crops are in order of the priority in the Gewog

Table 5.3.1 Priority and Potential Crops Presented by Gewogs in Workshop (2/2)

	Field crops	Fruit / Tree crops	Other horticulture crops	Special crops	Livestock
5. Drepong	1 Maize, 2 Barley, 3 Paddy, 4 Wheat, Mustard, Soybean	1 Orange/ Walnut, 2 Mango, 3 Apple	1 Potato, 2 Cabbage/Radish, 3 Chili, Ginger	Lemongrass oil	1 Cattle, 2 Pig, 3 Poultry
6. Gongdue	1. Maize, 2 Buckwheat, 3 Soybean, 4 Mustard, 5 Dry land Rice, 6 Wheat, 7 Paddy, 8 Pulses.	1 Orange, 2 Mango, 3 Walnut, 4 Jack fruit	1 Potato, 2 Chili, 3 Cardamom, 4 Vegetables (Cabbage, radish)		1 Cattle, 2 Poultry, 3 Pig,
7. Jurme	1 Maize, 2 Pulses, 3 Buckwheat, 4 Soybean, 5 Barley Wheat, 6 Mustard	1 Orange, 2 Mango, 3 Walnut, 4 Apple, 5 Peach, 6 Pear	1 Potato 2 Ginger, 3 Chili, 4 Vegetables	Artemesia	1 Cattle, 2 Pig, 3 Poultry
8. Kengkhar	1 Maize, 2 Foxtail millet, 3 Barley, 4 Mustard, 5 Soybean, 6 Buckwheat, 7 Beans,	1 Orange, 2 Mango, 3 Walnut, 4 Peach	1 Ginger 2 Potato, 3 Vegetables (cabbage, Radish)		1 Cattle, 2 Pig, 3 Poultry
9. Mongar	1 Maize, 2 Barley, 3 Wheat, 6 Dry land rice, Mustard, Soybean, Pulses	1 Orange, 2 Mango, 3 apple, 4 Walnut, 5 Pear, Peach, Persimmon, Plum	1 Chili, 2 Potato, 3 Ginger	Lemongrass, Wild asparagus	1 Cattle, 2 Poultry 3 Pig,
10. Ngatshang	1 Maize, 2 Paddy, 3 Barley, 4 Mustard, 5 Buckwheat, 6 Pulses	1 Orange, 2 Mango, 3 walnut, 4 Peach, 5 Apple	1 Potato, 2 Chili, 3 Vegetables	Lemongrass, Lac	1 Cattle, 2 Pig, 3 Poultry
11. Saleng	1 Maize, 2 Paddy, 3 Peas Wheat, 5 Barley	1 Orange, 2 Mango, 3 Walnut	1 Potato, 2 Vegetables	Lemongrass	1 Cattle, 2 Poultry, 3 Pig
12. Serimuhang	1 Maize, 2 Paddy, 3 Barley, 4 Buckwheat, 5 Mustard, 6 Wheat, 7 Soybean, 8 Pulses	1 Orange, 2 Mango, 3 Walnut, 4 Apple, 5 Peach, 6 Pear, 7 Persimmon, 8 Chestnut	1 Chili, 2 Potato, 3 Vegetables (Radish, Pumpkin)		1 Cattle, 2 Pig, 3 Poultry
13. Silambi	1 Maize, 2 Mustard, 3 Soybean, 4 Wheat, 5 Upland rice, 6 Millet	1 Orange, 2 Walnut,	1 Chili, 2 Potato,		1 Cattle, 2 Pig, 3 Poultry
14. Thangrong	1 Maize, 2 Wheat, 3 Barley, 4 Paddy, 5 Mustard, 6 Soybean, 7 Pulses, 8 Buckwheat,	1 Mango, 2 Orange, 3 Walnut, 4 Peach, 5 Pear, 6 Apple	1 Potato, 2 Chili, 3 Ginger 4. Cardamom, 5 Groundnut		1 Cattle, 2 Pig, 3 Poultry
15. Tsakaling	1 Maize, 2 Paddy, 3 Soybean, 4 Mustard	1 Mango, 2 Orange, 3 Walnut	1 Potato, 2 Chili, 3 Rajma bean	Wild asparagus, Artemesia	1 Cattle, 2 Pig, 3 Poultry
16. Tsamang	1 Maize, 2 Paddy,	1 Orange, 2 Walnut, 3 Mango,	1 Potato, 2 Chili, 3 Ginger		1 Cattle, 2 Poultry

Note: Names of crops are in order of the priority in the Gewog

Table 5.3.2 Sub-program Description of Program for Food Crop Production Increase (1/2)

Title	Food Security	**Stage of Gewog**: 1, 2 & 3
Implementing Organization	Dzongkhag	
Agency concerned	RNR Centers in Gewogs, RNR-RC-East, MOA	

Objectives:
1) Attainment of food sufficiency in the Gewogs suffering seasonal food shortage,
2) Production increase of food coping population increase,

Input:
None

Activities:
1) Proper and environmentally sustainable land use plan,
2) Input supply including improved / high yielding variety seeds,
3) Improvement of extension system (demonstration plot, farmers field school),
4) Training of EAs by Dzongkhag and MOA

Expected effects / profits:
1) To solve food shortage in each Gewog,
2) To make sure food security in whole Gewog,
3) To traine EA

Remarks:
1) Close relation with the Extension Strengthening Sub-program for Food Crops

Title	Paddy Rice Production	**Stage of Gewog**: 1, 2 & 3
Implementing Organization	Dzongkhag	
Agency concerned	RNR Centers in Gewogs, RNR-RC-East, MOA	

Objectives:
1) Production increase of paddy rice

Input:
None

Activities:
1) Proper and environmentally sustainable land use plan,
2) Introduction improved / high yielding varieties,
3) Improvement of extension system (demonstration plot, farmers field school, pilot area selection),
4) Training of EAs by Dzongkhag and MOA

Expected effects / profits:
1) To improve self-sufficiency rate of rice,
2) To train EA

Remarks:
1) Close relation with the Extension Strengthening Sub-program for food crops and Irrigation Development Sub-program

Table 5.3.2 Sub-program Description of Program for Food Crop Production Increase (2/2)

Title	Irrigation Development	**Stage of Gewog**: 1, 2 & 3
Implementing Organization	Gewog supported by Dzongkhag, Participation by Farmers	
Agency concerned	EA	
Objectives: 1) Production increase of paddy rice		
Input: 1) Rehabilitation and expansion of irrigation facilities: 747.9ha of 37 schemes in Lhuntse, 748.1 ha of 38 schemes in Mongar.		
Activities: 1) Rehabilitation and expansion of irrigation facilities with participated by beneficiaries, 2) Organizing and strengthening of WUA, 3) Strengthening of existing support system of MOA		
Expected effects / profits: 1) To improve self-sufficiency of rice		
Remarks: 1) Close relation with the Paddy Production Sub-program, 2) List of Irrigation Development in the Study Area is shown in Table 5.3.6		

Title	Backyard Animal Husbandry	**Stage of Gewog**: 2 & 3
Implementing Organization	Gewog supported by Dzongkhag,	
Agency concerned	EA	
Objectives: 1) Income increase through utilizing of surplus cereals (maize), 2) Production of good FYM materials, 3) Improvement of nutritious diets for rural people		
Input: None		
Activities: 1) Technical guidance of improved animal husbandry including improved animal shed/pen, 2) Supply of improved breeds		
Expected effects / profits: 1) To increase farmers income, 2) To improve nutrition conditions of rural people, 3) To prepare good FYM		
Remarks:		

Title	Post-harvest Technology Training	**Stage of Gewog**: 1, 3 &3
Implementing Organization	Dzongkhag Office	
Agency concerned	Supported by PHU/MOA	
Objectives: 1) To extend improved post-harvest processing technology for food crop and reduce losses and improve the condition of food self-sufficiency.		
Input: None		
Activities: 1) Creation of P/H technology training program in consultation with the PHU, covering the fields of drying, threshing and storage, 2) Carrying out the training for the agricultural extension agents (EA).		
Expected effects / profits: 1) Establishment of technology transfer linkage from the PHU as R & D agency to farmers.		
Remarks:		

Table 5.3.3 Sub-program Description of Program for Cash Crop Production Strengthening (1/2)

Title	Market Research	**Stage of Gewog**: -
Implementing Organization	RNR-RC-East	
Agency concerned	Cooperated by AMS	

Objectives:

To ensure the sustainable income increase of farmers through the integrated development of selected export products.

Input:

1) Participation of foreign experts.

Activities:

1) Organizing the study team composed fo the following members:
   Team leader: Director of RNR-RC-East
   Staff of AMS/PPD (1)
   Staff of RNR-RC-East (2)
   Extension Agents (4)
   Experienced experts (2)
2) Dividing two groups in charge of markets in India + Southeast Asia and in Europe as the research areas, and carrying out the preliminary analysis on general information, preparation of the long list of the potential crops and formulation of the field study plan attached with questionnaire, check list and itinerary.
3) Carrying out the market survey in India + Southeast Asia and Europe separately.
4) Selecting 5 to 6 target crops by analysis of the survey result and prepare the integrated development and action plan of each crop by each sector concerned such as R & D activity, extension activity, and marketing activity.

Expected effects / profits:

1) Demonstration of market research.
2) Promotion of the comparative advantage condition of selected crops production in the future.
3) Maintaining the sustainable circumstance for income increase of farmers in the Study Area.

Remarks:

Title	Technical Research and Development	**Stage of Gewog**: -
Implementing Organization	RNR-RC-East	
Agency concerned	MOA, Dzongkhag	

Objectives:

1) Establishment of farming technology on selected cash crops including seed and sapling production,
2) Varietal improvement,
3) Post-harvest and marketing technology,
4) Training of EAs through OJT

Input:

1) Experienced experts,
2) Laboratory and laboratory equipment,
3) Greenhouse and research farm equipment

Activities:

1) Research and development on cash crops including production technology, post-harvest and marketing,
2) Research of proper farming technology

Expected effects / profits:

1) To establish adaptable technology,
2) To select suitable varieties

Remarks:

1) Close relation with the Extension Strengthening Sub-program for Cash Crops

Table 5.3.3 Sub-program Description of Program for Cash Crop Production Strengthening (2/2)

Title	Training of Extension Agents	**Stage of Gewog**: -
Implementing Organization	RNR-RC-East	
Agency concerned	MOA, Dzongkhag	
Objectives: 1) Capacity building of EAs on specific cash crops		
Input: 1) Experienced experts, 2) Training hall with training equipment, and boarding facility for trainees		
Activities: 1) OJT training on targeted cash crops including farming technology, post-harvest and marketing, 2) Training on procedures of extension activity in the field level (farmers field school, awareness of farmers on cash crops, organizing farmers group, etc)		
Expected effects / profits: 1) EAs trained on cash crops for dissemination to farmers, 2) Technology disseminated to other EAs and Gewog through trained EA		
Remarks: 1) Close relation with the Extension Strengthening Sub-program for Cash Crops		

Title	Agro-Processing Technology Training	**Stage of Gewog**: -
Implementing Organization	RNR-Center	
Agency concerned	Supported by Dzongkhag	
Objectives: 1) To extend marketing and agro-processing technology and foster entrepreneurs for agro-processing business, 2) To create the incubation place of local agro-processing business and provide training and experimental activities for business development, 3) To increase opportunity for inhabitants especially women, to participate in the development of agro-processing business and to increase income.		
Input: 1) Small factory as a training and experimental facility, If possible, a trial sales shop will be attached to it as an annex and constructed in the downtown of Mongar. 2) Introduction of a series of simple and small-scale processing equipments such as: cooker, fryer, dryer, roaster, refrigerator, and oven, bottling machine, canning machine and sealer, 3) Participation of foreign experts in charge of training to trainers. a) Training of various processing, management and marketing technology to trainers b) Dzongkhag office's assistance for acquiring land or a building of an annex in or near the bus terminal in Mongar.		
Remarks: -		

Table 5.3.4 Sub-program Description of Market System Development Program (1/2)

Title	Collection Depot Construction	**Stage of Gewog**: 1, 2 &3
Implementing Organization	Dzongkhag Office Managed by Gewog Office after construction	
Agency concerned	EA	
Objectives: To increase opportunity for farmers to meet buyers.		
Input: Materials for shed depot		
Activities: 1) Construction of depots beside the road used for collection depot for buyers.		
Expected effects / profits: 1) More buyers come to buy the products, 2) Farmers have more opportunity to sell their products.		
Remarks: -		

Title	Group Assembling	**Stage of Gewog**: 1, 2 & 3
Implementing Organization	Farmers group in the Gewogs of stage 2 and 3, and some of stage 1.	
Agency concerned	Supervised & supported by Gewog & EA	
Objectives: To increase income and stability of sales.		
Input: (Using collection depots)		
Activities: 1) Organizing farmers using the collection depot, and forming the management members among organized farmers, 2) Bringing the products to the depot by each member farmer, 3) Promotion of the better condition for selling products such as grading and repacking by the management members, 4) Carrying out the transaction between buyers and farmers in the depot.		
Expected effects / profits: 1) Generating bargaining power to buyers, 2) Creation of stable marketing condition.		
Remarks: -		

Table 5.3.4 Sub-program Description of Market System Development Program (2/2)

Title	Group Assembling and Marketing	**Stage of Gewog**: 2 &3
Implementing Organization	Farmers group in the Gewogs of stage 2 and 3.	
Agency concerned	Supervised & supported by Gewog, EA, DAO and FCB	
Objectives: To create the comparative advantage condition of sales and gain more profit.		
Input: 1) Storage house, a) Provision of market information of Mongar market by the DOA and of the auction yard in Samdrup Jongkhar by FCB, b) Training of i) Management and marketing, and ii) Information collection and analysis to the management members		
Activities: 1) Strengthening ability of the management members above (#2) to carry out the group assembling activities, 2) Collection and analysis of market information, 3) Planning of assembling schedule among members, 4) Grading and repacking of products at the depot, 5) Transporting and selling at local markets or at the auction yard in Samdrup Jongkhar, 6) Storing some products once and shipping after studying market condition.		
Expected effects / profits: 1) Demonstration of market-oriented group marketing activity, 2) Generating bargaining power to markets, 3) Possibilities of expanding activities to the fields of agro-processing industry for adding value of products		
Remarks: -		

Title	Marketing Support by FCB	**Stage of Gewog**: 2 & 3
Implementing Organization	FCB	
Agency concerned	Supervised and supported by Dzongkhag Office	
Objectives: 1) To promote the ideal trading condition of export products for farmers through competition among middlemen and transporters. 2) To generate reasonable profit to farmers by reduction of transportation cost. 3) To improve the economic condition of FCB by reduction of the transportation cost for distribution of imported commodities.		
Input: 1) Trucks		
Activities: 1) Introduction of trucks to the FCB in Samdrup Jongkhar, 2) Allocating the staffs for the plan, 3) Transporting import commodities from S.J. and distributing to local offices and agents in the Study Area, afterward collecting local products from farmers and farmers groups at collection depots along the road to S.J. Traveling schedule is announced to farmers advance, 4) Issuance of receipts to farmers or representatives of farmers group when receiving products, 5) Auctioning the collected products at the yard by FCB after coming back to S.J, 6) Carrying out cash settlement in the time of next collection, after deduction of transportation and handling expenditure and commission of 3%.		
Expected effects / profits: 1) Strengthening the supporting activities to farmers by the FCB in addition to operation of the auction yard, 2) Creation of efficient and economic use of truck by distribution of imported goods on one-way and collection and transportation service for farmers on returning. It will reduce transportation cost for the FCB as well as farmers, 3) Improvement of the condition of unfair profit to middlemen / transporters and less returns to farmers, through better competition with middlemen and transporters		
Remarks:		

Table 5.3.5 Sub-program Description of Extension Strengthening Program

Title	Extension Strengthening for Food Crops	**Stage of Gewog**: 1, 2 & 3
Implementing Organization	Dzongkhag	
Agency concerned	RNR-RC-East, EA, DSC, BDFC	
Objectives: 1) Production increase of food crops		
Input: None		
Activities: 1) Preparation of technical guidebook for EAs and farmers by Dzongkhag supported by MOA, RNR-RC, 2) FFS (Farmers Field School) and demonstration plot in the field operated by EAs, 3) Encouragement of farmers leaders and farmers groups for extension activity, 4) Seed multiplication by farmers under guidance and inspection of DSC, 5) Input distribution by CAs, 6) Group micro-finance of BDFC for purchase of inputs		
Expected effects / profits: 1) Production increase of food crops		
Remarks: 1) Close relation with the Program for Food Crop Production Increase		

Title	Extension Strengthening for Cash Crops	**Stage of Gewog**: 1, 2 & 3
Implementing Organization	Dzongkhag	
Agency concerned	RNR-RC-East, EA, DSC, EA, BDFC	
Objectives: 1) Production increase of cash crops		
Input: None		
Activities: 1) Preparation of technical guidebook for EA and farmers by Dzongkhag supported by MOA, RNR-RC, 2) Awareness activity on cash crops for farmers, 3) FFS (Farmers Field School) and Demonstration plot in the field, 4) Encouragement of farmers leaders and farmers groups for extension activity, 5) Seed and seedling multiplication by DSC including farmers growers group, 6) Input distribution by CAs, 7) Group micro-finance of BDFC for purchase of inputs		
Expected effects / profits: 1) To increase farmers income through cash crop production		
Remarks: 1) Close relation with the Program for Cash Crop Production Strengthening		

Table 5.3.6 Proposed Irrigation Scheme by Gewog (1/5)

Lhuntse

No.	Gewog	Name of irrigation system/village	Irrigated area (ha)	Irrigated area (acre)	No. of beneficiaries (HH)	Water source (river name)	Canal length (km)	Condition of facilities	Activity of WUA	Unit cost(Mil. Nu) per Km	Estimate cost(Mil. Nu)	Remark.
	L1. Gangzur	Rehabilitation										
1		Somshing	40.5	100	50	Stream	4.0	Damaged	-	0.132	0.528	Included in 9th FYP.
2		Ney	60.7	150	60	Stream	5.0	-	-	0.132	0.660	
3		Tsholing	12.1	30	14	Stream	5.0	Damaged	-	0.132	0.660	
4		Shawa(Chuthigang)	18.2	45	30	River	2.0	-	-	0.132	0.264	
5		Jang	20.2	50	45	Stream	3.0	-	-	0.132	0.396	Included in 9th FYP.
6		Nimshong	40.5	100	40	Stream	6.0	On-going	-	0.132	0.792	
		Total	192.2	475	239		25.0				3.300	
		Proposed										
7		Maggar	40.5	100	48	Stream	5.0	-	-	0.300	1.500	Included in 9th FYP.
8		Ney(Dungkhartang)	20.2	50	60	River	5.0	-	-	0.300	1.500	Included in 9th FYP.
9		Shawa	4.0	10	30	River	3.0	-	-	0.300	0.900	Included in 9th FYP.
10		Denkaling	12.1	30	18	River	4.0	-	-	0.300	1.200	
		Total	76.9	190	156		17.0				5.100	
	L2. Jaray	Proposed										
11		Yabi Irrigation	20.2	50	22	Spring	1.5	On-going	-	0.300	0.450	Included in 9th FYP.
		Total	20.2	50	22		1.5				0.450	
	L3. Khoma	Rehabilitation										
12		Pangkhar	14.2	35	35	Pakachu	4.0	Partly damaged	Active	0.132	0.528	Included in 9th FYP.
13		Gangla	12.1	30	28	Spring	4.0	Partly damaged	Active	0.132	0.528	
14		Lawa	8.1	20	15	Spring	6.0	Good	Active	0.132	0.792	
15		Nylamdung	10.1	25	20	Spring	3.0	Damaged	-	0.132	0.396	Included in 9th FYP.
		Total	44.5	110	98		17.0				2.244	
	L4. Kurtoe	Rehabilitation										
16		Chusa	10.1	25	50	Stream	5.0	Partly damaged	Nil	0.132	0.660	Included in 9th FYP.
17		Jashabi	3.6	9	25	Stream	3.0	Partly damaged	Nil	0.132	0.396	Included in 9th FYP.
18		Thunpeng	12.1	30	60	Stream	8.0	Completely damaged	Nil	0.132	1.056	Included in 9th FYP.
19		Drogbber	2.4	6	5	Stream	6.0		Nil	0.132	0.792	
		Total	28.3	70	140		22.0				2.904	

Table 5.3.6 Proposed Irrigation Scheme by Gewog (2/5)

Lhuntse

No.	Gewog	Name of irrigation system/village	Irrigated area (ha)	Irrigated area (acre)	No. of beneficiaries (HH)	Water source (river name)	Canal length (km)	Condition of facilities	Activity of WUA	Unit cost(Mil. Nu) per Km	Estimate cost(Mil. Nu)	Remark.
	L5. Menbi	Rehabilitation										
20		Serchu	80.9	200	90	Bengang chu	5.0	bad	Active	0.132	0.660	
21		Gorgan	93.1	230	200	Bengang chu	4.0	good	Active	0.132	0.528	
		Total	174.0	430	290		9.0				1.188	
	L6. Metsho	Rehabilitation										
		Gortsum	24.3	60	25	Stream	3.0	Poor, no working	Inactive	0.132	0.396	
22		Total	24.3	60	25		3.0				0.396	
		Proposed										
23		Tongthrom	40.5	100	20	Stream	6.0	-	-	0.300	1.800	Included in 9th FYP.
24		Tshochen	12.1	30	5	Stream	3.0	-	-	0.300	0.900	
25		Oungar	10.1	25	15	Stream	1.5	-	-	0.300	0.450	Included in 9th FYP.
26		Obe	8.1	20	2	Stream	3.0	-	-	0.300	0.900	Included in 9th FYP.
27		Tshochen	10.1	25	25	River	4.0	-	-	0.300	1.200	
28		Dung	8.1	20	18	River	0.1	-	-	0.300	0.029	
		Total	89.0	220	85		17.6				5.279	
	L7. Minjay	Rehabilitation										
29		Minjay	32.4	80	100	Stream	6.0	Partly damaged	On-going	0.132	0.792	
30		Legshogang	16.2	40	40	Stream	3.5	Partly damaged	On-going	0.132	0.462	
		Total	48.6	120	140		9.5				1.254	
		Proposed										
31		Kupenesa	1.2	3	20	Stream	3.0	-	-	0.300	0.900	
32		Jalang	10.1	25	50	Stream	4.0	-	-	0.300	1.200	Included in 9th FYP.
		Total	11.3	28	70		7.0				2.100	Included in 9th FYP.
	L8. Tsenkhar	Rehabilitation										
33		Wambur	7.3	18	45	Kheybachu	4.0	Good	Active	0.132	0.528	
34		Umling	6.9	17	15	Kheybachu	2.0	Good	Active	0.132	0.264	
35		Dhomkhar	10.1	25	45	Kheybachu	3.0	Damaged	Active	0.132	0.396	Included in 9th FYP.
		Total	24.3	60	105		9.0				1.188	
		Proposed										
36		Umling	4.0	10	15	Kheybachu	2.0	-	-	0.300	0.600	
37		Dhomkhar	10.1	25	45	Kheybachu	2.0	-	-	0.300	0.600	Included in 9th FYP.
		Total	14.2	35	60		4.0				1.200	
	Grand Total	Rehabilitation	536.2	1325	1037		94.5				12.474	
		Proposed	211.7	523	393		47.1				14.129	10% of indirect cost considered
		Total	747.9	1848	1430		141.6				26.603	29.3 (Grand Total)

Table 5.3.6 Proposed Irrigation Scheme by Gewog (3/5)

Mongar

No.	Gewog	Name of irrigation system/village	Irrigated area (ha)	Irrigated area (acre)	No. of beneficiaries (HH)	Water source (river name)	Canal length (km)	Condition of facilities	Activity of WUA	Unit cost(Mil. Nu) per Km	Estimate cost(Mil. Nu)	Remark.
	M1. Balam	Rehabilitation										
1		Luehhilu	3.6	9	45	Shangshong	3.0	-	-	0.132	0.396	
		Total	3.6	9	45		3.0				0.396	
		New construction										
2		Khebishing	4.9	12	26	Ordeyhay	2.5	-	-	0.300	0.750	
		Total	4.9	12	26		2.5				0.750	
	M2. Chali	Rehabilitation										
3		- Chubli Chali	80.9	200	70	Thrirachu	8.0	good	Inactive	0.132	1.056	
		- Wamakhar										
		Total	80.9	200	70		8.0				1.056	
	M3. Chaskhar	Rehabilitation										
4		Chaskhar	44.5	110	250	Gudari	7.0	No good	active	0.132	0.924	Included in 9th FYP
5		Kharawang	20.2	50	100	Gudarijuke	2.5	Good		0.132	0.330	
		Total	64.8	160	350	0	9.5				1.254	
		Proposed										
6		Phakhdang	20.2	50	30	Phakhadang	5.0	-	-	0.300	1.500	
		Total	20.2	50	30		5.0				1.500	
	M4. Drametse	Rehabilitation										
7		Rolong	12.1	30	55	Bochar Dung	10.0	Old/ poor	Narang	0.132	1.320	Included in 9th FYP
8		Yayung	40.5	100	200	Gewa Dung	8.0	Old /poor	Drametse	0.132	1.056	Included in 9th FYP
9		Bazor	48.6	120	80	Leme Dung	5.0	New	Bazoor	0.132	0.660	
		Total	101.2	250	335	0	23.0				3.036	
		Proposed								0.300		
10		Shaphangma	12.1	30	70	Shangshong dung	6.0	-	-	0.300	1.800	Included in 9th FYP
11		Gomchu	8.1	20	60	Rolong chu	12.0	-	-	0.300	3.600	
12		Zimthung	6.1	15	40	Samgmari	5.0	-	-	0.300	1.500	
		Total	26.3	65	170		23.0				6.900	
	M5. Drepong	Rehabilitation										
13		Drepong	16.4	40.48	60	Spring	1.3	good	Drepong	0.132	0.172	
		Total	16.4	40.48	60		1.3				0.172	
		Proposed										
14		Bachheri	6.1	15	15	Hay karia	1.0	-	-	0.300	0.300	
		Total	6.1	15	15		1.0				0.300	

Table 5.3.6 Proposed Irrigation Scheme by Gewog (4/5)

Mongar

No.	Gewog	Name of irrigation system/village	Irrigated area (ha)	Irrigated area (acre)	No. of beneficiaries (HH)	Water source (river name)	Canal length (km)	Condition of facilities	Activity of WUA	Unit cost(Mil. Nu) per Km	Estimate cost(Mil. Nu)	Remark.
	M6. Gongdue	Proposed										
15		Bagla	3.2	8	15	Bapungri	2.5	-	-	0.300	0.750	Included in 9th FYP
16		Dungkhar	2.0	5	30	Chunglagang	2.0	-	-	0.300	0.600	
17		Yanbari	8.1	20	5	Gorpala	5.0	-	-	0.300	1.500	
18		Daksa	5.7	14	32	Rangtana	5.0	-	-	0.300	1.500	
		Total	19.0	47	82		14.5				4.350	
	M7. Jurme	Nil	-	-	-	-	-	-	-	-	-	
	M8. Kengkhar	Nil	-	-	-	-	-	-	-	-	-	
	M9. Mongar	Rehabilitation										
19		Wengkhar	13.0	32	110	Tokpaung.	5.0	-	-	0.132	0.660	
		Total	13.0	32	110		5.0				0.660	
		Proposed										
20		Tailing	6.1	15	25	Chorchormajuc	1.5	-	-	0.300	0.450	
21		Mrishing	4.9	12	20	Ganggola	5.0	-	-	0.300	1.500	
22		Themnangbi	6.1	15	20	Chompajue	4.0	-	-	0.300	1.200	
23		Khonbar	4.0	10	12	Hodongyea	3.0	-	-	0.300	0.900	
24		Pecklhurung	2.4	6	6	Choruorunjur	3.0	-	-	0.300	0.900	
		Total	23.5	58	83		16.5				4.950	
	M10. Ngatshang	Rehabilitation										
25		Yadhi	24.3	60	122	Spring water	5.0	Completely	-	0.132	0.660	
26		Ngatshang	28.3	70	82	stream	7.0	Expansion	-	0.132	0.924	
		Total	52.6	130	204		12.0				1.584	
	M11. Saleng	Rehabilitation										
27		Msangdaza	20.2	50	32	Shongjari	1.0	Running	Yes	0.132	0.132	
28		Tsanzibee	8.1	20	25	Shongja chu	1.0	Running	Yes	0.132	0.132	
		Total	28.3	70	57		2.0				0.264	
		Proposed										
29		Kalapang	12.1	30	25	Unaritop	2.0	-	-	0.300	0.600	
30		Kaleashing	16.2	40	35	Changkuchu	1.5	-	-	0.300	0.450	
		Total	28.3	70	60		3.5				1.050	
	M12. Serimuhung	Rehabilitation										
31		Bomey	10.1	25	21	Bomdy	1.0	Satisfactory	Nil	0.132	0.132	
32		Muhung	14.2	35	64	Samdrong	2.0	Poor	Nil	0.132	0.264	
		Total	24.3	60	85		3.0				0.396	

Table 5.3.6 Proposed Irrigation Scheme by Gewog (5/5)

Mongar

No.	Gewog	Name of irrigation system/village	Irrigated area (ha)	Irrigated area (acre)	No. of beneficiaries (HH)	Water source (river name)	Canal length (km)	Condition of facilities	Activity of WUA	Unit cost(Mil. Nu) per Km	Estimate cost(Mil. Nu)	Remark.
	M12. Serimuhung	Proposed										
33		Serzhong	121.4	300	94	Rari	10.0	-	-	0.300	3.000	Included in 9th FYP
		Total	121.4	300	94		10.0	-	-		3.000	
	M13. Silambi	Nil	-	-	-	-	-	-	-	-	-	
	M14. Thangrong	Proposed										
34		Dueling Boucholing	12.1	30	70	-	7.0	-	-	0.300	2.100	
		Total	12.1	30	70		7.0				2.100	
	M15. Tsakaling	Rehabilitation										
35		Takhambi	22.3	55	56	Chimungchu	4.0	-	-	0.132	0.528	
36		Thumling	12.1	30	150	Lungkpuungch	25.0	-	-	0.132	3.300	
		Total	34.4	85	206		29.0				3.828	
		Proposed										
37		Tormashong	60.7	150	120	Taisachu	3.0	-	-	0.300	0.900	
38		Palangphu	6.1	15	25	Manbarchu	1.5	-	-	0.300	0.450	
		Total	66.8	165	145		4.5				1.350	
	M16. Tsamang	Nil	-	-	-	-	-	-	-	-	-	
	Grand Total	Rehabilitation	419.5	1036	1522		95.8				12.646	
		Proposed	328.6	812	775		87.5				26.250	10% of indirect cost considered
		Total	748.1	1848	2297		183.3				38.896	42.8 (Grand Total)

Table 5.4.1 Basic Fleet Machinery

No	Equipment / Specification	Examination of specification
1	Bulldozer 170 ~ 190 HP, Angle-tilt dozer, With turbocharger, ROPS canopy, Multi-shank ripper (3 points), Weight: Approx. 20 ton	Considering agricultural road width (3 ~ 3.5 m), middle class 170 ~ 180 HP is adopted and at least 170 HP is necessary for ripping work. Angle-tilt is suitable for dozing of one way direction.
2	Hydraulic Excavator 135 ~ 145 HP, Steel cabin, Bucket capacity: Heaped: 0.8 m^3, Struck: min.0.6 m^3, Type: Rock bucket, Teeth and side cutter, With turbocharger, Weight: less than 20 ton, With hydraulic breaker included piping, Option: Single shank ripper, Weight: Approx. 20 ton	Considering a lot of hard rock, sharp slope and narrow job site, middle class 135 ~ 145 HP with hydraulic breaker is adopted. Hydraulic breaker, rock bucket with teeth and side cutter, and single shank ripper is suitable for breaking hard rock.
3	Hydraulic Excavator 80 ~ 90HP, Steel cabin, Bucket capacity: Heaped: applox.0.4 m^3, Type: Rock bucket, Teeth and side cutter, With turbocharger, Weight: 12.0 ~ 12.5 ton	Considering construction of side ditches and wall, small class 80 ~ 90 HP is adopted. Rock bucket with teeth and side cutter is suitable in rocky job site.
4	Dump Truck 220 ~ 260 HP, Payload: 8 ~ 9 ton, 4 x 2	Considering transportation of a lot of rock and soil from the job site to hauling area through narrow and curved road, middle size 8 ton (4 x 2) is adopted.
5	Vibration Roller 6 ~ 7.5 ton, Articulate type, Hydrostatic transmission, Front: Smooth drum, Vibration & Drive, Rear: Tire (OR) x 2 Drive , With awning	Considering sharp slope and curved road, articulate type and front & rear driven medium size 6 ~ 7.5 ton vibration roller is adopted.
6	Tamper 2.5 ~ 5 HP, 60 ~ 90 kg, Width: 350 ~ 500 mm	Considering narrow corner and space of compacting, and maintenance of road, tamper is adopted.
7	Hand Breaker (1) Pick hammer Handle type, Weight: Approx.16 kg, Number of blow: Approx.1,850 bpm, Air consumption:, Approx. 1.0 m^3/min With shank: Steel and spade (2) Jack hammer Vibration isolation type, Weight: Approx.17 kg, Number of blow:, Approx.2,150 bpm, Air consumption:, Approx. 2.1 m^3/min, With shank:, Steel and spade, Drill rod included, Air hose: 19 mm, Length: 50 m Taper rod: (3 ft, 5 ft, 8 ft, 12 ft), etc.	(1) Hand breaker is suitable for crushing hard rock into smaller pieces after using hydraulic breaker. (2) Jack hammer is suitable for blasting hard rock.
8	Air Compressor Approx. 80 HP, Air delivery: 7.5 m^3/min, Air port, 2" x 1 & 3/4" x 4, Operating pressure: 7 kg/cm^2, Mobile type: 2 tires, Weight: Approx.1.6 ton	Air compressor is necessary for using hand breakers at rocky job site. As air compressor uses hand breakers and jack hammers at the same time, air delivery of 7.5 m^3/min is needed. As job site is narrow, 2 tires type is adopted.
9	Wheel Loader 80 ~ 90 HP, With turbocharger, ROPS canopy, Bucket capacity: Heaped: min. 1.3 m^3, Struck: min. 1.2 m^3, Weight: 6.5 ~ 7.5 ton, Type: Bucket with bolt-on-edge	As main purpose is for dump truck and carrying use, 1.3 m^3 bucket is adopted. 80 ~ 90 HP is necessary for this bucket class. Considering job site of hard rock, bucket with bolt-on edge is adopted.
10	Safety Miscellaneous Safety belt, Goggle, Safety cap, Dust & mist respirator, Leather gloves	Considering work of crushing rock on steep slope of mountain, safety belt of worker is necessary. Furthermore, goggle, safety cap and dust & mist respirator is necessary for health of worker.
11	Tent Water proof cloth, Size: for 4 persons, Quantity: 5 pcs	One fleet is constituted from 10 main machines, and one machine is necessary one operator and one helper. So, necessary quantity of one fleet is totally 5 tents.
12	Portable Rock Drill with Engine Weight: Approx. 26 kg, Number of blow: Approx. 2,500 ~ 2,800 bpm.	To be used away from the point of the construction site where compressor is not reached.
13	Spare Parts For the above machinery	For periodical maintenance and consumable parts for 2,000 hours use.

Table 5.4.2 Support Machinery and Equipment

No	Equipment	Specification	Examination of specification
1	Cargo Truck	Approx. 320 HP with turbocharger With crane: Approx. 3 ton Payload: Approx. 15 ton GVW: max. 28 ton, 6 x 4	Considering transportation of small machine such as concrete mixer, tampers, hand breakers, and materials of construction such as steel pipes, cement, steel bars, etc., cargo truck with 2.9 ton crane is adopted.
2	Bulldozer	75 ~ 85 HP Power –angle-tilt dozer With turbocharger ROPS canopy Weight: less than 7.5 ton	Considering spreading and leveling of road in behalf of motor grader and maintenance of agricultural road, small class 7.0 ~ 7.5 ton is adopted. Angle-tilt is suitable for spreading and leveling.
3	Fuel Tanker	Approx. 125 HP Loading capacity: Approx. 3,000 Lit., 4 x 2	Considering supply of fuel in sharp, curved, narrow and long distance road, small size fuel tanker is adopted.
4	Concrete Mixer	Approx. 1 HP/Engine Capacity: Approx. 0.12 m^3 Weight: Approx. 125 kg Mobile type	Considering construction of side ditches, etc., small concrete mixer is adopted.
5	Total Station	Equipment for surveying	Considering decision of proper alignment and formation of road.
6	Motor Bicycle	For site inspection and communication	For site inspection
7	Spare parts	For the above machinery	For periodical maintenance and consumable parts for 2,000 hors.

Table 5.4.3 Equipment and Tools for Workshop

No	Equipment	Specification	Examination of specification
1	Workshop Equipment & Tools	Power source: 1-phase, 220 V AC50 Hz 3-phase, 380 V AC50 Hz 1) Portable gantry crane 2) Electric welder included welder set 3) Gas welder set 4) Electric air compressor included air impact wrench 5) Mechanic tool set for construction equipment with cabinet 6) Measuring instrument & tool 7) Engine service equipment and tools included engine repairing stand 8) Jack and lifting device 9) Wheel type vehicle service tools and tire remover 10) Master pin remover & installer for bulldozer 11) Battery charger 12) Lubricating equipment and tools 13) Electric power tools 14) Cleaning equipment for engine and water high pressure washer 15) Etc.(1.5 m lathe, portable welder (40 kg), grinder, vise, drill and so on)	For repair of engine and chassis including unit exchange of undercarriage in the workshop, the following specification of equipment and tools is necessary.
2	Mobile Workshop	185 ~ 230 HP, 4 x 2 Welder equipment and tools Electric equipment and tools Air equipment and tools Engine service equipment and tools Wheel type vehicle service tools Hand tools Jack and lifting device Lubricating equipment and tools Measuring gauge and tools, etc.	For repair of engine and chassis at job site when it is far from the workshop, mobile workshop is indispensable. As road in Bhutan is sharp slopes and on curved and narrow, it is necessary to repair construction machinery at job site as far as possible.
3	Spare parts	For the above equipment and tools of workshop included mobile workshop	For periodical maintenance and consumable parts of workshop equipment for 2,000 hours.

Table 5.4.4 Machinery for Transportation

No	Equipment	Specification	Examination of specification
1	Truck tractor & Low bed semi trailer	Truck tractor, Approx. 290 HP, 6 x 4, Low bed semi trailer. Payload: Max. 25 ton, Rear axle: 2	Low bed semi trailer is necessary for transportation of bulldozer and hydraulic excavator (20 ton class) between job site and workshop
2	Self loader truck	Approx. 320 HP, Payload: Approx. 14 ton, GVW: 26 ton, 6 x 4	Self-loader truck is necessary for transportation of construction machinery (less than 14 ton) between job site and workshop.
3	Spare parts	For the above workshop and loader truck	For periodical maintenance and consumable parts of workshop equipment for 2,000 hours.

Table 5.5.1 Implementation Schedule of RADP

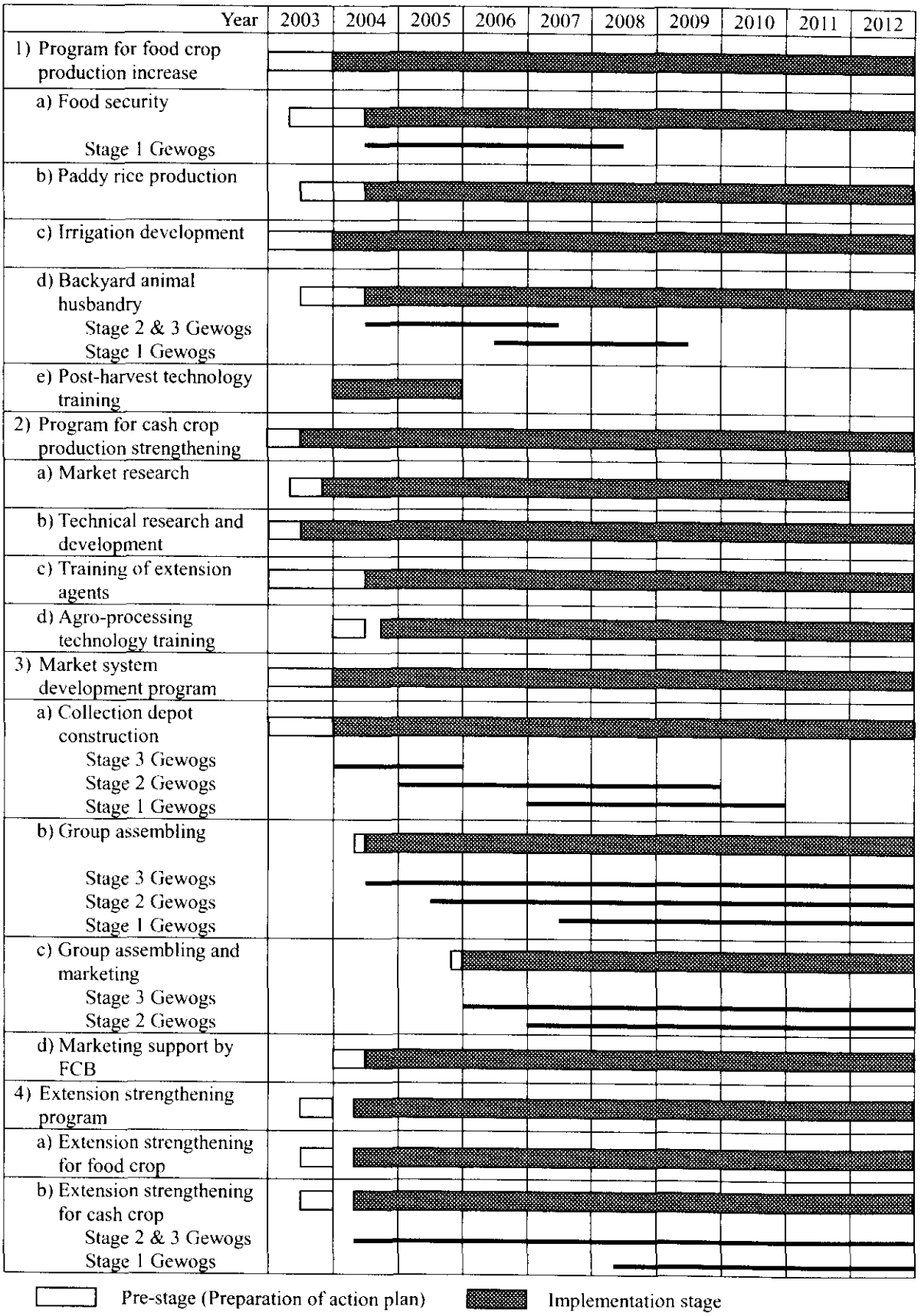


Table 5.5.2 Implementation Schedule of FRDP (Lhuntse)

Lhuentse

No.	Road	Gewog	Length (km)		2003/6	2004/6	2005/6	2006/6	2007/6	2008/6	2009/6	2010/6	2011/6	2012/6	Remarks
1	Takila to Ongar (Farm Road)	Coverage	42.8	F/S		D/D									Extension of Thinleypang to Takila feeder road up to Ongar, Metsho, be covered isolated
		Menbi	15.7	B/D					3.0	12.6	0.1				
		Metsho	27.1								12.5	12.6	2.0		
2	Phawan to Domkhar (Farm Road)	Coverage	10.6	F/S		D/D									Through Domkhar up to Phawan Khoy(nearby river).
		Tsenkhar	10.6	B/D				10.6							
3	Autsho to Tsenkhar (Farm Road)	Coverage	23.0	F/S		D/D									Alignment up to Tsenkhar
		Tsenkhar	23.0	B/D									10.5	12.5	
4	Budur to Wambur (Farm Road)	Coverage	7.3	F/S		D/D									To be connected to forest road
		Tsenkhar	7.3	B/D			7.3								
5	Suspension bridge to Khoma (Mule Track) (Light-load bridge)	Coverage	6.3												Alignment up to Khoma school, to be developed as mule track
		Khoma	6.3				Bridge replacement	5.0	1.3						
6	Thimyul to Jangcholing	Coverage	5.2	F/S		D/D									To activate Gangzur Gewog center
		Gangzur	5.2	B/D			5.2								
7	Lingabee to Ney (Farm Road)	Coverage	9.5	F/S		D/D									To be connected with feeder road at Lingabee
		Gangzur	9.5	B/D					9.5						
8	Autsho to Ladrong (Mule Track) (Light-load Bridge)	Coverage	22.4												To connect from existing suspension bridge at Autsho to Ladrong and to be improved as
		Jaray	22.4				Bridge replacement	5.6	5.6	5.6	5.6				
	Total		98.4	98.4			12.5	10.6	12.5	12.6	12.6	12.6	12.5	12.5	Farm road construction program
			28.7	28.7				10.6	6.9	5.6	5.6				Mule track construction program
	Construction Machinery Procurement			D/D			1	1	1	1	1	1	1	1	Construction machinery center program

Note: No.5 and No.8 are improved as mule track to be the transition stage to the farm road.

Table 5.5.3 Implementation Schedule of FRDP (Mongar)

Mongar

No.	Road	Gewog	Length (km)	2003/6	2004/6	Implementation Schedule (End of Fiscal Year) 2005/6	2006/6	2007/6	2008/6	2009/6	2010/6	2011/6	2012/6	Remarks
1	Bagengla to Narang (Farm Road)	Coverage	20.0	F/S	D/D									Firstly to be developed around Drametse
		Drametse	20.0	B/D					10.0	10.0				
2	Themnangbi to Chali (Farm Road)	Coverage	12.0	F/S	D/D									To run parallel to District road toward Lhuentse, to be constructed up to Chali first
		Mongar	6.4	B/D									6.4	
		Chali	5.6										5.6	
3	Gyelposhing to Laptsa (Farm Road)	Coverage	23.5	F/S	D/D									To be connected with road developed by Kuri Chhu
		Drepong	23.5	B/D			11.7	11.8						
4	Chaskhar to Thangrong (Farm	Coverage	12.3	F/S	D/D									To be extended from farm road under construction at Chaskhar
		Thangrong	12.3	B/D		12.3								
5	Jurme to Kengkhar (Mule Track)	Coverage	34.6	F/S	D/D									To be independently developed as mule track
		Jurme	21.2	B/D		5.3	5.3	5.3	5.3					
		Kengkhar	13.4							5.4	5.4	2.6		
6	Kuri Chhu to Nagor (Mule Track) (Light- load Bridge)	Coverage	50.8	F/S	D/D									After Light-load bridge construction, To be independentoly developed as
		Gongdue	43.3	B/D		Light-load bridge	7.2	7.2	7.2	7.2	7.2	7.3		
		Silambi	7.5										7.5	
7	Kalapang to Resa (Farm Road)	Coverage	16.8											To be connected with forest road
		Saleng	16.8								8.4	8.4		
	Total	—	84.6	84.6		12.3	11.7	11.8	10.0	10.0	8.4	8.4	12.0	Farm road construction program
			85.4	85.4		5.3	12.5	12.5	12.5	12.6	12.6	9.9	7.5	Mule track construction program
	Construction Machinery Procurement			D/D		1	1	1	1	1	1	1	1	Construction machinery center program

Note: No.5 and No.6 are improved as mule track to be the transition stage to the farm road.

Table 5.6.1 Farm Road Construction Cost per km (including WBM and permanent structure)

No.	Items	Quantity	Unit.	Rate (Nu.)	Amount (Nu.)	Remarks
	LABOUR					
1	Labour(male)	4,486.974	man/days	108.34	486,119	Beneficiaries' work
2	Labour(Female)	1,942.168	man/days	108.34	210,415	Beneficiaries' work
3	Mason 1	500.822	man/days	146.24	73,240	
4	Mason 2	1,414.715	man/days	130.22	184,224	
5	Blaster	16.074	man/days	130.80	2,102	
6	Supervisor	33.027	man/days	156.24	5,160	
7	P. Operator	1.262	man/days	130.22	164	
8	Black smith	18.000	man/days	146.24	2,632	
9	Carpenter	89.320	man/days	146.24	13,062	
				Sub total	977,119	
	MACHINERY					
1	Front/Loader	63.822	days	9,648.02	615,758	
2	Truck	74.762	days	2,873.95	214,863	
4	Compressor	61.141	days	4,342.84	265,524	
5	Bull Dozer	36.802	days	20,337.28	748,444	
6	Excavator	25.340	days	12,434.00	315,078	
7	Roller	8.590	days	2,114.40	18,163	
8	C. mixer	1.262	days	590.00	744	
9	C. Vibrator	1.262	days	490.00	618	
				Sub total	2,179,193	
	MATERIALS					
1	Sand	327.278	m^3	180.00	58,910	
2	Boulders	1,595.292	m^3		0	To be collected at site
3	Cement	93.432	tone	10,520.00	982,906	
4	Bar	1,512.000	kg	19.00	28,728	
5	Ballies	330.963	m	17.80	5,891	
6	Timber	2.680	m^3	5,650.00	15,142	
7	Superdyne	842.437	kg	55.59	46,831	
9	Fuse Coil	1,063.997	each	34.00	36,176	
10	Detonator	1,204.817	each	4.21	5,072	
11	Drill rod	16.074	each	2,940.00	47,257	
12	Royalty	264.219	truck	50.00	13,211	
13	Mud Dry	90.000	m^3	47.51	4,276	
				Sub total	1,244,400	

	Total	4,400,712
Add 18.92% cost index from BSR 2001 S/jongkhar rate		5,233,326
Add 5%(Work Charge)		5,494,993
	Grand total	5,494,993

Table 5.6.2 Farm Mule Track Construction Cost per km (considering only excavation by blasting)

No.	Items	Quantity	Unit.	Rate (Nu.)	Amount (Nu.)	Remarks
	LABOUR					
1	Labour(male)	1,035.062	man/days	108.34	112,139	Beneficiaries' work
2	Labour(Female)	41.063	man/days	108.34	4,449	Beneficiaries' work
3	Mason 1	0.000	man/days	146.24	0	
4	Mason 2	0.000	man/days	130.22	0	
5	Blaster	3.750	man/days	130.80	491	
6	Supervision	0.000	man/days	156.24	0	
7	P. Operator	0.000	man/days	130.22	0	
8	Black smith	0.000	man/days	146.24	0	
9	Carpenter	0.000	man/days	146.24	0	
				Sub total	117,078	
	MACHINERY					
1	Front/Loader	0.000	days	9,648.02	0	
2	Truck	0.000	days	2,873.95	0	
4	Compressor	6.000	days	4,342.84	26,057	
5	Bull Dozer	0.000	days	20,337.28	0	
6	Excavator	0.000	days	12,434.00	0	
7	Roller	0.000	days	2,114.40	0	
8	C. mixer	0.000	days	590.00	0	
9	C. Vibrator	0.000	days	490.00	0	
				Sub total	26,057	
	MATERIALS					
1	Sand	0.000	m^3	180.00	0	
2	Boulders	0.000	m^3		0	To be collected at site
3	Cement	0.000	tone	10,520.00	0	
4	Bar	0.000	kg	19.00	0	
5	Ballies	0.000	m	17.80	0	
6	Timber	0.000	m^3	5,650.00	0	
7	Superdyne	249.000	kg	55.59	13,842	
9	Fuse Coil	300.000	each	34.00	10,200	
10	Detonator	300.000	each	4.21	1,263	
11	Drill rod	3.750	each	2,940.00	11,025	
12	Royalty	0.000	truck	50.00	0	
13	Mud Dry	0.000	m^3	47.51	0	
				Sub total	36,330	
				Total	179,465	
Add 18.92% cost index from BSR 2001 S/jongkhar rate					213,420	
				Grand total	213,420	

Table 5.6.3 Construction Cost for Farm Road and Farm Mule Track

Lhuntse

Unit: Nu

No.	Road	Gewog	Length (km)	Constructed until 2012/6	Unit Cost	Indirect Cost (10 %) include	Total Cost
1	Takila to Ongar	Coverage	42.8				
		Menbi	15.7	15.7	5,500,000	86,350,000	
		Metsho	27.1	27.1	5,500,000	149,050,000	235,400,000
2	Phawan to Domkhar	Coverage	10.6				
		Tsenkhar	10.6	10.6	5,500,000	58,300,000	58,300,000
3	Autsho to Tsenkhar	Coverage	23.0				
		Tsenkhar	23.0	23.0	5,500,000	126,500,000	126,500,000
4	Budur to Wambur	Coverage	7.3				
		Tsenkhar	7.3	7.3	5,500,000	40,150,000	40,150,000
5	Suspension bridge to Khoma	Coverage	6.3				
	(Farm Mule Track)	Khoma	6.3	6.3	214,000	1,348,200	1,348,200
6	Thimyul to Jangcholing	Coverage	5.2				
		Gangzur	5.2	5.2	5,500,000	28,600,000	28,600,000
7	Lingabee to Ney	Coverage	9.5				
		Gangzur	9.5	9.5	5,500,000	52,250,000	52,250,000
8	Autsho to Ladrong	Coverage	22.4				0
	(Farm Mule Track)	Jaray	22.4	22.4	214,000	4,793,600	4,793,600
	Total	Farm Road	98.4	98.4	5,500,000	541,200,000	541,200,000
		Farm Mule	28.7	28.7	214,000	6,141,800	6,141,800
	Grand Total						547,341,800

Note: 10% of indirect cost is included.

Mongar

Unit: Nu

No.	Road	Gewog	Length (km)	Constructed until 2012/6	Unit Cost	Indirect Cost (10 %) include	Total Cost
1	Serizong to Narang	Coverage	62.8				
		Drametse	28.0	20.0	5,500,000	110,000,000	110,000,000
		Balam	13.4	0.0	5,500,000	0	
		Serimuhung	21.4	0.0	5,500,000	0	
2	Themnagabi to Rewan	Coverage	40.0				
		Mongar	6.4	6.4	5,500,000	35,200,000	
		Chali	5.6	5.6	5,500,000	30,800,000	66,000,000
		Tsakaling	28.0	0.0	5,500,000	0	
3	Gyelposhing to Laptsa	Coverage	23.5				
		Drepong	23.5	23.5	5,500,000	129,250,000	129,250,000
4	Chaskhar to Thangrong	Coverage	12.3				
		Thangrong	12.3	12.3	5,500,000	67,650,000	67,650,000
5	Jurme to Kengkhar	Coverage	34.6				
	(Farm Mule Track)	Jurme	21.2	21.2	214,000	4,536,800	
		Kengkhar	13.4	13.4	214,000	2,867,600	7,404,400
6	Kuri Chhu to Nagor	Coverage	50.8				
	(Farm Mule Track)	Gongdue	43.3	43.3	214,000	9,266,200	
		Silambi	7.5	7.5	214,000	1,605,000	10,871,200
7	Kalapang to Resa	Coverage	16.8				
		Saleng	16.8	16.8	5,500,000	92,400,000	92,400,000
	Total	Farm Road	155.4	84.6	5,500,000	465,300,000	465,300,000
		Farm Mule	85.4	85.4	214,000	18,275,600	18,275,600
	Grand Total						483,575,600

Note: 10% of indirect cost is included.

Construction Cost for Farm Road and Fram Mule Track | Grand Total(1,000Nu) | 1,030,917

Table 5.6.4 Construction Cost for Light-Load Bridge

Lhuntse

Unit: Nu

No.	Light-Load Bridge	Gewog Status	Length (m)	Including Approach Facilities(m)	Road	Unit Cost (Nu/m)	Indirect Cost(20%)	Total Cost
1	Suspension bridge to Khoma (Farm Mule Track)	Khoma Replacement	80.0	90.0		60,000	1,080,000	6,480,000
2	Autsho to Ladrong (Farm Mule Track)	Jaray Replacement	91.0	100.0		60,000	1,200,000	7,200,000
	Total	New	0.0	0.0			0	0
		Replacement	171.0	190.0			2,280,000	13,680,000

Note: 1. 20% of indirect cost is considered for replacement.
2. The unit cost relates with the length including approach facilities and includes unskilled labor cost.

Mongar

Unit: Nu

No.	Road	Gewog	Length (m)	Including Approach Facilities(m)	Road	Unit Cost (Nu/m)	Indirect Cost(30%)	Total Cost
1	Kuri Chhu to Nagor (Farm Mule Track)	Gongdue New	90.0	120.0		60,000	2,160,000	9,360,000
	Total	New	90.0	120.0			2,160,000	9,360,000
		Replacement	0.0	0.0			0	0

Note: 1. 30% of indirect cost is considered for new construction.
2. The unit cost relates with the length including approach facilities and includes unskilled labor cost.

Grand Total (Nu): 23,040,000

Table 5.6.5 Cost Estimation for Construction Machinery and Equipment

1. Basic Fleet Machinery — Unit : US$

No	Designation	Specification	Quantity	Unit	Unit Price	Price (FOB)	Price (CIF)	Remarks
1	Bulldozer	15t	1	No.	265,006	265,006	318,007	with ripper
2	Hydraulic Excavator	0.6m^3	1	No.	193,948	193,948	232,737	with breaker
3	Hydraulic Excavator	0.3m3	1	No.	107,006	107,006	128,407	heaped 0.4m3
4	Dump Truck	8t	1	No.	62,699	62,699	75,238	
5	Vibration Roller	6t	1	No.	85,270	85,270	102,324	
6	Tamper	60kg	2	No.	1,421	2,842	3,411	
7	Hand Breaker							
	Pick Hammer	Handle type	4	No.	1,906	7,624	9,149	
	Jack hammer	Vibration type	2	No.	3,946	7,892	9,470	
8	Air Compressor	7.5m^3/min	1	No.	33,439	33,439	40,127	
9	Wheel Loader	1.2m^3	1	No.	96,138	96,138	115,365	
10	Safety Miscellaneous		10	Set	150	1,505	1,806	goggle, safety belt etc.
11	Tent	Water proof	5	No.	836	4,180	5,016	for 4 persons
12	Portable Rock Drill		3	No.	5,016	15,048	18,057	with engine
13	Spare Parts		1	Set	-	70,608	84,729	for the above
	Total					953,202	1,143,843	

2. Supporting Machinery and Equipment — Unit : US$

No	Designation	Specification	Quantity	Unit	Unit Price	Price (FOB)	Price (CIF)	Remarks
1	Cargo Truck	15t	1	No.	100,318	100,318	120,381	with 2.9t crane
2	Bulldozer	6t	1	No.	101,990	101,990	122,388	
3	Fuel Tanker	3,000 l	1	No.	50,159	50,159	60,191	
4	Concrete Mixer	0.12m^3	2	No.	8,360	16,720	20,064	
5	Total Station		1	No.	25,079	25,079	30,095	with software
6	Motor Bicycle	200cc	2	No.	3,511	7,022	8,427	
7	Spare Parts		1	Set	-	24,103	28,924	for the above
	Total					325,390	390,468	

3. Equipment & Tools and Building for Workshop — Unit : US$/Nu

No	Designation	Specification	Quantity	Unit	Unit Price	Price (FOB)	Price (CIF)	Remarks
1	Workshop Equipment & Tools	Welder, Compressor etc.	1	Set	252,466	252,466	302,959	for workshop in Bumthang
2	Mobile Workshop	4x4	1	No.	183,916	183,916	220,699	with equipment & tools
3	Spare Parts		1	Set	-	34,911	41,893	for the above
4	Building	Workshop	1	L.S	-	Nu	10,000,000	Office included
	Total						565,551 10,000,000	US$ Nu for building

4. Machinery for Transportation — Unit : US$

No	Designation	Specification	Quantity	Unit	Unit Price	Price (FOB)	Price (CIF)	Remarks
1	Tractor & Trailer	25t	1	No.	137,937	137,937	165,524	low bed semi trailer
2	Self Loader Track	14t	1	No.	121,217	121,217	145,461	
3	Spare Parts		1	Set	-	20,732	24,879	for the above
	Total					279,886	335,864	

Table 5.7.1 Economic Internal Rate of Return

(Unit: Nu. million)

Year		Cost										Benefit			Balance	Accumulation
		Investment					O&M			Replacement	Total					
		Farm Road	Irrigation	RNR-RC	Marketing	Training	Farm road	Irrigation	RNR-RC			Crop	Farm Road	Total		
2003	1									0.0	0.0			0.0	0.0	0.0
2004	2		5.2	13.6	0.6	1.1				0.0	20.5			0.0	-20.5	-20.5
2005	3	119.1	5.2	13.6	0.6	1.1		0.2	0.0	0.0	139.8	8.3		8.3	131.5	-152.1
2006	4	119.1	5.2		0.6	1.1	0.5	0.3	0.4	0.0	127.2	16.5	1.4	17.9	-109.3	-261.4
2007	5	119.1	5.2		0.6	1.1	0.9	0.5	0.4	0.0	127.8	24.8	2.8	27.6	-100.3	-361.7
2008	6	119.1	5.2		0.6	1.1	1.4	0.6	0.4	0.0	128.5	33.0	4.2	37.2	-91.3	-452.9
2009	7	119.1	5.2		0.6	1.1	1.9	0.8	0.4	0.0	129.1	41.3	5.6	46.9	-82.2	-535.1
2010	8	119.1	5.2		0.6	1.1	2.3	0.9	0.4	0.0	129.7	49.6	6.9	56.5	-73.2	-608.3
2011	9	119.1	5.2			1.1	2.8	1.1	0.4	0.0	129.7	57.8	8.3	66.1	-63.6	-671.9
2012	10	119.1	5.2			1.1	3.2	1.3	0.4	0.0	130.3	66.1	9.7	75.8	-54.5	-726.4
2013	11						3.7	1.4	0.4	0.0	5.5	74.3	11.1	85.4	79.9	-646.5
2014	12						3.7	1.4	0.4	12.7	18.2	82.6	11.1	93.7	75.5	-571.0
2015	13						3.7	1.4	0.4	12.7	18.2	82.6	11.1	93.7	75.5	-495.5
2016	14						3.7	1.4	0.4	1.8	7.3	82.6	11.1	93.7	86.4	-409.1
2017	15						3.7	1.4	0.4	1.8	7.3	82.6	11.1	93.7	86.4	-322.8
2018	16						3.7	1.4	0.4	0.0	5.5	82.6	11.1	93.7	88.2	-234.6
2019	17						3.7	1.4	0.4	0.0	5.5	82.6	11.1	93.7	88.2	-146.4
2020	18						3.7	1.4	0.4	0.0	5.5	82.6	11.1	93.7	88.2	-58.3
2021	19						3.7	1.4	0.4	0.0	5.5	82.6	11.1	93.7	88.2	29.9
2022	20						3.7	1.4	0.4	0.0	5.5	82.6	11.1	93.7	88.2	118.0
2023	21						3.7	1.4	0.4	0.0	5.5	82.6	11.1	93.7	88.2	206.2
2024	22						3.7	1.4	0.4	19.2	24.7	82.6	11.1	93.7	69.0	275.2
2025	23						3.7	1.4	0.4	19.2	24.7	82.6	11.1	93.7	69.0	344.2
2026	24						3.7	1.4	0.4	7.4	12.9	82.6	11.1	93.7	80.8	425.0
2027	25						3.7	1.4	0.4	5.6	11.1	82.6	11.1	93.7	82.6	507.6
2028	26						3.7	1.4	0.4	5.6	11.1	82.6	11.1	93.7	82.6	590.2
2029	27						3.7	1.4	0.4	5.6	11.1	82.6	11.1	93.7	82.6	672.8
2030	28						3.7	1.4	0.4	12.5	18.1	82.6	11.1	93.7	75.6	748.4
2031	29						3.7	1.4	0.4	12.2	17.7	82.6	11.1	93.7	76.0	824.4
2032	30						3.7	1.4	0.4	12.2	17.7	82.6	11.1	93.7	76.0	900.3
2033	31						3.7	1.4	0.4	0.0	5.5	82.6	11.1	93.7	88.2	988.5
2034	32						3.7	1.4	0.4	12.7	18.2	82.6	11.1	93.7	75.5	1,064.0
2035	33						3.7	1.4	0.4	12.7	18.2	82.6	11.1	93.7	75.5	1,139.5
2036	34						3.7	1.4	0.4	1.8	7.3	82.6	11.1	93.7	86.4	1,225.9
2037	35						3.7	1.4	0.4	0.0	5.5	82.6	11.1	93.7	88.2	1,314.0
2038	36						3.7	1.4	0.4	0.0	5.5	82.6	11.1	93.7	88.2	1,402.2
2039	37						3.7	1.4	0.4	0.0	5.5	82.6	11.1	93.7	88.2	1,490.4
2040	38						3.7	1.4	0.4	0.0	5.5	82.6	11.1	93.7	88.2	1,578.5
2041	39						3.7	1.4	0.4	0.0	5.5	82.6	11.1	93.7	88.2	1,666.7
2042	40						3.7	1.4	0.4	0.0	5.5	82.6	11.1	93.7	88.2	1,754.9
2043	41						3.7	1.4	0.4	0.0	5.5	82.6	11.1	93.7	88.2	1,843.0
2044	42						3.7	1.4	0.4	19.2	24.7	82.6	11.1	93.7	69.0	1,912.0
2045	43						3.7	1.4	0.4	19.2	24.7	82.6	11.1	93.7	69.0	1,981.0
2046	44						3.7	1.4	0.4	7.4	12.9	82.6	11.1	93.7	80.8	2,061.8
2047	45						3.7	1.4	0.4	5.6	11.1	82.6	11.1	93.7	82.6	2,144.4
2048	46						3.7	1.4	0.4	5.6	11.1	82.6	11.1	93.7	82.6	2,227.0
2049	47						3.7	1.4	0.4	5.6	11.1	82.6	11.1	93.7	82.6	2,309.6
2050	48						3.7	1.4	0.4	5.6	11.1	82.6	11.1	93.7	82.6	2,392.2
2051	49						3.7	1.4	0.4	5.2	10.8	82.6	11.1	93.7	82.9	2,475.1
2052	50						3.7	1.4	0.4	5.2	10.8	82.6	11.1	93.7	82.9	2,558.1
Total		952.7	46.9	27.2	4.3	9.9	161.0	61.9	20.3	233.7	1,517.9	3,593.1	482.9	4076.0	2,558.1	
														IRR =	7.7%	

Table 5.8.1 Project Description (PD)

1. Study Title (Project Name)
   The Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts in the Kingdom of Bhutan
2. Background Information and Objectives of Project
   1) Attainment and maintenance of food sufficiency.
   2) Improvement of living standard and income level.
3. Brief Description of Project

Outline of Project Area:	Lhuntse and Mongar Dzongkhags.
Beneficiaries & Development Area:	63,500 persons (all residents), 7,482 households.
Relevant Project Components:	Irrigation, RADP and FRDP
Executing Agencies:	Ministry of Agriculture.
Environmental Agencies Concerned:	National Environment Commission (NEC).

4. Major Components and Development Scale of Project

Major Components	Type		Scale and Characteristic				Screening
	New	Rehab.	Area, etc.	Characteristic			
a. Irrigation	√	√	346.4 km 3119.5 ha	Lhuntse:	New	Length: 47.1 km Beneficiaries: 393 HH Irrigation area: 211.7 ha	IEE
					Rehab.	Length: 94.5 km Beneficiaries: 1037 HH Irrigation area: 536.2 ha	
				Mongar:	New	Length: 86.5 km Beneficiaries: 775 HH Irrigation area: 399.2 ha	
					Rehab.	Length: 118.3 km Beneficiaries: 1422 HH Irrigation area: 324.6 ha	
b. Drainage							N.A.
c. Land clearing & leveling							N.A.
d. Sea/swamp reclamation							N.A.
e. Land consolidation							N.A.
f. New settlement							N.A.
g. Dam & reservoir							N.A.
h. Substantial changes in farming system							N.A.
i. Others 1 (RADP)							
i-1 Program for food crop production increase		√		Change of land use from Tseri to permanent cultivation (dry land). Recommendation on proper land use.			screen out
i-2 Program for cash crop production strengthening		√		Change of land use from Tseri to permanent cultivation (orchard land). Recommendation on proper land use.			screen out
i-3 Marketing system development program	√	√		Construction of depots beside road.			screen out
i-4 Extension strengthening program	√	√		Supply of improved / high yield variety seeds. Improvement of extension system (demonstration plot and farmers field school)			screen out
j. Others 2 (FRDP)							
j-1 Farm road construction program	√		183.0 km	Lhuntse:	New	98.4 km	IEE
					Beneficiaries[1]	1,291 HH	
				Mongar:	New	84.6 km	
					Beneficiaries[1]	1,521 HH	
j-2 Mule track construction program	√		114.1 km	Lhuntse:	New	28.7 km	IEE
					Beneficiaries[1]	589 HH	
				Mongar:	New	85.4 km	
					Beneficiaries[1]	572 HH	
j-3 Light-load bridge construction program	√	√	3 nos.	Lhuntse:	Rehab.	2 nos.	IEE
					Beneficiaries[1]	589 HH	
				Mongar:	New	1 no.	
					Beneficiaries[1]	572 HH	
j4 Construction machinery centre program	√		2 fleets	See Table 5.4.1, 5.4.2 and 5.4.4.			screen out

Note: "a." to "h." of main components are specified in JICA environmental guideline, whereas "i" and "j" are additionally proposed in the Master Plan.
1: Anticipated beneficiaries by FRDP in 10 years are estimated with population growth rate of 2.5 % per year. Other estimated beneficiaries are present household.

Table 5.8.2 Site Description (SD)

1. Present Socioeconomic Status of the Study Area

Land ownership and land use, etc.	The government granted land-holding right. Most of the land, including land for house and farm land, has been registered. Some of commune forest, which is designated for management by local community, is used for grazing of animals.
Economic activities	Most of households in and around the Study Area are engaged in agriculture. Economic activities are observed in town area (capitals of each Dzongkhag and some Gewog center) only.
Customs (water right, etc.)	In the Study Area, water of river and ponds is used for agriculture and drinking. However, no of customs or systems on water use right exists.
Host people or community	As divorce isn't so special things, some single mothers are seen in every village. There are some minority groups in the Study Area.
Health and sanitation	Diarrhea/ dysentery, respiratory tract infection, and skin infection are common diseases in Bhutan.
Population	Total population and households in the Study Area about 63,600 persons and 7,500 households. Percentage of male/female is 95.7 %.
Others	

2. Natural Conditions of the Study Area

Climate	Average temperature is 22.6°C (max.) and 13.6°C (min.) (Mongar station, '94-'01). Annual rainfall is 800-1,500 mm in the Study Area, and 79 % of it occurs during monsoon season (May - Sep.).
Topography	The topography of the Study Area is mountainous. The elevation ranges from EL400 m to EL 5,800 m.
Hydrology and drainage	The Kuri river finally flows into the Manas river thorough the Dangme river. Most of small river flows into the Kuri river or Dangme river.
Soil	Soils in the Study Area were classified into seven soil units based on the FAO/UNESCO soil classification system, namely i) Phaezems, ii) Cambisols, iii) Acrisoils, iv) Gleysols, v) Arenosols, vi) Regosols and vii) Lithosols.
Forest and vegetation	Most of the Study Area is covered by forest, 75.3 % in Lhuntse Dzongkhag and 88.5 % in Mongar Dzongkhag.
Rare species or fragile ecology	There is a rich repository of rare and endangered species in the Study Area.
Water quality	No available data. Most of villagers drink water without any sterilization.
Others	

3. Area under Specific Designation

Environmental Sensitive Area	Applicable or Not					
	in Project Area			Vicinity of Project Area		
	Applicable	N.A.	Unknown	Applicable	N.A.	Unknown
a. Habitat of fauna and flora listed in CITES	√			√		
b. Wetland designated in Ramsar Convention			√			√
c. Heritage sites under the World Heritage Convention		√			√	
d. National park, nature reserve, etc.	√			√		

Remark CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora

Table 5.8.3 Scoping Checklist (Social Environment)

Category of Environmental Impact*1	Initial Evaluation*2						Remarks
	Main Project Component*3						
	Irrigation		FR	MuT	LLB		
	New	Rehab	New	New	New	Rehab	
1. Socioeconomic Issue							
(1) Social Aspects							
1. Planned agricultural settlement	*	*	*	*	*	*	
2. Compulsory relocation of houses	-/C	*	-/B	-/B	-/C	X	
3. Land expropriation	-/C	X	-/B	-/B	-/C	X	
4. Substantial changes in way of life	+/C	X	+/C	+/C	+/C	X	Diffusion of money economy.
5. Conflict among communities and people	-/C	X	X	X	X	X	Conflict among beneficiaries and non-beneficiaries.
6. Impacts on indigenous people ethnic minorities and nomads	*	*	X	X	*	*	Social impacts on ethnic minorities.
(2) Demographic Issues							
1. Population increase	*	*	*	*	*	*	
2. Drastic changes in population composition	*	*	*	*	*	*	
(3) Economic activities							
1. Relocation of base economic activities	*	*	+/C	+/C	+/C	*	Diffusion of money economy.
2. Occupational changes, loss of labor opportunity	*	*	*	*	*	*	
3. Increase in income disparities	-/C	-/C	-/C	-/C	-/C	*	Disparities among beneficiaries and non-beneficiaries.
(4) Institutional and custom related issues							
1. Adjustment and regulation of water or fishing rights	-/C	-/C	*	*	*	*	Competition with drinking water source. Conflict by readjustment of irrigable area.
2. Changes in social and institutional structures	-/C	-/C	*	*	*	*	Water users' association. Beneficiaries' contribution for construction works.
3. Changes in existing institutions and customs	*	*	*	*	*	*	
2. Health and Sanitary Issues							
1. Increased use of agrochemicals	*	*	*	*	*	*	Religious hate for agrochemicals.
2. Outbreak of endemic disease	*	*	X	X	X	*	
3. Prevalence of epidemic diseases	*	*	X	X	X	*	
4. Residual toxicity of agrochemicals	*	*	*	*	*	*	Religious hate for agrochemicals.
5. Increase in domestic and other human wastes	*	*	-/C	*	*	*	Waste oil from construction machinery.
3. Cultural Issues							
1. Impairment of historic remains and cultural assets	-/C	*	-/B	-/B	-/C	X	
2. Damage to aesthetic sites	-/C	*	-/B	-/B	-/C	X	
3. Impediment of mineral resources exploitation	*	*	*	*	*	*	

*1 Definition of each category of environmental impact is followed by JICA environment guideline.

*2 Each applicable item is marked with the following classifications.

+/A: Upper part shows the direction of impacts and lower part shows the magnitude of impacts.
A: Relatively high magnitude of impacts is anticipated.
B: Relatively medium magnitude of impacts is anticipated.
C: Relatively low magnitude of impacts is anticipated.
X: No effect is expected. *: No relation
+: Positive effect is expected -: Negative effect is expected.

*3 Main Project components are abbreviated hereunder:

FR: Farm road construction program, MuT: Mule track construction program, LLB: Light-load bridge construction program
New: New project, Rehb.: Rehabilitation

Table 5.8.4 Scoping Checklist (Natural Environment)

Category of Environmental Impact*1	Initial Evaluation*2						Remarks
	Main Project Component*3						
	Irrigation		FR	MuT	LLB		
	New	Rehab	New	New	New	Rehab	
4. Biological and Ecological Issue							
1. Deterioration or degradation of vegetation	*	*	-/B	-/B	X	X	Earth dug outflow from construction site. Prevention of landslide.
2. Negative impacts on important or indigenous fauna and flora	*	*	-/B	-/B	-/C	X	Interruption of biological corridor.
3. Degradation of ecosystem with biological diversity	*	*	-/C	-/C	X	X	
4. Proliferation of exotic and/or hazard species	*	*	-/B	-/B	-/C	X	
5. Encroachment on wetland and peat swamp	*	*	*	*	*	*	
6. Encroachment on tropical forests	*	*	*	*	*	*	
7. Destruction or degradation of mangrove forests	*	*	*	*	*	*	
8. Degradation of coral reef	*	*	*	*	*	*	
5. Soil and Land Resources							
(1) Soil Resources							
1. Soil erosion	+/C	+/C	-/B	-/B	X	X	
2. Soil salinization	*	*	*	*	*	*	
3. Deterioration of soil fertility	+/C	+/C	*	*	*	*	
4. Soil contamination by agrochemicals	*	*	*	*	*	*	Religious hate for agrochemicals.
(2) Land Resources							
1. Devastation or desertification of land	X	X	-/B	-/B	*	*	Devastation of surrounding forest
2. Devastation of hinterland	X	X	*	*	X	X	
3. Ground subsidence	*	*	*	*	*	*	
6. Hydrology and Air and Water Quality Issues							
(1) Hydrology							
1. Changes in surface water hydrology	-/C	-/C	X	X	X	X	
2. Changes in groundwater hydrology	*	*	*	*	*	*	
3. Inundation and flood	*	*	*	*	*	*	
4. Soil sedimentation	+/C	+/C	*	*	*	*	Soil spillage.
5. Riverbed degradation	*	*	*	*	*	*	
6. Impediment of inland navigation	*	*	*	*	*	*	
(2) Water quality and temperature							
1. Water contamination and deterioration of water quality	+/C	+/C	-/C	-/C	X	*	Soil spillage.
2. Water eutrophication	*	*	*	*	*	*	
3. Sea water intrusion	*	*	*	*	*	*	
4. Low irrigation water temperature	*	*	*	*	*	*	
(3) Atmosphere							
1. Atmospheric pollution	*	*	-/C	X	X	X	Pollution by construction machinery.

*1 Definition of each category of environmental impact is followed by JICA environment guideline.

*2 Each applicable item is marked with the following classifications.

+/A: Upper part shows the direction of impacts and lower part shows the magnitude of impacts.
A: Relatively high magnitude of impacts is anticipated.
B: Relatively medium magnitude of impacts is anticipated.
C: Relatively low magnitude of impacts is anticipated.
X: No effect is expected. *: No relation
+: Positive effect is expected -: Negative effect is expected.

*3 Main Project components are abbreviated hereunder:

FR: Farm road construction program, MuT: Mule track construction program, LLB: Light-load bridge construction program
New: New project, Rehb.: Rehabilitation

Table 7.3.1 Schedule of Delegation of Powers to the Dzongkhag and Gewog Levels

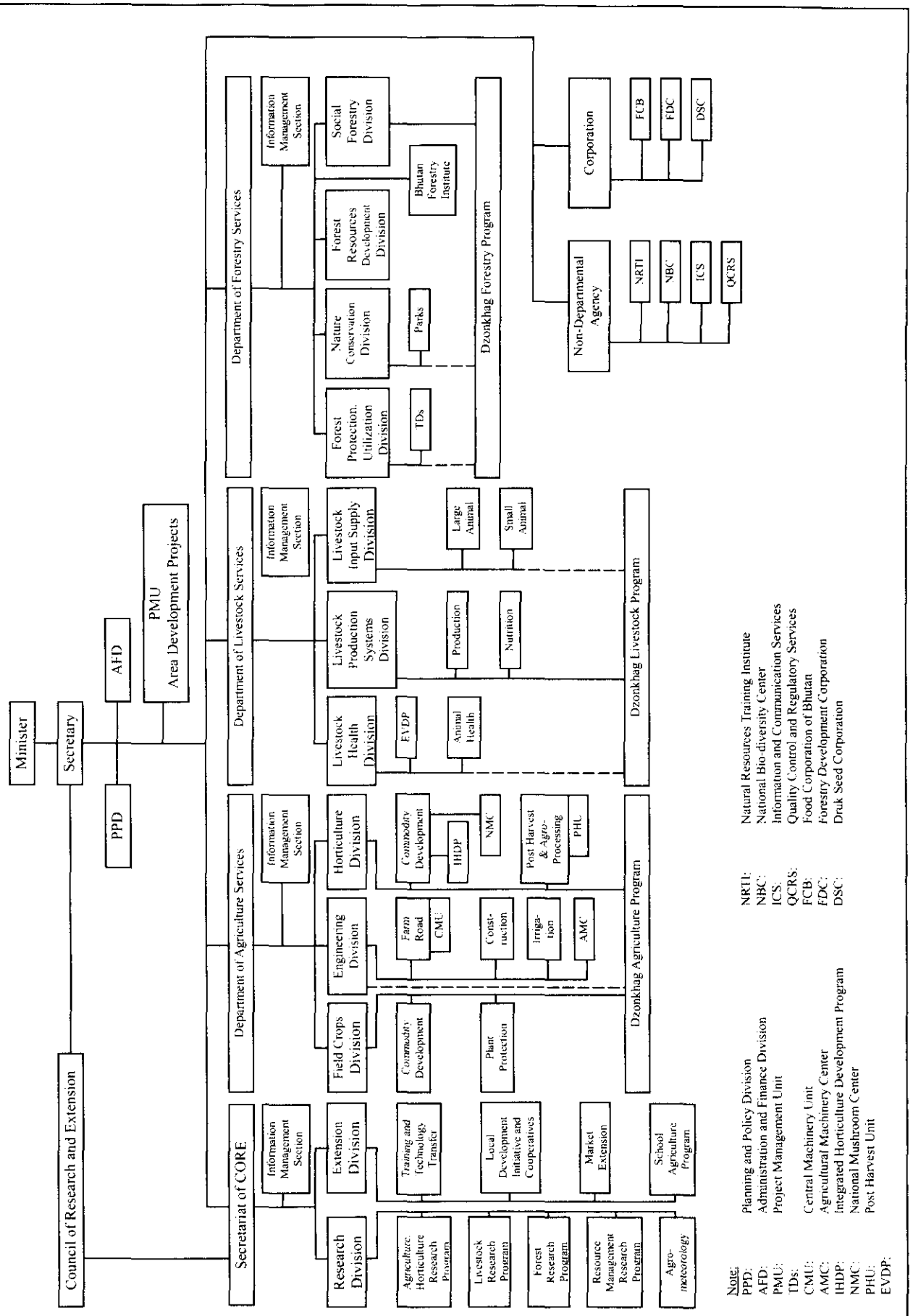
No.	Powers Delegated	Nature of Power	DYT	Head of Dzong -khag	GYT	Gup	Remarks (RMK)
1	Personnel & other personnel emoluments						
	a. Payment of emoluments	O	NA	FP	NA	FP	
	b. Encashment of leave	O	NA	NA	NA	NA	
	c. Sanction of arrears emoluments	O	NA	FP	NA	FP	
	d. Payment of salary advance	O	NA	FP	NA	Nil	Subject to liquidation within the same financial year
4	Travel						
	a. Tours						
	i) Within Bhutan & India	O	NA	FP	NA	FP	Gup (within Bhutan only)
	b. Seminar and conferences						
	i) Within Bhutan & India	O	NA	FP	NA	FP	Gup (within Bhutan only)
	c. Leave travel claims	O	NA	FP	NA	NA	
	d. Travel benefits (TG/transport)	O	NA	FP	NA	NA	
	e. Travel by ineligible modes	EO	NA	Nil	NA	Nil	
5	Utilities	O	NA	FP	NA	FP	
6	Rental of Properties						
	a. Hiring of buildings	EO	NA	FP	NA	Nil	
	b. Hiring machinery / equipment	O	NA	FP	NA	FP	
7	Supply of Materials	O	NA	FP	NA	FP	
8	Maintenance of Property						
	a. Insurance	O	NA	FP	NA	FP	
	b. Repair	O	NA	FP	NA	FP	
9	Maintenance of Vehicles						
	a. POL of official vehicles	O	NA	FP	NA	Nil	
	b. Repair of vehicles/equipment	O	NA	FP	NA	Nil	
	c. Purchase of spareparts	O	NA	FP	NA	Nil	
10	Operating Expenses	O		FP		FP	
12	Write-off	O	NA	FP	NA	Nil	
	a. Write off of losses						
	i) due to theft/ natural calamity	EO	Up to 50,000	Up to 10,000	Nil	Nil	Per incidence
	ii) in transit, handling, storage	EO	Up to 50,000	Up to 20,000	Nil	Nil	Per incidence
	b. Unserviceable and obsolete stores	EO	Up to 100,000	Up to 50,000	Nil	Nil	Per incidence
14	Purchase of Non-expendable Properties						
	a. Land, building (Bhutan)	EO	Nil	Nil	NA	Nil	
	b. Tools/plants/equipment	O	NA	FP	NA	FP	
	c. Vehicles	O	NA	FP	Nil	Nil	
	d. Furniture/office equipment	O	NA	FP	NA	FP	
15	Leases						
	a. Private land	EO	Nil	Nil	Nil	Nil	
	b. Gov. land and property	EO	Nil	Nil	Nil	Nil	
17	Constructions						
	a. Administrative approval & financial sanction	O	FP	FP	FP	Up to 50,000	Technical sanctions shall be issued by a competent technical authority
	b. Award of works	O	NA	FP	FP	Up to 50,000	
18	Hiring of Vehicles	O	NA	FP	Nil	Nil	

Note: O; ordinary, i.e., which can be further delegated, EO; extra ordinary, i.e., which can not be further delegated, FP; full power, NA; not applicable

Source: DYT Chathrim 2002

Figures

Figure 2.3.1
The Bhutanese System of Governance



The Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts in the Kingdom of Bhutan

Japan International Cooperation Agency

Figure 2.3.2

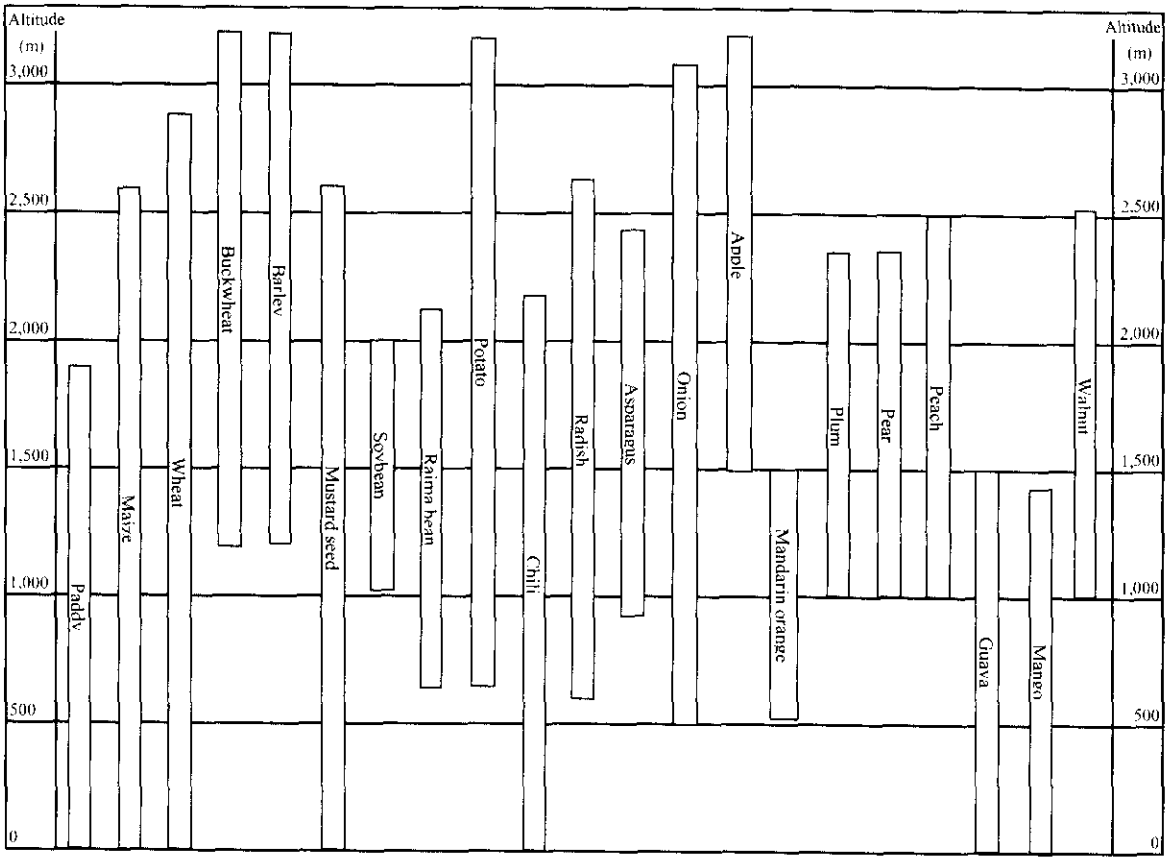
Organization Chart of Ministry of Agriculture

Figure 2.3.3
Organization Chart of RNR and Engineering Sectors of Lhuntse Dzongkhag

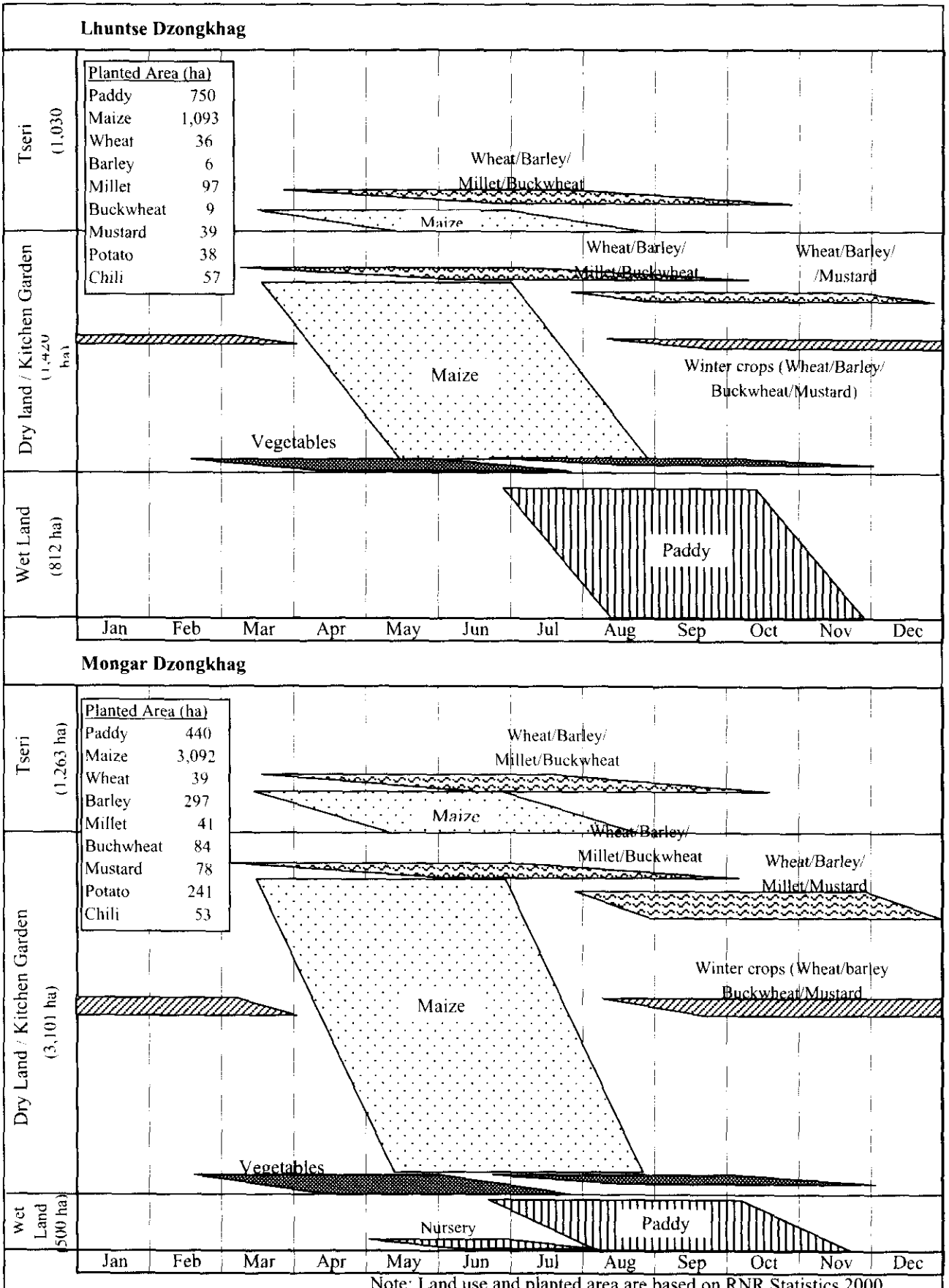
Note:
DAO: District Agricultural Officer
ADAO: Assistant DAO
DAHO: District Animal Husbandry Officer
ADAHO: Assistant DAHO
DFO: District Forest Officer
DE: District Engineer
PHE: Public Health Engineer
AE: Assistant Engineer
JE: Junior Engineer
SO: Section officer
Figure in parentheses shows number of staff.

Note:
APO: Assistant Planning Officer
DAO: District Agricultural Officer
ADAO: Assistant DAO
AEO: Agricultural Extension Officer
DAHO: District Animal Husbandry Officer
ADAHO: Assistant DAHO
LEO: Livestock Extension Officer
AIT: Artificial Insemination Technician
LSO: Livestock Officer
DFO: District Forest Officer
AFDO: Assistant DFO
DE: District Engineer
PHE: Public Health Engineer
AE: Assistant Engineer
JE: Junior Engineer
SO: Section officer
Figure in parentheses shows number of staff.

Figure 2.3.4 Organization Chart of RNR and Engineering Sectors of Mongar Dzongkhag



The Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts in the Kingdom of Bhutan	Figure 3.3.1
Japan International Cooperation Agency (JICA)	Suitable Altitude Range of Major Crops in the Study Area

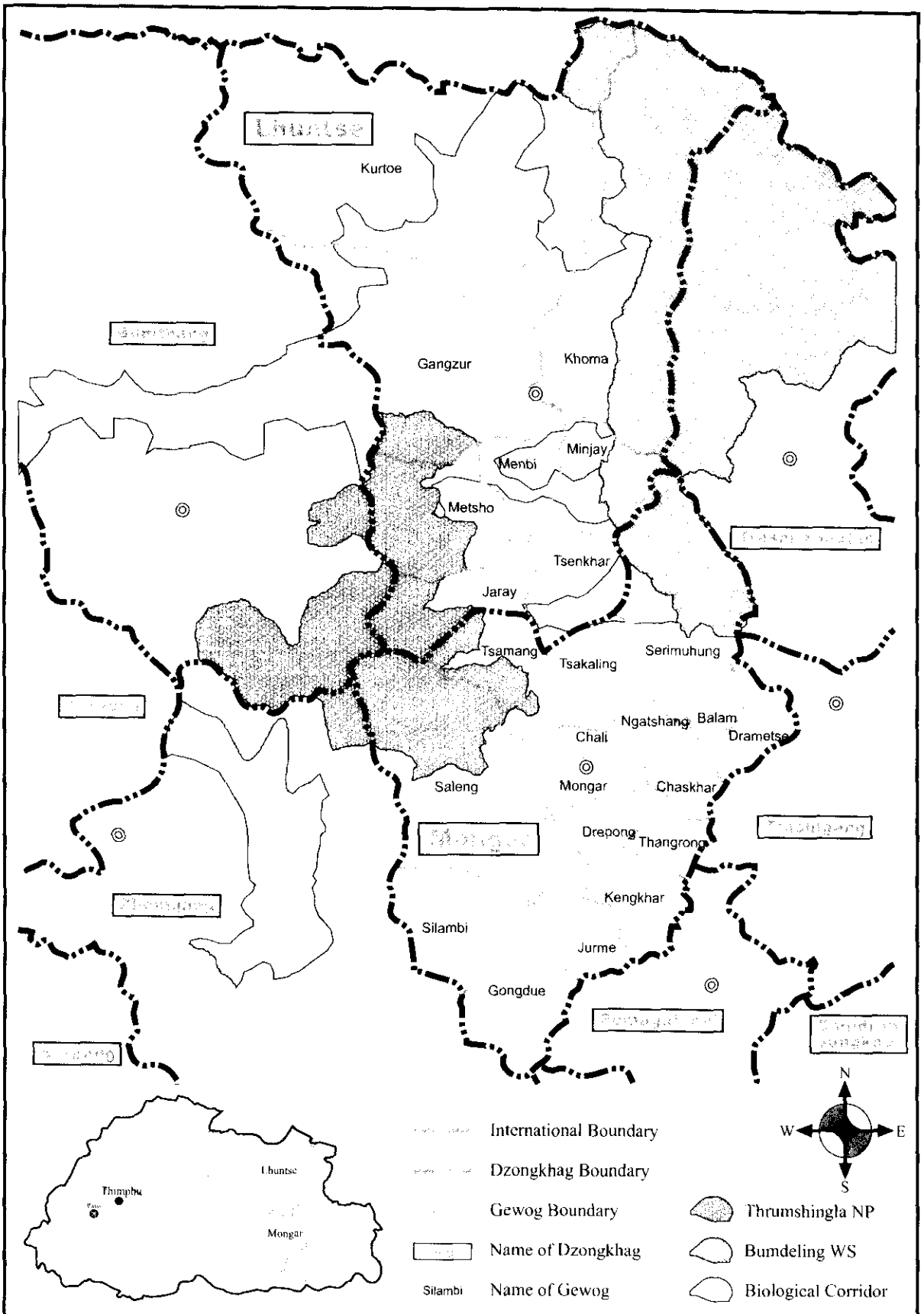


Note: Land use and planted area are based on RNR Statistics 2000

The Study on Agriculture and Farm Road Development in the Lhuntse and Mongar District in the Kingdom of Bhutan

Japan International Cooperation Agency (JICA)

Figure 3.3.2
Present Cropping Pattern of Major crops in the Study Area

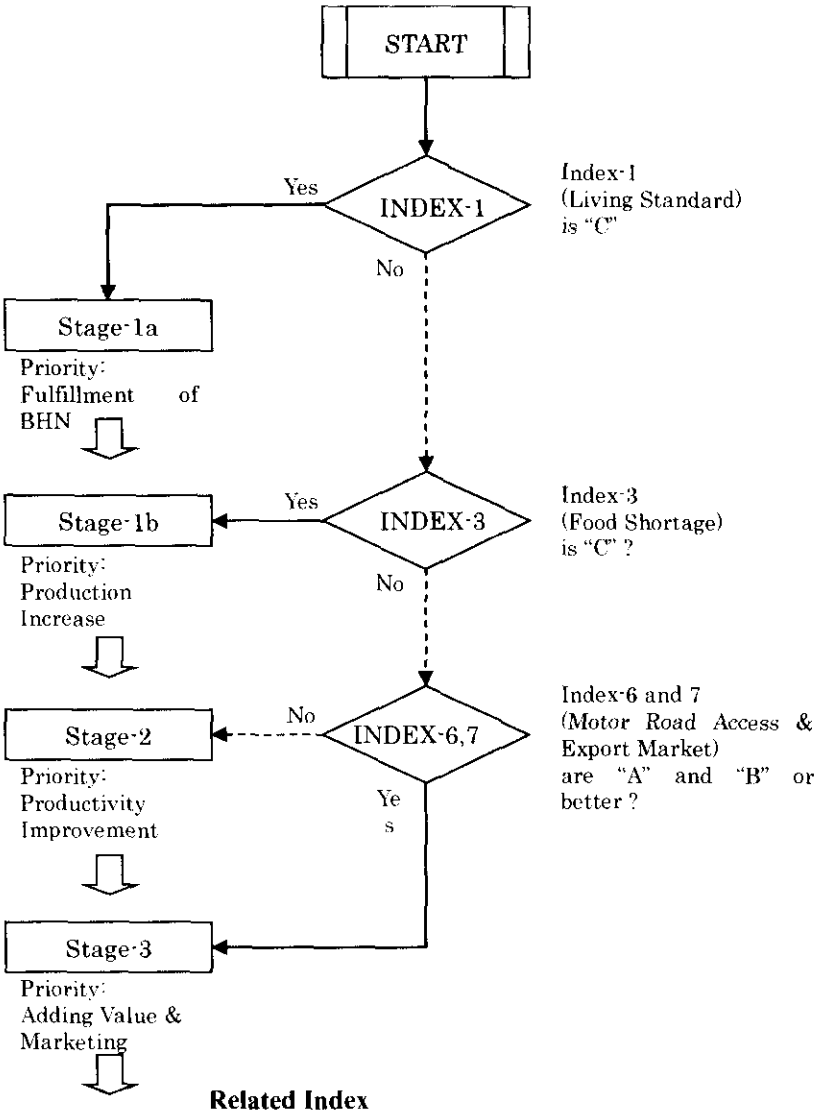


The Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts in the Kingdom of Bhutan

Japan International Cooperation Agency (JICA)

Figure 3.9.1

Protected Area



Related Index

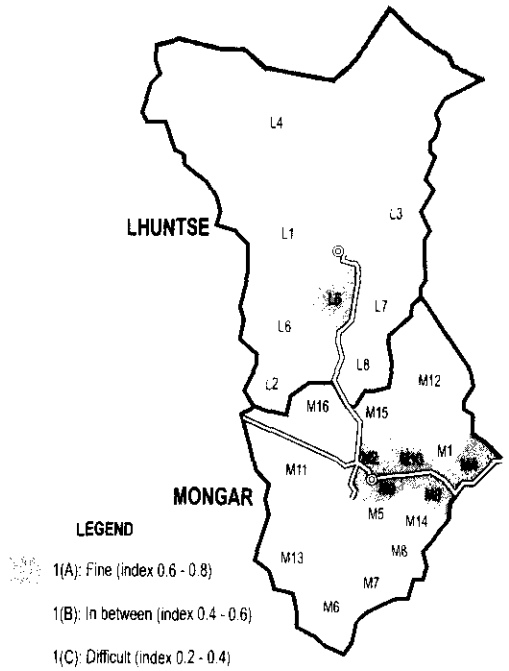
Index-1 (Living Standard):	A=Fine B=In-between C=Difficult
Index-3 (Food security):	A=High or Surplus B=Sufficient C=Seasonal shortage
Index-6 (Access to motor road):	A=less than 1 hour walk → over 50% less than 3 hours walk → over 90% B=less than 3 hours walk → over 75% C= others
Index-7 (Access to export market)	A=Gewogs with motor road and located between S. Jongkhar and Mongar B=Gewogs with motor road and located beyond Mongar from S Jongkhar C=Gewogs without motor road

The Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts in the Kingdom of Bhutan

Japan International Cooperative Agency

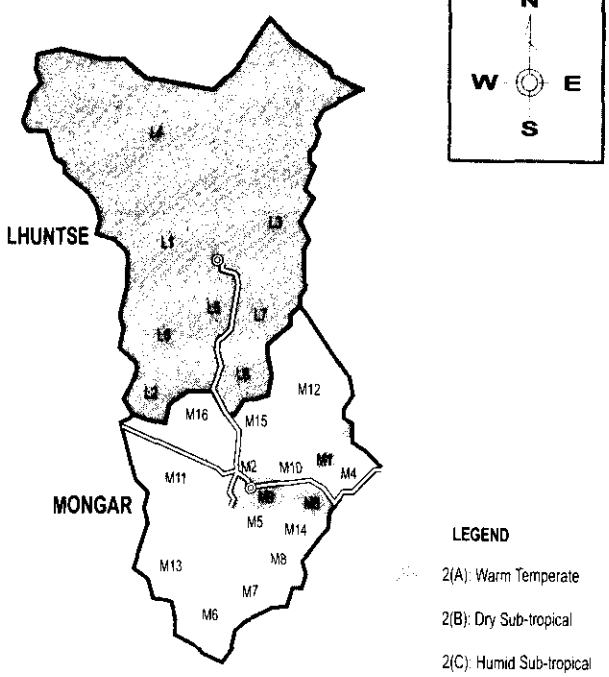
Figure 4.1.1

Flowchart to Identify Development Stages



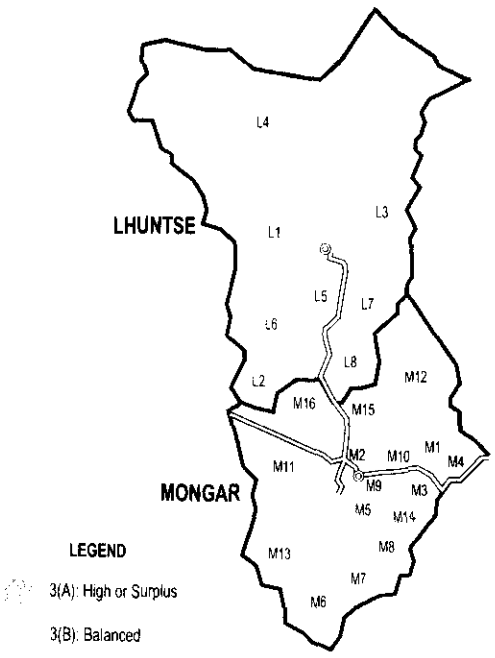
Index-1 Living Standard

(Composite index with priority weights, Poverty Assessment and Analysis Report)

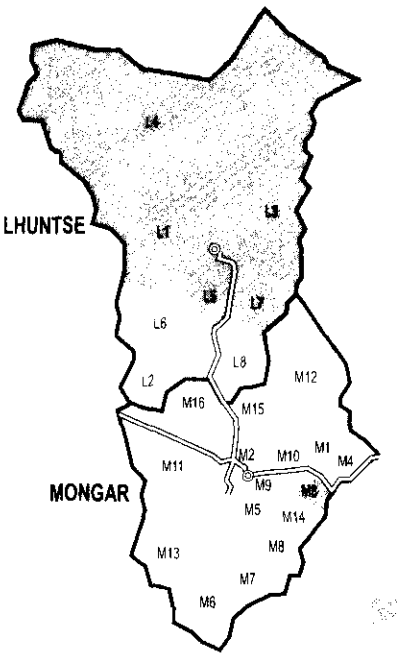


Index-2 Agro-Ecological Zone

(Predominant agro-ecological zone in agricultural land resource)



Index-3 Food Security



Index-4 Special Crops

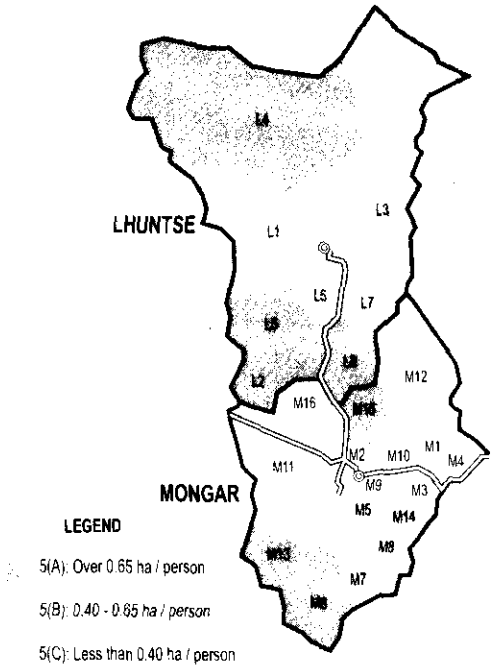
LHUNTSE

L1 Ganzur
L2 Jaray
L3 Khoma
L4 Kurtoe
L5 Menbi
L6 Metsho
L7 Minjay
L8 Tsenkhar

MONGAR

M1 Balam
M2 Chali
M3 Chaskhar
M4 Dramtse
M5 Drepong
M6 Gondue
M7 Jurme
M8 Kenkhar
M9 Mongar
M10 Ngatsang
M11 Saleng
M12 Serimuhung
M13 Silambi
M14 Thangrong
M15 Tsakaling
M16 Tsamang

The Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts in the Kingdom of Bhutan	Figure 4.1.2
Japan International Cooperation Agency	Zoning by Index by Study Area (1/2)



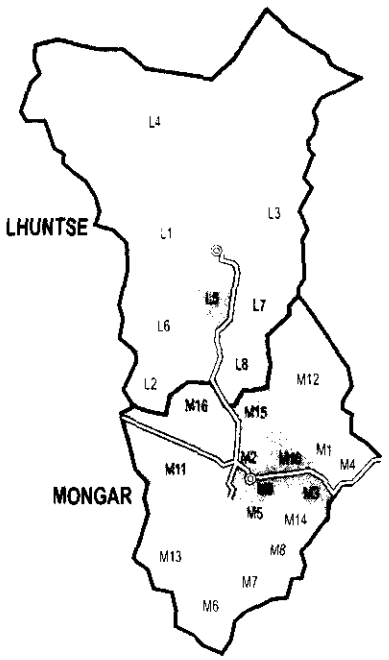
LEGEND

5(A): Over 0.65 ha / person

5(B): 0.40 - 0.65 ha / person

5(C): Less than 0.40 ha / person

Index-5 Land Resources
(Potential agricultural land per person)



Index-6 Accessibility to Motor Road

N
W E
S

LEGEND

6(A): Over 50% of households can reach motor roads within one hour walk and over 90% households can reach within three hours walk

6(B): Over 75% of households can reach motor roads within three hours walk

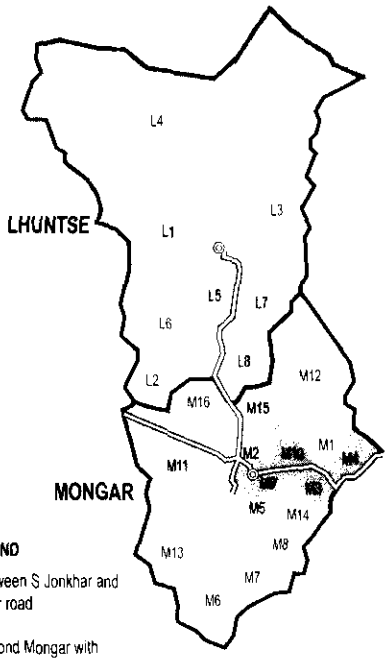
6(C): Others

LHUNTSE

L1 Ganzur
L2 Jaray
L3 Khoma
L4 Kurtoe
L5 Menbi
L6 Metsho
L7 Minjay
L8 Tsenkhar

MONGAR

M1 Balam
M2 Chali
M3 Chaskhar
M4 Dramtse
M5 Drepong
M6 Gondue
M7 Jurme
M8 Kenkhar
M9 Mongar
M10 Ngatsang
M11 Saieng
M12 Serimuhung
M13 Silambi
M14 Thangrong
M15 Tsakaling
M16 Tsamang



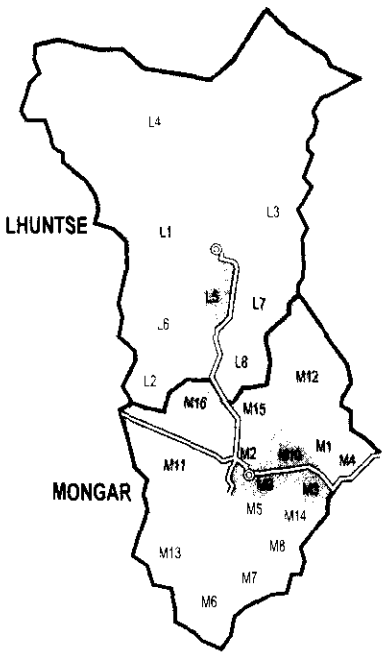
LEGEND

7(A): Gewogs between S Jonkhar and Mongar with motor road

7(B): Gewogs beyond Mongar with motor road at Gewog center

7(C): Others

Index-7 Accessibility to Export Market
(Distance to Samdrup Jonkhar)



LEGEND

Stage-3

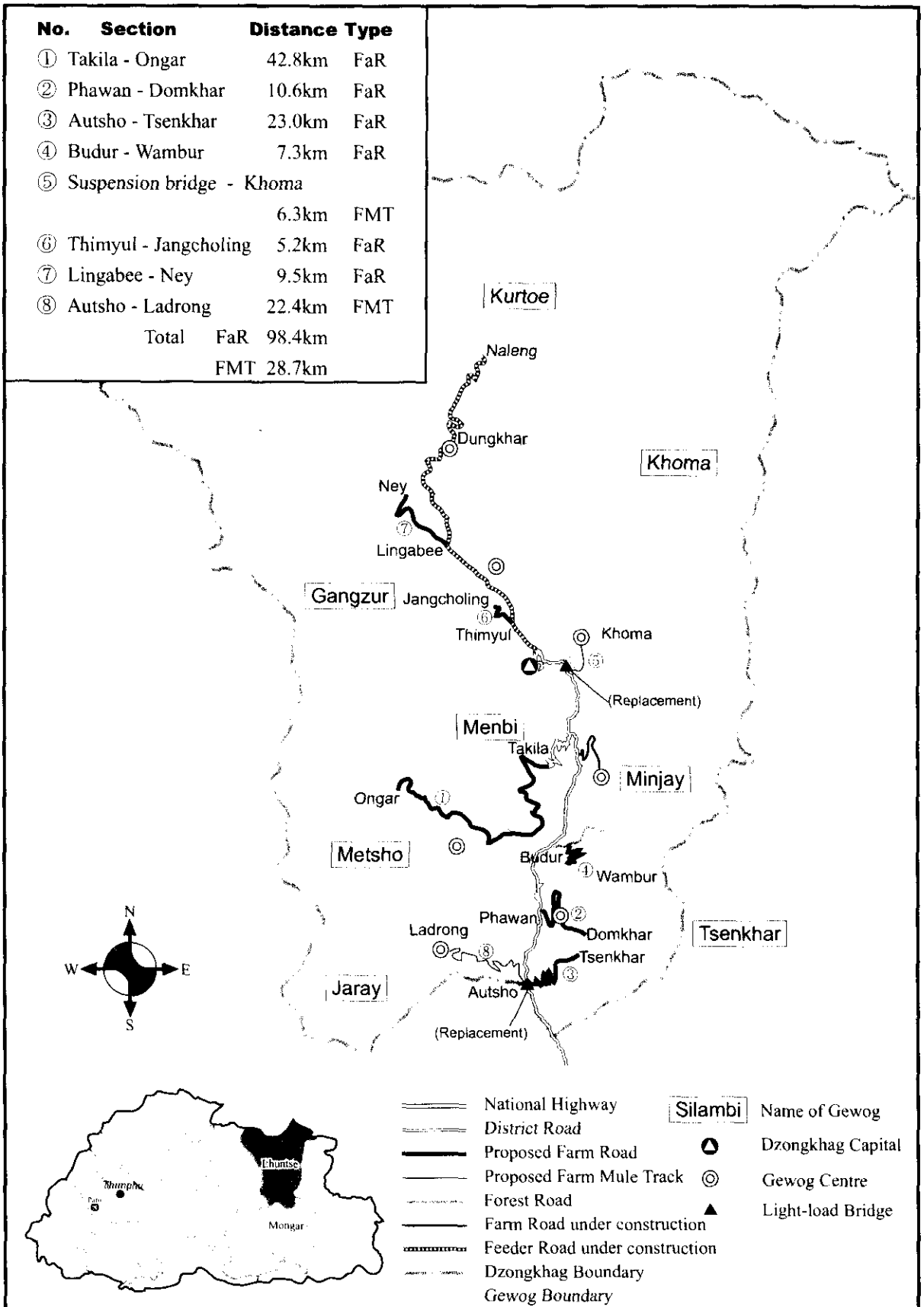
Stage-2

Stage-1

Present Development Stage

The Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts in the Kingdom of Bhutan	Figure 4.1.2
Japan International Cooperation Agency	Zoning by Index by Study Area (2/2) and Development Stage

Figure 5.2.1 Development Vision of the Study Area

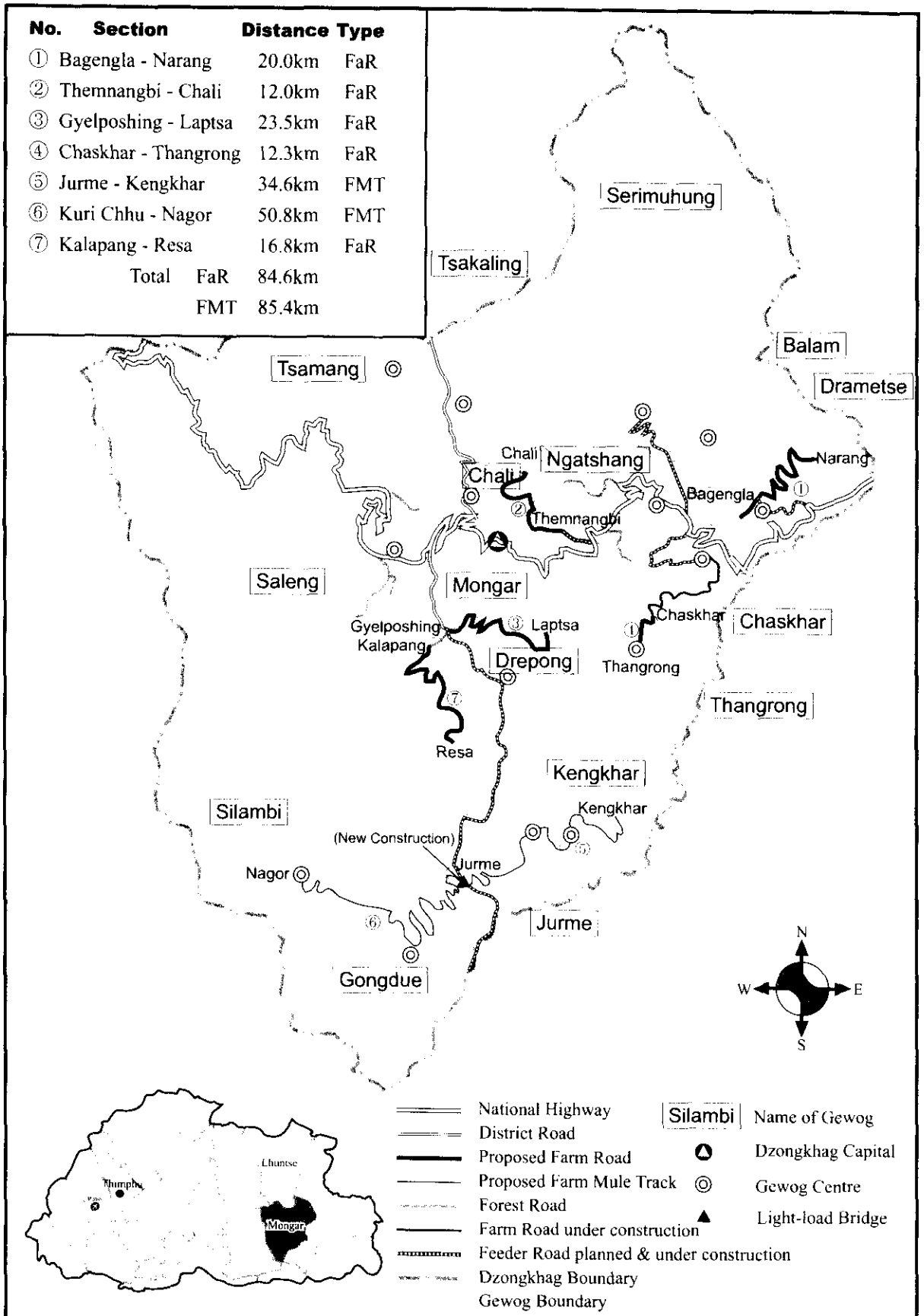


The Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts in the Kingdom of Bhutan

Japan International Cooperation Agency (JICA)

Figure 5.4.1

Proposed Farm Road in Lhuntse

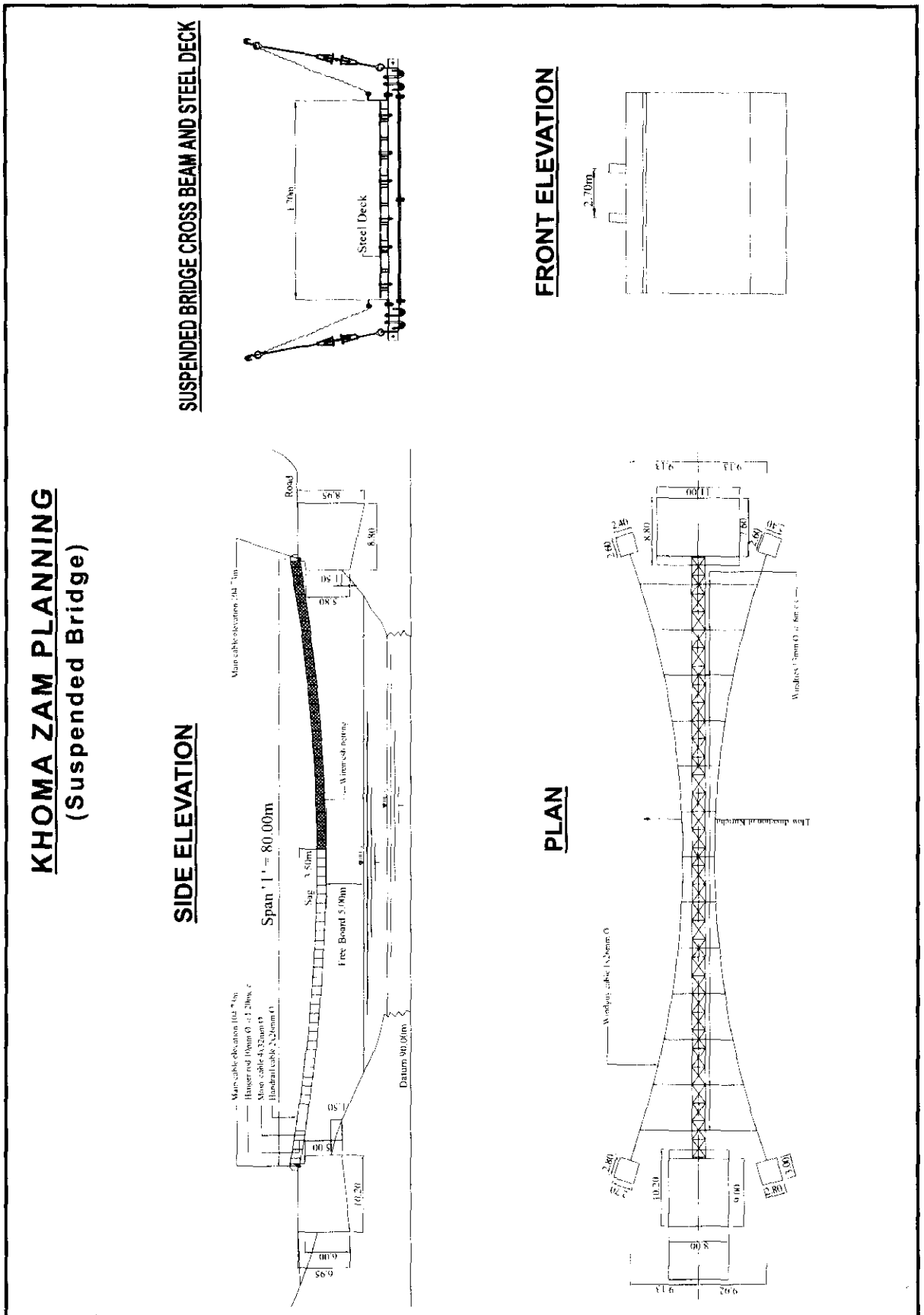


The Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts in the Kingdom of Bhutan

Japan International Cooperation Agency (JICA)

Figure 5.4.2

Proposed Farm Road in Mongar



The Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts in the Kingdom of Bhutan

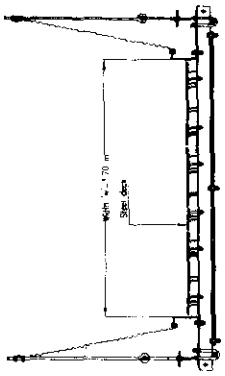
Japan International Cooperation Agency (JICA)

Figure 5.4.3

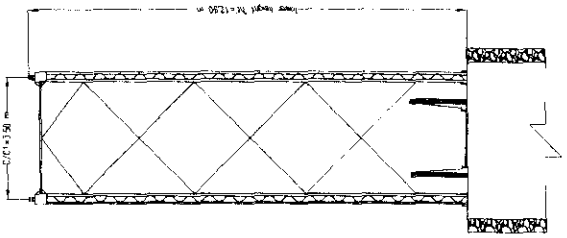
Khoma Zam Planning (Suspended Bridge)

AUTSHO ZAM PLANNING
(Suspension Bridge)

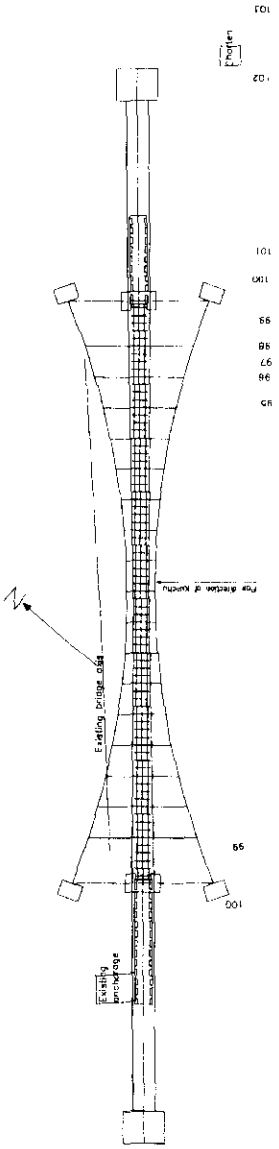
SUSPENDED BRIDGE CROSS BEAM AND STEEL DECK



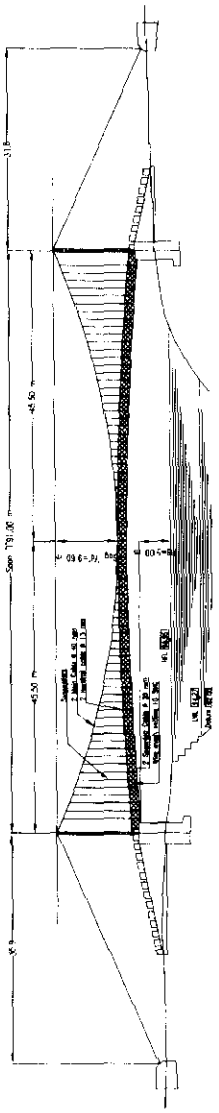
TOWER AND TOWER FOUNDATION



SIDE ELEVATION



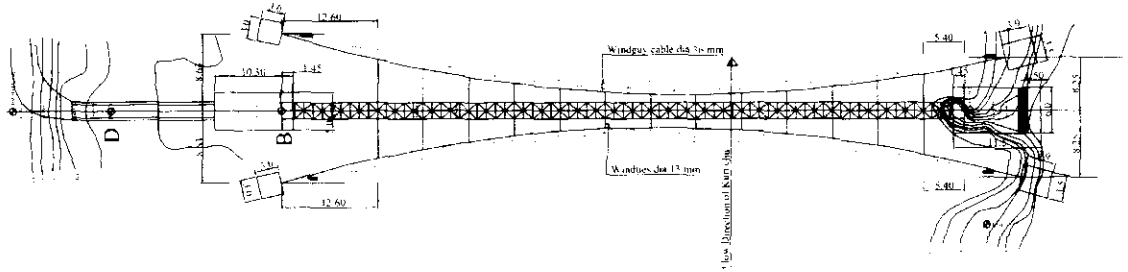
PLAN



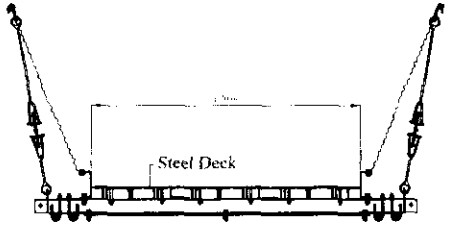
The Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts in the Kingdom of Bhutan	Figure 5.4.4
Japan International Cooperation Agency (JICA)	Autsho Zam Planning (Suspension Bridge)

GORTHONGLA ZAM PLANNING
(Suspended Bridge)

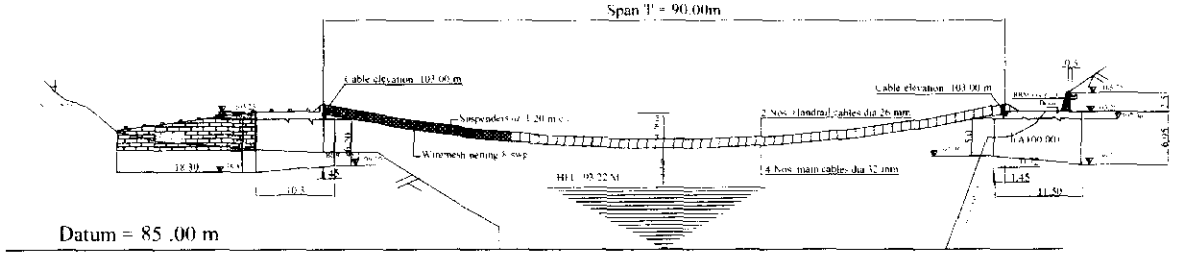
SIDE ELEVATION



SUSPENDED BRIDGE CROSS BEAM AND STEEL DECK



PLAN



FRONT ELEVATION

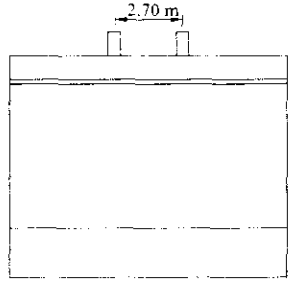
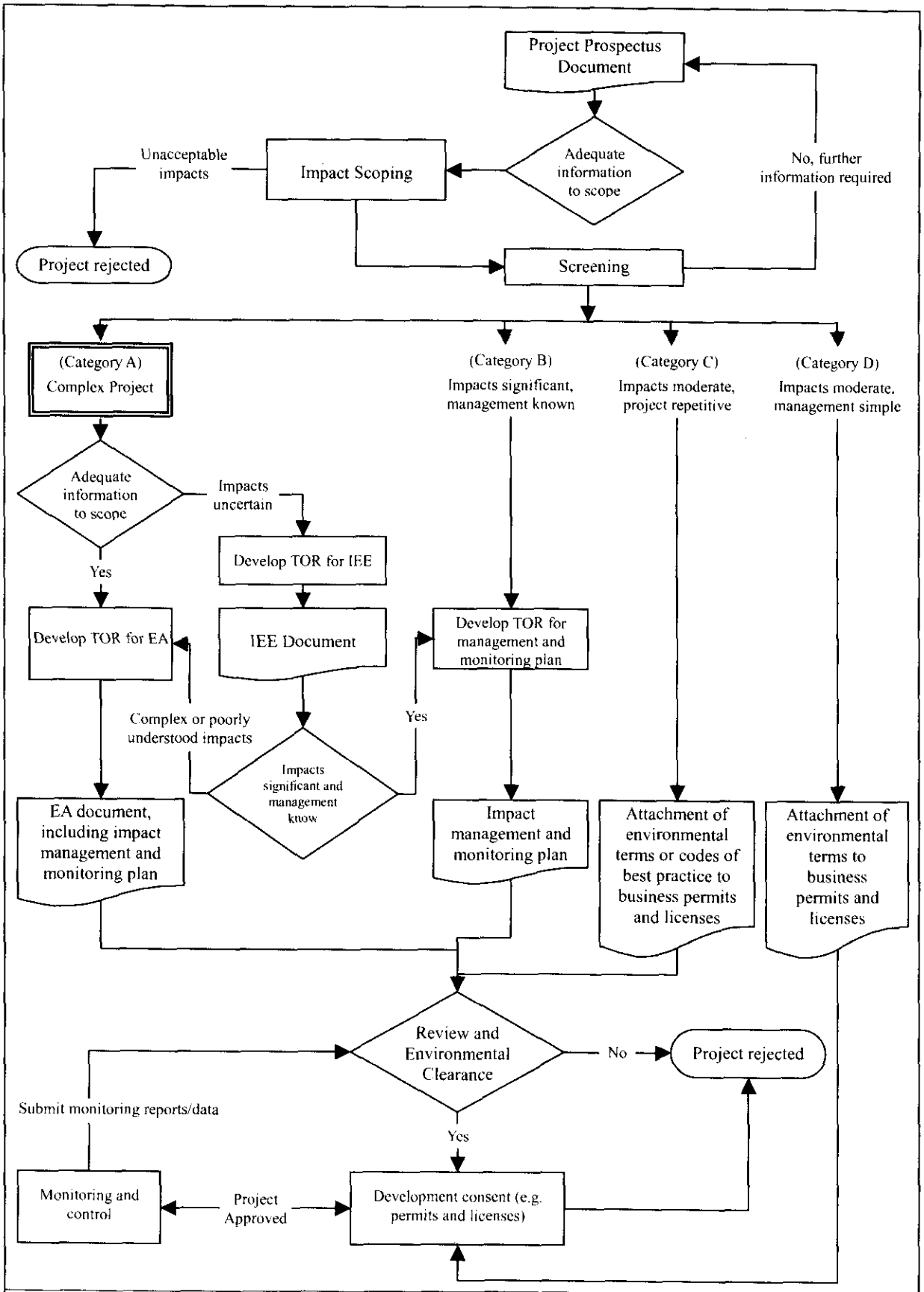


Figure 5.4.5 Gorthongla Zam Planning (Suspended Bridge)

The Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts in the Kingdom of Bhutan

Japan International Cooperation Agency (JICA)



The Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts in the Kingdom of Bhutan	Figure 5.8.1
Japan International Cooperation Agency (JICA)	Procedure for Project Assessment

Attachments

Attachment-1

Scope of Work

for

the Study

on

Agriculture and Farm Road Development

in

the Lhuntse and Mongar Districts

in

The Kingdom of Bhutan

agreed upon between

The Ministry of Agriculture of

The Kingdom of Bhutan

and

The Japan International Cooperation Agency

Thimphu, 11 December 2001

Dasho Sangey Thinlay
Secretary
Ministry of Agriculture

Mr. Hisashi KAWAGUCHI
Leader
Preparatory Study Team
Japan International Cooperation Agency

I. INTRODUCTION

In response to a request from the Royal Government of Bhutan (hereinafter referred to as the "RGOB"), the Government of Japan has decided to conduct the Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, will undertake the Study in close cooperation with the authorities concerned of the RGOB.

This document sets forth the scope of work with regard to the Study.

II. OBJECTIVES OF THE STUDY

The long-term objective of the Study is to upgrade the living standards (economically, socially and environmentally)of people in the Lhuntse and Mongar Districts. In order to achieve this long-term objective, the Study consists of the following aspects.

2.1 Formulation of the Master Plan on development of rural agriculture and farm road , which is based on due consideration for improvement of accessibility to markets and for enhancement of farm productivity.

2.2 Formulation of the Action Plan (including project documents and strategies for implementation of the projects) in the priority area(s)to be established in the Master Plan.

2.3 Implementation of technology transfer to Bhutanese counterparts through on-the-job training in the course of the Study.

III. STUDY AREA

3.1 The Master Plan will cover the Lhuntse and Mongar Districts.

3.2 The Action Plan will cover priority area(s) that will be established

in the Master Plan.

IV. SCOPE OF THE STUDY

In order to achieve the above objectives, the Study shall consist of the following activities:

4.1 Data collection

(a) To collect and assess existing data on the following aspects:

(i) Natural, social and economic conditions.
(ii) National policy, strategy and plans.
(iii) Farming systems.
(iv) Post-harvesting and marketing.
(v) Agricultural and social infrastructure.
(vi) Operation and maintenance of existing agricultural infrastructure and facilities.
(vii) Agricultural extension and credit.
(viii) Environmental issues.
(ix) Others.

(b) To conduct field surveys in several areas for supplementary data collection.

(c) To review relevant projects and plans.

4.2 Identification of potentials and constraints through data collection.

4.3 Formulation of the Master Plan.

(a) The Master Plan will be studied in line with the potentials and constraints that were identified through data collection. In the course of Master Plan formulation, the following aspects shall be examined:

(i) Agricultural issues
(ii) Marketing issues
(iii) Farm road issues
(iv) Environmental issues
(v) Institution and capacity building
(vi) Monitoring and evaluation
(vii) Others

(b) Selection of the priority area(s) in accordance with social, economic,

physical and environmental conditions will be carried out.

4.4 Formulation of an Action Plan

An Action Plan will be formulated in accordance with the goal(s), guideline(s) and priority(s) that will be established in the Master Plan. In the course of formulation of the Action Plan, an Initial Environmental Evaluation (IEE) on the proposed projects will be carried out in cooperation with the National Environmental Commission (NEC). If the results of the IEE indicate the necessity of an EIA, the Study team will support the implementation of the EIA.

V. STUDY SCHEDULE

The Study will be carried out in accordance with the attached Tentative Schedule (Annex).

VI. REPORTS

JICA shall prepare and submit the following reports, written in English, to the RGOB:

Inception Report:

Twenty (20) copies at the commencement of the Study.

Progress Report 1:

Twenty (20) copies at the middle of the first phase of work in Bhutan.

Progress Report 2:

Twenty (20) copies at the end of the first phase of work in Bhutan.

Draft Final Report:

Twenty (20) copies at the commencement of the second phase of work in Bhutan. The Bhutanese side will provide JICA with its comments on the Draft Final Report within one (1) month of its receipt of the Draft Final Report.

Final Report:

Thirty (30) copies within two (2) months of receipt of the Bhutanese side's comments on the Draft Final Report.

VII. UNDERTAKINGS OF THE RGOB

7.1 To facilitate the smooth conduct of the Study, the RGOB shall take necessary measures:

(a) To permit the members of the Team to enter, leave and sojourn in the Kingdom of Bhutan for the duration of their assignments therein, and to exempt the members of the Team from foreign registration requirements and

consular fees;
(b) To exempt the members of the Team from taxes, duties and any other charges on equipment, machinery and other material brought into the Kingdom of Bhutan for the implementation of the Study;
(c) To exempt the members of the Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the team for their services in connection with the implementation of the Study;
(d) To provide necessary facilities to the Team for the remittance as well as utilization of funds introduced into the Kingdom of Bhutan from Japan in connection with the implementation of the study.

7.2 The RGOB shall bear claims, if any arise, against the members of the Team resulting from, occurring in the course of, or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Team.

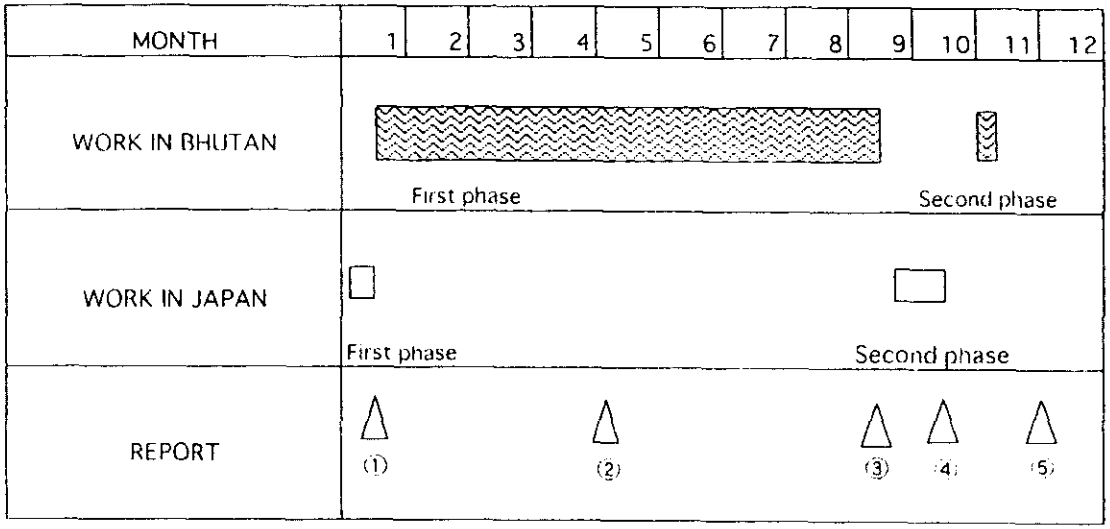
7.3 The Ministry of Agriculture (hereinafter referred to as the "MOA") shall, at its own expense, provide the Team with the following in cooperation with other organizations concerned:

(a) Security-related information on as well as measures to ensure the safety of the Team;
(b) Information on as well as support in obtaining medical service;
(c) Available data related to the Study;
(d) Counterpart personnel;
(e) Suitable office space with necessary office equipment and furniture;
(f) Credentials or identification cards.

IX. CONSULTATION
JICA and the MOA shall maintain constant communication and consult with each other in respect of any matters that may arise from or in connection with the Study.

ANNEX

TENTATIVE SCHEDULE



① Inception Report
② Progress Report 1
③ Progress Report 2
④ Draft Final Report
⑤ Final Report

Attachment-2

Minutes of Meetings
for
the Study
on
Agriculture and Farm Road Development
in
the Lhuntse and Mongar Districts
in
The Kingdom of Bhutan
agreed upon between
The Ministry of Agriculture of
The Kingdom of Bhutan
and
The Japan International Cooperation Agency

Thimphu, 11 December 2001

Dasho Sangey Thinlay
Secretary
Ministry of Agriculture

Mr. Hisashi KAWAGUCHI
Leader
The Preparatory Study Team
Japan International Cooperation Agency

In response to a request from the Royal Government of Bhutan (hereinafter referred to as "RGOB"), the Preparatory Study Team (hereinafter referred to as "the Team") headed by Mr. Hisashi KAWAGUCHI was sent to Kingdom of Bhutan by the Japan International Cooperation Agency from 30 November, to 18 December, 2001.

The Team held a series of discussions in relation to the Scope of the Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts (hereinafter referred to as "the Study") with representatives of the Ministry of Agriculture (hereinafter referred to as "MOA"), Lhuntse and Mongar Districts of RGOB and other relevant organizations. The list of participants in the series of meetings is attached as ANNEX. The followings were agreed upon by both Bhutanese and Japanese sides in relation to the Study.

1. Title of the Study

Both sides agreed that the title of the study should be changed from "The Farm Road Construction" to "The Study on Agriculture and Farm Road Development in the Lhuntse and Mongar districts".

2. Undertakings

JICA requested MOA to make necessary arrangement in providing office spaces in Thimphu, Lhuntse and Mongar. MOA promised to undertake this responsibility.

3. Counterpart Agency

Both sides confirmed that MOA acts as a counterpart agency to the Study Team and also as a coordinating and guiding body in relation with other governmental and non-governmental organizations and donors concerned for the smooth implementation of the Study.

4. Time Frame

MOA requested that the duration of the Master Plan and Action Plan should be set forth 8-10 years. (2003 to 2012)

5. Steering Committee

For the smooth and effective implementation of the Study, both sides agreed upon the need for establishment of a steering committee chaired by MOA in the course of the Study. Expected participants of the steering committee are as follows:

(1) Ministry of Agriculture.

(2) Luntse District.
(3) Mongar District.
(4) Ministry of Finance.
(5) Department of Roads, Ministry of Communication.
(6) National Environmental Commission.
(7) JICA Bhutanese Office.
(8) Japanese embassy in India(as an observer).
(9) Any other co-opted members.

6. Counterpart Personnel

MOA promised to assign the necessary number of counterpart personnel for the Study Team from the MOA, Lhuntse disrict and Mongar district.

7. Counterpart Training in Japan

MOA requested the training of counterpart personnel on specific relevant subjects in Japan for the efficient implementation of the Study. The Team promised to convey it to the Government of Japan.

8. Workshops

Both sides agreed to hold the workshops for recognizing the process and outputs of the Study among related actors.

9.Final report

Both sides agreed that the final report would be accessible to whoever interested.

10. Master Plan components

Both sides agreed that horticultural and livestock aspects will be taken into consideration in the course of the Master Plan formulation.

ANNEX

(A) Bhutanese side

1. Lyonpo Kinzang Dorji Hon'ble Minister, MOA
2. Dasho Sangay Thinley, Secretary, MoA
3. Mr. Phuntsho Wangyel, Program Officer, DADM, Ministry of Finance
4. Dr. Pema Gyamtsho Dy. Secretary PPD, MoA
5. Mr. Ganesh B. Chettri Offtg. Director, DRDS, MoA
6. Mr. Kaylzang Tshering, SE, DRDS, MoA
7. Mr. Karma Tashi, Extension Programme Officer, RNRRC, Khangma
8. Ms. Deki Pema, Planning Officer, PPD, MoA
9. Dasho Jigme Tshultrim Dzongdag Dzongkhag Administration, Mongar
10. Dasho Tappo Dzongrab Dzongkhag Administration, Mongar
11. Mr. Tandin Dorji, District Agriculture Officer, Dzongkhag Administration, Mongar
12. Mr. Dorji Wangchuck, District Animal Husbandry Officer, Dzongkhag Administration, Mongar
13. Mr. Penden Norgay, District Engineer, Dzongkhag Administration, Mongar
14. Mr. P.M. Pradhan, Programme Director, RNR Research Centre, Khangma
15. Dasho Nima Wangdi Dzongdag Dzongkhag Administration, Lhuentse
16. Mr. Bhakta Bdr. Shangshong, District Animal Husbandry Officer, Dzongkhag Administration, Lhuentse
17. Mr. S. B. Chettri, Engineer Dzongkhag Administration, Lhuentse
18. Mr. B. P. Adhikari, Assistant District Agriculture Officer, Dzongkhag Administration, Lhuentse
19. Mr. Nagphey, Assistant District Forestry Extension Officer, Dzongkhag Administration, Lhuentse
20. Mr. Yuichi TOMIYASU, JICA expert
21. Mr. Choni Dendup, Head, Agriculture Marketing Section, PPD, MOA

(B) Japanese side

1. Mr. Hisashi KAWAGUCHI, Leader, the Preparatory Study Team, JICA
2. Mr. Isamu YAMAZAKI, Member, the Preparatory Study Team, JICA
3. Mr. Seigo FURUDONO, Member, the Preparatory Study Team, JICA
4. Mr. Kenji HAYASHI, Member, the Preparatory Study Team, JICA
5. Mr. Yasujuki MORI, Resident Representative, JICA/ JOCV Bhutan Office
6. Mr. Kinley Dorji, Program Officer, JICA/ JOCV Bhutan Office

Attachment-3

MINUTES OF MEETING
ON
THE INCEPTION REPORT
OF
THE STUDY ON AGRICULTURE AND FARM ROAD DEVELOPMENT
IN THE LHUNTSE AND MONGAR DISCTRICTS
IN
THE KINGDOM OF BHUTAN

Thimphu, April 19, 2002

Dasho Sangay Thinley
Secretary
Ministry of Agriculture

Mr. Nobuo Sambe
Leader,
JICA Study Team

Witnessed by

Mr. Kenji Hayashi
Staff of Agricultural Development Study Division
Agriculture, Forestry and Fisheries Development Study Department, Japan International Cooperation Agency

In accordance with the Scope of Work and the Minutes of Meeting for "the Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts in the Kingdom of Bhutan" (hereinafter referred to as "the Study") agreed on December 11, 2001, the Ministry of Agriculture (hereinafter referred to as "MOA") has organized a Steering Committee for the Study (hereinafter referred to as "the SC"). The meeting between the SC and the JICA Study Team was held on April 19, 2002 at MOA.

The meeting was chaired by Dasho Sangay Thinley, Secretary, MOA. The attendants of the meeting are listed in ANNEX-1. After the Team briefed the contents of the Inception Report to the attendants at the meeting, discussions were made between the SC and the Team. Finally, the contents of the Inception Report were approved by the SC. The both sides confirmed to proceed to the next stage of the Study in accordance with the approaches and the plan of operation mentioned in the Inception Report. The major points discussed and agreed upon between the both sides are as follows :

(1) Scope of Work of the Study was re-confirmed that the Study consists of formulation of the Master Plan and Action Plan, and technology transfer.

(2) Close coordination and linkage with related programs, projects and studies conducted in the Study Area will be duly considered so that resources and inputs for the Study should be optimized.

(3) The target year of the Master Plan and Action Plans is set 2012. The Master Plan should also include a long-term vision of agriculture and farm road development in the Study Area for 20 years.

(4) Undertakings of RGOB/MOA mentioned in the Scope of Work of the Study were confirmed. MOA will arrange or assign counterpart personnel in either Thimphu or the Study Area as required.

(5) Another meeting on the Inception Report will be arranged and held soon with counterparts and related officials in the Study Area.

K. Hayashi

ANNEX-I

List of Attendants

Bhutanese Side

1.	Dasho SangayThinley	Secretary, MOA (Ministry of Agriculture)
2.	Dr. Pema Gyamtsho	Deputy Secretary, PPD (Policy and Planning Division), MOA
3.	Dr Pema Choephyel,	Officiating Director, DRDS (Department of Research and Development Services), MOA
4	Mr. Yuichi TOMIYASU	JICA Expert, RNR-RC (Renewable Natural Resources Research Center) East, MOA
5	Mr. Kaylzang Tshering	Superintending Engineer, DRDS, MOA
6.	Mr. G.B. Chettri	Joint Director, Research Division, DRDS, MOA
7.	Mr. Karma Dorji	Executive Director, QCRS (Quality Control and Regulatory Services), MOA
8.	S. R. Gurung	Deputy Director, DOFS (Department of Forest Service), FPUD (Forest Protection and Utilization Division), MOA
9	Mr. Tseten Rabgay	Officiating Director, DALSS (Department of Agriculture and Livestock Support Services), MOA
10.	Ms. Deki Pema	Planning Officer, PPD, MOA
11.	Mr. Norbu Wangchuk	DADM (Department of Aid and Debt Management), MOF (Ministry of Finance)
12.	Mr. Tshewang Dorji	Jr. Engineer, Survey & Design Section, Department of Roads, Ministry of Communication
13.	Ms. Peldon Tshering	EA (Environmental Impact Assessment Officer), NEC (National Environment Commission)
14.	Ms. Kinzang Wangmo	Finance Officer, AFD (Administration of Finance Division), MOA

Japanese Side

1.	Mr. Yasuyuki MORI	Resident Representative, JICA / JOCV Bhutan Office
2.	Mr. Kenji HAYASHI	Member, the Advisory Team, JICA Head Office, Tokyo
3	Ms. Midori ISHII	Planning and Research Officer, JICA / JOCV Bhutan Office
4.	Mr. Kinley Dorji	Program Officer, JICA / JOCV Bhutan Office
5.	Mr. Nobuo SAMBE	Leader, the JICA Study Team
6.	Mr. Hisashi ISHIKAWA	Member, the JICA Study Team
7	Dr. Itaru KOZAKI	Member, the JICA Study Team
8.	Mr. Seiji ITAYA	Member, the JICA Study Team
9	Mr. Tetsuo MORI	Member, the JICA Study Team

Attachment-4

MINUTES OF MEETING
ON
THE DRAFT PROGRESS REPORT (1)
OF
THE STUDY ON AGRICULTURE AND FARM ROAD DEVELOPMENT
IN THE LHUNTSE AND MONGAR DISCTRICTS
IN
THE KINGDOM OF BHUTAN

Thimphu, August 8, 2002

Dasho Sangay Thinley
Secretary
Ministry of Agriculture

Mr. Nobuo Sambe
Leader,
JICA Study Team

In accordance with the Scope of Work and the Minutes of Meeting for "the Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts in the Kingdom of Bhutan" (hereinafter referred to as "the Study") agreed on December 11, 2001, the Ministry of Agriculture (hereinafter referred to as "MOA") has organized a Steering Committee for the Study (hereinafter referred to as "the SC"). The second SC meeting on the Draft Progress Report (1) of the Study was held on August 8, 2002 at MOA.

The meeting was chaired by the Honorable Minister, Lyonpo Dr. Kinzang Dori, MOA. The attendants of the meeting are listed in ANNEX-I. After the Team briefed the contents of the Draft Progress Report (1) to the attendants at the meeting, discussions were made between the SC and the Team. The Hon'ble Minister and other RGOB members commended the SC for the excellent report and expressed their appreciation of the detailed analysis of constraints and opportunities. Finally, the contents of the Draft Progress Report (1) were approved by the SC. The both sides confirmed to proceed to the next stage of the Study in accordance with the approaches and the plan of operation mentioned in the Inception Report. The major points discussed and agreed upon between the both sides are as follows :

(1) Development plans of Gewogs of which action plans will be formulated in the following stage of the Study would be linked with the Gewog development plan of the 9th FYP.

(2) Social aspects or benefits from the project to further strengthen its justification would include "deceleration of rural-urban migration" and "generation of employment opportunity".

(3) Ganzur Gewog in Lhuntse Dzongkhag, Drepong and Chaskhar Gewogs in Mongar Dzongkhag were confirmed as the Gewogs for the formulation of the Action Plan in the following stage. Mule track and a light-load bridge to Khoma, Lhuntse Dzongkhag will be included for the formulation of the Action Plan of the Mule Track Construction Program (MTCP) and Light-load Bridge Construction Program (LBCP) of the Farm Road Development Plan (FRDP).

(4) Close coordination and exchange of information would be required on the projects handled by DOR, particularly on the implementation of the feeder road from Gyelposing(Mongar) to Nganglam (Samdrup Jhongkhar) which might influence the achievement of the Master Plan of adjacent Gewogs.

(5) RGOB requested for Japanese assistance for implementation of the plans and programs formulated in the Master Plan. The Team replied to convey the request to the Japanese side.

(6) The third steering committee on the Progress Report (1) will be held in September.

ANNEX-I

List of Attendants

Bhutanese Side

1.	Hon'ble Kinzang Dorji	Minister, MoA (Ministry of Agriculture)
2.	Dasho SangayThinley	Secretary, MoA
3.	Am Yangki Wangchuk,	Director General, DADM (Department of Aid & Debt Management) MoF (Ministry of Finance)
4.	Mr. Nima Wangdi	Dasho Dzongdag, Lhuentse
5.	Mr. Lham Dorji	Dasho Dzongdag, Mongar
6.	Mr. Ugyen Thinley	Director, Department of Forestry, MoA
7.	Mr. Tenzin Dhendup,	Director, DALSS (Department of Agriculture & Livestock Support Services) MoA Services, Mo A
8.	Dr. Pema Gyamtsho	Deputy Secretary, PPD (Policy and Planning Division), MoA
9.	Mr. Sonam Wangdi	Deputy Secretary, AFD (Accounts & Finance Division), MoA
10.	Dr. Pema Choephyel, Development Services, MoA	Officiating Director, DRDS (Department of Research and
11.	Mr. G. K. Pradhan	Joint Director, NEC (Natural Environment Commission)
12.	Mr. Karma C. Nyedrup	Head, Environment Assessment Section, NEC
13.	Mr. Karma Dorji	Executive Director, QCRS (Quality Control and Regulatory Regulatory Services, MoA
14.	Ms Pema Lhamo	Program Director, Information & Communication Services MoA
15.	Mr. Norbu Wangchuk,	Planning Officer, DADM, MoF
16	Mr. Kaylzang Tshering	Superintending Engineer, DRDS, MOA
17.	Mr. Niralal Rai	Deputy Executive Engineer, DoR(Department of Roads) MoC (Ministry of Communication)
18.	Mr. Karma Tashi	Extension Program Officer, RNRRC(Renewable Natural Resources Research Centre, Khangma, DRDS, MoA
19.	Mr. A.K Rinzin	Planning Officer, PPD, MoA
20.	Ms. Kinzang Wangmo	Finance Officer, AFD, MoA
21.	Mr. Nedrup Tshewang	Section Officer, DRDS, MoA
22.	Ms. Bindu M. Tamang	Assistant Planning Officer, PPD, MoA

Japanese Side

1.	Ms. Minori ISHII	Planning and Research Officer, JICA / JOCV Bhutan Office
2.	Mr. Kinley Dorji	Program Officer, JICA / JOCV Bhutan Office
3.	Mr. Nobuo SAMBE	Leader, the JICA Study Team
4.	Mr. Hisashi ISHIKAWA	Member, the JICA Study Team
5.	Mr. Keiji NAKAOKA	Member, the JICA Study Team
6.	Mr. Seiji ITAYA	Member, the JICA Study Team

Attachment-5

MINUTES OF MEETING
ON
THE PROGRESS REPORT (1)
OF
THE STUDY ON AGRICULTURE AND FARM ROAD DEVELOPMENT IN THE LHUNTSE AND MONGAR DISCTRICTS
IN
THE KINGDOM OF BHUTAN

Thimphu, September 20, 2002

Mr. Tenzin Dhendup
Officiating Secretary
Ministry of Agriculture

三部 信雄

Mr. Nobuo Sambe
Leader,
JICA Study Team

In accordance with the Scope of Work and the Minutes of Meeting for "the Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts in the Kingdom of Bhutan" (hereinafter referred to as "the Study") agreed on December 11, 2001, the Ministry of Agriculture (hereinafter referred to as "MOA") has organized a Steering Committee for the Study (hereinafter referred to as "the SC"). The third SC meeting on the Progress Report (1) of the Study was held on September 20, 2002 at MOA.

The meeting was chaired by the Honorable Secretary (Officiating), Mr. Tenzin Dhendup, Director, DALSS, MOA. The attendants of the meeting are listed in ANNEX-I. The Team firstly briefed the contents of discussions in a meeting on the Progress Report (1) held in Japan on September 11 with Advisory Committee and related officials for the Study. Secondly, the Team explained further schedule of the Action Plan Stage of the Study. Thirdly, the Team presented progress and present condition of the programme, "Technical Transfer through OJT", which have been conducted in the Study Area.

Then the both sides discussed on the issues presented and explained by the Team. The major points discussed and agreed upon between the both sides are as follows :

(1) "Mule Track" proposed in the Master Plan was identified as one of the categories of the farm roads. In order to clarify such concept, the mule track in the Study would be called "Farm Mule Track".

(2) The pumps used for irrigation would as far as possible be local/regional in order to ensure availability of after-sale-service and spare parts.

(3) DOR presented kind information that a part of the feeder road from Gyelposing to Nganglam (20 kms to be taken up in the 9th FYP starting with 10 km from Gyelposing to Jurmi Gewog, Mongar) will be constructed during the period of 2003-2005.

(4) The meeting was informed that the SEZAP Mid-Term Review Mission is currently being fielded and some interaction would be necessary in connection with the Master Plan and formulation of the Action Plan of the Study.

ANNEX-I

List of Attendants

Bhutanese Side

1.	Mr. Tenzin Dhendup,	(Chairperson) Officiating Hon'ble Secretary, DALSS (Department of Agriculture & Livestock
2.	Mr. Pema Chewang ,	Senior Program Officer, DADM (Department of Aid & Debt Management) MoF (Ministry of Finance)
3	Mr. Sangay Wangchuk	Officiating Director, Department of Forestry, MoA Support Services) MoA
4	Dr. Pema Gyamtsho	Deputy Secretary, PPD (Policy and Planning Division), MoA
5	Mr. Karma Rabten	Head, TD, NEC
6	Mr. Karma Dorji	Executive Director, QCRS (Quality Control and Regulatory Regulatory Services, MoA
7.	Mr. Kaylzang Tshering	Superintending Engineer, DRDS, MOA
8	Mr. Niralal Rai	Deputy Executive Engineer, DoR(Department of Roads) MoC (Ministry of Communication)
9	Ms. Kinzang Wangmo	Finance Officer, AFD, MoA
10	Ms. Deki Pema	Planning Officer, PPD, MoA
11	Ms. Bindu M. Tamang	Assistant Planning Officer, PPD, MoA

Japanese Side

1	Mr. Yasuyuki MORI	Resident Representative, JICA/JOCV Bhutan Office
2	Ms. Minori ISHII	Planning and Research Officer, JICA / JOCV Bhutan Office
3.	Mr. Kinley Dorji	Program Officer, JICA / JOCV Bhutan Office
4.	Mr. Nobuo SAMBE	Leader, the JICA Study Team
5	Mr. Hisashi ISHIKAWA	Member, the JICA Study Team
6	Mr. Keiji NAKAOKA	Member, the JICA Study Team
7.	Mr. Seiji ITAYA	Member, the JICA Study Team

Attachment-6

MINUTES OF MEETING
ON
THE DRAFT PROGRESS REPORT (2)
OF
THE STUDY ON AGRICULTURE AND FARM ROAD DEVELOPMENT
IN THE LHUNTSE AND MONGAR DISCTRICTS
IN
THE KINGDOM OF BHUTAN

Thimphu, December 13, 2002

Dr. Pema Choephyel
Officiating Secretary
Ministry of Agriculture

Mr. Nobuo Sambe
Leader,
JICA Study Team

In accordance with the Scope of Work and the Minutes of Meeting for "the Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts in the Kingdom of Bhutan" (hereinafter referred to as "the Study") agreed on December 11, 2001, the Ministry of Agriculture (hereinafter referred to as "MOA") has organized a Steering Committee for the Study (hereinafter referred to as "the SC"). The fourth SC meeting on the Draft Progress Report (2) of the Study was held on December 12, 2002 at MOA.

The meeting was chaired by the Honorable Secretary (Officiating), Dr. Pema Choephyel, Officiating Director, DRDS, MOA. The attendants of the meeting are listed in ANNEX-I. The Team firstly briefed the contents of the Draft Progress Report (2).

Then the both sides discussed on the issues presented and explained by the Team. Status of programs and sub-programs in terms of implementation and financing was also discussed, particularly on the programs requested to the Japanese Government. The major points discussed and agreed upon between the both sides are as follows :

(1) The contents of the Draft Progress Report (2) consisting of the Master Plan and the Draft Action Plans were confirmed and agreed.

(2) RNR coordinator (DAO) of Lhuntse Dzongkhag proposed continuation of farm road construction from Menbi to Ongar, Metsho, even having another development alternative to construct a light-load bridge at Gorgan and a farm mule track from Gorgan to Ongar.

(3) Director General of DADM, MOF commented that certain sector or programs / sub-programs should be focused on or prioritized for financial arrangement even though they are incorporated with the 9th FYP, for more effective budget allocation by RGOB. The team leader replied that production increase of food crops and improvement of rural access are considered as the priority development approaches in the Study Area.

(4) Representative from DALLS commented that cattle development does not seem to be included in the programs or sub-programs of the Master Plan. The leader replied that main targets of the Study are food security and income increase by cash crop development, and accordingly, animal husbandry for attaining these targets were considered in the Study. The Study Team also recommended regional development in integrated manner even with components which are not included in the Master Plan so that well-balanced development should be performed in the Study Area.

(5) Bhutanese side will take necessary action to request for Japanese Official Development Assistance for implementation of programs of the Master Plan.

ANNEX-I

List of Attendants

Bhutanese Side

1.	Dr. Pema Choephyel,	(Chairperson) Officiating Hon'ble Secretary, Director DRDS
2.	Am Yangki T. Wangchuk,	Director General, DADM (Department of Aid & Debt Management) MOF (Ministry of Finance)
3.	Mr. Sangay Wangchuk	Officiating Director, Department of Forestry, MOA
4.	Mr. Choni Dendup	Officiating Deputy Secretary, PPD (Marketing Officer), MOA
5.	Mr. Sonam Wangdi	Deputy Secretary, AFD, MOA
6.	Ms. Pema Lhamo	Program Director, ICS, MOA
7.	Mr. Thuji Tshering	Joint Director, QCRS, MOA
8	Mr. Karma C. Nedrup	Head, Environmental Assessment Section, NEC
9	Mr. K. Wangdi	Officiating Director, DALLS, MOA
10.	Mr. Dorji Rinchen	Marketing Officer, PPD, MOA
11.	Ms. Deki Pema	Planning Officer, PPD, MOA
12.	Mr. S.D. Thapa	Planning Officer, Lhuntse Dzongkhag
13.	Mr. Deepak Rai	District Agriculture Officer, Lhuntse Dzongkhag
14.	Mr. Om Nath Giri	District Engineer, Lhuntse Dzongkhag
15.	Mr. Chimi Tshewang	Statistical Officer, Mongar Dzongkhag
16.	Mr. Niralal Rai	Deputy Executive Engineer, DoR(Department of Roads) MoC (Ministry of Communication)
17.	Ms. Kinzang Wangmo	Finance Officer, AFD, MOA
18.	Mr. Nedrup Tshewang	Junior Engineer, DRDS, MOA

Japanese Side

1.	Mr. Yasuyuki MORI	Resident Representative, JICA/JOCV Bhutan Office
2.	Ms. Minori ISHII	Planning and Research Officer, JICA / JOCV Bhutan Office
3.	Mr. Kinley Dorji	Program Officer, JICA / JOCV Bhutan Office
4.	Mr. Thinley Tobgey	Program Officer, JICA / JOCV Bhutan Office
5.	Mr. Nobuo SAMBE	Leader, the JICA Study Team
6.	Mr. Hisashi ISHIKAWA	Member, the JICA Study Team
7.	Mr. Yoshiharu TOYAMA	Member, the JICA Study Team
8.	Mr. Seiji ITAYA	Member, the JICA Study Team

Attachment-7

MINUTES OF MEETING
ON
THE DRAFT FINAL REPORT
OF
THE STUDY ON AGRICULTURE AND FARM ROAD DEVELOPMENT
IN THE LHUNTSE AND MONGAR DISCTRICTS
IN
THE KINGDOM OF BHUTAN

Thimphu, February 10, 2003

Dasho Sangay Thinley
Secretary
Ministry of Agriculture

Mr. Nobuo Sambe
Leader
JICA Study Team

Witnessed by

Mr. Sataro Yazawa
Leader
JICA Advisory Team

In accordance with the Scope of Work and the Minutes of Meeting for "the Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts in the Kingdom of Bhutan" (hereinafter referred to as "the Study") agreed on December 11, 2001, the Ministry of Agriculture (hereinafter referred to as "MOA") has organized a Steering Committee for the Study (hereinafter referred to as "the SC"). The fifth SC meeting on the Draft Final Report of the Study was held on February 7, 2003 at MoA.

The meeting was chaired by the Honorable Secretary, Dasho Sangay Thinley, MOA. The participants of the meeting are listed in ANNEX-I. After the Team briefed the meeting on the contents of the Draft Final Report and discussion on it made in Japan, discussions were made between the SC and the Team. The major comments and points discussed and agreed upon between the both sides are as follows:

(1) Production of maize has been affected by; market price of maize, physical accessibility to market or difficulties in collection of products, crop varieties and farming practices. The Master Plan set various targets of food crop production in accordance with current production level. Production increase, access improvement and establishment of marketing system for smooth collection and shipping should be promoted according to the Master Plan.

(2) Quality control and processing of agriculture products including animal products would be also an important aspect to improve agricultural income.

(3) Taking into consideration various income sources of rural household, livestock, NTFP, tourism and other off-farm activities should also be promoted.

(4) Japanese side suggested that RGoB should seek for financial resources for implementation of proposed programs in the Master Plan, not only from Japan but also from various donors and/or RGoB's own resources. Various schemes and resources that are applicable for the proposed programs should be considered.

(5) On behalf of RGoB, the DADM expressed appreciation and gratitude for the continuing support and development assistance being rendered by the Government of Japan to Bhutan. DADM also expressed appreciation of the excellent work done by the JICA Study Team and pointed out that resource mobilization for the implementation of the proposed programs in the Master Plan which build upon the Gewog and Dzongkhag Plans for the 9th FYP is of utmost urgency. It is particularly important because the participatory process of planning that has been adopted has raised the expectations of the people and if the programs cannot be implemented it would greatly undermine this process. Furthermore the need for rural infrastructure

development and in particular, farm roads has been emphasized as a priority area for poverty alleviation and rural development. Therefore the RGoB would like to solicit aid, particularly for farm roads development. The RGoB would like to seek the support of the Government of Japan in this very vital area for rural development.

(6) MoA will send further comments on the Draft Final Report, if any, by March 5, 2003 to the JICA Headquarters through JICA/ JOCV Office of Bhutan.

ANNEX-I

List of Attendants

Bhutanese Side

1.	Dasho Sangay Thinley,	(Chairperson) Hon'ble Secretary, MoA
2.	Ms. Yanki T. Wangchuk	Director General, DADM, MoF
3.	Mr. Ugyen Thinley	Director, DoFS, MoA
4.	Mr. Tenzin Dendup	Director, DALSS, MoA
5.	Mr. Ganesh Chettri	Offtg. Director, DRDS, MoA
6.	Mr. Sonam Wangdi	Dy, Secretary, Accounts & Finance Division, MoA
7.	Ms. Pema Lhamo	Program Director, Information & Communication Services, MoA
8.	Mr.Phuntsho Wangyel	Asst. Program Officer, DADM (Department of Aid & Debt Management) MoF
9.	Mr. Choni Dendup	Offtg. Deputy Secretary, PPD (Policy and Planning Division), MoA
10.	Mr. Kumbu Dukpa	Program Officer, NEC
11.	Mr. Karma Dorji	Executive Director, QCRS (Quality Control and Regulatory Services, MoA
12.	Mr. Kaylzang Tshering	Superintending Engineer, DRDS, MOA
13.	Mr. Karma Tashi	Program Director, Renewable Natural Resources Research Center (RNR-RC) Khangma
14.	Mr. Tshewang Dorji	AE, DoR (Department of Roads) MoC (Ministry of Communication)
15.	Ms. Kinzang Wangmo	Finance Officer, AFD, MoA
16.	Ms. Deki Pema	Planning Officer, PPD, MoA
17.	Mr. Nedrup Tsheawang	JE, DRDS, MoA
18.	Ms. Bindu M. Tamang	Assistant Planning Officer, PPD, MoA

Japanese Side

1.	Mr. Sataro Yazawa	Leader, JICA Advisory Team
2.	Mr. Hitoshi Fujiie	Study incharge, JICA HQ
3.	Mr. Yasuyuki Mori	Resident Representative, JICA/JOCV Bhutan Office
4.	Ms. Minori Ishii	Planning and Research Officer, JICA / JOCV Bhutan Office
5.	Mr. Kinley Dorji	Program Officer, JICA / JOCV Bhutan Office
6.	Mr. Nobuo Sambe	Leader, JICA Study Team
7.	Mr. Hisashi Ishikawa	Member, JICA Study Team
8.	Mr. Rajesh Pradhan	Coordinator, JICA Study Team