

Tables

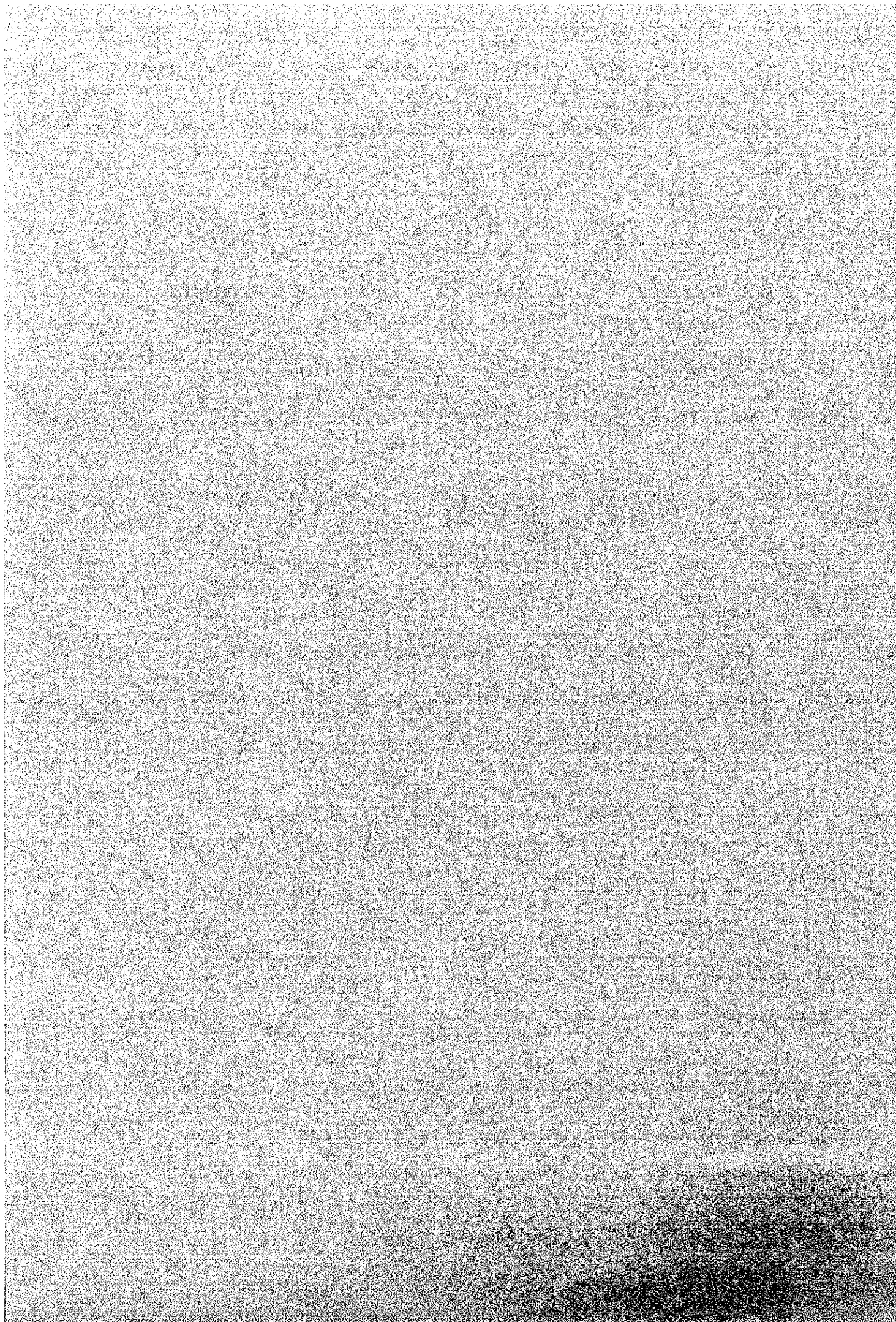


Table 2.4.1 Vegetable Production in the Philippines, 1983-1992

(unit: 1,000 tons)

Items	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	Growth
											Rate (%)
Mongo	24.9	25.1	25.3	25.9	25.3	26.6	25.1	26.7	25.1	23.2	-7.3
Onion	42.5	52.5	53.1	54.2	60.9	45.9	65.3	61.5	60.3	55.5	23.4
Garlic	14.6	13.3	15.0	15.5	15.4	14.1	17.2	17.9	12.4	11.8	-23.7
Tomato	133.3	149.0	150.4	165.7	166.9	167.9	178.7	184.0	177.2	165.4	19.4
Eggplant	112.1	110.4	102.7	104.5	107.7	109.8	111.6	113.0	104.0	110.4	-1.5
Cabbage	63.0	62.1	66.1	69.0	71.3	70.3	75.9	68.3	75.8	83.2	24.3
Tubers	147.3	140.2	146.8	162.0	159.6	198.0	214.0	201.4	198.4	199.3	26.1
Spices	21.3	22.9	25.6	26.1	24.9	25.5	26.3	27.0	26.5	26.7	20.2
Camote	731.4	692.9	701.7	726.2	716.9	695.0	660.3	668.9	662.3	677.2	-8.0
Peanuts	33.7	40.0	41.3	42.2	43.0	39.9	37.6	34.8	31.4	34.0	0.9
Fruit bearing veg.	2,677.8	2,503.4	2,633.3	2,740.8	2,691.4	2,680.6	2,887.6	2,910.2	2,820.2	2,831.3	5.4
Leafy/stem veg.	1,108.9	1,092.0	1,122.4	1,141.7	910.5	1,058.0	1,097.2	1,080.2	1,124.6	1,134.5	2.3
Other legumes	28.6	29.7	30.1	31.8	31.3	32.0	34.0	34.3	35.0	35.3	19.0
Other rootcrops	245.9	197.8	121.1	126.4	126.8	127.5	121.3	132.3	128.7	129.3	-90.2
Total	5,385.3	5,131.3	5,234.9	5,432.0	5,151.9	5,291.1	5,552.1	5,560.5	5,481.9	5,517.1	2.4
Population ('000)	52,055	53,351	54,688	56,004	57,356	58,721	60,097	61,480	62,868	64,259	19.0
Per capita supply (kg)	103	96	96	97	90	90	92	90	87	86	-20.5

Table 3.3.1 Population of Laguna Province and Municipalities concerned**(1) Population enumerated in various censuses**

	1960	1970	1975	1980	1990
Laguna	472,064	699,736	803,750	973,104	1,374,232
Nagcarlan	18,227	25,057	27,493	30,637	37,806
Liliw	11,064	14,638	15,907	17,436	21,975
Majayjay	9,906	12,316	13,182	13,699	15,921

Source: National Statistic Office

(2) Average population growth rate

Unit : %

	1948-1960	1960-1970	1970-1975	1975-1980	1980-1990
Laguna	3.3	4.0	2.8	3.9	3.5
Nagcarlan	1.5	3.2	1.9	2.2	2.1
Liliw	2.8	2.8	1.7	1.9	2.3
Majayjay	2.1	2.2	1.4	0.8	1.5

Source: National Statistic Office

(3) Population density

	Land Area (sq.km.)	1960	1970	1980	1990
Laguna	1,759.7	268.3	397.6	456.8	553.0
Nagcarlan	78.1	233.4	320.8	352.0	392.3
Liliw	39.1	283.0	374.4	406.8	445.7
Majayjay	69.6	142.3	177.0	189.4	196.8

Source: National Statistic Office

(4) Urban-Rural population

	'1970		'1980		'1990	
	Urban	Rural	Urban	Rural	Urban	Rural
Laguna	350,450	349,286	594,622	378,482	897,524	476,708
Nagcarlan	9,359	15,698	8,768	21,869	17,114	20,697
Liliw	7,809	6,829	8,540	8,896	9,940	12,035
Majayjay	469	11,847	7,122	6,577	8,530	7,391

Source: National Statistic Office

(5) Population by major age groups, 1990

	under 14	15-29	30-39	40-49	50-59	over 60
Laguna	553,905	419,676	158,390	90,112	77,715	74,434
Nagcarlan	14,296	11,294	4,187	3,056	2,277	2,696
Liliw	8,197	6,062	2,612	1,533	1,543	2,027
Majayjay	6,078	4,137	1,576	1,542	1,084	1,505

Source: National Statistic Office

Table 3.3.2 Population, Households and Land Area by Brangay of the Study Area

Barangay	Total population	Total households	Number of farm households	Total land area (ha)	Cropping area (ha)
			(a)		(b)
Nagcarlan					
Abo	563	132	124	431	283
Bukal	467	112	106	44	27
Kanluan Lazaan	452	104	90	252	165
San Francisco	1,196	228	121	499	325
Silangan Lazaan	941	195	153	252	161
Silangan Napapatid	534	125	56	139	85
Balimbing	312	63	32	82	49
Malinao	702	150	130	81	45
Total (Study Area)	5,167	1,109	812	1,780	1,140
(b/a)					1.4
Liliw					
Ilayang San Roque	259	59	56	35	37
Ilayang Sungai	364	55	52	605	346
Luquin	553	116	110	227	198
Novaliches	773	193	183	103	79
Total (Study Area)	1,949	423	401	970	660
(b/a)					1.6
Majayjay					
Bukal	361	83	45	27	24
Malinao	416	81	63	205	180
Oobi	151	31	29	18	16
Total (Study Area)	928	195	127	250	220
(b/a)					1.7
Total Study Area	8,044	1,727	1,340	3,000	2,020
(b/a)					1.5

Table 3.8.1 Road Inventory in Laguna Province

District/ Municipality	No. of Brgy.	Total Land Area (sq.km)	Length of Existing Roads (kms)			
			National Road	Prov'l Road	Mun'l Road	Brgy. Road
First District	61	105.2	25.080	34.820	15.012	56.729
1 San Pedro	19	22.6	3.200	15.810	3.625	6.650
2 Binan	24	43.5	5.830	8.590	7.672	36.429
3 Sta. Rosa	18	39.1	16.050	10.420	3.715	13.650
Second District	101	332.8	74.030	52.170	13.315	40.585
1 Cabuyao	18	84.6	6.010	18.450	4.145	4.125
2 Calamba	54	144.8	43.200	16.450	3.820	11.510
3 Los Banos	14	56.5	17.700	5.560	3.150	14.640
4 Bay	15	46.9	7.120	11.620	2.200	10.320
Third District	217	513.3	100.380	39.540	125.451	182.597
1 Alaminos	15	54.7	8.830	13.210	15.380	6.279
2 Calauan	17	66.4	17.990	12.240	2.276	16.660
3 Liliw	33	39.1	4.040	3.930	3.642	25.480
4 Nagcarlan	52	78.1	19.560	5.310	3.148	29.100
5 Rizal	11	27.9	2.955	0.570	2.800	11.020
6 Victoria	9	33.1	4.260	4.280	10.950	11.968
7 San Pablo	80	214.0	42.745	-	87.255	82.090
Fourth District	294	808.7	153.985	78.800	80.312	370.629
1 Sta. Maria	25	128.4	15.610	4.050	7.112	57.556
2 Mabitac	15	73.3	10.680	10.900	4.403	9.280
3 Famy	20	19.4	4.340	0.250	4.300	16.804
4 Siniloan	20	41.1	19.920	0.930	10.460	23.650
5 Pangil	8	23.0	6.700	-	1.754	18.548
6 Pakil	13	13.0	4.280	0.070	5.000	16.216
7 Paete	9	32.4	5.143	0.500	3.834	42.820
8 Kalayaan	3	46.6	5.077	7.510	12.265	8.530
9 Lumban	16	96.8	12.720	1.300	6.154	13.230
10 Pagsanjan	16	26.4	6.710	4.880	5.630	22.165
11 Luisiana	23	63.8	12.230	12.600	2.772	49.331
12 Majayjay	40	69.9	9.155	1.010	0.918	11.690
13 Sta. Cruz	26	38.6	12.060	14.190	5.388	30.910
14 Pila	17	31.2	6.730	11.660	5.256	10.389
15 Magdalena	24	34.4	-	0.790	0.767	1.520
16 Cavinti	19	70.4	24.630	8.160	4.299	37.990
Total	673	1,760.0	353.475	205.330	234.090	650.540
District	593	1,546.0	310.725	205.330	146.835	568.450
City	80	214.0	42.745	-	87.255	82.090

Source:

Table 3.8.2 Water Sources for Rural Water Supply (Vicinity of the Study area)

Municipality	Water Source	Elevation	Service Barangay	Production	Service Population	Storage Facilities
Nagcarlan	San Vicenta	El. 300 m	Poblacion	40 lit/sec	-	1,480 cum water tank
	Bukal spring	El. 900 m	Bukal, Abo, San Francisco, Malinao, Lazaan		4,650	
	Bigaa	El. 380 m				
Liliw	Gawanan spring #1	El. 500 m	Poblacion	20 lit/sec	-	
	Gawanan spring #2	El. 500 m	Poblacion	80 lit/sec	-	
	Sirian spring	El. 300 m	Poblacion	30 lit/sec	-	27 cum collection box
	Luquin spring	El. 550 m	Luquin	no data	-	
	Spring Development		Bukal, Oples	no data	-	
	Water works		Cabuyew, Novaliches	no data	-	
Majayjay	Spring			3 lit/sec	5,930	

Table 3.8.3 Water Supply Service Coverage (1990)

Municipality	Level III		Level II		Private		Deep well		Shallow well		Percentage	
	Population served	No. of system	Water Authority	Population served	No. of system	Water Authority	Population served	No. of wells	Population served	No. of wells	Population served	Population unserved
Nagcarlan												
Urban	9,049	1	DPWH	1,530	1	RWDC	-	-	-	-	0	0
Rural	28,647	-	-	-	-	-	2,070	152	498	66	18,774	66
Total	37,696	1	DPWH	1,530	1	-	2,070	152	498	66	18,774	50
Liliw												
Urban	8,330	1	Mun.	-	-	-	-	-	-	-	0	0
Rural	13,581	-	-	590	1	RWDC	1,698	150	561	6	6,528	48
Total	21,911	1	Mun.	590	1	RWDC	1,698	150	561	6	6,528	30
Majayjay												
Urban	6,972	1	Mun.	654	1	RWDC	-	-	-	-	0	0
Rural	8,903	-	-	-	-	-	285	35	4,350	105	2,698	30
Total	15,875	1	Mun.	654	1	-	285	35	4,350	105	2,698	17

Sources: Water Supply Sewerage and Sanitation Sector Plan, 1992-2010, Province of Laguna, DPWH.

Table 3.9.1 (1/2) Estimated Area and Production of Selected Crops, Laguna

Crop	1,991			1,992			1,993		
	Area ha	Yield/ha kg/ha	Production tons	Area ha	Yield/ha kg/ha	Production tons	Area ha	Yield/ha kg/ha	Production tons
Cowpea (dry)	1	1,000	1.0	1	1,000	1.0	1	1,000	1.0
Peanut	15	1,213	18.2	15	1,225	18.4	15	1,225	18.4
Mongo	12	600	7.2	12	592	7.1	12	597	7.2
String beans	47	5,298	249.0	47	5,285	248.4	48	5,314	255.1
Winged beans	12	4,917	59.0	8	4,750	38.0	8	4,523	36.2
Banana	1,051	7,807	8,205.5	1,081	6,169	6,668.3	1,004	6,092	6,116.6
Calamansi	470	175	82.1	470	178	83.6	470	134	62.9
Coconut	71,096	1,545	109,835.0	66,830	1,538	104,133.9	66,800	1,459	97,455.9
Jackfruit			368.0			372.6			376.3
Mango	168	2,412	405.3	165	2,646	436.5	170	2,698	458.6
Pineapple	456	7,211	3,288.0	467	7,170	3,348.5	399	7,176	2,863.2
Bamboo shoots			0.3			0.3			0.3
Black pepper	15	733	11.0	15	748	11.2	15	763	11.4
Cacao	11	238	2.6	9	224	2.0	9	226	2.0
Coffee	1,020	443	452.2	1,020	440	448.4	1,002	440	440.6
Sugarcane	7,062	82,931	585,661.0	6,562	84,257	552,892.8	9,949	60,781	604,713.0

Source: Bureau of Agricultural Statistics

Table 3.9.1 (2/2) Estimated Area and Production of Selected Crops, Laguna

Crop	1991			1992			1993		
	Area ha	Yield/ha kg/ha	Production tons	Area ha	Yield/ha kg/ha	Production tons	Area ha	Yield/ha kg/ha	Production tons
Ampalaya	30	2,082	62.5	31	2,131	66.1	31	2,157	66.9
Chayote	12	8,400	100.8	13	8,408	109.3	13	8,290	107.8
Cucumber	2	1,800	3.6	2	1,820	3.6	2	1,784	3.6
Eggplant	113	8,654	977.9	126	7,976	1,005.0	151	6,728	1,016.0
Gourd	14	9,550	133.7	14	9,646	135.0	14	9,820	137.5
Green pepper	3	4,067	12.2	3	4,113	12.3	3	4,154	12.5
Okra	10	11,500	115.0	10	11,895	119.0	10	12,088	120.9
Patola	4	3,000	12.0	4	3,090	12.4	4	3,074	12.3
Squash	75	20,000	1,500.0	85	19,988	1,699.0	84	19,895	1,671.1
Tomato	715	12,779	9,137.0	561	13,339	7,483.0	600	13,407	8,044.0
Watermelon	188	19,149	3,600.0	167	18,635	3,112.0	163	18,492	3,014.3
Arrowroots	58	7,328	425.0	58	7,401	429.3	59	7,422	437.9
Carrot	283	7,085	2,005.0	279	7,229	2,016.8	272	7,212	1,961.7
Cassava	244	12,291	2,999.0	204	12,934	2,638.6	207	12,779	2,645.3
Gabi	67	6,515	436.5	67	6,541	438.3	71	6,404	454.7
Garlic	50	3,850	192.5	51	3,850	196.3	55	3,891	214.0
Ginger	7	9,171	64.2	6	10,807	64.8	6	11,023	66.1
Radish	87	7,838	681.9	88	7,842	690.1	90	7,742	696.8
Ubi	16	4,625	74.0	16	4,718	75.5	16	4,812	77.0
Cabbage	229	6,367	1,458.0	231	6,347	1,466.2	231	6,319	1,459.7
Mustard	34	6,353	216.0	33	6,480	213.8	34	6,328	215.2
Pechay	14	9,857	138.0	16	8,884	142.1	16	8,926	142.8
String beans	47	5,298	249.0	47	5,285	248.4	48	5,314	255.1
Winged beans	12	4,917	59.0	8	4,750	38.0	8	4,523	36.2

Source: Bureau of Agricultural Statistics (Radish and Cabbage were revised according to field survey of JICA Study Team in 1994.)

Table 3.9.2 Monthly Average Wholesale Prices of Vegetables at Divisoria (1989 - 1994)

(Unit : Pesos / kg)

Vegetables	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Ave.
Existing Vegetables													
1. Tomato	6.58	3.14	4.16	5.00	6.14	7.96	9.94	9.91	11.08	9.14	13.04	13.37	8.29
2. Cabbage	7.23	7.05	8.31	8.68	10.57	10.34	9.28	11.44	14.07	13.23	13.44	8.55	10.18
3. Raddish	5.41	5.18	5.75	5.51	7.44	9.28	8.14	7.19	9.33	10.77	7.76	7.35	7.43
4. Baguio Beans	8.49	9.97	12.07	11.21	13.34	12.15	13.75	12.49	15.81	17.41	16.07	12.93	12.97
5. Sweet Potato	4.93	4.56	4.38	4.15	4.14	3.97	4.24	5.96	6.06	5.70	5.80	6.91	5.07
Existing Vegetables													
6. Ampalaya	8.09	7.15	7.62	6.94	8.04	9.24	9.65	9.84	11.32	13.36	12.89	10.16	9.53
7. Cucumber	9.06	6.65	8.19	7.52	8.01	5.82	5.86	7.66	3.86	3.52	5.97	5.88	6.50
8. Eggplant	9.30	6.21	5.52	5.10	5.72	5.96	8.28	10.58	10.59	10.34	15.39	11.83	8.74
9. Green Pepper	50.90	45.15	22.10	14.30	18.15	24.22	20.01	22.07	47.56	47.24	84.91	46.55	36.93
10. Okra	9.02	8.95	8.15	5.76	6.83	4.82	4.98	7.17	7.48	9.14	10.67	10.56	7.79
11. Squash	4.93	4.49	4.72	4.65	4.92	4.07	4.45	8.49	8.32	6.11	7.69	11.37	6.18
12. Upo	5.01	4.11	3.96	3.44	4.81	3.11	3.78	6.31	5.28	4.51	5.16	5.81	4.61
13. Water Melon	19.40	17.34	21.55	21.13	-	-	-	-	-	-	-	-	19.86
14. Califlower	7.80	6.78	8.45	10.97	24.32	-	-	37.44	34.98	42.88	37.71	12.81	22.41
15. Celery	26.85	23.49	14.37	13.07	12.47	13.94	19.14	22.63	36.20	25.00	38.00	35.93	23.42
16. Chinese Cabbage	16.03	15.36	17.47	16.61	17.48	19.90	19.78	20.75	30.43	25.01	21.73	15.30	19.65
17. Lettuce	23.49	21.60	13.68	17.01	21.51	22.97	10.19	24.26	27.62	28.88	30.47	16.00	21.47
18. Pechay	6.29	5.78	5.67	5.83	7.65	7.68	7.93	9.41	11.12	11.20	9.16	7.50	7.94
19. Peanuts	27.84	28.37	27.52	27.13	27.34	25.10	23.74	24.18	24.34	24.20	24.10	25.09	25.75
20. Sitao	12.09	11.54	12.58	12.16	11.18	10.80	13.19	12.19	11.69	12.28	13.62	13.24	12.21
21. Sweet Peas	26.80	27.04	26.96	29.11	41.19	36.65	34.06	43.48	48.56	60.13	44.88	53.91	39.40
22. Carrot	11.03	9.31	10.31	11.18	15.26	13.86	16.84	18.02	19.99	17.27	21.57	14.09	14.89
23. Garlic	94.18	70.90	52.39	51.68	55.55	71.45	79.54	85.73	87.64	90.80	93.49	98.64	77.67
24. Ginger	9.90	9.24	9.40	9.85	11.63	13.04	14.01	16.00	15.62	12.02	10.52	12.21	11.95
25. Irish Potato	10.71	8.85	8.48	7.59	8.25	8.58	8.27	9.25	10.32	10.69	12.30	13.29	9.72

Source: Bureau of Agricultural Statistics, Department of Agriculture, Manila

Table 3.9.3

**Comparison between Wholesale Prices at Divisoria Market, Manila and
Ex-Trading Post Prices at La Trinidad, Benguet**

(Unit : Peso/Kg)

Market	Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Ave.
Cabbage	(1) Wholesale Prices at Divisoria Market	1990	3.95	4.13	6.39	11.02	14.13	18.80	18.82	15.61	12.22	13.56	8.13	11.86
	1991	7.23	8.93	12.32	8.09	7.92	10.26	6.99	15.92	20.52	13.28	9.83	6.88	10.68
	1992	8.57	5.80	5.57	6.65	11.67	11.23	7.70	5.82	12.18	14.50	15.84	12.69	9.85
	Ave.	6.58	6.29	8.09	8.59	11.24	13.43	11.17	12.45	16.07	13.33	13.08	9.23	10.80
	(2) Ex-Trading Prices at La Trinidad	1990	3.33	3.09	5.67	9.85	12.16	17.66	9.21	12.73	12.52	11.40	11.19	7.01
1991	6.15	7.76	10.75	5.90	6.65	8.05	5.75	14.75	17.95	11.25	6.90	6.45	9.03	9.03
1992	7.17	5.68	4.03	4.79	10.29	10.38	-	3.21	6.45	13.35	15.15	12.43	8.45	8.45
Ave.	5.55	5.51	6.82	6.85	9.70	12.03	7.48	10.23	12.31	12.00	11.08	8.63	9.02	
(3) Ratio = (2)/(1)	1990	84.3%	74.8%	88.7%	89.4%	86.1%	93.9%	48.9%	81.6%	80.7%	93.3%	82.5%	86.2%	82.5%
1991	85.1%	86.9%	87.3%	72.9%	84.0%	78.5%	82.3%	82.3%	92.7%	87.5%	84.7%	70.2%	93.8%	83.8%
1992	83.7%	97.9%	72.4%	72.0%	88.2%	92.4%	-	-	55.2%	53.0%	92.1%	95.6%	98.0%	81.9%
Ave.	84.3%	86.5%	82.8%	78.1%	86.1%	88.3%	65.6%	65.6%	76.5%	73.7%	90.0%	82.8%	92.6%	82.3%
Carrot	(1) Wholesale Prices at Divisoria Market	1990	6.63	6.05	7.12	9.49	13.63	18.62	23.80	26.28	15.17	8.09	10.34	12.92
	1991	10.59	8.59	9.04	9.97	11.32	13.77	13.47	14.54	16.21	19.06	13.89	10.32	12.56
	1992	9.05	8.26	13.10	14.10	16.22	18.03	21.84	16.94	22.59	20.36	19.90	26.45	17.24
	Ave.	8.76	7.63	9.75	11.19	13.72	16.81	19.70	19.25	17.99	15.84	14.71	15.55	14.24
	(2) Ex-Trading Prices at La Trinidad	1990	4.00	4.37	5.84	-	13.06	19.09	16.85	18.30	10.22	7.15	9.11	7.23
1991	6.27	5.27	6.35	7.55	7.75	10.30	11.77	11.05	11.05	16.30	15.50	8.15	7.25	9.46
1992	6.23	7.18	10.34	9.49	12.05	15.95	8.91	11.49	11.60	11.60	16.82	18.14	20.19	12.37
Ave.	5.50	5.61	7.51	8.52	10.95	15.11	12.51	13.61	12.71	13.16	11.80	11.56	11.56	10.71
(3) Ratio = (2)/(1)	1990	60.3%	72.2%	82.0%	-	95.8%	102.5%	70.8%	69.6%	67.4%	88.4%	88.1%	73.3%	79.1%
1991	59.2%	61.4%	70.2%	75.7%	68.5%	74.8%	87.4%	87.4%	76.0%	100.6%	81.3%	58.7%	70.3%	73.7%
1992	68.8%	86.9%	78.9%	67.3%	74.3%	88.5%	40.8%	40.8%	67.8%	51.4%	82.6%	91.2%	76.3%	72.9%
Ave.	62.8%	73.5%	77.1%	71.5%	79.5%	88.6%	66.3%	66.3%	71.2%	73.1%	84.1%	79.3%	73.3%	75.0%

Source: Ex-Trading post prices (1990-1992); Provincial Agricultural Office, Benguet

Table 3.9.4 Estimated Monthly Ex-Trading Post Prices of Vegetables in the Study Area

(Unit : Pesos / kg)

Vegetables	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Ave.
Existing Vegetables													
1. Tomato	4.94	2.36	3.12	3.75	4.61	5.97	7.46	7.43	8.31	6.86	9.78	10.03	6.22
2. Cabbage	5.42	5.29	6.23	6.51	7.93	7.76	6.96	8.58	10.55	9.92	10.08	6.41	7.64
3. Raddish	4.06	3.89	4.31	4.13	5.58	6.96	6.11	5.39	7.00	8.08	5.82	5.51	5.57
4. Baguio Beans	6.37	7.48	9.05	8.41	10.01	9.11	10.31	9.37	11.86	13.06	12.05	9.70	9.73
5. Sweet Potato	3.70	3.42	3.29	3.11	3.11	2.98	3.18	4.47	4.55	4.28	4.35	5.18	3.80
Existing Vegetables													
6. Ampalaya	6.07	5.36	5.72	5.21	6.03	6.93	7.24	7.38	8.49	10.02	9.67	7.62	7.14
7. Cucumber	6.80	4.99	6.14	5.64	6.01	4.37	4.40	5.75	2.90	2.64	4.48	4.41	4.88
8. Eggplant	6.98	4.66	4.14	3.83	4.29	4.47	6.21	7.94	7.94	7.76	11.54	8.87	6.55
9. Green Pepper	38.18	33.86	16.58	10.73	13.61	18.17	15.01	16.55	35.67	35.43	63.68	34.91	27.70
10. Okra	6.77	6.71	6.11	4.32	5.12	3.62	3.74	5.38	5.61	6.86	8.00	7.92	5.85
11. Squash	3.70	3.37	3.54	3.49	3.69	3.05	3.34	6.37	6.24	4.58	5.77	8.53	4.64
12. Upo	3.76	3.08	2.97	2.58	3.61	2.33	2.84	4.73	3.96	3.38	3.87	4.36	3.46
13. Water Melon	14.55	13.01	16.16	15.85	-	-	-	-	-	-	-	-	14.89
14. Califlower	5.85	5.09	6.34	8.23	18.24	-	-	28.08	26.24	32.16	28.28	9.61	16.81
15. Celery	20.14	17.62	10.78	9.80	9.35	10.46	14.36	16.97	27.15	18.75	28.50	26.95	17.57
16. Chinese Cabbage	12.02	11.52	13.10	12.46	13.11	14.93	14.84	15.56	22.82	18.76	16.30	11.48	14.74
17. Lettuce	17.62	16.20	10.26	12.76	16.13	17.23	7.64	18.20	20.72	21.66	22.85	12.00	16.11
18. Pechay	4.72	4.34	4.25	4.37	5.74	5.76	5.95	7.06	8.34	8.40	6.87	5.63	5.95
19. Peanuts	20.88	21.28	20.64	20.35	20.51	18.83	17.81	18.14	18.26	18.15	18.08	18.82	19.31
20. Sitao	9.07	8.66	9.44	9.12	8.39	8.10	9.89	9.14	8.77	9.21	10.22	9.93	9.16
21. Sweet Peas	20.10	20.28	20.22	21.83	30.89	27.49	25.55	32.61	36.42	45.10	33.66	40.43	29.55
22. Carrot	8.27	6.98	7.73	8.39	11.45	10.40	12.63	13.52	14.99	12.95	16.18	10.57	11.17
23. Garlic	70.64	53.18	39.29	38.76	41.66	53.59	59.66	64.30	65.73	68.10	70.12	73.98	58.25
24. Ginger	7.43	6.93	7.05	7.39	8.72	9.78	10.51	12.00	11.72	9.02	7.89	9.16	8.97
25. Irish Potato	8.03	6.64	6.36	5.69	6.19	6.44	6.20	6.94	7.74	8.02	9.23	9.97	7.29

Ex-trading post prices are estimated to be 75% of the whole prices at Divisoria market.

**Table 3.10.1 Registered Cooperatives in Region IV
(As of June 1994)**

PROVINCE	TYPE OF COOPERATIVE											TOTAL
	CREDIT COOP.	CONSUMER S COOP.	PRODUCERS COOP.	MARKETING COOP.	SERVICES COOP.	MULTI- PURPOSE	LAB COOP.	FEDERATION COOP.	UNION COOP.	CREDIT RURAL BANK		
1. AURORA	2	0	1	0	1	93	0	1	0	0	0	98
2. BATANGAS	39	10	6	10	7	364	0	6	1	1	1	444
3. CAVITE	50	4	2	11	8	243	0	4	1	1	1	324
4. LAGUNA	31	11	8	7	19	462	0	7	2	1	1	548
5. MARINDUQUE	2	2	0	1	0	129	0	0	0	0	0	134
6. OCC. MINDORO	5	1	2	3	6	278	0	6	1	0	0	302
7. OR. MINDORO	9	2	0	1	2	157	0	2	1	0	0	174
8. PALAWAN	10	4	3	12	4	277	0	4	1	0	0	315
9. QUEZON	46	3	3	3	8	423	1	3	1	1	1	492
10. RIZAL	29	4	26	2	15	313	0	3	1	0	0	393
11. ROMBLON	0	0	1	1	1	112	0	1	0	0	0	116
TOTAL	223	41	52	51	71	2,851	1	37	9	4	4	3,340

Source: Cooperative Development Authority, Region IV

Table 3.10.2 List of the Cooperatives Organized in the Municipalities Concerned

NAME OF COOPERATIVE	REGISTRATION			ADDRESS
	TYPE*	NUMBER	DATE	
NAGCARLAN, Laguna				
1. Talahib Multi-Purpose Coop.	AG	MLA-1641	1991 Oct 16	Talahib
2. Koop sa Alumbrado na Pumapan day sa Ikaunladng Tao (KAPIT)	AG	MLA-0992	1991 Jul 29	Alumbrado
3. Abo Multi-Purpose Coop, Inc.	AG	MLA-2098	1991 Nov 29	Brgy. Abo
4. Cooperative Multi-Purpose of Sta. Lucia	AG	MLA-0048	1992 May 04	Sta. Lucia
5. Masilayan Multi-Purpose Coop.	AG	LGA-634	1991 Mar 08	Brgy. Malinao
6. Manaol MP Coop., Inc.	AG	LGA-495	1991 Feb 28	Manaol
7. Malaya MP Coop., Inc.	AG	MLA-1488	1991 Oct 01	Brgy. Malaya
8. Nagcarlan Public Market Vendors MP Coop., Inc.	NA	MLA-0613	1991 Jan 06	Nagcarlan
9. Taytay MP Coop., Inc.	AG	MLA-1489	1991 Oct 01	Brgy. Taytay
10. Silangang Napapatid MP Coop. Inc. (SNMPCI)	AG	MLA-1874	1991 Nov 07	Silangang Napapatid
11. San Francisco MP Coop., Inc.	AG	MLA-1628	1991 Oct 14	Brgy. San Frabcisco
12. SAMABA Multi-Purpose Coop., Inc.	AG	MLA-0874	1991 Jul 04	Brgy. Bukal
13. RINALISA Transport Service Coop., Inc.	AG	MLA-C-0423	1991 Mar 27	Nagcarlan
14. Ang Koop. ng mga Mangingisda sa Lawa ng Yambo (AKOMALAYA)	AG	MLA-1916	1991 Nov 12	Sitio Yambo, Brgy. Sulsuguin
15. OPLES MP Coop., Inc.	AG	MLA-2254	1991 Dec 20	Brgy. Oples
16. LAWAGUIN MP Coop., Inc.	AG	MLA-0741	1991 Jan 21	Brgy. Lawaguin
17. WESTERN MP Cooperative	AG	LGA-1223	1993 Oct 21	Nagcarlan
18. Samahan ng mga Barangay sa Kabuhayan MP Cooperative	AG	LGA-0680	1993 Jan 05	Silangang Kabuhayan
19. Sabang Primary MP Coop., Inc.	AG	LGA-0782	1993 Feb 12	Sabang
20. Brgy. Ynkos MP Coop., Inc.	AG	LGA-0930	1993 May 06	Brgy. Yucos
21. San Macos MP Coop., Inc.	AG	LGA-0865	1993 Mar 23	Buboy
LILIW, laguna				
1. Kaunlaran sa Liliw MPC	UA	LGA-0040	1992 Apr 29	Kanlurang Bukal
2. Samahang Manulad na Babuyan ng Liliw MPC, Inc.	UA	MLA-0523	1991 May 30	Liliw
3. Magtatanim ng Gulay ng Liliw MPC, Inc.	UA	MLA-1111	1991 Apr 03	Brgy. Novaliches
4. Kaunlaran sa Banahaw MPC	UA	LGA-1917	1993 Apr 27	Liliw
5. Liliw MPC	UA	LGA-1918	1993 Apr 27	Liliw
6. Sules MPC	UA	LGA-0740	1993 Feb 01	Municipal Hall
7. Liliw Stall Holders MPC	NA	LGA-0694	1993 Jun 08	Public Market
MAJAYJAY, Laguna				
1. Kooperatiba Kapit-Bisig ng Majayjay	AG	MLA-0240	1991 Apr 30	Majayjay
2. Balikatan MPC Inc.	AG	MLA-1773	1991 Oct 28	Brgy. Balayong
3. Brgy. Original Livelihood Dev't. System MPC	AG	MLA-0272	1991 May 03	Majayjay
4. Piit Multi-Purpose Coop.	NA	MLA-1724	1991 Oct 22	Piit
5. Malinaw Multi-Purpose C	AG	MLA-1775	1991 Oct 28	Rizal Brgy. Hall
6. Samahan Maghahalaman at Paghahayupan MPC, Inc.	AG	MLA-1731	1991 Oct 23	Brgy. Malinao
7. Green 1 B MPC, Inc.	AG	MLA-1776	1991 Oct 28	Brgy. Ibabang Banga
8. Maimpis MPC, Inc.	AG	MLA-1770	1991 Oct 28	Brgy. Panglan
9. Samahan ng Magbubukid MPC	AG	MLA-1723	1991 Oct 22	May-it
10. Brgy. Pangil Samahan ng Maliit na Magniniyog MPC	AG	MLA-0179	1991 Apr 22	Brgy. Pangil
11. Koop. ng mga Magsasakang Kalahok sa Produksiyon na may Adhikain sa Kaunlaran	AG	MLA-C-0737	1991 Jun 06	Majayjay
12. Banahaw Multi-Purpose Coop.	AG	MLA-0178	1991 Apr 22	Majayjay Municipal Hall
13. Mangagawa sa Ikaunlad ng Pamayanan (MASIKLAP) MPC	AG	MLA-0706	1991 Jun 14	Brgy. Oobi
14. Gabay sa Kaunlaran MPC	AG	MLA-1725	1991 Oct 22	Brgy. Bitaoy

Notes: This list shows the cooperatives as of December, 1993.

*AG; Agricultural; UA: Upland Agricultural; and NA: Non Agricultural.

Table 5.2.1 Endowed Water Resources and Potential Irrigation Areas (1/2)

Item No.	Water sources	Available water	Arable lands (Elevation, Acreage)	Existing facilities for water supply	Development possibility
1. Municipality of Nagcarlan					
1.1	Bukal Spring	0.04 cu.m/sec in the dry season ; 0.08 cu.m/sec at El.890m in the wet season. Irrigation period is from Jan. to Apr. Available water in this period is 0.04 cu.m/sec.	Potential benefited areas extend between EL. 500 m and EL. 900 m. Most of the areas are irrigable by means of gravity. However, as amount of water is limited, irrigable area will be 160 ha.	This water source supplies domestic water through existing pipelines to six barangays located downstream. Intake structure shall serve both for irrigation and domestic water supply. Share of water for domestic supply shall be 10 % in the dry season.	Intake structure will be of small scale. Delivery of water shall be conducted by pipelines. No problem is expected in the construction of intake because no sediment is anticipated throughout the year.
1.2	Nagcarlan River (middle stream)	Part of river water flows down as subsurface flow from El. 700 m to El. 400 m. There is no expected water intake point in the middle stream in the dry season.	Abundant surface flow is observed in the lower elevation due to spring yields at around EL. 400 m. It is difficult to utilize this surface flow for irrigation in the Study area.	None	Collection of subsurface flow by means of cut-off wall does not seem to be effective due to leakage around the wall. Construction of a intake structure in the middle of the river is not advantageous.
1.3	San Vicenta Spring, etc. in the San Diego River	Surface water exists only at downstream from the springs. Spring yield is approx., 0.01 cu.m/sec in the dry season.	There exists few arable lands to be irrigated in the lower elevation than that of springs.	An intake structure is constructed to supply domestic water to Nagcarlan City.	No surface water in the river course is available. Elevation of the springs is lower than that of surrounding farmlands. Gravity irrigation is not possible.
2. Municipality of Liliw					
2.1	Spring at uppermost stream of the Liliw River	0.003 - 0.005 cu.m/sec in the dry season.	The spring is located at EL. 900 m approximately. Gravity irrigation is practiced for the farmlands located between EL. 600 m and EL 800.	An intake structure and a pipeline system is provided for both irrigation and domestic water supply.	All the spring yields are collected by the existing intake facilities, and no other water source is available. There is no possibility for further development of water resource.
2.2	Luquin Springs (Upstream and Downstream)	0.070 cu.m/sec (Upstream in the dry season) 0.23 cu.m/sec (Downstream in the dry season)	The upper spring is located at EL. 600 m, and the lower spring, at EL. 540 m. Arable lands located below EL. 500 m can be irrigated by gravity (160 ha), whereas the lands located higher than El. 500 m can be irrigated by means of pumps with a head of 150 m (160 ha).	An intake structure consisting of 3 m x 3 m x 2 m concrete box is constructed for supplying domestic water for Liliw city and Liliw Municipality within the Study area. It is estimated that the present amount of water supplied is approximately 5 % of the total yields.	The farmlands which are located at lower elevation than that of the springs will be irrigated by means of gravity. The farmlands which are located at higher elevation than that of the springs need mechanical power, and hence, economic viability shall be examined taking into account the construction cost and O/M cost (Not feasible).

Table 5.2.1 Endowed Water Resources and Potential Irrigation Areas (2/2)

Item No.	Water sources	Available water	Arable lands (Elevation, Acreage)	Existing facilities for water supply	Development possibility
2.3	Liliw River (Middle stream)	The spring yield of the above column conforms the river flow of the Liliw river. Available discharge within the Study area is 0.23 cu.m/sec in the dry season.	Intake structures shall be constructed as high as possible so as to maximize the benefited area by means of gravity irrigation. There may be no irrigable area if the intake structure is provided lower than EL. 400 m.	None	Same condition with the above column.
2.4	Oples River	No flow in the dry season.			No development potential.
2.5	Bancal River	No flow in the dry season.			No development potential.
2.6	Gawanan Spring	0.10 cu.m/sec in the dry season.	Elevation of the spring is too low to irrigate farmlands in the Study area.	All the spring water is taken to supply domestic water in Liliw Municipality.	No development potential.
2.7	Serian Spring	0.03 cu.m/sec in the dry season.	Elevation of the spring is too low to irrigate farmlands in the Study area.	All the spring water is taken to supply domestic water in Liliw Municipality.	No development potential.
3. Municipality of Majayjay					
3.1	Maimpis Spring	0.20 cu.m/sec in the dry season.	The spring is located at EL. 600 m, and its yield is the biggest among other springs. Potential benefited areas estimated at 200 ha in the Municipality of Liliw and Majayjay.	None	Despite the high potential in terms of amount of water, development of the water resources for irrigation is extremely difficult technically and nonviable economically because the spring is located at the bottom of the very deeps and steep valley. Lands in Majayjay Province are irrigated by the present weir and earth canal system utilizing water of the Olla river. High priority is not given to the development of water resource of the Maimpis spring for irrigation of this area.
3.2	Maimpis River	Discharge of the Maimpis River depends on the yield of the spring, which is estimated at 0.20 cu.m/sec.	Irrigable areas are limited to the lands which is located lower than EL. 600 m.	None	Same conditions with the above column.
3.3	Olla River	0.10 cu.m/sec in the dry season.	Water of the Olla river is utilized for the areas in Majayjay Municipality.	An existing intake structure on the Olla river with canal system serves water to existing farmlands.	Father development of the water source will not be practical.

Table 5.5.1 Comparison of Soil Erosion Control Measures (1/2)

Descriptions	Merits	Demerits
VEGETATIVE MEASURES		
1. CONTOUR HEDGEROW		
<p>Vegetative (trees) rows or strips established along the contour. Trees serve as live barrier to surface runoff and soil erosion. Nitrogen fixing trees, if used, can improve the soil. (See Fig. 5.4.1)</p>	<ol style="list-style-type: none"> 1. Economical (less costly) 2. Adaptable to various conditions 3. Easier to establish and repair 4. Durable if maintained properly 5. Improve the soil if nitrogen fixing trees are used 	<ol style="list-style-type: none"> 1. It takes at least one year to attain benefits. 2. Less effective when slope is too steep 3. Hedgerows may pose competition with crops
2. RANDOMIZED MIXED PLANTING		
<p>This refers to the growing of crops with trees or horticultural crops. Vegetation covers intercept the rainfall and serve as protection cover against soil erosion. Rooting characteristics of tree crops enable the soil to increase the water infiltration capacity. (See Fig. 5.4.1)</p>	<ol style="list-style-type: none"> 1. Any available planting materials including indigenous species could be planted. 	<ol style="list-style-type: none"> 1. The effectiveness is limited to more stable soil and less steep areas. 2. Difficult to find vegetation species that conserve soil and yield economic benefits.
3. WATTLING		
<p>It is vegetative structure established in contour line or intermittently along the contour. It is used to trap the soil particles that are eroded down with surface runoff. Cuttings of brushwoods are interwoven to form fence. (See Fig. 5.4.1)</p>	<ol style="list-style-type: none"> 1. Very effective and stable 2. Early achievement of protection 3. When the brushwoods sprout, the leaves can be used as green manure or mulching materials 	<ol style="list-style-type: none"> 1. Difficult to find suitable sprouting brushwood rods. 2. Difficult to construct
4. FASCINES		
<p>They are structure consisting of sprouting brushwoods bundled and secured to a wooden pegdriven into the ground. They are laid horizontally following the contour in trenches to enhance sprouting. Fascines can trap the eroding soil particles by reducing the velocity of surface runoff. (See Fig. 5.4.2)</p>	<ol style="list-style-type: none"> 1. Easy to establish 2. Less expensive 3. Protection is achieved right after the establishment 	<ol style="list-style-type: none"> 1. They require large quantities of brushwood. 2. They are liable to dry out.
5. SALT (SLOPING AGRICULTURAL LAND TECHNOLOGY)		
<p>Similar to contour hedgerow. It involves growing annual and perennial woody crops on contour strips between hedgerows composed of leguminous shrub. (See Fig. 5.4.2)</p>	<ol style="list-style-type: none"> 1. Economical (less costly) 2. Easy to repair 3. It provide short-term (annual crops) and long-term income (tree crops). 4. Leguminous trees replenish soil nitrogen. 	<ol style="list-style-type: none"> 1. It takes at least one year to attain benefits. 2. Less effective when slope is too steep

Table 5.5.1 Comparison of Soil Erosion Control Measures (2/2)

Descriptions	Merits	Demerits
STRUCTURAL MEASURES		
6. BALABAG		
<p>Similar to wattling, it is fence-like structures consisting of wooden stakes driven into the ground. The difference is that balabag does not use live wood. (See Fig. 5.4.3)</p>	<p>1. Become effective as soon as the establishment</p>	<p>1. It requires a large amount of pegs and poles. 2. It lasts only up to four or five years.</p>
7. ROCKWALLS		
<p>They are walls of stones running across the slope at regular intervals. The walls provide an effective barrier to the downward movement of soil and water. (See Fig. 5.4.3)</p>	<p>1. Effective right after the establishment 2. Permanent structure</p>	<p>1. Require high labor input to construct. 2. Require a large amount of rocks.</p>
8. CONTOUR DITCHES AND DRAINAGE CANALS		
<p>They are digging structures established in the hillsides to check the erosive power of surface runoff by tapping soil particles. Drainage canals are larger and deeper than contour ditches and established along the boundaries of farms. Both structures are often constructed with checkdams. (See Fig. 5.4.4)</p>	<p>1. Relatively easier to construct compared with other structures. 2. Ditches and canals can be good water impoundment structures that can hold water for plants.</p>	<p>1. The effectiveness is limited when used in very steep slopes. 2. The effectiveness is limited when heavy rains continue long.</p>
9. BENCH TERRACES		
<p>They are series of level or nearly level strips running across the slopes supported by steep risers. (See Fig. 5.4.4)</p>	<p>The most effective among erosion control measures in minimizing soil erosion.</p>	<p>1. They require a lot of time and manpower to construct. 2. Soil erosion during construction stage may be high. 3. Not suitable for the sites in which topsoils only have thin layer.</p>
CULTURAL MEASURES		
10. CONTOUR PLOWING		
<p>It's a plowing method to create furrows following the contour of the land. (See Fig. 5.4.4)</p>	<p>1. It increases water absorption capacity of the soil. 2. It also reduces both the quantity and velocity of surface runoff.</p>	<p>1. A bit difficult to plow properly.</p>
11. CONTOUR PLANTING		
<p>It's a planting method following the contour of the land. The crops planted act as barriers to the force of surface runoff.</p>	<p>1. Easy to adopt</p>	

Table 5.7.1 Changes in Land Use by the Project

Land Use	without Project	with Project	Difference
A&D land			
Vegetable farm	530	1,160	+ 630
- Rainfed	530	890	+ 360
- Irrigated	0	270	+ 270
Coconuts	1,020	390	- 630
Others	270	270	± 0
Sub-total	1,820	1,820	± 0
Public Forest			
Vegetable farm	150	150	± 0
- Rainfed	150	80	- 70
- Irrigated	0	70	+ 70
Coconuts	180	180	± 0
Forest/scrub	60	60	± 0
Sub-total	390	390	± 0
National Park			
Vegetable farm	80	80	± 0
- Rainfed	80	80	± 0
- Irrigated	0	0	± 0
Coconuts	20	20	± 0
Forest	690	690	± 0
Sub-total	790	790	± 0
Total	3,000	3,000	± 0

Remark: "Others" includes river beds, residential areas, rice land, etc.

Summary of Land Use Changes by the Project

Land Use	without Project	with Project	Difference
Vegetable farm	760	1,390	+ 630
- Rainfed	760	1,050	+ 290
- Irrigated	0	340	+ 340
Coconuts	1,220	590	- 630
Forest/scrub	750	750	± 0
Others	270	270	± 0
Total	3,000	3,000	± 0

Table 5.7.2

**Comparison of Existing and Potential Vegetables
in terms of Profitability and Marketability**

Vegetables	Unit Yield (ton/ha)	Unit Price (P/kg)	Gross Income (TP/ha)	Production Costs			Net Income (TP/ha)	Profita- bility	Market- ability	Suit- ability	Overall Rank
				Labor (TP/ha)	Material (TP/ha)	Total (TP/ha)					
Existing Vegetables											
1. Tomato	14.7	6.22	91.1	17.3	17.3	34.6	56.5	B	A	A	A
2. Cabbage	17.6	7.64	134.5	14.5	33.9	48.4	86.1	A	A	A	A
3. Raddish	15.3	5.57	85.3	13.3	16.2	29.5	55.8	B	B	A	A
4. Baguio Beans	6.7	9.73	65.4	17.0	25.5	42.5	22.9	C	B	A	B
5. Sweet Potato	15.4	3.80	58.5	11.4	13.9	25.3	33.2	C	A	A	B
Potential Vegetables											
6. Ampalaya	15.8	7.14	112.5	21.9	51.2	73.1	39.4	C	B	B	C
7. Cucumber	12.6	4.88	61.5	11.9	17.9	29.8	31.7	C	B	B	C
8. Eggplant	16.1	6.55	105.5	22.8	27.8	50.6	54.9	B	A	B	B
9. Green Pepper	7.8	27.70	216.1	42.6	28.4	71.0	145.1	A	A	B	B
10. Okra	12.1	5.85	70.7	26.5	11.3	37.8	32.9	C	B	C	C
11. Squash	15.8	4.64	73.5	16.6	24.9	41.5	32.0	C	B	C	C
12. Upo	12.0	3.46	41.5	12.3	18.5	30.8	10.7	C	B	B	C
13. Water Melon	16.0	14.89	238.2	39.2	39.2	78.4	159.8	A	C	C	C
14. Califlower	9.4	16.81	157.3	23.2	34.9	58.1	99.2	A	B	A	A
15. Celery	12.6	17.57	222.1	47.3	31.5	78.8	143.3	A	B	A	A
16. Chinese Cabbage	13.9	14.74	205.2	28.6	43.0	71.6	133.6	A	B	A	A
17. Lettuce	11.9	16.11	192.0	44.0	29.3	73.3	118.7	A	B	A	A
18. Pechay	9.0	5.95	53.6	14.9	10.0	24.9	28.7	C	A	A	B
19. Peanuts	2.1	19.31	40.6	5.3	9.8	15.1	25.5	C	B	C	C
20. Sitao	10.3	9.16	94.5	12.9	12.9	25.8	68.7	B	A	A	A
21. Sweet Peas	3.1	29.55	92.2	22.1	33.2	55.3	36.9	C	B	B	C
22. Carrot	12.6	11.17	140.3	18.8	28.2	47.0	93.3	A	B	A	A
23. Garlic	3.0	58.25	172.4	24.6	37.0	61.6	110.8	A	A	C	C
24. Ginger	8.0	8.97	71.8	15.5	36.1	51.6	20.2	C	B	C	C
25. Irish Potato	13.8	7.29	100.3	19.7	45.9	65.6	34.7	B	A	B	C

Source: elaborated from various data obtained from DCIEP, BAS, BPI, MAS, Benguet Provincial Office and Second Laguna de Bay Irrigation Project-Vegetable Component

Unit Yield: Average unit yield of crops grown in Cavite and Beguet (see Table 5.6.4)

Unit Prices: Estimated annual average ex-trading post prices derived from annual wholesale prices at Divisoria (see Table 3.6.4)

Production Costs: Average of various cost data obtained from BAS, Second Laguna de Bay Irrigation Project - Vegetable Component and Provincial Agricultural Office, Benguet after adjusting to 1994 prices (see Table 5.6.3)

Rating: A: Recommendable, B: Acceptable, C: Not recommendable

Table 5.7.3

Unit Vegetable Production Costs for Comparison

(Unit : Pesos/ha)

Vegetables	Actual Production Costs (1993)		Average	Production Costs for Comparison
	Cavite	Benguet		
Existing Vegetables				
1. Tomato	43,100	26,000	34,550	34,600
2. Cabbage	57,100	39,600	48,350	48,400
3. Raddish	21,800	37,100	29,450	29,500
4. Baguio Beans	-	42,500	42,500	42,500
5. Sweet Potato	27,600	22,900	25,250	25,300
Potential Vegetables				
6. Ampalaya	73,100	-	73,100	73,100
7. Cucumber	29,800	-	29,800	29,800
8. Eggplant	57,900	43,200	50,550	50,600
9. Green Pepper	-	71,000	71,000	71,000
10. Okra	37,800	-	37,800	37,800
11. Squash	41,500	-	41,500	41,500
12. Upo	30,800	-	30,800	30,800
13. Water Melon	78,400	-	78,400	78,400
14. Califlower	-	58,100	58,100	58,100
15. Celery	-	78,800	78,800	78,800
16. Chinese Cabbage	-	71,600	71,600	71,600
17. Lettuce	-	73,300	73,300	73,300
18. Pechay	26,600	23,100	24,850	24,900
19. Peanuts	-	15,100	15,100	15,100
20. Sitao	25,800	-	25,800	25,800
21. Sweet Peas	-	55,300	55,300	55,300
22. Carrot	-	47,000	47,000	47,000
23. Garlic	61,600	-	61,600	61,600
24. Ginger	51,600	-	51,600	51,600
25. Irish Potato	-	65,600	65,600	65,600

Source: Cavite: Second Laguna de Bay Irrigation Project- Vegetable component
Benguet: Provincial Agricultural Office, Benguet

Remarks: Averages of unit production costs per ha in Cavite (lowland) and Benguet (highland) are adopted as production costs under future condition with the Project, because the project area is located in-between lowland and highland.

Table 5.7.4 Anticipated Unit Yield of Vegetables

(Unit : ton/ha)

Vegetables	Actual Crop Yield (1993)		Average	Anticipated Crop Yield
	Cavite	Benguet		
Existing Vegetables				
1. Tomato	14.50	14.8	14.7	14.7
2. Cabbage	18.70	16.5	17.6	17.6
3. Raddish	14.50	16.1	15.3	15.3
4. Baguio Beans	-	8.4	8.4	6.7
5. Sweet Potato	14.60	16.2	15.4	15.4
Potential Vegetables				
6. Ampalaya	19.70	-	19.7	15.8
7. Cucumber	15.80	-	15.8	12.6
8. Eggplant	15.40	16.8	16.1	16.1
9. Green Pepper	-	9.7	9.7	7.8
10. Okra	15.10	-	15.1	12.1
11. Squash	19.80	-	19.8	15.8
12. Upo	15.00	-	15.0	12.0
13. Water Melon	20.00	-	20.0	16.0
14. Califlower	-	11.7	11.7	9.4
15. Celery	-	15.8	15.8	12.6
16. Chinese Cabbage	-	17.4	17.4	13.9
17. Lettuce	-	14.9	14.9	11.9
18. Pechay	9.50	8.5	9.0	9.0
19. Peanuts	-	2.6	2.6	2.1
20. Sitao	12.90	-	12.9	10.3
21. Sweet Peas	-	3.9	3.9	3.1
22. Carrot	-	15.7	15.7	12.6
23. Garlic	3.70	-	3.7	3.0
24. Ginger	10.00	-	10.0	8.0
25. Irish Potato	-	17.2	17.2	13.8

Source: Cavite: Second Laguna de Bay Irrigation Project- Vegetable component
Benguet: Provincial Agricultural Office, Benguet

Remarks: Average unit yields of crops grown in Cavite (lowland) and Benguet (highland) are adopted as anticipated crop yield under the future condition with the Project, because the project area is located in-between lowland and highland. In case that only one data is available either from Cavite or Benguet, 80% of the actual unit yield record was adopted.

Table 5.7.5 Production cost per hectare in the Irrigated area (Financial) (1/2)

Item	Tomato	Cabbage Dry	Cabbage Wet	Radish	Sweet Potato	Baguio Beans	Carrot	Cauli-flower	Celery	Chinese Cabbage	Lettuce	Sitao
Farm inputs												
Seeds	2,500	2,232	2,232	1,200	3,300	2,000	3,360	1,068	4,032	1,155	2,268	960
Fertilizer	7,800	9,660	7,305	4,035	3,810	1,920	12,050	15,120	14,160	13,200	12,390	2,880
Agro-chemicals	5,345	5,945	6,814	1,738		1,069	3,207	5,945	7,214	5,945	9,214	4,276
Other farm materials	4,610	1,250	22,000	1,250		7,520	22,000	22,000	1,250	1,250	22,000	7,520
Labour	17,700	20,400	17,700	14,100	11,400	10,270	20,400	29,400	45,600	35,700	40,200	11,400
Transportation	4,750	5,500	3,250	4,750	4,750	2,250	4,000	3,000	4,000	4,500	3,750	3,250
Others	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Total Cost	44,205	46,487	60,801	28,573	24,760	26,529	66,517	78,033	77,756	63,250	91,322	31,786

Table 5.7.5 Production cost per hectare in the Irrigated area (Economic) (2/2)

Item	Tomato	Cabbage Dry	Cabbage Wet	Radish	Sweet Potato	Baguio Beans	Carrot	Cauli-flower	Celery	Chinese Cabbage	Lettuce	Sitao
Farm inputs												
Seeds	2,450	2,187	2,187	960	2,640	1,600	3,300	1,047	3,952	1,133	2,223	768
Fertilizer	6,085	7,620	5,765	3,035	3,030	1,490	10,600	11,770	10,835	10,365	9,560	2,235
Agro-chemicals	5,238	5,826	6,678	1,703		1,048	3,143	5,826	7,070	5,826	9,030	4,190
Other farm materials	3,688	1,000	17,600	1,000		6,016	17,600	17,600	1,000	1,000	17,600	6,016
Labour	12,390	14,280	12,390	9,870	7,980	7,189	14,280	20,580	31,920	24,990	28,140	7,980
Transportation	3,325	3,850	2,275	3,325	3,325	1,575	2,800	2,100	2,800	3,150	2,625	2,275
Others	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200
Total Cost	34,376	35,963	48,095	21,093	18,175	20,118	52,923	60,123	58,777	47,664	70,378	24,664

Table 5.7.6 Production cost per hectare in the Rainfed area (Financial) (1/2)

Item	(Unit: Peso/ha)									
	Tomato	Cabbage Dry	Cabbage Wet	Radish	Sweet Potato	Baguio Beans	Carrot	Lettuce	Sitao	
Farm inputs										
Seeds	2,500	1,488	1,488	1,200	3,300	2,000	2,800	2,268	960	
Fertilizer	6,429	5,748	5,748	2,628	3,810	1,920	10,600	9,912	2,880	
Agro-chemicals	4,276	3,607	5,745	1,738		1,069	3,207	7,545	4,276	
Other farm materials	3,360		10,000			6,270	10,000	10,000	16,270	
Labor	13,200	13,200	13,200	11,600	10,250	9,820	17,450	37,250	10,500	
Transportation	3,750	2,750	2,750	3,500	3,750	2,250	3,500	3,000	2,500	
Others	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	
Total Cost	34,715	27,993	40,131	21,866	22,310	24,529	48,757	71,175	38,586	

Table 5.7.6 Production cost per hectare in the Rainfed area (Economic) (2/2)

Item	(Unit: Peso/ha)									
	Tomato	Cabbage Dry	Cabbage Wet	Radish	Sweet Potato	Baguio Beans	Carrot	Lettuce	Sitao	
Farm inputs										
Seeds	2,450	1,458	1,458	960	2,640	1,600	2,750	2,223	768	
Fertilizer	5,011	4,532	4,532	1,983	3,030	1,490	9,280	7,648	2,235	
Agro-chemicals	4,190	3,535	5,630	1,703		1,048	3,143	7,394	4,190	
Other farm materials	3,488		8,000			5,016	8,000	8,000	13,016	
Labor	9,240	9,240	9,240	8,120	7,175	6,874	12,215	26,075	7,350	
Transportation	2,625	1,925	1,925	2,450	2,625	1,575	2,450	2,100	1,750	
Others	960	960	960	960	960	960	960	960	960	
Total Cost	27,964	21,650	31,745	16,176	16,430	18,563	38,798	54,400	30,269	

Table 7.3.1 List of O&M Equipment and Machinery

O&M Machinery/Equipment	Q'ty	Unit	Remarks
1) Upland Horticulture and Irrigation Technology Center			
(1) Experiment instrument			
a) Soil test equipment	1	LS	
b) Spare parts	1	LS	
(2) Meteorological observation equipment			
a) Rainfall recorder	1	sets	Automatic recording
b) Wind velocity/direction	1	sets	Automatic recording
c) Sunshine duration meter	1	sets	Automatic recording
d) Evaporation pan	1	sets	Automatic recording
e) Temperature/Humidity	1	sets	Automatic recording
f) Spare parts	1	LS	
(3) O&M equipment			
a) Office tools			
Table/chair	5	sets	
Desk/chair	15	sets	
Locker	12	sets	
b) Accommodation furniture	8	sets	
c) Computers incl. printer	2	sets	
d) Copy machine	1	sets	
e) Tractors	3	cars	
f) 2 ton truck	1	cars	
g) Pickup car	1	cars	
h) 4-wheel jeep	2	cars	
i) Motor bike	2	units	
j) Spare parts	1	LS	
2) Soil Conservation Extension Center			
a) Office tools			
Table/chair	4	sets	
Computer incl. printer	1	sets	
Copy machine	1	sets	
b) Farm tools	1	LS	
c) 2 ton truck	1	cars	
d) Pickup car	1	cars	
e) 4-wheel jeep	2	cars	
f) Motor bike	2	units	
g) Spare parts	1	LS	
3) Trading Post			
a) Office tools			
Table/chair	15	sets	
b) 2 ton truck	1	cars	
c) Pickup car	1	cars	
d) 4-wheel jeep	1	cars	
e) Motor bike	2	units	
f) Weight Measurement	15	sets	
g) Spare parts	1	LS	

Table 7.3.2 Summary of Project Cost

(unit: 000 pesos)

Items	Description	Project Cost		Total
		Foreign Portion	Local Portion	
I	Pre-construction Works/Detailed Design			
	1) Administration Cost	48	1,745	1,793
	2) Engineering Cost	10,010	3,420	13,430
	Sub-Total I	10,058	5,165	15,223
II	Construction Works			
	1 Construction Works			
	1) Irrigation Construction Works	43,626	31,664	75,290
	2) Road Improvement Works	53,537	59,594	113,131
	3) Trading Post Construction	4,761	7,192	11,953
	4) Horticulture/Irrigation Center	2,597	5,898	8,495
	5) Soil Conservation Works	657	3,179	3,836
	6) Rehabilitation Works for Domestic Water System	1,228	665	1,893
	Sub-Total II-1	106,406	108,192	214,598
	2 O&M Equipment	10,021	2,210	12,231
	3 Administration Cost	72	2,870	2,942
	4 Engineering Cost	20,790	4,740	25,530
	5 Land Acquisition & Compensation	0	2,065	2,065
	Sub-Total II-(2+3+4+5)	30,883	11,885	42,768
	Sub-Total I+II	147,347	125,242	272,589
III	Physical Contingency (10%)	14,734	12,524	27,258
	Sub-Total	162,081	137,766	299,847
IV	Price Contingency (4.0% of Foreign Portion) (8.0% of Foreign Portion)	16,886	30,547	47,433
	Total (I+II+III+IV)	178,967	168,313	347,280

Table 7.3.3 Annual Fund Requirement

Items	Description	1995		1996		1997		Total		
		F/C	L/C	F/C	L/C	F/C	L/C	F/C	L/C	
I Detailed Design										
Pre-construction works										
1)	Administration Cost	24	346	24	1,399	24	1,423	48	1,745	1,793
2)	Engineering Cost			10,010	3,420	10,010	13,430	10,010	3,420	13,430
	Sub-Total I	24	346	10,034	4,819	10,034	14,853	10,058	5,165	15,223
II Construction Works										
1 Construction Works										
1)	Irrigation Construction Works			20,605	12,932	23,021	18,732	43,626	31,664	75,290
2)	Road Improvement Works			16,598	16,897	36,939	42,697	53,537	59,594	113,131
3)	Trading Post Construction			2,539	3,836	2,222	3,356	4,761	7,192	11,953
4)	Horticulture/Irrigation Center			1,039	2,359	1,558	3,539	2,597	5,898	8,495
5)	Soil Conservation Works			558	1,811	99	1,368	657	3,179	3,836
6)	Rehabilitation Works for Domestic Water System			491	266	737	399	1,228	665	1,893
	Sub-Total II-2			41,830	38,101	79,931	64,576	70,091	108,192	214,598
2)	O&M Equipment			10,021	2,210	12,231		10,021	2,210	12,231
3)	Administration Cost			24	1,197	1,221	48	1,673	1,721	2,942
4)	Engineering Cost			8,470	1,910	10,380	12,320	20,790	4,740	25,530
5)	Land Acquisition & Compensation			0	2,065	2,065		0	2,065	2,065
	Sub-Total II-(2+3+4+5)			18,515	7,382	25,897	12,368	4,503	16,871	42,768
	Sub-Total I+II-(1+2+3+4+5)	24	346	70,379	50,302	120,681	76,944	74,594	147,347	272,589
III Physical Contingency (10 %)										
		2	35	7,038	5,030	12,068	7,694	7,459	14,734	27,258
	Sub-Total	26	381	77,417	55,332	132,749	84,638	82,053	162,081	299,847
IV Price Contingency (4.0 %:Foreign Portion) (8.0 %:Local Portion)										
		1	30	6,317	9,207	15,524	10,568	21,310	31,878	47,433
	Total (I+II+III+IV)	27	411	83,734	64,539	148,273	95,206	103,363	178,967	347,280
F/C: Foreign Cost, L/C: Local Cost										

Table 8.3.1 Detailed O&M Requirements of Each Component

Irrigation facilities

	O&M activities	Responsible agencies
Beneficiaries	Preparation of regulations as to IAs establishment Preparation of regulation and roles of IAs, and O&M activities Inventory survey, water fee collection and O&M management Preparation of evaluation report (revise plan of cultivation, and re-structure of IAs organization, etc.)	MGs, NIA IAs, NIA IAs IAs
Routine O&M	Irrigation water control, removal of sediment, maintenance of on-farm facilities (hydrant valve, etc.)	IAs
Periodical O&M	Maintenance of intake, pipelines, farm ponds, etc.	IAs, NIA
Emergency O&M	Rehabilitation works caused by natural disaster, etc.	IAs, MGs, NIA

Rural roads

	O&M activities	Responsible agencies
Routine O&M	Maintenance of road surface, removal of sediment in drainages	MGs, PGL
Periodical O&M	Maintenance of pavement, bridges, slopes of embankment, etc.	MGs, PGL
Emergency O&M	Rehabilitation works caused by natural disaster, etc.	MGs, PGL, DPWH

Trading posts

	O&M activities	Responsible agencies
Beneficiaries	Preparation of regulations as to marketing cooperatives establishment Preparation of regulation and roles of marketing cooperatives, and O&M activities Inventory survey, collection of dues and O&M management Preparation of annual report (revise plan of marketing, and re-structure of cooperatives organization, etc.)	MGs, CDA Cooperatives, MGs, CDA Cooperatives Cooperatives
Routine O&M	Inspection and easy repair of trading posts	Cooperatives
Periodical O&M	Inspection and repair of structural materials of trading posts, etc.	Cooperatives, MGs
Emergency O&M	Rehabilitation works caused by natural disaster, etc.	Cooperatives, MGs

Upland Horticulture and Irrigation Technology Center

	O&M activities	Responsible agencies
Office in charge	Extension of farm technology and training, seminar to farmers Testing of irrigation methods and new crop cultivation at demo-farm Survey and monitoring regarding agricultural extension services Preparation of annual report (revise plan of O&M activities, and re-structure of functional organization, etc.)	DA Regional office
Beneficiaries	Participation to training, seminar, and assistance for preparation of seminar, training, etc.	Farmers, MGs, NIA
Routine O&M	Inspection, easy repair of buildings, irrigation devices and green house	DA Regional office
Periodical O&M	Inspection and repair of structural materials of center, etc.	DA Regional office
Emergency O&M	Rehabilitation works caused by natural disaster, etc.	DA Regional office, MGs

Soil Conservation Extension Center and demonstration fields

	O&M activities	Responsible agencies
Office in charge	Extension of soil conservation technology and training, seminar to farmers maintenance of demonstration fields, supply of tree nursery and promotion of ISF program Survey and monitoring regarding soil conservation extension services Preparation of annual report (revise plan of O&M activities, and re-structure of functional organization, etc.)	PENRO (DENR Regional office)
Beneficiaries	Participation to training, seminar, and assistance for preparation of seminar, training, etc.	Farmers, MGs
Routine O&M	Inspection, easy repair of buildings, nursery yards	PENRO
Periodical O&M	Inspection and repair of structural materials of center, etc.	PENRO DENR Regional office
Emergency O&M	Rehabilitation works caused by natural disaster, etc.	PENRO, MGs, DENR Regional office

Rural water supply system

	O&M activities	Responsible agencies
Routine O&M	Inspection of intake and conduits	MGs
Periodical O&M	Inspection and repair of structural materials	MGs
Emergency O&M	Rehabilitation works caused by natural disaster, etc.	MGs, PGL

Table 9.1.1 Gross and Net Economic Production Values under Future Condition without Project (1,320 ha)

(1) Existing Vegetable Farm (720 ha)

Crops	Cultivation Area (ha)	Unit Yield (ton/ha)	Production (ton)	Unit Price (P/kg)	Gross Value (P1,000)	Production Cost		Net Value (P1,000)	
						Unit (P/ha)	Total (P1,000)		
Dry season									
Tomato	435	10.0	4,350	3.34	14,529	20,720	9,013	5,516	
Cabbage	145	7.0	1,015	6.34	6,435	15,106	2,190	4,245	
Raddish	70	9.0	630	3.88	2,444	12,900	903	1,541	
Baguio Beans	70	6.0	420	6.73	2,827	17,828	1,248	1,579	
Sweet Potato	-	-	-	-	-	-	-	-	
Sub-total	720	-	6,415	-	26,235	-	13,355	12,881	
Wet season									
Tomato	-	-	-	-	-	-	-	-	
Cabbage	70	5.0	350	7.94	2,779	18,433	1,290	1,489	
Raddish	-	-	-	-	-	-	-	-	
Baguio Beans	-	-	-	-	-	-	-	-	
Sweet Potato	145	10.0	1,450	3.82	5,539	13,333	1,933	3,606	
Sub-total	215	-	1,800	-	8,318	-	3,224	5,094	
Total	935	-	8,215	-	34,553	-	16,578	17,975	
Net Production Value per ha (Pesos/ha)								=	24,965

Vegetable farm includes areas under multi-storied cropping with coconuts/tree crops.

(2) Coconuts Plantation in Road Influence Area (600 ha)

Crops	Cultivation Area (ha)	Unit Yield (nuts/ha)	Production (1,000 nuts)	Unit Price (P/nut)	Gross Value (P1,000)	Production Cost		Net Value (P1,000)	
						Unit (P/ha)	Total (P1,000)		
Coconuts	600	3,600	2,160	1.6	3,456	3,811	2,287	1,169	
Net Production Value per ha (Pesos/ha)								=	1,949

Table 9.1.2 Gross and Net Economic Production Values under Future Irrigated Condition with Project (320 ha)

Crops	Cultivation Area (ha)	Unit Yield (ton/ha)	Production (ton)	Unit Price (p/kg)	Gross Value (P1,000)	Production Cost		Net Value (P1,000)	
						Unit (P/ha)	Total (P1,000)		
Pattern-1	30%								
Sitao	96	10.3	989	7.55	7,465	24,664	2,368	5,098	
Tomato	96	14.7	1,411	5.97	8,425	34,376	3,300	5,125	
Carrots	96	12.6	1,210	12.94	15,652	52,923	5,081	10,572	
Sub-total	288	-	-	-	31,543	-	10,748	20,794	
Pattern-2	10%								
Celery	32	12.6	403	14.10	5,685	58,777	1,881	3,804	
Cabbage	32	17.6	563	6.21	3,497	35,963	1,151	2,347	
Lettuce	32	11.9	381	17.81	6,782	70,378	2,252	4,530	
Sub-total	96	-	-	-	15,965	-	5,284	10,681	
Pattern-3	20%								
Chinese cabbage	64	13.9	890	10.48	9,323	47,664	3,050	6,273	
Tomato	64	14.7	941	5.97	5,617	34,376	2,200	3,417	
Sweet potato	64	15.4	986	3.48	3,430	18,175	1,163	2,267	
Sub-total	192	-	-	-	18,369	-	6,414	11,956	
Pattern-4	10%								
Baguio beans	32	6.7	214	7.24	1,552	20,118	644	908	
Cabbage	32	17.6	563	5.89	3,317	35,963	1,151	2,166	
Cauliflower	32	9.4	301	22.62	6,804	60,123	1,924	4,880	
Sub-total	96	-	-	-	11,674	-	3,719	7,955	
Pattern-5	20%								
Sitao	64	10.3	659	7.24	4,773	24,664	1,578	3,194	
Raddish	64	15.3	979	5.57	5,454	21,093	1,350	4,104	
Cabbage Wet	64	10.6	678	8.00	5,427	48,095	3,078	2,349	
Sub-total	192	-	-	-	15,654	-	6,007	9,647	
Pattern-6	10%								
Chinese cabbage	32	13.9	445	9.85	4,381	47,664	1,525	2,856	
Cabbage	32	17.6	563	6.21	3,497	35,963	1,151	2,347	
Sweet potato	32	15.4	493	3.46	1,705	18,175	582	1,123	
Sub-total	96	-	-	-	9,584	-	3,258	6,326	
Total	960	-	-	-	102,788	-	35,429	67,359	
Average Net Production Value per ha (Pesos/ha)								=	210,498

Table 9.1.3

**Gross and Net Economic Production Values
under Future Rainfed Condition with Project (930 ha)**

Crops	Cultivation Area (ha)	Unit Yield (ton/ha)	Production (ton)	Unit Price (p/kg)	Gross Value (P1,000)	Production Cost		Net Value (P1,000)	
						Unit (P/ha)	Total (P1,000)		
Pattern-1	30%								
Tomato	279	12.0	3,348	3.69	12,354	27,964	7,802	4,552	
Sweet potato	279	12.0	3,348	3.82	12,789	16,430	4,584	8,205	
Sub-total	558	-	-	-	25,143	-	12,386	12,758	
Pattern-2	20%								
Tomato	186	12.0	2,232	3.69	8,236	27,964	5,201	3,035	
Cabbage Wet	186	8.4	1,562	8.00	12,499	31,745	5,905	6,595	
Sub-total	372	-	-	-	20,735	-	11,106	9,629	
Pattern-3	20%								
Cabbage	186	8.4	1,562	6.34	9,906	21,650	4,027	5,879	
Sitao	186	8.2	1,525	8.18	12,476	30,269	5,630	6,846	
Sub-total	372	-	-	-	22,382	-	9,657	12,725	
Pattern-4	10%								
Raddish	93	10.8	1,004	4.46	4,480	16,176	1,504	2,975	
Sitao	93	8.2	763	8.18	6,238	30,269	2,815	3,423	
Sub-total	186	-	-	-	10,718	-	4,319	6,398	
Pattern-5	10%								
Raddish	93	10.8	1,004	4.46	4,480	16,176	1,504	2,975	
Lettuce	93	9.5	884	17.81	15,735	54,400	5,059	10,676	
Sub-total	186	-	-	-	20,215	-	6,564	13,651	
Pattern-6	10%								
Baguio beans	93	6.3	586	6.73	3,943	18,563	1,726	2,217	
Carrot	93	10.1	939	12.94	12,155	38,798	3,608	8,546	
Sub-total	186	-	-	-	16,098	-	5,335	10,763	
Total	1860	-	-	-	115,291	-	49,366	65,924	
Average Net Production Value per ha (Pesos/ha)								=	70,886

Table 9.5.1 Prospective Environmental Impacts without Mitigating Measures (Irrigation)

Prospective Impacts	Significance without mitigating measures	Mitigating Measures
- Negative Impacts -		
<i>During Construction</i>		
1 New construction roads, if established, will destruct vegetation and result in soil erosion.	Major	<ul style="list-style-type: none"> ● Manual transportation of materials and construction equipment. ● Restoration of land by reseeding or replanting.
2 Construction activities will disturb soil surface and increase susceptibility to water erosion.	Major	<ul style="list-style-type: none"> ● Limitation of construction works in the rainy season. ● Use of low impact construction methods. ● Reestablishment of vegetation cover as soon as possible after disturbance. ● No clearing on steep and unstable slopes.
<i>Permanent</i>		
3 Soil erosion	Major	<ul style="list-style-type: none"> ● Adoption of soil conservation measures.
4 Deterioration of river water quality below the proposed irrigation area.	Moderate	<ul style="list-style-type: none"> ● Avoidance of overwatering. ● Control of agro-chemicals and fertilizers.
<i>Indirect</i>		
5 Unplanned or illegal land clearing using construction roads.	Major	<ul style="list-style-type: none"> ● Restoration of construction roads to original condition to extent possible. ● Prohibition of the use of the roads.
6 Increase in population in-migration	Moderate	<ul style="list-style-type: none"> ● Administrative control of in-migration.
- Positive Impacts -		
7 Increase in crop production	Major	

Table 9.5.2 Prospective Environmental Impacts without Mitigating Measures (Road)

Prospective Impacts	Significance without mitigating measures	Mitigating Measures
- Negative Impacts -		
<i>During Construction</i>		
1 Erosion from fresh road cuts and fill, particularly in secondary road construction	Major	<ul style="list-style-type: none"> ● Limitation of construction in the dry season ● Proper disposition of cut and fill materials ● Protection of most susceptible soil surface with mulch.
<i>Permanent</i>		
2 Destruction of present vegetation and land use. (secondary roads only)	Major	<ul style="list-style-type: none"> ● Restoration of sites to original condition by reseeded or replanting. ● Compensation given to present landowners
3 Erosion of lands below the roadbed receiving concentrated outflow carried by drains.	Major	<ul style="list-style-type: none"> ● Increase in number of drain outlets. ● Drain outlets so as to avoid cascade effects. ● Lining of receiving surface.
4 Landslides and slips in road cut, particularly in secondary roads.	Major	<ul style="list-style-type: none"> ● Change of route alignment avoiding unstable areas. ● Design of drainage works. ● Stabilization of road cuts with structures.
<i>Indirect</i>		
5 Unplanned or illegal land clearing	Moderate	<ul style="list-style-type: none"> ● Education ● Monitoring and control
6 Increase in population in-migration	Moderate	<ul style="list-style-type: none"> ● Control of in-migration.
- Positive Impacts -		
7 Reduction of crop damages during transportation	Major	
8 Activation of marketing activities.	Major	
9 Improvement of living condition	Major	
10 Enhancement of extension services	Major	