3.5.2 Crop production

The production of crops under the future without and with project conditions were estimated by multiplying the anticipated unit yield with the future cropping area. These are presented in Table B.3.5, and are summarized as follows :

Crops	Unit	Without project	With project	Incremental
Strawberry	ton	549	560	11
Rose	1,000 doz	1,500	2,301	801
Rice	ton	95	125	30
Vegetables	ton	6,441	13,600	7,159
Flower	1,000 doz	148	150	2

3.6 Projected Demand for Vegetables

Demand of vegetables produced in the project area in year 2000 was analyzed to assess the future supply and demand conditions of vegetables. The future demand of vegetables in Metro Manila as the largest consumer area, Ilocos Region and Central Luzon Region were estimated based on the assumption of : a) population growth rate of 2.8 %, 1.9 % and 1.0 % for Metro Manila, Ilocos Region and Cetral Luzon Region, respectively ; b) a target annual increase in per capita income by Medium-Term Development Plan (4.4 %) ; and c) income elasticities of demand for each vegetable. The results are presented in Table B.3.6 and summarized below :

(Unit : ton/year)

Region / Items	Leafy Vegetables	Fruit Vegetables	Leguminous Vegetables	Root and Bulb crops	Total
Metro Manila					
Demand in CY 1986	114,980	140,770	34,890	89,970	380,610
Demand in CY 2000	153,720	219,980	54,200	140,590	568,490
Increase	38,740	79,210	19,310	50,620	187,880
Ilocos Region					
Demand in CY 1986	71,500	79,710	23,160	37,130	211,500
Demand in CY 2000	84,450	110,190	31,820	51,330	277,790
Increase	12,950	30,480	8,660	14,200	66,290
Central Luzon Region					
Demand in CY 1986	68,850	100,530	22,500	54,090	245,970
Demand in CY 2000	71,760	122,810	27,320	66,080	287,970
Increase	2,910	22,280	4,820	11,990	30,010
Total					
Demand in CY 1986	255,330	321,010	80,550	181,190	838,080
Demand in CY 2000	309,930	452,980	113,340	258,000	1,134,250
Increase	54,600	131,970	32,790	77,810	296,170

Total demand of vegetables in three regions in 2000 will increase by about 300,000 tons or 35 % of the demand in 1986. As mentioned in Section 3.5.2, incremental production of vegetables in the project area in 2000 is expected to be about 7,200 tons which would be equivalent only about 2.4 % of the demand increases in the above three regions. Considering the advantage of the cool climate of the Project area which is suitable to temperate vegetables cultivation, marketability of these products will be promising and the highland areas will have to increase vegetables production as much as possible in order to fulfill the gap between supply and demand. The project will be a model of agricultural development in the highland region.

3.7 Agricultural Support System

The major objective of this project is to improve and stabilize the farmers' economy through increased productivity and profitability of agricultural production based on already established crops such as vegetables and flowers. This objective will be achieved by rehabilitating existing irrigation systems, expanding the area served by irrigation facilities and improving accessibility from farm to the market as well as strengthening of agricultural support services.

Such agricultural support services include agricultural research, extension services, farmer's cooperative movement and agricultural credit. Although most of the agricultural support systems for these services have already been established in and around the Project area with Government Promotion, the following matters should be realized in order to sustain full accomplishment of the project objective :

1) To strengthen agricultural extension services to extend improved farming practices to farmers through existing extension channels,

2) To strengthen inter-agency coordination among different organizations involved in rural development such as BPI, Department of Agriculture, BAS, BSU, etc.,

3) To promote the establishment of farmers association groups for operation and maintenance of irrigation and drainage system in the on-farm level,

4) To encourage credit services of farmers cooperative, and

5) To promote production planning based on demand and supply projection in order to avoid periodic over-supply which may lower the price and waste of products.

3.7.1 Agricultural extension services

Among the agricultural support systems, priority should be given to the extension services in view of its role in coordinating activities between research institutions and farmers, transfer of knowledge, planning of production, strengthening of farmers' organization, etc. At present two agencies have conducted agricultural extension services in the project area i.e. MAO under the Department of Agriculture and the Office of the Provincial Agriculturist under the Benguet Provincial Government. The existing extension system will be strengthened through the following measures :

1) Establishment of contact farmer and demonstration/trial farm

Introduction of contact farmer system will be effective for extension works. Contact farmers shall be utilized for on-farm demonstration and on-farm trials. Contact farmers must be willing to try out practices recommended by the extension workers and be prepared to have other farmers visit their field. Furthermore, the contact farmers must be of good standing in their community so that their view on new practices will be respected by other farmers. They shall be selected from each barangay in the project area. Since they will serve as demonstration focal points for all farmers in the barangay, it is important to have demonstration farms which is accessible to other farmers. Demonstration / trial farms would have the following function :

a) To evaluate new varieties of currently grown, high value and traditional crops

b) To explore new high value crops for the area

c) To test and introduce new or existing farming technologies applicable to the situation

d) To help farmers make appropriate varietal choices for their farming systems

The demonstration / trial farms will be cared by the contact farmers who shall be closely guided by extension workers in all on-farm practices. Major inputs needed on the farms will be supplied by the project. Following harvest, inputs provided to the farmers will be replaced by them.

2) Links with research

There is a constant need for vegetables to search for improved varieties which will be resistant to diseases and which will yield well under the natural condition in the area. The research institutes have responsibilities to solve such problems and needs,

however extension activities of the institutes and linkage between research and extension are limited and existing research findings have not yet informed to the farmers. The extension service can close these gaps through the development of the cooperative relationship with these institutes. This will be vital to the success of the project.

The strategy of a research-extension links is to utilize the existing organizations like HARRC agencies located in and around the project area.

The extension workers shall get a close contact with the research agencies in order to :

a) collect information on new varieties of crops for which verification trials have been conducted,

b) take new technologies which seems to be superior to existing practice,

c) request consultation for the problems which arise in the area, and

d) propose new research program for the problems which require further study.

3) Production program

Vegetable prices are erratic between years and within years. If the prices are high, farmers get much profit, but if the prices drop down, they can not cover even the production cost. Supply fluctuation of vegetables causes such price variations. At present, Benguet Province is the primary source of temperate vegetables in Philippines and the lowland vegetables are not competitive with highland vegetables as mentioned in Chapter 2. To reduce the price variation, constant supply of vegetables with an even quality is important along with the continuous supply throughout the year. The extension worker should guide farmers to regulate vegetable production by mean of :

a) estimating monthly production of vegetables by monitoring the planted area,

b) coordinating with BAS Baguio to provide timely market information services, and

c) Making production program in the area based on the past records of production, prices, planted areas and harvesting period.

In view of changing market conditions and competitions from the lowlands in the future, there is a need for new crop introduction requiring careful and thorough testing.

4) Strengthening of farmers association

The bargaining power of farmers in the Project area is very weak, since marketing and credit are linked through the practice of dealers providing fund for inputs and through informal contractual systems for vegetables. In order to improve the bargaining position of farmers, farmers' cooperatives will be strengthened or newly established under the guidance of extension workers. These farmers cooperatives will have following functions :

a) Cooperative marketing of production

b) Credit assistance to farmers

Rural community centers planned in the Project will be used for meeting of the farmers association as well as farmers' class. The farmers cooperative will eventually be able to generate funds for further strengthening or upgrading their association.

3.7.2 Proposed organization of extension system

The proposed organizational structure of the extension system by the Project is presented in Fig. B.3.2. HIRDP Special Project Section for extension services will be established in the Provincial Agriculturist Office of Benguet Province. The staff of the Provincial Agriculturist office will be increased as follows :

Staff	Present	Proposed	Increase for HIRDP
Provincial Agriculturist	1	1	0
Administrative Assistant	1	1	0
Senior Clerk	1	1	0
Clerk	1	1	0
Driver	1	3	2
Extension Service Technician (Extension worker)	4	8	4
Information Officer	0	1	1
Nursery Foreman	2	2	0
Plant Propagator	7	7	0

The present Provincial Agriculturist will be responsible for the management of the HIRDP Special Project Section as well as routine office activities. Four extension technicians and one information officer will be assigned to the Project. The increased extension technicians shall concentrate their activities inside the Project area. The information officer will be in

charge of collecting and disseminating of daily prices information, and of compiling pamphlets on agricultural matters. Two drivers will also be recruited for the operation of vehicles.

3.7.3 O & M equipment

Vehicles are one of the most important inputs to the extension system, as they provide the mobility required for field visits of extension workers, transportation of farm inputs to the fields of contact farmers, etc. Two four-wheel drive vehicles including one jeep and one pick up truck, and three motorcycles will be procured and stationed at the HIRDP extension office. All vehicles will be operated under a pool arrangement.

The office will also procure office equipments and furniture, instructional equipment such as audio visual aid, and basic agricultural equipment necessary for field extension works. The list of O & M equipment and their procurement cost were estimated at about 930,000 pesos as shown in Table B.3.7.

3.7.4 Annual O & M cost for extension system

Annual operation and maintenance cost comprises of salaries for staff increased, cost for operation, repair and maintenance of O & M equipment. The annual O & M cost is estimated at about 301,000 pesos as shown in Table B.3.8.

4. AGRICULTURAL BENEFIT AND FARM ECONOMY

4.1 Price Forecast

Economic and financial farmgate prices of farm inputs and outputs were set in order to evaluate the expected monetary benefit and effects. Prices of internationally traded inputs (fertilizers) were estimated on the basis of projected international market prices by the World bank with the necessary adjustments, and are all expressed in 1987 constant value as shown in Table B.4.1. Economic prices of all imported farm inputs except fertilizers were converted from the current market price, assuming that 90 percent of the market price consists of foreign exchange and 10 percent of total currency which is adjusted using a standard conversion factor of 0.86. Economic prices of locally produced farm inputs was also converted from the farmgate prices using a standard conversion factor. A shadow wage rate of 0.80 was used for both family and hired farm labor. All economic prices of outputs were converted into economic prices using a standard consumption conversion factor of 0.85. Financial farmgate prices of farm inputs and outputs were estimated on the basis of current farm gate prices prevailing in the Project area as of 1987.

Financial and economic prices of all agricultural commodities are shown in Table B.4.2., and are summarized as below :

Farm inputs and outputs	Unit	Financial prices as of 1987	Economic prices in 2000 (1987 constant)
Outputs			
Paddy	(peso/kg)	3.48	2.96
Chinese Cabbage	(peso/kg)	2.74	2.33
Lettuce	(peso/kg)	4.00	3.40
Baguio Bean	(peso/kg)	4.20	3.57
Garden Pea	(peso/kg)	16.19	13.76
Green Onion	(peso/kg)	2.50	2.13
Strawberry	(peso/kg)	15.00	12.75
Celery	(peso/kg)	4.50	3.83
Rose	(peso/doz)	7.00	5.95
Gradiolus	(peso/doz)	3.00	2.55
Fertilizers and agro-chemicals			
N	(peso/kg)	9.70	14.80
P2O5	(peso/kg)	11.20	13.90
K	(peso/kg)	5.80	7.50
Chicken manure	(peso/kg)	0.60	0.52
Insecticides (G)	(peso/kg)	183	180
Insecticides (L)	(peso/lit)	242	239
Fungicides (G)	(peso/kg)	140	138
Fungicides (L)	(peso/lit)	158	156
Trellises	(peso/100 pieces)	20.00	17.20
Labor charge	(peso/day)	35	28
Animal power	(peso/day)	85	68
Transportation	(peso/kg)		
From farm to market		0.13	0.11
From market to farm		0.10	0.09

4.2 Agricultural Benefit

Agricultural benefit to be expected is defined as the difference of net return from crops between the future with Project and the future without Project conditions. The economic net return per ha for each crop was calculated as below, on the basis of estimated gross income and production cost. The details are as shown in Table B.4.3.

(Unit : peso/ha)

Crops	Without Project	With Project
Paddy	40	100
Strawberry	60,500	104,900
Rose	88,500	167,600
Chinese cabbage	17,300	23,500
Lettuce	11,000	28,100
Baguio Bean	6,400	10,600
Garden Pea	13,200	36,200
Green Onion	4,200	5,800
Celery	39,300	70,800
Gradiolus	21,700	21,700
Average of vegetables #1	15,300	29,100
Intercrop #2	10,900	16,400

#1 : Vegetables include C. Cabbage, Lettuce, Baguio Bean, Garden Pea, G. Onion and Celery.
#2 : Crops for intercropping include G. Onion, Celery and Gradiolus.
Net return per ha of intercrops was estimated at a half value of the normal cropping

Applying the above net return per ha for each crop to the cropped area, the total annual net return accrued from the agricultural production was calculated on both the future with Project and without Project conditions. Based on these results, the agricultural benefit is calculated as shown in Table B.4.4. The agricultural benefit at full development stage were estimated at about 23.6 million pesos. This value includes benefit by flood elimination in Zone I. It is estimated at 6.3 million pesos by multiplying the net return per ha of 29,100 pesos with increase of cropping area (217 ha). Agricultural benefits may be expected to the increase linearly year by year, and to reach its full benefit about five years after completion of the Project.

4.3 Farmer's Economy

After implementation of the Project, more irrigation water and extension services would be provided to all farmers in the Project area, and crop productivity would improve remarkably. As a result, a significant increase in farm income would be expected in future with Project condition.

The impact of the Project on the beneficiary farmers was examined analyzing the farm budget of typical representative farmers with average farm size. As mentioned in Section 2.6, their average farm sizes are estimated at 0.87 ha, 0.70 ha and 0.91 ha for Zone I, II and III, respectively. Financial net return for ha for each crop was analyzed as shown in Table B.4.5. The results of the farm budget analysis are shown in Table B.4.6 and B.4.7, and are summarized below.

(Unit : pesos/year)

Items	Zone I		Zone II		Zone III	
	Without	With	Without	With	Without	With
Farm size (ha)	0.87		0.70		0.91	
Net farm area (ha)	0.70		0.46		0.65	
Total cultivated area (ha)	1.32	2.39	1.02	0.99	1.35	2.13
Total Net Income	56,900	129,000	52.500	83,000	33,600	82,500
Net Farm Income	52,700	124,800	49,500	79,900	28,000	76,900
Non-farm Income	4,200	4,200	3,100	3,100	5,600	5,600
Total Expenses #	50,200	80,600	45,900	53,200	32,600	53,300
Net reserve	6,700	48,400	6,600	29,800	1,000	29,200

: Including irrigation fee.

Total net income under the with Project condition would be expected to increase 1.6 to 2.5 times as compared in future under the without Project condition. The annual net reserve under the future with Project condition would also remarkably increase as compared with future without Project condition. The increase in net reserve would enable farmers to pay the irrigation fee and would also offer them incentives for further development.

Table B.2.1 Basic Socio Data in La Trinidad Municipality

Barangay	Land Area	Population in 1975	1985							
			Population	Family	Household	Farm #1 Family	Farm Household #2 No.	Farm Household #2 Percent	Farm Area	Farm Size per Farm Household
	(ha)				(A)		(B)	(B/A)	(ha)	(ha)
Alapang	143.8	938	1,697	265	229	146	126	(55.1%)	49.7	0.39
Alno	1012.8	954	1,043	190	169	152	135	(80.0%)	232.2	1.72
Ambiong	337.2	708	995	205	200	150	146	(73.2%)	149.3	1.02
Bahong	410.0	1,490	2,010	372	348	186	174	(50.0%)	60.0	0.34
Balili	166.5	2,099	3,343	645	533	235	194	(36.4%)	57.2	0.29
Beckel	930.9	1,514	2,075	347	339	240	234	(69.2%)	131.6	0.56
Betag	167.5	2,026	2,505	531	261	125	61	(23.5%)	4.1	0.07
Bineng	693.1	590	718	156	125	109	87	(69.9%)	183.5	2.10
Cruz	92.0	927	1,403	229	204	55	49	(24.0%)	15.0	0.31
Lubas	283.0	629	949	176	175	80	80	(45.5%)	73.7	0.93
Pico	733.0	4,097	5,457	1,091	815	297	222	(27.2%)	52.5	0.24
Poblacion	197.6	2,563	3,663	704	607	100	86	(14.2%)	51.1	0.59
Puguis	940.8	1,366	2,403	436	402	145	134	(33.3%)	171.9	1.29
Shilan	196.5	1,520	1,847	351	328	270	252	(76.9%)	511.9	2.03
Tawang	855.9	638	1,589	275	261	124	118	(45.1%)	30.9	0.26
Wangal	1113.4	673	893	187	153	126	103	(67.4%)	64.1	0.62
LA TRINIDAD TOTAL	8274.0	22,732	32,590	6,160	5,149	2,540	2,201	(42.8%)	1,839	0.83

Population growth rate from 1975 to 1985 (%) : 3.67

Source : 1980 Census of Agriculture and Fisheries, Province of Benguet, NCSO
1980 Census of Population and Housing, NCSO
Family Survey 1985, Rural Health Unit

Remarks : #1 : Family whose income source is agriculture.
#2 : Derived from the correlation between total family and total household

Table B.2.2 Age Distribution of Population in La Trinidad

AGE	1980			1985		
	Male	Female	TOTAL	Male	Female	TOTAL
0 - 4	2,223	2,052	4,275	2,571	2,389	4,960
5 - 9	1,838	1,897	3,735	2,397	2,156	4,553
10 - 14	1,784	1,833	3,617	1,734	1,706	3,440
15 - 19	1,520	2,027	3,547	1,643	1,795	3,438
20 - 24	1,551	1,529	3,080	1,424	1,701	3,125
25 - 29	1,164	1,215	2,379	1,476	1,614	3,090
30 - 34	900	925	1,825	1,338	1,224	2,562
35 - 39	767	771	1,538	1,041	1,012	2,053
40 - 44	693	662	1,355	764	680	1,444
45 - 49	554	512	1,066	618	539	1,157
50 - 54	364	324	688	496	427	923
55 - 59	269	209	478	346	317	663
60 - 64	201	284	485	265	235	500
65 and over	326	319	645	361	321	682
TOTAL	14,154 (49.3%)	14,559 (50.7%)	28,713 (100%)	16,474 (50.5%)	16,116 (49.5%)	32,590 (100%)

Source : Family Survey 1985, Rural Health Unit
1980 Census of Population & Housing, NCSO

Table B.2.3 Population 15 Years Old and Over by Gainful Occupation in La Trinidad (CY 1985)

Occupation	Male		Female		Total	
	Number	(%)	Number	(%)	Number	(%)
Farmer	5,108	(54.5%)	4,954	(55.2%)	10,062	(54.9%)
Teacher	128	(1.4%)	342	(3.8%)	470	(2.6%)
Government Employee	816	(8.7%)	365	(4.1%)	1,181	(6.4%)
Household Helper	46	(0.5%)	1,185	(13.2%)	1,231	(6.7%)
Businessman	657	(7.0%)	997	(11.1%)	1,654	(9.0%)
Private Employee	327	(3.5%)	184	(2.1%)	511	(2.8%)
Driver	510	(5.4%)	2	(0.0%)	512	(2.8%)
Mechanic	201	(2.1%)	3	(0.0%)	204	(1.1%)
Laborer	786	(8.4%)	654	(7.3%)	1,440	(7.8%)
Carpenter	229	(2.4%)	0	(0.0%)	229	(1.2%)
Others	563	(6.0%)	287	(3.2%)	850	(4.6%)
TOTAL	9,371	(100%)	8,973	(100%)	18,344	(100%)

Source : Family Survey 1985, Rural Health Unit

Table B.2.4 Average Monthly Meteorological Data in Baguio PAGASA Station (1949 - 1987)

Item	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave./Total
Mean Temperature	(°C)	17.6	18.4	19.5	20.4	20.6	20.0	19.6	19.7	19.4	19.6	19.1	18.4	19.4
Maximum Temperature	(°C)	22.6	23.5	24.7	25.2	24.8	23.7	23.1	22.2	23.0	23.5	23.3	22.9	23.5
Minimum Temperature	(°C)	12.9	13.3	14.3	15.6	16.4	16.3	16.2	15.9	15.8	15.6	14.9	14.1	15.1
Dry Bulb Temperature	(°C)	16.6	17.2	18.4	19.3	19.5	19.0	18.6	18.2	18.5	18.7	18.2	17.3	18.3
Wet Bulb temperature	(°C)	14.5	14.8	16.1	17.2	17.8	17.7	17.3	17.3	17.3	17.2	16.4	15.3	16.6
Relative Humidity	(%)	82	80	80	82	86	88	90	92	90	87	84	82	85
Open Pan Evaporation	(mm/day)	3.0	3.6	4.1	3.7	3.0	2.8	2.5	2.1	2.4	2.6	2.8	2.9	3.0
Duration of Sunshine	(min/day)	425	481	458	444	350	300	239	161	268	356	367	400	354
Average Wind Velocity	(m/sec)	2.0	2.1	1.9	1.9	1.9	2.3	2.3	2.4	2.1	2.1	2.1	2.1	2.1
Monthly Rainfall	(mm/month)	12.3	9.0	31.8	99.0	327.2	467.7	721.3	897.2	591.3	327.5	140.8	25.5	3650.6

Source : Baguio PAGASA Station

Table B.2.5 Main Pests and Diseases of Crops

Crops	Insect pest	Diseases
Potato	Thrips Tuber moth Aphid Army worm	Late blight Early blight Virus
Asparagus	Slugs Thrips	Fusarium Oxysporum
Cabbage	Aphid	Downy mildew
Cauliflower	Diamond-back moth	Soft rot
Broccoli	Slugs and snails	
Brussels sprouts	White butterfly	
Peas	Thrips Leaf miner	Downy mildew
Tomato	Tomato fruit worm Cut worm Aphid and mite	Rust Late blight Early blight Fusarium wilt Verticillium wilt Botrytis cinerea Septoria leafspot Virus diseases Bossom cup rot
Carrot	Carrot rust Fly Root rot nematode Army worm	Leaf blight Leaf spot Bacterial soft rot Violent root rot
Lettuce	Aphid Catterpillers Slugs	Downy mildew
Celery	Aphid	Septoria leaf spot Bactera soft rot Rust
Pepper	Thrips Aphid	Sclerotinia

Table B.2.6 Present Labor and Farm Inputs Requirement per Ha for Selected Crops

Crops	Unit Yield	Seed / Seedling	Labor			Animal Power	Fertilizer			Chicken Manure	Insecticides #		Fungicides #	
			Familiy	Hired	Total		Urea	14-14-14	16-20-0		Powder	Liquid	Powder	Liquid
		(kg)	(M-D)	(M-D)	(M-D)	(day)	(kg)	(kg)	(kg)	(kg)	(kg)	(lit)	(kg)	(lit)
Rice	1.9	60	169	8	177	5	0	0	0	0	0.0	0.0	0.0	0.0
C. cabbage	15.5	1.12	215	85	300	0	220	200	0	410	0.0	6.7	3.8	1.9
Lettuce	11.0	0.95	186	92	278	0	430	870	0	5,160	0.0	10.3	7.6	10.2
Baguio beans	7.5	60	188	34	222	0	250	280	0	910	1.1	5.7	1.0	4.8
Garden peas	3.0	60	166	56	222	0	290	300	50	1,190	0.3	6.2	4.1	3.5
Green onion	7.8	250	129	81	210	0	220	170	0	320	0.0	3.3	0.7	3.2
Strawberry	9.8	80,000	523	177	700	0	380	770	0	0	0.0	16.0	3.3	10.8
Celery	14.5	1.50	201	29	230	0	160	160	0	1,440	0.0	4.4	2.0	2.4
Rose	25.0	60,000	509	261	770	0	760	850	40	580	0.4	10.7	3.7	14.2
Gladiolus	14.8	480	143	42	185	0	318	389	0	0	0.3	4.2	0.8	6.1

Source : Farm Economic Survey conducted by JICA team

Remarks #
Insecticides : Powder Vegetox
Liquid Tamaron, Thiodan, Hostation, Sumicidin
Fungicides : Powder Manzate, Curzate, Elosal
Liquid Dithane

Table B.2.7 Crop Area, Yield and Production in La Trinidad

Crops	1984			1985			1986			1987			Average		
	Area (ha)	Production (ton)	Yield	Area (ha)	Production (ton)	Yield	Area (ha)	Production (ton)	Yield	Area (ha)	Production (ton)	Yield	Area (ha)	Production (ton)	Yield
Rice	84	143	1.7	113	213	1.9	123	237	1.9	130	247	1.9	113	210	1.9
Baguio Beans	190	1,710	9.0	414	3,058	7.4	395	2,765	7.0	385	2,905	7.5	346	2,610	7.5
Garden pea	45	203	4.5	95	298	3.1	310	883	2.8	220	605	2.8	168	497	3.0
Chinese Cabbage	90	1,485	16.5	330	4,875	14.8	375	5,925	15.8	340	5,780	17.0	284	4,516	15.9
Pechay/Mustard	25	200	8.0	255	2,040	8.0	283	2,264	8.0	310	2,264	7.3	218	1,692	7.8
Lettuce	35	228	6.5	87	1,044	12.0	95	1,026	10.8	75	900	12.0	73	800	11.0
Cabbage	50	800	16.0	44	652	14.8	56	896	16.0	65	1,072	16.5	54	855	15.9
Cauli./Broc.				17	245	14.4	15	240	16.0	11	176	16.0	14	220	15.4
Cucumber	5	90	18.0	53	795	15.0	53	822	15.5	55	880	16.0	42	647	15.6
Tomato	10	140	14.0	54	816	15.1	47	658	14.0	47	658	14.0	40	568	14.4
Sweet Pepper	5	30	6.0	28	160	5.7	32	190	5.9	65	390	6.0	33	193	5.9
Chayote	15	375	25.0	29	975	33.6	23	628	27.3	45	2,025	45.0	28	1,001	35.7
White Potato	40	600	15.0	19	279	14.7	24	384	16.0	50	800	16.0	33	516	15.5
Carrot/Radish	5	70	14.0	19	300	15.8	26	390	15.0	26	390	15.0	19	288	15.1
Sweet Potato	20	220	11.0	52	626	12.0	58	696	12.0	58	696	12.0	47	560	11.9
Gabi	10	120	12.0	13	182	14.0	12	168	14.0	12	169	14.1	12	160	13.6
Green onion	25	200	8.0	130	1,038	8.0	127	1,016	8.0	127	952	7.5	102	802	7.8
Celery	40	560	14.0	68	782	11.5	78	1,248	16.0	78	1,248	16.0	66	960	14.5
Strawberry	20	280	14.0	24	173	7.2	25	225	9.0	25	225	9.0	24	226	9.6
SUB-TOTAL	714	7,454	0	1,844	18,551	0	2,157	20,661		2,124	22,382		1,713	17,317	
Roses										45	1,125	25.0	45	1,125	25.0
Gladiola							195	2,925	15.0	200	2,916	14.6	198	2,921	14.8
Others				203	717	3.5	138	1,104	8.0	150	1,500	10.0	164	1,107	6.8
SUB-TOTAL	0	0	0	203	717	0	333	4,029		395	5,541		406	5,153	
Coffee	197	130	0.7	27	17	0.6	20	14	0.7	20	14	0.7	66	44	0.7
Citrus	10	21	2.1	7	10	1.4	10	12	1.2	18	35	1.9	11	20	1.7
Guava	5	30	6.0	4	19	4.8	6	24	4.0	10	60	6.0	6	33	5.3
Banana	10	70	7.0	24	225	9.4	21	250	11.9	24	280	11.7	20	206	10.4
SUB-TOTAL	222	251	0	62	271		57	300		72	389	0	103	303	
GRAND-TOTAL	936	7,705	0	2,109	19,539		2,547	24,990		2,591	28,312	0	2,223	22,772	

Source : Annual Report CY 1982 - 1987, Department of Agriculture La Trinidad, Benguet
Remarks : Production of flowers is shown in a thousand dozen
Area and production in 1984 were very low due to typhoon "Maring".
Crop areas of strawberry and roses are considered to be more than the above mentioned values based on the field survey.

Table B.2.8 Livestock Population in Benguet Province (CY 1983)

(Unit : head.)

Municipality	Water Buffalo	Cattle	Goat	Pigs	Chicken	Duks, etc.
Atok	349	714	72	959	80,393	112
Bakun	856	1,418	22	2,814	18,620	733
Bokod	1,033	2,243	580	2,089	14,020	2,616
Buguias	443	1,370	50	2,991	25,382	3,899
Itigon	817	2,282	387	1,529	14,941	1,914
Kabayan	1,008	2,192	79	2,320	18,398	1,038
Kapangan	942	1,216	200	1,902	16,582	71
Kibungan	1,445	1,596	64	6,794	29,762	1,272
La Trinidad	176	1,308	387	3,169	117,429	1,425
Mankayan	456	1,047	272	2,285	22,372	529
Sablan	841	1,132	36	1,460	14,012	1,150
Tuba	632	3,600	251	1,317	19,327	713
Tublay	707	830	79	2,084	18,802	631
Total	9,705	20,948	2,479	31,713	410,040	16,103

Source : BAEcon

Table B.2.9 Price of Vegetables in Baguio (Average for 1984 - 86, 1986 constant)

(Unit : pesos/kg)

Items	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave.
Cabbage													Ave.
- Farmgate	2.64	2.17	3.14	2.91	2.95	2.36	4.01	2.26	5.52	5.67	4.40	5.05	3.59
- Wholesale	4.82	3.41	4.69	4.35	4.55	3.69	5.52	4.24	7.81	7.74	6.50	7.22	5.38
- Retail	9.11	7.22	8.04	8.18	8.50	7.45	9.17	8.48	12.21	12.85	11.63	14.18	9.75
C. Cabbage													Ave.
- Farmgate	1.87	1.78	1.88	1.78	1.78	1.64	1.94	1.42	3.75	3.01	2.18	2.05	2.09
- Wholesale	2.85	3.10	3.09	2.91	3.04	2.50	3.10	2.95	5.66	4.34	4.16	3.03	3.39
- Retail	7.48	6.65	6.78	5.83	6.09	5.78	7.09	6.33	9.38	9.05	8.25	7.05	7.15
Lettuce													Ave.
- Farmgate													
- Wholesale	2.25	3.01				4.01	5.83	4.69	13.51	11.88	8.02		6.65
- Retail	9.13	9.59	8.82	12.94	15.20	16.90	19.66	17.33	38.32	21.64	27.85	14.28	17.64
Baguio beans													Ave.
- Farmgate													
- Wholesale	4.90	4.79	4.49	3.97	5.67	4.93	6.74	6.48	10.35	8.91	5.30	5.59	6.01
- Retail	7.38	7.03	6.67	6.50	7.85	7.50	9.97	9.04	13.72	12.87	8.95	8.33	8.82
Garden pea													Ave.
- Farmgate	7.60	7.75	10.00	12.23	18.91	13.48	20.48	23.44	37.68	27.85	16.16	14.82	17.53
- Wholesale	12.01	13.05	14.74	17.48	24.40	22.54	27.56	30.66	44.46	33.60	24.64	17.69	23.57
- Retail	18.10	16.99	19.70	23.57	28.88	29.44	37.50	38.07	53.27	44.03	31.39	25.18	30.51
Carrot (M size)													Ave.
- Farmgate	1.72	1.24	1.35	1.36	2.09	3.41	3.18	1.96	3.18	4.37	3.73	3.85	2.62
- Wholesale	2.73	1.82	2.14	2.32	3.63	5.20	5.26	4.39	5.69	7.40	6.79	6.73	4.51
- Retail	9.58	6.77	6.95	6.62	7.12	12.64	12.89	12.65	14.87	18.64	17.06	17.09	11.90
Potato (M size)													Ave.
- Farmgate	2.42	2.14	2.08	1.85	2.19	2.00	1.79	2.06	3.09	3.78	3.44	3.29	2.51
- Wholesale	3.73	3.65	3.64	3.21	3.24	3.30	3.20	3.94	4.96	5.48	5.08	4.91	4.03
- Retail	6.92	6.16	5.85	5.38	5.92	6.61	7.05	7.44	8.22	8.74	9.00	8.47	7.15
Celery													
- Farmgate													
- Wholesale	6.15	3.51	3.49	3.58	4.87	13.85	15.13	9.53	18.17	18.70	11.03	9.67	9.81
- Retail	17.55	9.73	8.42	8.22	11.10	12.31	19.42	21.50	32.48	32.50	24.07	23.61	18.41

Source : Bureau of Agricultural Statistics, Baguio

Table B.2.10 Prices of Agricultural Commodities

Items	Unit	Farmgate Price (pesos)	
a) Outputs (farmgate price)			
Paddy (Local variety) #1	kg	3.48	
Chinese Cabbage #2	kg	2.74	
Lettuce #1	kg	4.00	
Baguio Beans #1	kg	4.20	
Garden Peas #2	kg	16.19	
Green Onion #1	kg	2.50	
Strawberry #3	kg	15.00	
Celery #1	kg	4.50	
Rose #3	doz	7.00	
Gladiolus #3	doz	3.00	
b) Inputs (Seeds and seedlings) #4			
Paddy	kg	4.50	
Chinese Cabbage	kg	2,580	
Lettuce	kg	1,475	
Baguio Beans	kg	60	
Garden Peas	kg	163	
Green Onion (seedling)	kg	6	
Strawberry	runner	0.32	
Celery	kg	1,980	
Rose	piece	1.00	
Gladiolus	kg	5.40	
c) Fertilizers & Agro-chemicals #4			
Urea	kg	3.46	
14-14-14	kg	4.40	
16-20-0	kg	4.30	
Chicken Manure	kg	0.60	
Tamaron	lit	310	
Thiodan	lit	179	
Sumicidin	lit	175	
Vegetox	kg	183	
Dithane	lit	158	
Manzate	kg	123	
Curzate	kg	219	
Elosal	kg	78	
Trellises	100 pieces	20	
d) Labor charge #3	M-D	35	
e) Animal Power	Animal-D	85	
f) Transportation cost #3	kg	0.13	From farm to market
		0.10	From market to farm

Sources :

#1 : Semi-Annual Field Report , Selected Crop Statistics BAS
#2 : BAS, Baguio (based on the monthly price data)
#3 : Estimated price based on the results of the farm economic survey
#4 : Actual market price as of 1987

Table B.2.11 Supply and Demand of Vegetables (as of 1986)

(Unit : ton/year)

Region / Items	Leafy Vegetables	Fruit Vegetables	Leguminous Vegetables	Root, Bulbs Crops
Metro Manila				
Demand	114,980	140,770	34,890	89,970
Ilocos Region				
Demand	71,500	79,710	23,160	37,130
Production (Supply) #1	88,130	98,910	18,200	144,800
Surplus/Defisit	16,630	19,200	-4,960	107,670
Central Luzon Region				
Demand	68,850	100,530	22,500	54,090
Production (Supply) #1	5,960	54,580	17,100	71,000
Surplus/Defisit	-62,890	-45,950	-5,400	16,910
Total				
Demand	255,330	321,010	80,550	181,190
Production (Supply)	94,090	153,490	35,300	215,800
Surplus/Defisit	-161,240	-167,520	-45,250	34,610

Remarks : Leafy vegetables : Cabbage, Green Onion, Mustard, Pechay, and others
Fruit vegetables : Ampalaya, Calabasa, Chayote, Eggplant, Potala, Pepino Pepper, Tomato, Upo, and other fruit vegetables
Leguminous : Habichuelas, Sitao, Mongo Bean, Soybeans, and others
Root, bulb crops : Onion, Garlic, Irish Potato, Camote and Cassava

Demand of vegetables = Per capita consumption x population

Population in 1986 : Metro Manila 7,147,000
Ilocos 3,978,000
Central Luzon 5,590,000

Per capita consumption of vegetables was estimated as below :

(Unit : kg/year)

Region	Leafy Vegetables	Fruit Vegetables	Leguminous Vegetables	Root, Bulbs Crops
(CY 1975) #2				
Metro Manila	12.8	23.0	5.7	14.7
Ilocos	14.3	23.4	6.8	10.9
C. Luzon	9.8	21.0	4.7	11.3
(CY 1986) #3				
Metro Manila	16.1	19.7	4.9	12.6
Ilocos	18.0	20.0	5.8	9.3
C. Luzon	12.3	18.0	4.0	9.7

#3 : Multiplying an annual growth rate of 2.1 % for leafy vegetables, while -1.4 % for other crops based on "Population Food Requirement 1984-2000" prepared by NEDA

Source : #1 Bureau of Agricultural Statistics
#2 Regional Consumption Pattern for Major Food 1974-76, Dept.of Agri

Table B.2.12 Results of Farm Economic Survey (1/2)

Item		Zone I	Zone II	Zone III
Sample size (farmers)		17	47	28
I. LIVING CONDITION				
Average farm size	(ha)	0.87	0.70	0.91
Average family size	(persons)	5.8	6.0	5.6
Families engaged in farming operation	(persons)	2.4	2.6	2.6
Average farm experience	(years)	29.7	27.0	17.0
Average distance from farm to road	(km)	0.5	0.5	1.0
Average distance from farm to Baguio market	(km)	6.9	9.4	9.9

Source of drinking water	Wet season (answers)	Dry season (answers)	Wet season (answers)	Dry season (answers)	Wet season (answers)	Dry season (answers)
1 Piped water	12	12	27	28	15	22
2 Spring water	2	2	13	17	3	11
3 River water	0	0	2	0	1	4
4 Rain water	1	0	41	1	15	0
5 Well & others	6	6	0	2	0	0

Electricity			
1 Available	17	35	3
2 Non available	2	10	26

II. ECONOMIC CONDITION

		Zone I	Zone II	Zone III
Annual Farm Income (A)	(pesos)	37,020	27,350	19,240
Annual Off-farm Income (B)	(pesos)	4,240	2,150	5,630
Annual Income (A+B)	(pesos)	41,260	30,500	24,870
Under 6,000	(pesos)	1 (6%)	0 (0%)	0 (0%)
6,000 - 9,999	(pesos)	0 (0%)	0 (0%)	1 (4%)
10,000 - 14,999	(pesos)	1 (6%)	1 (2%)	5 (18%)
15,000 - 19,999	(pesos)	1 (6%)	11 (23%)	6 (21%)
20,000 - 29,999	(pesos)	3 (18%)	16 (34%)	6 (21%)
30,000 - 39,999	(pesos)	7 (41%)	8 (17%)	8 (29%)
40,000 - 59,999	(pesos)	1 (6%)	10 (21%)	1 (4%)
60,000 - 99,999	(pesos)	1 (6%)	1 (2%)	1 (4%)
100,000 and over	(pesos)	2 (12%)	0 (0%)	0 (0%)
Annual Expenditure				
1 Food	(pesos)	15,570 (46%)	10,820 (44%)	11,150 (52%)
2 Clothing	(pesos)	2,330 (7%)	1,840 (7%)	1,440 (7%)
3 Residence	(pesos)	2,150 (6%)	830 (3%)	1,010 (5%)
4 Education	(pesos)	10,240 (31%)	5,840 (24%)	3,950 (18%)
5 Medical care	(pesos)	1,220 (4%)	1,170 (5%)	890 (4%)
6 Others	(pesos)	2,030 (6%)	4,200 (17%)	3,150 (15%)
7 Total	(pesos)	33,540 (100%)	24,700 (100%)	21,590 (100%)
Under 6,000	(pesos)	0 (0%)	0 (0%)	0 (0%)
6,000 - 9,999	(pesos)	0 (0%)	4 (9%)	0 (0%)
10,000 - 14,999	(pesos)	1 (6%)	10 (21%)	7 (26%)
15,000 - 19,999	(pesos)	2 (12%)	14 (30%)	8 (30%)
20,000 - 29,999	(pesos)	5 (29%)	13 (28%)	10 (37%)
30,000 - 39,999	(pesos)	8 (47%)	4 (9%)	2 (7%)
40,000 - 59,999	(pesos)	0 (0%)	2 (4%)	0 (0%)
60,000 - 99,999	(pesos)	1 (6%)	0 (0%)	0 (0%)
100,000 and over	(pesos)	0 (0%)	0 (0%)	0 (0%)

III. AGRICULTURAL SUPPORTING SERVICE

What kind of extension service do you want ?			
1 Field visit of extension worker	14	34	28
2 Establishment of demonstration farm	13	14	23
3 Attending farmer's class & seminor	6	4	1
4 Others	1	3	0

Table B.2.12 Results of Farm Economic Survey (2/2)

	Zone I	Zone II	Zone III
What kind of assistance / service do you expect as a member of farmer's group ?			
1 To provide fertilizers and chemicals at low price	2	9	1
2 Credit service	2	8	0
3 Technical assistance	2	0	1
4 Maintenance of irrigation facilities	11	5	13
5 To provide marketing information	1	0	0
6 Others	0	0	0
Did you apply for credit to finance your field operations over the past 1 year ?			
YES	8	1	7
NO	10	45	21
Reason for not applying credit			
1 Lack of land title	0	9	3
2 Lack of collateral	0	28	11
3 High interest rate	7	26	14
4 Others	3	3	6

IV. FARMERS' INTENTION

Constraints for development	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
1 Availability of drinking water	1	1	0	25	8	5	15	5	4
2 Availability of irrigation water	10	3	0	18	18	3	10	16	2
3 Land size	3	4	2	1	5	4	0	1	1
4 Availability of farm inputs	1	4	4	1	4	5	3	1	5
5 Availability of labour force	0	0	2	0	1	1	0	0	0
6 Post harvest facility	0	0	2	0	1	2	0	0	0
7 Transportation	0	0	0	0	3	8	1	5	15
8 Marketing problem	3	5	3	0	4	3	0	0	0
9 Lack of technical information	1	2	6	0	2	15	0	1	2
What items do you want to improve present farm / living condition ?	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
1 Drinking water supply	1	1	0	26	9	2	6	5	2
2 Irrigation water supply	7	4	0	16	23	1	21	6	0
3 To acquire electricity	0	0	0	0	3	2	1	10	3
4 Drainage of excess water	5	1	0	0	0	0	0	0	1
5 Prevention of pests and diseases	3	3	0	2	2	2	0	1	1
6 High yield varieties	0	4	3	0	0	3	0	0	0
7 Improvement of fertilization in volume at right time	0	0	2	0	1	0	0	0	0
8 Improvement of rural road	0	0	0	0	1	13	1	6	18
9 Improvement of postharvest loss	0	0	0	0	1	2	0	0	0
10 Agricultural extension service	1	1	43	0	1	15	0	0	1
11 Improvement of marketing system	2	4	6	0	3	2	0	0	0
12 Agricultural credit service	0	1	4	1	1	3	0	1	2

Which kind of crops do you want to cultivate ?	Wet season (answers)	Dry season (answers)	Wet season (answers)	Dry season (answers)	Wet season (answers)	Dry season (answers)
1 Rice	0	0	0	0	14	3
2 Baguio beans	3	2	15	13	23	17
3 Cabbage	4	6	3	1	3	18
4 Celery	8	2	21	18	1	3
5 Lettuce	10	12	0	0	2	0
6 Chinese cabbage	8	4	13	9	7	18
7 Gladiolas	1	0	3	5	1	1
8 Rose	0	1	26	27	0	0
9 Strawberry	3	6	0	1	1	1
10 Green onion	5	1	15	7	4	0
11 Garden peas	4	9	29	42	9	14
Reason for selection of these crops	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
1 High profitability	1	2	1	12	3	3	1	1	1
2 Easy farming technique	11	3	2	4	11	10	16	4	0
3 High marketability	1	6	2	8	7	7	3	1	3
4 High tolerance to pests and disease	2	2	0	2	13	8	1	2	2
5 High stable market price	3	0	5	8	5	4	0	5	5
6 Soil suitability	0	6	7	8	5	10	2	9	7
7 Other reasons	1	0	2	1	0	2	3	5	7

Table B.3.1 Labor Balance Study for Typical Farmers in Each Zone (10 days basis)

(Unit : man/day)

	Crops	Planted area (ha)	Jan F	Jan M	Jan E	Feb F	Feb M	Feb E	Mar F	Mar M	Mar E	Apr F	Apr M	Apr E	May F	May M	May E	Jun F	Jun M	Jun E	Jul F	Jul M	Jul E	Aug F	Aug M	Aug E	Sep F	Sep M	Sep E	Oct F	Oct M	Oct E	Nov F	Nov M	Nov E	Dec F	Dec M	Dec E
Zone I (Net farm area = 0.70 ha)																																						
	Strawberry	0.18	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.02	0.90	0.90												2.05	1.07	1.42	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
	Veg-1	0.28	1.11	1.11	1.11	0.77	2.51																													0.30	3.03	1.81
	Veg-2	0.28					0.30	3.03	1.81	1.11	1.11	1.11	0.77	2.51																								
	Veg-3	0.53												0.56	5.73	3.42	2.11	2.11	2.11	1.46	4.76																	
	Veg-4	0.53																			0.56	5.73	3.42	2.11	2.11	2.11	1.46	4.76									
	Veg-5	0.46																										0.49	4.97	2.97	1.83	1.83	1.83	1.27	4.13			
	Veg-6	0.15														0.16	1.62	0.97	0.60	0.60	0.60	0.41	1.35															
	Dairy labor requirement		2.2	2.2	2.2	1.9	3.9	4.1	2.9	2.2	2.2	2.1	1.7	4.0	5.7	3.6	3.7	3.1	2.7	2.1	5.9	6.1	4.8	2.1	2.1	4.2	2.5	6.7	5.3	3.3	2.1	2.1	2.1	1.6	4.4	0.6	3.3	2.1
#1	Annual labor requirement		910 man-day																																			
	Available family labor =		2.4 persons/day																																			
#2	Dairy labor deficit						-1.5	-1.7	-0.5					-1.6	-3.3	-1.2	-1.3	-0.7	-0.3		-3.5	-3.7	-2.4			-1.8	-0.1	-4.3	-2.9	-0.9					-2.0		-0.9	
#3	Annual labor deficit =		-277 man-day																																			
Zone II (Net farm area = 0.46 ha)																																						
	Rose	0.18	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55
	Veg-1	0.09	0.36	0.36	0.36	0.25	0.81																													0.10	0.97	0.58
	Veg-2	0.09					0.10	0.97	0.58	0.36	0.36	0.36	0.25	0.81																								
	Veg-3	0.28												0.30	3.03	1.81	1.11	1.11	1.11	0.77	2.51																	
	Veg-4	0.06																			0.06	0.65	0.39	0.24	0.24	0.24	0.17	0.54									
	Veg-5	0.28																										0.30	3.03	1.81	1.11	1.11	1.11	0.77	2.51			
	Intercrop-1	0.06													0.03	0.24	0.11	0.08	0.08	0.08	0.06	0.18																
	Intercrop-2	0.12																				0.05	0.49	0.22	0.17	0.17	0.17	0.12	0.36									
	Dairy labor requirement		0.9	0.9	0.9	0.8	1.4	1.5	1.1	0.9	0.9	0.9	0.8	1.7	3.6	2.6	1.8	1.7	1.7	1.4	3.2	1.4	1.4	1.0	1.0	1.0	0.9	1.5	3.9	2.4	1.7	1.7	1.7	1.3	3.1	0.6	1.5	1.1
#1	Annual labor requirement		447 man-day																																			
	Available family labor =		2.6 persons/day																																			
#2	Dairy labor deficit														-1.0						-0.6								-1.3						-0.5			
#3	Annual labor deficit =		-27 man-day																																			
Zone III (Net farm area = 0.65 ha)																																						
	Rice-1	0.19	0.32	0.32	1.27	0.73	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.01	0.01	0.93																	
	Rice-2	0.28																0.47	0.47	1.87	1.08	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.11	0.11	0.01	0.01	1.37			
	Veg-1	0.09	0.36	0.36	0.36	0.25	0.81																													0.10	0.97	0.58
	Veg-2	0.09					0.10	0.97	0.58	0.36	0.36	0.36	0.25	0.81																								
	Veg-3	0.37	1.02	3.32																															0.39	4.00	2.39	1.47	1.47	1.47
	Veg-4	0.37		0.39	4.00	2.39	1.47	1.47	1.47	1.02	3.32																											
	Veg-5	0.37										0.39	4.00	2.39	1.47	1.47	1.47	1.02	3.32																			
	Veg-6	0.37																							0.39	4.00	2.39	1.47	1.47	1.47	1.02	3.32						
	Dairy labor requirement		1.7	4.4	5.6	3.4	2.5	2.5	2.1	1.5	3.8	0.8	4.3	3.3	1.6	1.5	1.5	1.5	3.8	2.8	1.1	0.1	0.1	0.1	0.5	4.1	2.5	1.6	1.6	1.6	1.1	3.4	0.4	4.0	3.8	1.6	2.4	2.1
#1	Annual labor requirement		647 man-day																																			
	Available family labor =		2.6 persons/day																																			
#2	Dairy labor deficit			-1.8	-3.0	-0.8					-1.2		-1.7	-0.7					-1.2	-0.2						-1.5					-0.8			-1.4	-1.2			
#3	Annual labor deficit =		-124 man-day																																			

Remarks : #1 : Annual labor requirement = (Accumulation of dairy labor requirement) x (10 days) x 0.8 (% of workable days)
#2 : Dairy labor deficit = (Available family labor) - (Dairy labor requirement)
#3 : Annual labor deficit = (Accumulation of dairy labor deficit) x 10 days x 0.8 (% of workable days)

Table B.3.2 Estimated Hired Labor Requirement for Typical Farmers under the Present Condition

Zone / Crops	Annual Planted Area (ha)	Labor Requirement (M-D/ha)	Total Labor Requirement (M-D/year)	
Zone I (Net farm area = 0.70 ha)				
Strawberry	0.25	730	183	
Vegetables	1.09	292	318	
		Total	501	
		Hired labor	125	#
Zone II (Net farm area = 0.46 ha)				
Rose	0.18	790	142	
Vegetables	0.84	292	245	
Intercrops	0.18	104	19	
		Total	406	
		Hired labor	102	#
Zone III (Net farm area = 0.65 ha)				
Rice	0.48	177	85	
Vegetables	0.88	292	257	
		Total	342	
		Hired labor	85	#

Remarks

: Hired labor accounts for 25 % of the total labor requirement

Table B.3.3 Summary of the Chemical Characteristics of Soils in the Project Area

Items	Unit	Desirable Level	La Trinidad Silt Loam Zone I Upland	Tacdian Loamy Sand Zone II Upland	Tacdian Silt Loam Zone II Upland	Tacdian Silt Loam Alluvial Zone II Upland	Bineng Silt Loam Zone III Upland	Bineng Silt Loam Zone III Paddy field	Bineng Silt Loam Zone III Paddy field
1 pH (H2O)		5.5 - 6.5	4.3	7.4	5.4	5.6	4.6	4.9	5.4
2 Organic Matter	(%)	5 <	4.5	3	2.9	1.9	4.4	3.4	3.2
3 Total Nitrogen	(%)	0.5 <	0.22	0.12	0.1	0.07	0.09	0.14	0.15
4 Available Phosphorous	(mg/100g)	5 <	7	18	6	1.5	0.6	13	2.8
5 Cation Exchange Capacity	(me/100g)	20 <	46	44	58	33	39	42	33
6 Exchangeable Ca	(me/100g)	210 <	307	676	591	304	274	310	334
7 Exchangeable Mg	(me/100g)	6 <	65	39	96	83	62	73	49
8 Exchangeable K	(me/100g)	40 <	8	31	9	5	11	43	6
9 Lime Requirement #	(CaCO3 tons/ha)		7.75	-	4.35	1.6	5.6	4.65	1.7

Amount of lime required for raising soil pH by 7.0

Table B.3.4 Future Labor and Farm Inputs Requirement for Selected Crops

Crops		Unit Yield (tons)	Seed / Seedling (kg)	Labor Familiy (M-D)	Labor Hired (M-D)	Labor Total (M-D)	Animal Power (day)	Fertilizer N (kg)	Fertilizer P2O5 (kg)	Fertilizer K (kg)	Chicken Manure (kg)	Insecticides #2 Powder (kg)	Insecticides #2 Liquid (lit)	Fungicides #2 Powder (kg)	Fungicides #2 Liquid (lit)
Rice		2.5	60	181	9	190	5	50	0	0	0	0.0	1.5	0.0	1.5
C. Cabbage		20.0	1.12	222	87	309	0	210	30	50	1,000	0.0	8.0	4.0	2.0
Lettuce		14.0	0.95	190	93	283	0	180	0	40	2,000	0.0	12.0	8.0	11.0
Baguio beans		9.0	60	198	35	233	0	20	90	40	1,000	2.0	7.0	2.0	5.0
Garden peas		4.5	60	185	62	247	0	20	90	40	1,000	2.0	8.0	6.0	5.0
Green onion		11.5	250	136	87	223	0	90	210	210	1,000	0.0	4.0	1.0	4.0
Strawberry		14.0	80,000	611	204	815	0	170	170	190	1,000	0.0	20.0	5.0	12.0
Celery		24.0	1.50	215	32	247	0	180	0	40	2,000	0.0	6.0	3.0	4.0
Rose	#1	39.0	60,000	535	275	810	0	140	140	180	2,000	2.0	15.0	5.0	20.0
Gladiolus	#1	15.0	480	136	41	177	0	198	54	54	0	0.3	4.2	0.8	6.1

Remarks

#1 Production of roses and gladiolus are presented in 1,000 doz

#2 Insecticides : Powder Vegetox
Liquid Tamaron, Thiodan, Hostation, Sumicidin
Fungicides : Powder Manzate, Curzate, Elosal
Liquid Dithane

Table B.3.5 Production of Crops in the Project Area

ZONE / Crops	Without Project Area (ha)	Without Project Unit Yield (t/ha)	Without Project Prod'n (ton)	With Project Area (ha)	With Project Unit Yield (t/ha)	With Project Prod'n (ton)
ZONE I						
Strawberry	56	9.8	549	40	14.0	560
Vegetables #2	249	9.9	2,465	500	14.0	7,000
ZONE II						
Roses	60	25.0	1,500	59	39.0	2,301
Vegetables #2	283	9.9	2,802	266	14.0	3,724
Inter-crop #3	60			60		
-Vegetables	40	5.6	224	40	8.9	356
-Flower (Gradiolus)	20	7.4	148 #1	20	7.5	150 #1
ZONE III						
Rice	50	1.9	95	50	2.5	125
Vegetables #2	96	9.9	950	180	14.0	2,520
Total Cropping Area	854			1,155		
(Inter-cropping)	(60)			(60)		
Total Production						
Strawberry			549			560
Rose			1,500 #1			2,301 #1
Rice			95			125
Vegetables			6,441			13,600
Flower (Gradiolus)			148 #1			150 #1

#1 Unit : 1,000 doz
#2 Vegetables include Lettuce, Chinese Cabbage, Green Onion, Baguio Bean, Garden Pea and Celery
#3 Intercrops include Green Onion, Gladiolus and Celery
Unit yield of intercrops was estimated at a half of the normal cropping

Table B.3.6 Supply and Demand Projection of Vegetables in 2000

(Unit : ton/ha)

Region / Items	Leafy Vegetables	Fruit Vegetables	Leguminous Vegetables	Root, Bulbs Crops
Demand in 1986 #1				
Metro Manila	114,980	140,770	34,890	89,970
Ilocos Region	71,500	79,710	23,160	37,130
Central Luzon Region	68,850	100,530	22,500	54,090
Total Demand	255,328	321,010	80,550	181,190
Supply and Demand in FY 2000				
Metro Manila				
Demand in FY 2000	153,720	219,980	54,200	140,590
Ilocos Region				
Demand in FY 2000	84,450	110,190	31,820	51,330
Production (in 1986) #2	88,130	98,910	18,200	144,800
Surplus / Defisit	3,680	-11,280	-13,620	93,470
Central Luzon Region				
Demand in FY 2000	71,760	122,810	27,320	66,080
Production (in 1986) #2	5,960	54,580	17,100	71,000
Surplus / Defisit	-65,800	-68,230	-10,220	4,920
Total				
Demand in FY 2000	309,930	452,980	113,340	258,000
Production (in 1986)	94,090	153,490	35,300	215,800
Surplus / Defisit	-215,840	-299,490	-78,040	-42,200

Remarks : Leafy vegetables : Cabbage, Green Onion, Mustard, Pechay, and others
Fruit vegetables : Ampalaya, Calabasa, Chayote, Eggplant, Potala, Pepino Pepper, Tomato, Upo, and other fruit vegetables
Leguminous : Habichuelas, Sitao, Mongo Bean, Soybeans, and others
Root, bulb crops : Onion, Garlic, Irish Potato, Camote and Cassava

#1 : See Table B.2.11
Demand of vegetables was estimated as below
Demand in FY 2000 = Demand in 1986 x (Pg + Ie x Pi) 14
Pg = Population growth rate #3 (%)

Metro Manila	2.80%
Ilocos	1.90%
C. Luzon	1.00%

Ie = Income elasticity #4

Leafy Vegetable	-0.16
Fruit vegetables	0.10
Leguminous	0.09
Roots, bulbs.	0.10

Pi = Projected growth rate of annual per capita income (4.4 %) #5

Source : #2 Bureau of Agricultural Statistics
#3 NCSO
#4 Population Food Requirement 1984-2000, NEDA
#5 Medium-Term Philippine Development Plan 1987-1992

Table B.3.7 Procurement Cost of O & M Equipment

O & M Equipment	Unit price (1,000 pesos)	Quantity	Amount (1,000 pesos)
Vehicles			
- 4 wheel-drive jeep	300	1	300
- 4 wheel-drive pick-up	280	1	280
- Motorcicles	20	3	60
- Spare parts (10 % of above)			64
Office Equipment			
- Photo copier	15	1	15
- Micro computor / Ward processor with accessaries	90	1	90
- Audio visual aid	15	1	15
- Camera with accessaries	12	1	12
- Furniture	20	Various	20
- Others	10	Various	10
Agricultural Equipment #1	24	Various	24
Sub-total			890
Contingency (5 % 0f above)			40
TOTAL			**930**

Remarks
#1 : Agricultural equipment include shovel, knopsack sprayers, hoe, etc.

Table B.3.8 Annual O & M Cost for Extension Service

(Unit : peso)

Item	Unit Cost	Quantity	Amount
Salaries			
Extension workers	16,000 /year	4	64,000
Information officer	16,000 /year	1	16,000
Drivers	12,000 /year	2	24,000
Living allowance	6,000 /year	7	42,000
Traveling expense	400 /month	7	33,600
Gasoline and oil for vehicles #1	4,000 /month		48,000
Repaire and regular maintenance for vehicles (5 % of procurement cost)	32,000 /year		32,000
Agricultural inputs #2	15,000 /year		15,000
Office supplies	1,000 /month		12,000
Sub-total			286,600
Contingency (5 % 0f above)			14,300
TOTAL			**300,900**

Remarks

#1 : Gasoline 600 lit / month x 6 pesos / lit = 3,600 pesos
Oil 400 pesos

#2 : Provision of agricultural inputs for contact farmers
(10,000 pesos / ha of production cost) x (0.1 ha / site) x (5 sites) x (3 times / year)

Table B.4.1 Economic Price of Fertilizers

Item	Urea	TSP	KCl
	(US$/ton)	(US$/ton)	(US$/ton)
1) Projected World Market Price #1 (1987 constant)	229	196	118
2) Ocean Freight and Insurance	23	35	23
3) CIF Manila	252	231	141
	(peso/ton)	(peso/ton)	(peso/ton)
	5,292 #2	4,851 #2	2,961 #2
4) Port Charges, Handling #2 and Transport	870	870	870
5) Ex-Warehouse Price	6,162	5,721	3,831
6) Transport, Handling #2 and Retail Margin	650	650	650
7) Farmgate Prices	6,812	6,371	4,481
	(peso/kg)	(peso/kg)	(peso/kg)
8) Farmgate price per nutrient	14.8	13.9	7.5

Sources : #1 : IBRD Half-Yearly Revision of Commodity Price Forecasts, February 1988

Urea : FOB Europe
TSP : FOB US Gulf
KCl : FOB Vancouber

#2 : IFPRI's Price and Investment Policies for Food Crop sector growth in the Philippines, August 1986.

Table B.4.2 Financial and Economic Price of Agricultural Commodities

Items	Unit	Financial Price (1987)	Economic Price in 2000 (1987 constant)	
a) Outputs (farmgate price) #1				
Paddy (Local variety)	kg	3.48	2.96	
Chinese Cabbage	kg	2.74	2.33	
Lettuce	kg	4.00	3.40	
Baguio Beans	kg	4.20	3.57	
Garden Peas	kg	16.19	13.76	
Green Onion	kg	2.50	2.13	
Strawberry	kg	15.00	12.75	
Celery	kg	4.50	3.83	
Rose	doz	7.00	5.95	
Gladiolus	doz	3.00	2.55	
b) Inputs (Seeds and seedlings) #2				
Paddy	kg	4.50	3.87	
Chinese Cabbage	kg	2,580	2,544	
Lettuce	kg	1,475	1,454	
Baguio Beans	kg	60	51.6	
Garden Peas	kg	163	161	
Green Onion (seedling)	kg	6.00	5.16	
Strawberry	runner	0.32	0.28	
Celery	kg	1,980	1,952	
Rose	piece	1.00	0.86	
Gladiolus	kg	5.40	4.64	
c) Fertilizers & Agro-chemicals				
N	kg	9.70	14.80	#3
P2O5	kg	11.20	13.90	#3
K	kg	5.80	7.50	#3
Chicken Manure	kg	0.60	0.52	#4
#5 Insecticides (P)	kg	183	180	#6
#5 Insecticides (L)	lit	242	239	#6
#5 Fungicides (P)	kg	140	138	#6
#5 Fungicides (L)	lit	158	156	#6
Trellises	100 pieces	20	17.20	#4
d) Labor charge #7	M-D	35	28	
e) Animal Power #7	Animal-D	85	68	
f) Transportation cost	kg	0.13	0.11	#4
		0.10	0.09	#4

Remarks :

#1 Eonomic Prices (EP) = Financial Prices (FP) x 0.85 (consumption conversion factor).

#2 Imported Seeds (#): EP = FP x (0.9 + 0.1 x 0.86 (SCF))

#3 See Table B.4.1.

#4 EP = FP x 0.86 (SCF)

#5

Insecticides (P)	Powder :	Vegetox
Insecticides (L)	Liquid :	Tamaron, Thiodan, Hostation, sumicidin
Fungicides (P)	Powder :	Manzate, Curzate, Closal
Fungicides (L)	Liquid :	Dithane

#6 As same as the imported seeds.

#7 A shadow wage rate of 0.80 is used.

Table B.4.3 Economic Net Return per Ha of Crops (1/5)

Paddy

Item	Unit	Without project		With project	
		Quantity	Value	Quantity	Value
Unit Yield	kg	1,900	5,624	2,500	7,400
Total Labor Requirement	Man-day	177	4,956	190	5,320
Animal Requirement	M-D-A	5	340	5	340
Seed	kg	60	232	60	232
Fertilizer					
- N	kg	0	0	50	740
- P2O5	kg	0	0	0	0
- K	kg	0	0	0	0
- Chicken Manure	kg	0	0	0	0
Insecticides					
- Granular	kg	0.0	0	0.0	0
- Liquid	lit	0.0	0	1.5	359
Fungicides					
- Granular	kg	0.0	0	0.0	0
- Liquid	lit	0.0	0	1.5	234
Transportation Cost			0		0
Miscellaneous			55		72
Total Cost			5,583		7,297
Net return per hectare			41		103

Chinese Cabbage

Item	Unit	Without project		With project	
		Quantity	Value	Quantity	Value
Unit Yield	kg	15,500	36,115	20,000	46,600
Total Labor Requirement	Man-day	300	8,400	309	8,652
Seed	kg	1.12	2,849	1.12	2,849
Fertilizer					
- N	kg	127	1,880	210	3,108
- P2O5	kg	28	389	30	417
- K	kg	28	0	50	375
- Chicken Manure	kg	410	213	1,000	520
Insecticides					
- Granular	kg	0.0	0	0.0	0
- Liquid	lit	6.7	1,601	8.0	1,912
Fungicides					
- Granular	kg	3.8	524	4.0	552
- Liquid	lit	1.9	296	2.0	312
Transportation Cost			1,759		2,317
Miscellaneous #1			896		2,101
Total Cost			18,809		23,116
Net return per hectare			17,306		23,484

#1 : 5 % of the production cost for without project, while 10 % for with project condition taking into account the cost for soil improvement

Table B.4.3 Economic Net Return per Ha of Crops (2/5)

Lettuce

Item	Unit	Without project		With project	
		Quantity	Value	Quantity	Value
Unit Yield	kg	11,000	44,000	15,000	60,000
Total Labor Requirement	Man-day	278	5,838	283	5,943
Seed	kg	0.95	1,682	0.95	1,682
Fertilizer					
- N	kg	315	5,387	180	3,078
- P2O5	kg	122	2,025	0	0
- K	kg	122	0	40	340
- Chicken Manure	kg	5,160	3,096	2,000	1,200
Insecticides					
- Granular	kg	0.0	0	0.0	0
- Liquid	lit	10.3	2,915	12.0	3,396
Fungicides					
- Granular	kg	7.6	1,246	8.0	1,312
- Liquid	lit	10.2	1,887	11.0	2,035
Transportation Cost			2,172		2,348
Miscellaneous #1			1,312		2,133
Total Cost			27,560		23,466
Net return per hectare			16,440		36,534

#1 : 5 % of the production cost for without project, while 10 % for with project condition taking into account the cost for soil improvement

Baguio Beans

Item	Unit	Without project		With project	
		Quantity	Value	Quantity	Value
Unit Yield	kg	7,500	31,500	9,000	37,800
Total Labor Requirement	Man-day	222	4,662	233	4,893
Seed	kg	60	3,600	60	3,600
Fertilizer					
- N	kg	152	2,599	20	342
- P2O5	kg	39	647	90	1,494
- K	kg	39	0	40	340
- Chicken Manure	kg	910	546	1,000	600
Insecticides					
- Granular	kg	1.1	235	2.0	428
- Liquid	lit	5.7	1,613	7.0	1,981
Fungicides					
- Granular	kg	1.0	164	2.0	328
- Liquid	lit	4.8	888	5.0	925
Trellises	pieces	20,000	4,000	20,000	4,000
Transportation Cost			1,177		1,388
Miscellaneous #1			1,007		2,032
Total Cost			21,138		22,351
Net return per hectare			10,362		15,449

#1 : 5 % of the production cost for without project, while 10 % for with project condition taking into account the cost for soil improvement

Table B.4.3 Economic Net Return per Ha of Crops (3/5)

Garden Pea

Item	Unit	Without project		With project	
		Quantity	Value	Quantity	Value
Unit Yield	kg	3,000	48,570	4,500	72,855
Total Labor Requirement	Man-day	222	4,662	247	5,187
Seed	kg	60	11,760	60	11,760
Fertilizer					
- N	kg	181	3,095	20	342
- P2O5	kg	52	863	90	1,494
- K	kg	42	357	40	340
- Chicken Manure	kg	1,190	714	1,000	600
Insecticides					
- Granular	kg	0.3	64	2.0	428
- Liquid	lit	6.2	1,755	8.0	2,264
Fungicides					
- Granular	kg	4.1	672	6.0	984
- Liquid	lit	3.5	648	5.0	925
Trellises	pieces	20,000	4,000	20,000	0
Transportation Cost			583		759
Miscellaneous #1			1,459		2,508
Total Cost			30,631		27,591
Net return per hectare			17,939		45,264

#1 : 5 % of the production cost for without project, while 10 % for with project condition taking into account the cost for soil improvement

Green Onion

Item	Unit	Without project		With project	
		Quantity	Value	Quantity	Value
Unit Yield	kg	7,800	19,500	11,500	28,750
Total Labor Requirement	Man-day	210	4,410	223	4,683
Seed	kg	250	1,500	250	1,500
Fertilizer					
- N	kg	123	2,103	90	1,539
- P2O5	kg	24	398	210	3,486
- K	kg	24	0	210	1,785
- Chicken Manure	kg	320	192	1,000	600
Insecticides					
- Granular	kg	0.0	0	0.0	0
- Liquid	lit	3.3	934	4.0	1,132
Fungicides					
- Granular	kg	0.7	115	1.0	164
- Liquid	lit	3.2	592	4.0	740
Transportation Cost			1,147		1,777
Miscellaneous #1			570		1,741
Total Cost			11,961		19,147
Net return per hectare			7,539		9,603

#1 : 5 % of the production cost for without project, while 10 % for with project condition taking into account the cost for soil improvement

Table B.4.3 Economic Net Return per Ha of Crops (4/5)

Strawberry

Item	Unit	Without project		With project	
		Quantity	Value	Quantity	Value
Unit Yield	kg	9,800	147,000	14,000	210,000
Total Labor Requirement	Man-day	730	15,330	815	17,115
Seed	kg	80,000	25,600	80,000	25,600
Fertilizer					
- N	kg	279	4,771	170	2,907
- P2O5	kg	108	1,793	170	2,822
- K	kg	108	0	190	1,615
- Chicken Manure	kg	0	0	1,000	600
Insecticides					
- Granular	kg	0.0	0	0.0	0
- Liquid	lit	16.0	4,528	20.0	5,660
Fungicides					
- Granular	kg	3.3	541	5.0	820
- Liquid	lit	10.8	1,998	12.0	2,220
Multi			5000		5000
Bamboo Basckct		33.0	825	33.0	825
Transportation Cost			1,430		2,132
Miscellaneous #1			3,091		6,732
Total Cost			64,906		74,048
Net return per hectare			82,094		135,952

#1 : 5 % of the production cost for without project, while 10 % for with project condition taking into account the cost for soil improvement

Rose

Item	Unit	Without project		With project	
		Quantity	Value	Quantity	Value
Unit Yield	doz	25,000	175,000	39,000	273,000
Total Labor Requirement	Man-day	790	16,590	810	17,010
Seed	piece	20,000	20,000	20,000	20,000
Fertilizer					
- N	kg	467	7,986	140	2,394
- P2O5	kg	127	2,108	140	2,324
- K	kg	119	1,012	180	1,530
- Chicken Manure	kg	580	348	2,000	1,200
Insecticides					
- Granular	kg	0.4	86	2.0	428
- Liquid	lit	10.7	3,028	15.0	4,245
Fungicides					
- Granular	kg	3.7	607	5.0	820
- Liquid	lit	14.2	2,627	20.0	3,700
Transportation Cost			3,645		5,735
Miscellaneous #1			2,902		5,939
Total Cost			60,938		65,325
Net return per hectare			114,062		207,675

#1 : 5 % of the production cost for without project, while 10 % for with project condition taking into account the cost for soil improvement

Table B.4.3 Economic Net Return per Ha of Crops (5/5)

Celery

Item	Unit	Without project		With project	
		Quantity	Value	Quantity	Value
Unit Yield	kg	14,500	65,250	24,000	108,000
Total Labor Requirement	Man-day	230	4,830	247	5,187
Seed	kg	1.50	3,564	1.50	3,564
Fertilizer					
- N	kg	94	1,607	180	3,078
- P2O5	kg	22	365	0	0
- K	kg	22	187	40	340
- Chicken Manure	kg	1,440	864	2,000	1,200
Insecticides					
- Granular	kg	0.0	0	0.0	0
- Liquid	lit	4.4	1,245	6.0	1,698
Fungicides					
- Granular	kg	2.0	328	3.0	492
- Liquid	lit	2.4	444	4.0	740
Transportation Cost			2,205		3,606
Miscellaneous £1			782		1,990
Total Cost			16,421		21,895
Net return per hectare			48,829		86,105

#1 : 5 % of the production cost for without project, while 10 % for with project condition taking into account the cost for soil improvement

Gladiolus

Item	Unit	Without project		With project	
		Quantity	Value	Quantity	Value
Unit Yield	doz	14,800	44,400	15,000	45,000
Total Labor Requirement	Man-day	185	3,885	177	3,717
Seed	kg	480	2,592	480	2,592
Fertilizer					
- N	kg	198	3,386	198	3,386
- P2O5	kg	54	896	54	896
- K	kg	54	459	54	459
- Chicken Manure	kg	0	0	0	0
Insecticides					
- Granular	kg	0.3	64	0.3	64
- Liquid	lit	4.2	1,189	4.2	1,189
Fungicides					
- Granular	kg	0.8	131	0.8	131
- Liquid	lit	6.1	1,129	6.1	1,129
Transportation Cost			2,107		2,135
Miscellaneous #1			792		1,570
Total Cost			16,629		17,267
Net return per hectare			27,771		27,733

#1 : 5 % of the production cost for without project, while 10 % for with project condition taking into account the cost for soil improvement

Table B.4.4 AGRICULTURAL BENEFIT

ZONE / CROPS	Planted Area		Net return per ha		Annual profit		Net Incremental Benefit
	Without (ha)	With (ha)	Without (pesos/ha)	With (pesos/ha)	Without (pesos)	With (pesos)	(pesos)
ZONE I	**305**	**540**			**7,197,700**	**18,746,000**	**11,548,300**
Strawberry	56	40	60,500	104,900	3,388,000	4,196,000	808,000
Vegetables #1	249	500	15,300	29,100	3,809,700	14,550,000	10,740,300
ZONE II	**343**	**325**			**10,293,900**	**18,613,000**	**8,319,100**
Rose	60	59	88,500	167,600	5,310,000	9,888,400	4,578,400
Vegetables #1	283	266	15,300	29,100	4,329,900	7,740,600	3,410,700
Intercropping #2	**60**	**60**	10,900	16,400	654,000	984,000	330,000
ZONE III	**146**	**230**			**1,470,800**	**5,243,000**	**3,772,200**
Rice	50	50	40	100	2,000	5,000	3,000
Vegetables #1	96	180	15,300	29,100	1,468,800	5,238,000	3,769,200
						Total	**23,639,600**

#1 Vegetables : Lettuce, Garden pea, Green onion, Chinese Cabbage, Baguio bean, Celery
#2 Intercropping : Celery, G. onion, Gladiolus
Net return of intercrop was estimated half of the normal cropping.

Table B.4.5 Financial Net Return per Ha of Crops (1/5)

Paddy

Item	Unit	Unit Price	Without Project Quantity	Without Project Value	With Project Quantity	With Project Value
		(pesos)		(pesos)		(pesos)
Unit Yield	kg	3.48	1,900	6,612	2,500	8,700
Total Hired Labor	Man-day	35	9	315	9	315
Total Animal Power	Animal-D	85	5	425	5	425
Seed	kg	0.00	60	0	60	0
Fertilizer						
- N	kg	9.70	0	0	50	485
- P2O5	kg	11.20	0	0	0	0
- K	kg	5.80	0	0	0	0
- Chicken Manure	kg	0.60	0	0	0	0
Insecticides						
- Powder	kg	183	0.0	0	0.0	0
- Liquid	lit	242	0.0	0	1.5	363
Fungicides						
- Powder	kg	140	0.0	0	0.0	0
- Liquid	lit	158	0.0	0	1.5	237
Transportation Cost #1				0		0
Miscellaneous				7		18
Total Cost				747		1,843
Net return per hectare				5,865		6,857

Chinese Cabbage

Item	Unit	Unit Price	Without Project Quantity	Without Project Value	With Project Quantity	With Project Value
		(pesos)		(pesos)		(pesos)
Unit Yield	kg	2.74	15,500	42,470	20,000	54,800
Total Hired Labor	Man-day	35	84	2,940	87	3,045
Seed	kg	2,580	1.12	2,890	1.12	2,890
Fertilizer						
- N	kg	9.70	127	1,232	210	2,037
- P2O5	kg	11.20	28	314	30	336
- K	kg	5.80	28	162	50	290
- Chicken Manure	kg	0.60	410	246	1,000	600
Insecticides						
- Powder	kg	183	0.0	0	0.0	0
- Liquid	lit	242	6.7	1,621	8.0	1,936
Fungicides						
- Powder	kg	140	3.8	532	4.0	560
- Liquid	lit	158	1.9	300	2.0	316
Transportation Cost #1				2,076		2,730
Miscellaneous #2				616		1,474
Total Cost				12,928		16,214
Net return per hectare				29,542		38,586

#1 : 0.13 pesos x production (kg) + 0.10 pesos x farm input (kg)
#2 : 5 % of the production cost for without project, while 10 % for with project condition taking into account the cost for soil improvement

Table B.4.5 Financial Net Return per Ha of Crops (2/5)

Lettuce

Item	Unit	Unit Price	Without Project Quantity	Without Project Value	With Project Quantity	With Project Value
		(pesos)		(pesos)		(pesos)
Unit Yield	kg	4.00	11,000	44,000	15,000	60,000
Total Hired Labor	Man-day	35	92	3,220	93	3,255
Seed	kg	1,475	0.95	1,401	0.95	1,401
Fertilizer						
- N	kg	9.70	315	3,056	180	1,746
- P2O5	kg	11.20	122	1,366	0	0
- K	kg	5.80	122	708	40	232
- Chicken Manure	kg	0.60	5,160	3,096	2,000	1,200
Insecticides						
- Powder	kg	183	0.0	0	0.0	0
- Liquid	lit	242	10.3	2,493	12.0	2,904
Fungicides						
- Powder	kg	140	7.6	1,064	8.0	1,120
- Liquid	lit	158	10.2	1,612	11.0	1,738
Transportation Cost #1				2,005		2,175
Miscellaneous #2				1,001		1,577
Total Cost				21,021		17,348
Net return per hectare				22,979		42,652

#1 : 0.13 pesos x production (kg) + 0.10 pesos x farm input (kg)
#2 : 5 % of the production cost for without project, while 10 % for with project condition taking into account the cost for soil improvement

Baguio Beans

Item	Unit	Unit Price	Without Project Quantity	Without Project Value	With Project Quantity	With Project Value
		(pesos)		(pesos)		(pesos)
Unit Yield	kg	4.20	7,500	31,500	9,000	37,800
Total Hired Labor	Man-day	35	33	1,155	35	1,225
Seed	kg	60.00	60	3,600	60	3,600
Fertilizer						
- N	kg	9.70	152	1,474	20	194
- P2O5	kg	11.20	39	437	90	1,008
- K	kg	5.80	39	226	40	232
- Chicken Manure	kg	0.60	910	546	1,000	600
Insecticides						
- Powder	kg	183	1.1	201	2.0	366
- Liquid	lit	242	5.7	1,379	7.0	1,694
Fungicides						
- Powder	kg	140	1.0	140	2.0	280
- Liquid	lit	158	4.8	758	5.0	790
Trellises #2	Pieces		20,000	4,000	20,000	4,000
Transportation Cost #1				1,090		1,287
Miscellaneous #3				750		1,528
Total Cost				15,758		16,803
Net return per hectare				15,742		20,997

#1 : 0.13 pesos x production (kg) + 0.10 pesos x farm input (kg)
#2 : 80,000 pieces of bamboo stick is used for 4 times
#3 : 5 % of the production cost for without project, while 10 % for with project condition taking into account the cost for soil improvement

Table B.4.5 Financial Net Return per Ha of Crops (3/5)

Garden Peas

Item	Unit	Unit Price (pesos)	Without Project Quantity	Without Project Value (pesos)	With Project Quantity	With Project Value (pesos)
Unit Yield	kg	16.19	3,000	48,570	4,500	72,855
Total Hired Labor	Man-day	35	56	1,960	62	2,170
Seed	kg	163.00	60	9,780	60	9,780
Fertilizer						
- N	kg	9.70	183	1,775	20	194
- P2O5	kg	11.20	50	560	90	1,008
- K	kg	5.80	42	244	40	232
- Chicken Manure	kg	0.60	1,190	714	1,000	600
Insecticides						
- Powder	kg	183	0.3	55	2.0	366
- Liquid	lit	242	6.2	1,500	8.0	1,936
Fungicides						
- Powder	kg	140	4.1	574	6.0	840
- Liquid	lit	158	3.5	553	5.0	790
Trellises #2	Pieces		20,000	4,000	20,000	4,000
Transportation Cost #1				538		702
Miscellaneous #3				1,113		2,262
Total Cost				23,366		24,880
Net return per hectare				25,204		47,975

#1 : 0.13 pesos x production (kg) + 0.10 pesos x farm input (kg)
#2 : 80,000 pieces of bamboo stick is used for 4 times
#3 : 5 % of the production cost for without project, while 10 % for with project condition taking into account the cost for soil improvement

Green Onion

Item	Unit	Unit Price (pesos)	Without Project Quantity	Without Project Value (pesos)	With Project Quantity	With Project Value (pesos)
Unit Yield	kg	2.50	7,800	19,500	11,500	28,750
Total Hired Labor	Man-day	35	82	2,870	87	3,045
Seed	kg	6.00	250	1,500	250	1,500
Fertilizer						
- N	kg	9.70	123	1,193	90	873
- P2O5	kg	11.20	24	269	210	2,352
- K	kg	5.80	24	139	110	638
- Chicken Manure	kg	0.60	320	192	1,000	600
Insecticides						
- Powder	kg	183	0.0	0	0.0	0
- Liquid	lit	242	3.3	799	4.0	968
Fungicides						
- Powder	kg	140	0.7	98	1.0	140
- Liquid	lit	158	3.2	506	4.0	632
Transportation Cost #1				1,064		1,637
Miscellaneous #2				431		1,238
Total Cost				9,061		13,623
Net return per hectare				10,439		15,127

#1 : 0.13 pesos x production (kg) + 0.10 pesos x farm input (kg)
#2 : 5 % of the production cost for without project, while 10 % for with project condition taking into account the cost for soil improvement

Table B.4.5 Financial Net Return per Ha of Crops (4/5)

Strawberry

Item	Unit	Unit Price	Without Project Quantity	Without Project Value	With Project Quantity	With Project Value
		(pesos)		(pesos)		(pesos)
Unit Yield	kg	15.00	9,800	147,000	14,000	210,000
Total Hired Labor	Man-day	35	182	6,370	204	7,140
Seed	kg	0.32	80,000	25,600	80,000	25,600
Fertilizer						
- N	kg	9.70	279	2,706	170	1,649
- P2O5	kg	11.20	108	1,210	170	1,904
- K	kg	5.80	108	626	190	1,102
- Chicken Manure	kg	0.60	0	0	1,000	600
Insecticides						
- Powder	kg	183	0.0	0	0.0	0
- Liquid	lit	242	16.0	3,872	20.0	4,840
Fungicides						
- Powder	kg	140	3.3	462	5.0	700
- Liquid	lit	158	10.8	1,706	12.0	1,896
Multi	Truckload			5,000		5,000
Bamboo bascket		25	33.0	825	33.0	825
Transportation Cost #1				1,327		1,977
Miscellaneous #2				2,485		5,323
Total Cost				52,189		58,556
Net return per hectare				94,811		151,444

#1 : 0.13 pesos x production (kg) + 0.10 pesos x farm input (kg)
#2 : 5 % of the production cost for without project, while 10 % for with project condition taking into account the cost for soil improvement

Rose

Item	Unit	Unit Price	Without Project Quantity	Without Project Value	With Project Quantity	With Project Value
		(pesos)		(pesos)		(pesos)
Unit Yield	kg	7.00	25,000	175,000	39,000	273,000
Total Hired Labor	Man-day	35	269	9,415	275	9,625
Seedling #2	kg	1.00	20,000	20,000	20,000	20,000
Fertilizer						
- N	kg	9.70	467	4,530	140	1,358
- P2O5	kg	11.20	127	1,422	140	1,568
- K	kg	5.80	119	690	180	1,044
- Chicken Manure	kg	0.60	580	348	2,000	1,200
Insecticides						
- Powder	kg	183	0.4	73	2.0	366
- Liquid	lit	242	10.7	2,589	15.0	3,630
Fungicides						
- Powder	kg	140	3.7	518	5.0	700
- Liquid	lit	158	14.2	2,244	20.0	3,160
Transportation Cost #1				3,382		5,320
Miscellaneous #2				2,261		4,797
Total Cost				47,472		52,768
Net return per hectare				127,528		220,232

#1 : 0.13 pesos x production (kg) + 0.10 pesos x farm input (kg)
#2 : 5 % of the production cost for without project, while 10 % for with project condition taking into account the cost for soil improvement

Table B.4.5 Financial Net Return per Ha of Crops (5/5)

Celery

Item	Unit	Unit Price	Without Project Quantity	Without Project Value	With Project Quantity	With Project Value
		(pesos)		(pesos)		(pesos)
Unit Yield	kg	4.50	14,500	65,250	24,000	108,000
Total Hired Labor	Man-day	35	30	1,050	32	1,120
Seed	kg	1,980	1.50	2,970	1.50	2,970
Fertilizer						
- N	kg	9.70	94	912	180	1,746
- P2O5	kg	11.20	22	246	0	0
- K	kg	5.80	22	128	40	232
- Chicken Manure	kg	0.60	1,440	864	2,000	1,200
Insecticides						
- Powder	kg	183	0.0	0	0.0	0
- Liquid	lit	242	4.4	1,065	6.0	1,452
Fungicides						
- Powder	kg	140	2.0	280	3.0	420
- Liquid	lit	158	2.4	379	4.0	632
Transportation Cost #1				2,044		3,343
Miscellaneous #2				497		1,312
Total Cost				10,434		14,427
Net return per hectare				54,816		93,573

#1 : 0.13 pesos x production (kg) + 0.10 pesos x farm input (kg)
#2 : 5 % of the production cost for without project, while 10 % for with project condition taking into account the cost for soil improvement

Gladiolus

Item	Unit	Unit Price	Without Project Quantity	Without Project Value	With Project Quantity	With Project Value
		(pesos)		(pesos)		(pesos)
Unit Yield	kg	2.20	14,800	32,560	15,000	33,000
Total Hired Labor	Man-day	35	43	1,505	41	1,435
Seed	kg	5.40	480	2,592	480	2,592
Fertilizer						
- N	kg	9.70	198	1,921	198	1,921
- P2O5	kg	11.20	54	605	54	605
- K	kg	5.80	54	313	54	313
- Chicken Manure	kg	0.60	0	0	0	0
Insecticides						
- Powder	kg	183	0.3	55	0.3	55
- Liquid	lit	242	4.2	1,016	4.2	1,016
Fungicides						
- Powder	kg	140	0.8	112	0.8	112
- Liquid	lit	158	6.1	964	6.1	964
Transportation Cost #1				1,956		1,982
Miscellaneous #2				552		1,099
Total Cost				11,590		12,094
Net return per hectare				20,970		20,906

#1 : 0.13 pesos x production (kg) + 0.10 pesos x farm input (kg)
#2 : 5 % of the production cost for without project, while 10 % for with project condition taking into account the cost for soil improvement

Table B.4.6 Farm Family Budget under Without Project Condition

Item	Zone-I	Zone-II	Zone-III
Farm Size	0.87 ha	0.70 ha	0.91 ha
(Net Farm Area)	(0.70) ha	(0.46) ha	(0.65) ha
Net Planted Area	1.32 ha	1.02 ha	1.35 ha
Strawberry	0.23 ha		
Rose		0.18 ha	
Paddy			0.47 ha
Vegetables #1	1.09 ha	0.84 ha	0.88 ha
Intercropping		0.18 ha	
Livestock (pig)	1 head	1 head	1 head
Total Net Income (A)	**56,900**	**52,500**	**33,600**
Net Farm income	52,700	49,400	28,000
Strawberry	21,800		
Rose		22,600	
Paddy			2,700
Vegetables #1	28,900	22,300	23,300
Intercropping #2		2,500	
Livestock	2,000	2,000	2,000
Non-farm income	4,200	3,100	5,600
Total Expences (B) #3	**50,200**	**45,900**	**32,600**
Living expences	49,500	45,700	32,300
(Household size)	(5.8) persons	(6.0) persons	(5.6) persons
Food	27,100	24,800	17,900
Non-food	22,400	20,900	14,400
Land tax	700	200	300
Net Reserve (A-B)	**6,700**	**6,600**	**1,000**

#1 Vegetables : Lettuce, Garden pea, Green onion, Chinese Cabbage, Baguio bean, Celery
#2 Intercropping : Celery, G. onion, Gladiolus
Production value of intercropping was estimated half of the normal cropping.
#3 Expences was estimated as below :

Total Expences = Living Expences + Land tax
Living Expences = Total Net Income x A
Food Expences = Total Expences x B
Non-food Expences = Living Expences - Food Expences

Income class (pesos/year)	Average Income	Average Expences	A	Food Expences	B
	(C)	(D)	(D/C)	(E)	(E/D)
20,000-29,000	24,800	21,000	85%	12,800	61%
30,000-39,000	33,700	32,300	96%	17,800	55%
40,000-59,000	44,400	38,600	87%	20,800	54%
60,000-99,000	78,600	49,000	62%	21,600	44%
100,000 and over	144,000	86,100	60%	36,100	42%

Remarks : Average income and expenditure for rural areas in Region I with family size of five persons
Source : 1985 Family Income and Expenditures survey, NCSO

Table B.4.7 Farm Family Budget under With Project Condition

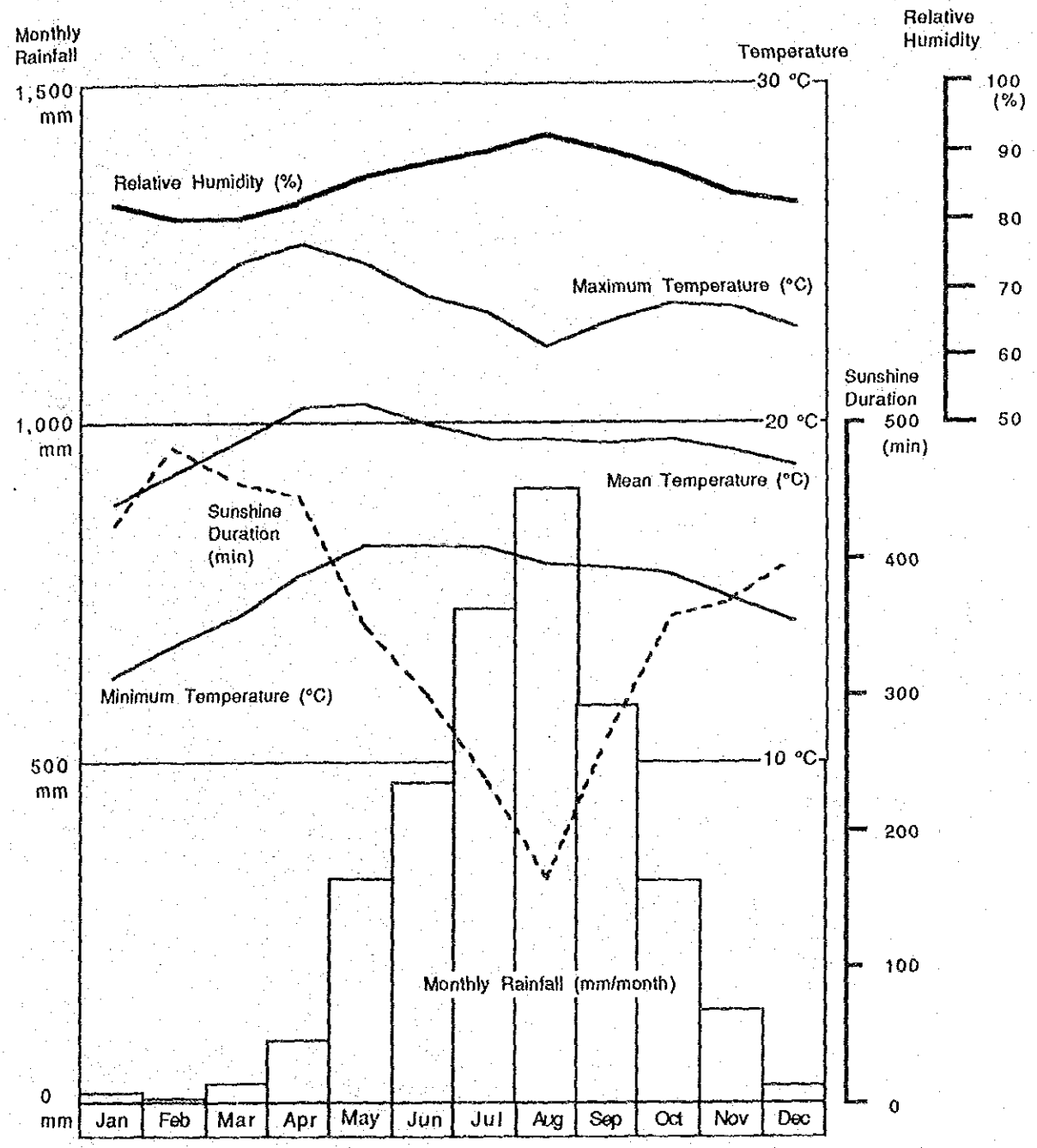
Item	Zone-I	Zone-II	Zone-III
Farm Size	0.87 ha	0.70 ha	0.91 ha
(Net Farm Area)	(0.70) ha	(0.46) ha	(0.65) ha
Net Planted Area	2.39 ha	0.99 ha	2.13 ha
Strawberry	0.18 ha		
Rose		0.18 ha	
Paddy			0.47 ha
Vegetables #1	2.21 ha	0.81 ha	1.66 ha
Intercropping		0.18 ha	
Livestock (pig)	1 head	1 head	1 head
Total Net Income (A)	**129,000**	**83,000**	**82,500**
Net Farm Income	124,800	79,900	76,900
Strawberry	27,300		
Rose		39,100	
Paddy			3,200
Vegetables #1	95,500	35,000	71,700
Intercropping #2		3,800	
Livestock	2,000	2,000	2,000
Non-farm income	4,200	3,100	5,600
Total Expences (B) #3	**80,600**	**53,200**	**53,300**
Living expences	77,400	51,500	51,200
(Household size)	(5.8) persons	(6.0) persons	(5.6) persons
Food	32,500	22,700	22,500
Non-food	44,900	28,800	28,700
Land tax	700	200	300
Irrigation fee	2,500	1,500	1,800
Net Reserve (A-B)	**48,400**	**29,800**	**29,200**

#1 : Vegetables : Lettuce, Garden pea, Green onion, Chinese Cabbage, Baguio bean, Celery
#2 Intercropping : Celery, G. onion, Gladiolus
Production value of intercropping was estimated half of the normal cropping.
#3 Expences was estimated as below :

Total Expences = Living Expences + Land tax + Irrigation fee
Living Expences = Total Net Income x A
Food Expences = Total Expences x B
Non-food Expences = Living Expences - Food Expences

Income class (pesos/year)	Average Income	Average Expences	A	Food Expences	B
	(C)	(D)	(D/C)	(E)	(E/D)
20,000-29,000	24,800	21,000	85%	12,800	61%
30,000-39,000	33,700	32,300	96%	17,800	55%
40,000-59,000	44,400	38,600	87%	20,800	54%
60,000-99,000	78,600	49,000	62%	21,600	44%
100,000 and over	144,000	86,100	60%	36,100	42%

Remarks : Average income and expenditure for rural areas in Region I with family size of five persons
Source : 1985 Family Income and Expenditures survey, NCSO



Source : Baguio PAGASA Station (Averaged for 1949 - 1987)

Fig. B.2.1 Monthly Meteorological Characteristics in the Project Area

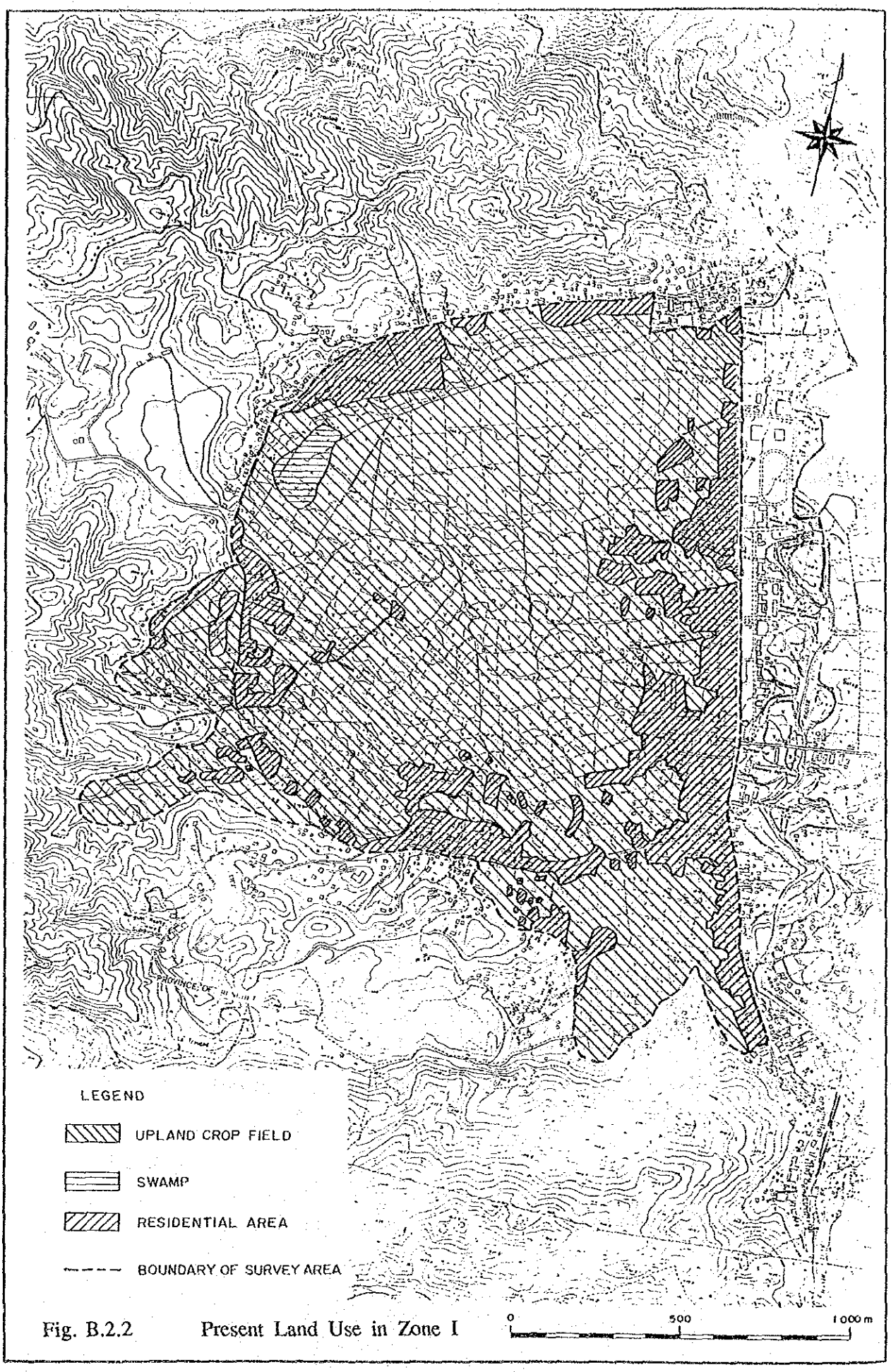


Fig. B.2.2 Present Land Use in Zone I

Fig. B.2.3 Present Land Use in Zone II

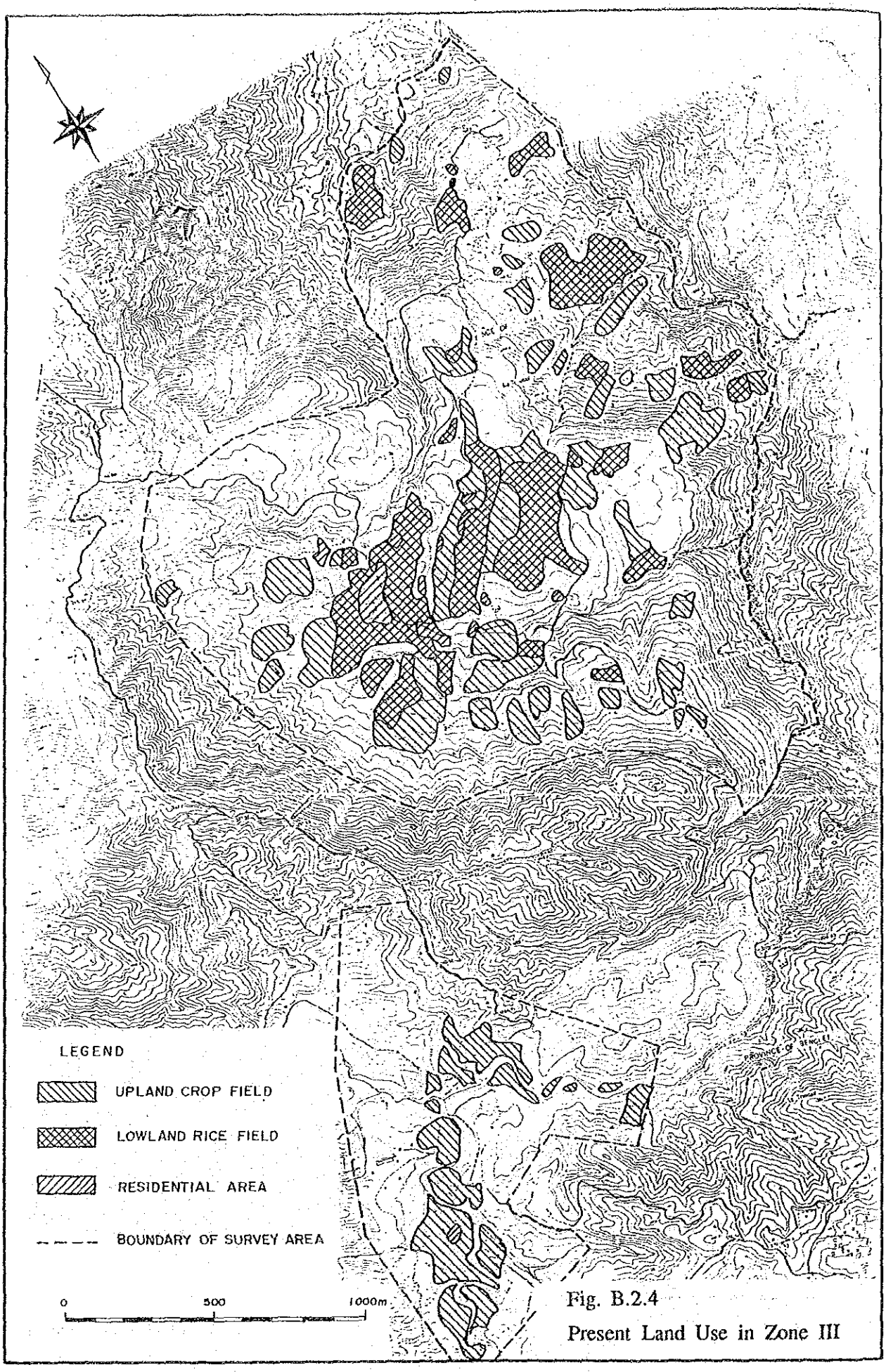


Fig. B.2.4
Present Land Use in Zone III

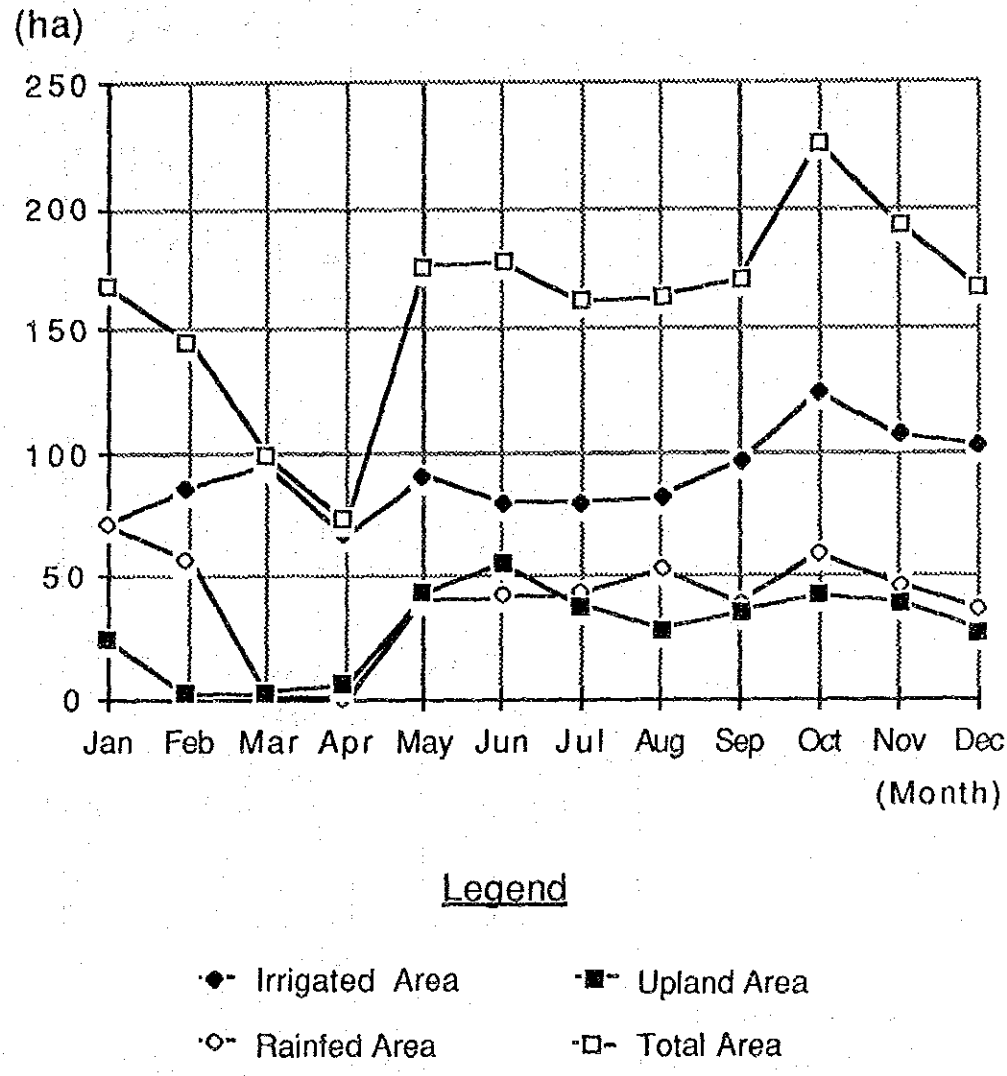


Fig B.2.5 Monthly Cropped Area in La Trinidad
(Excluding flowers, coffee, citrus, banana and fruit)

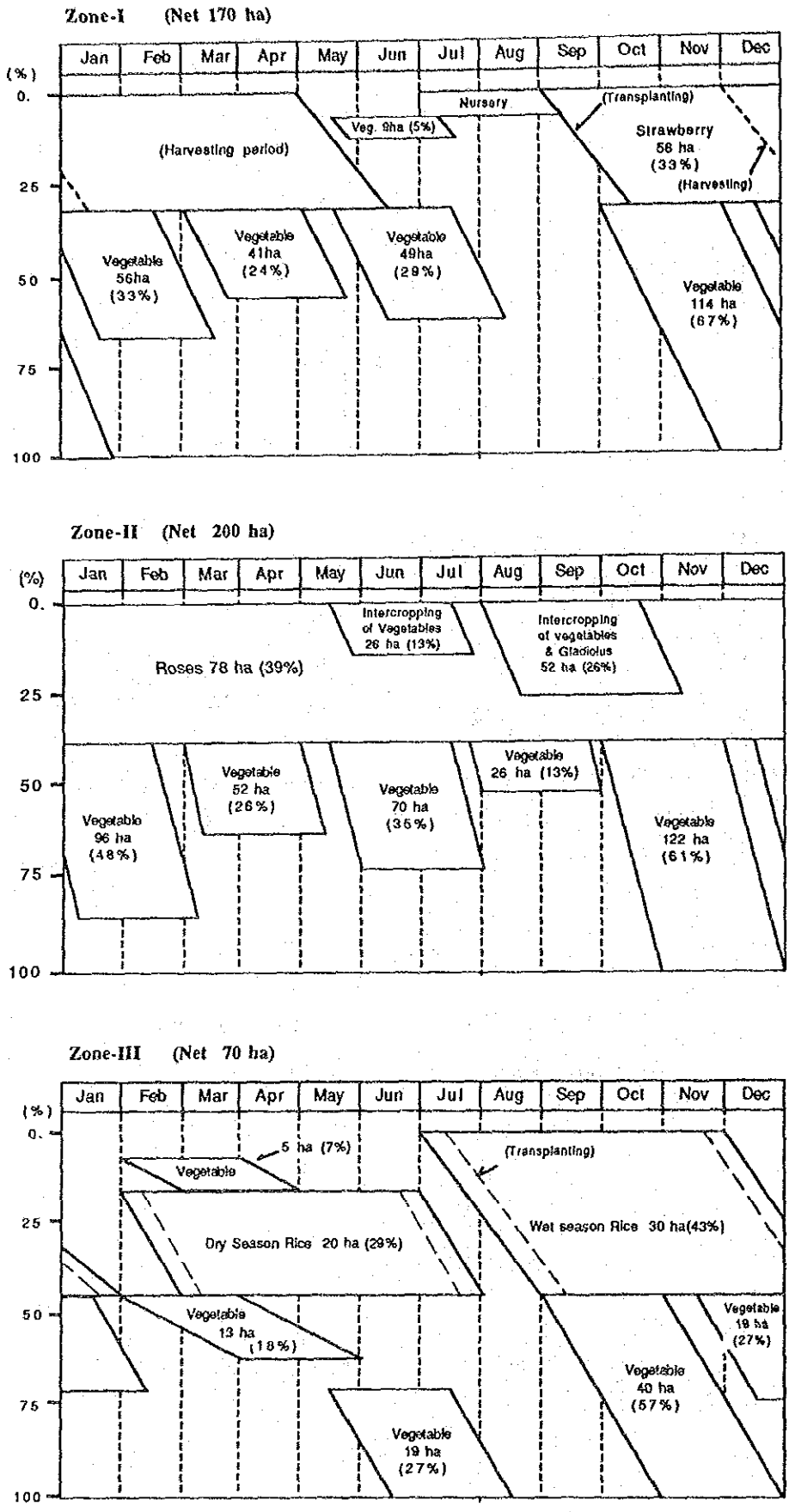


Fig. B.2.6 Present Cropping Pattern in the Project Area

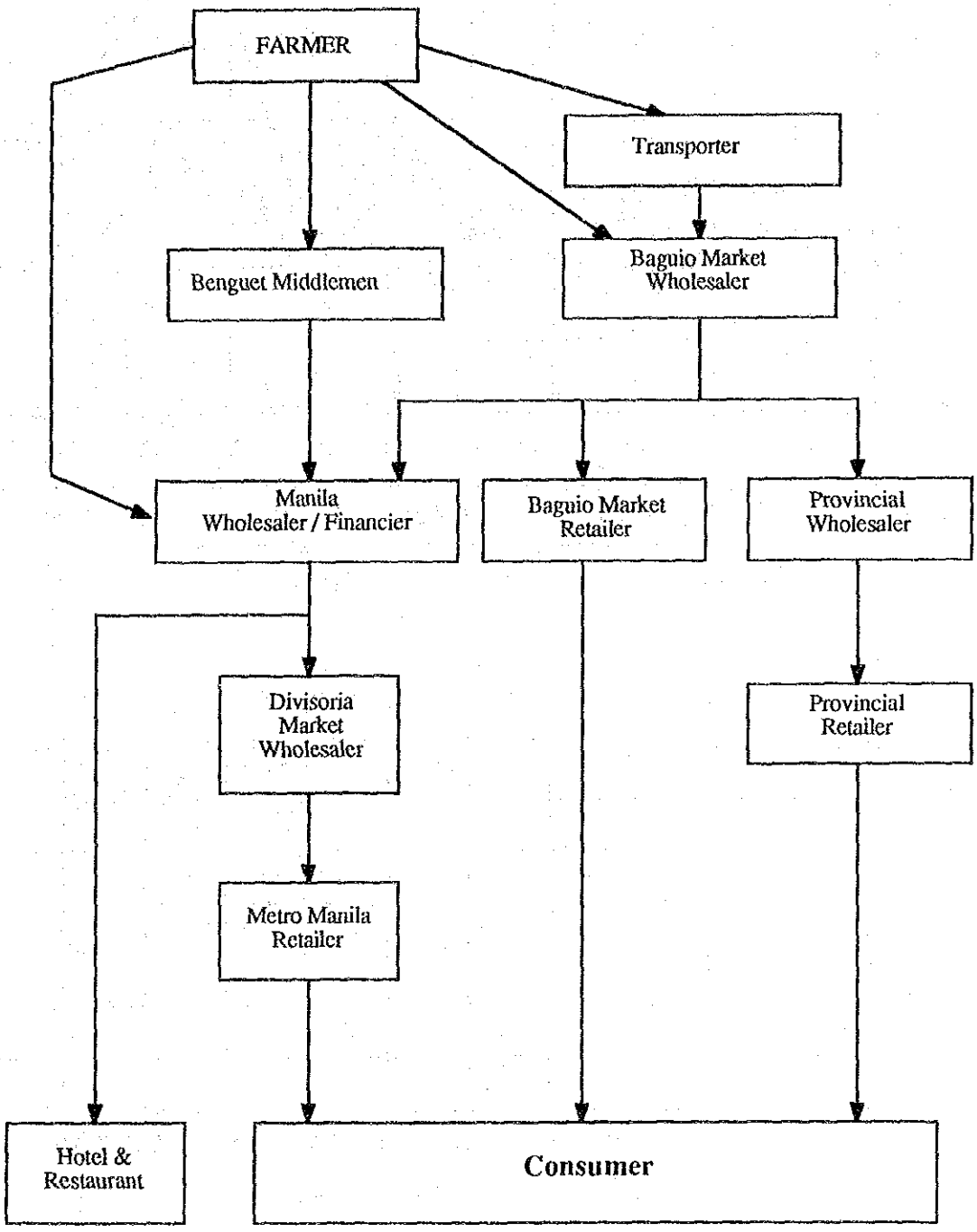
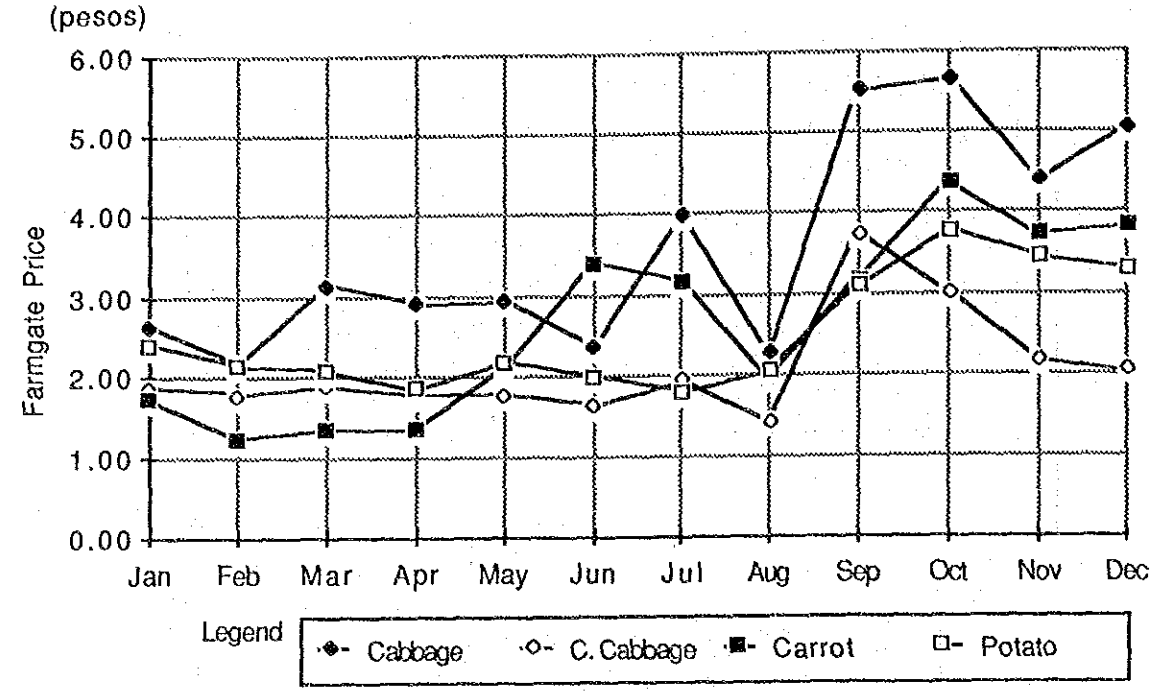


Fig. B.2.7 Market Flow of Vegetables



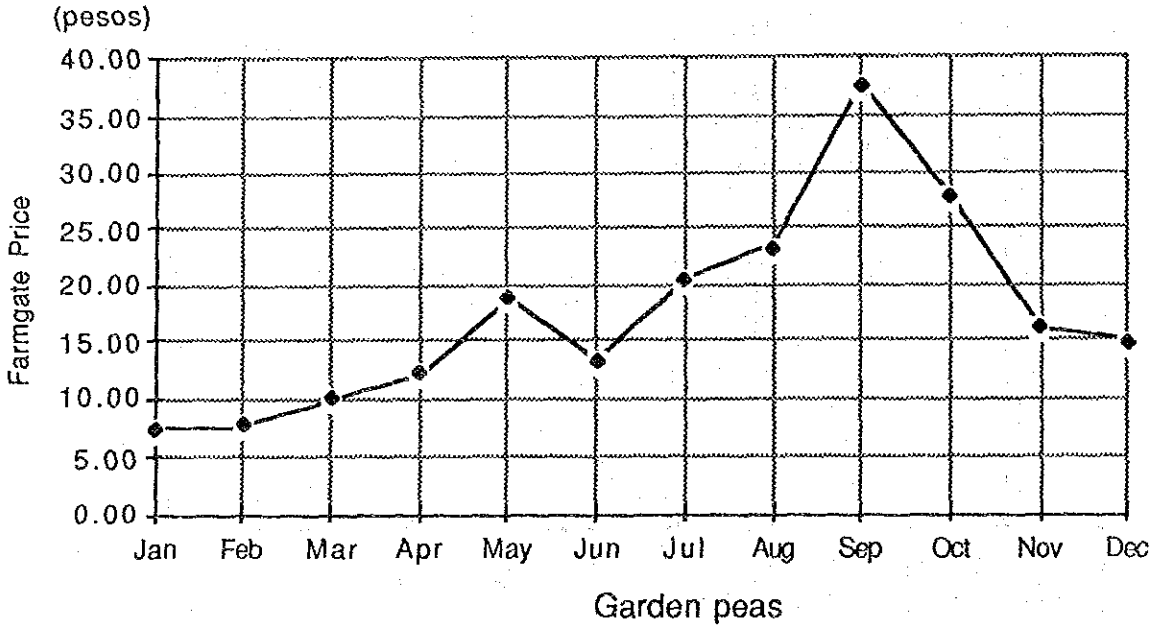


Fig. B.2.8 Seasonal Price Fluctuation of Vegetables (Farmgate Price in Baguio)

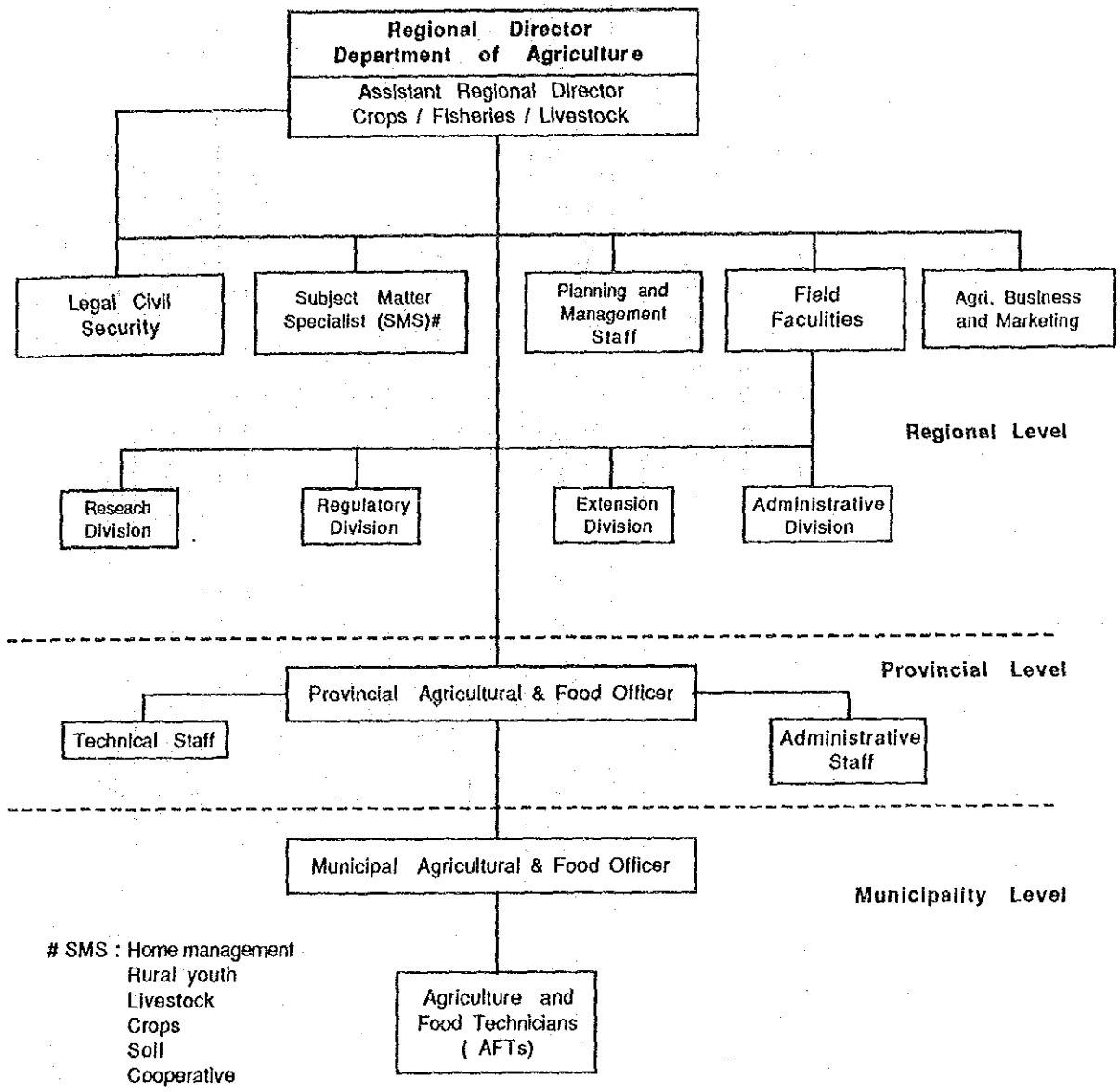


Fig. B.2.9 Organization Chart of Regional Office, Region I Department of Agriculture

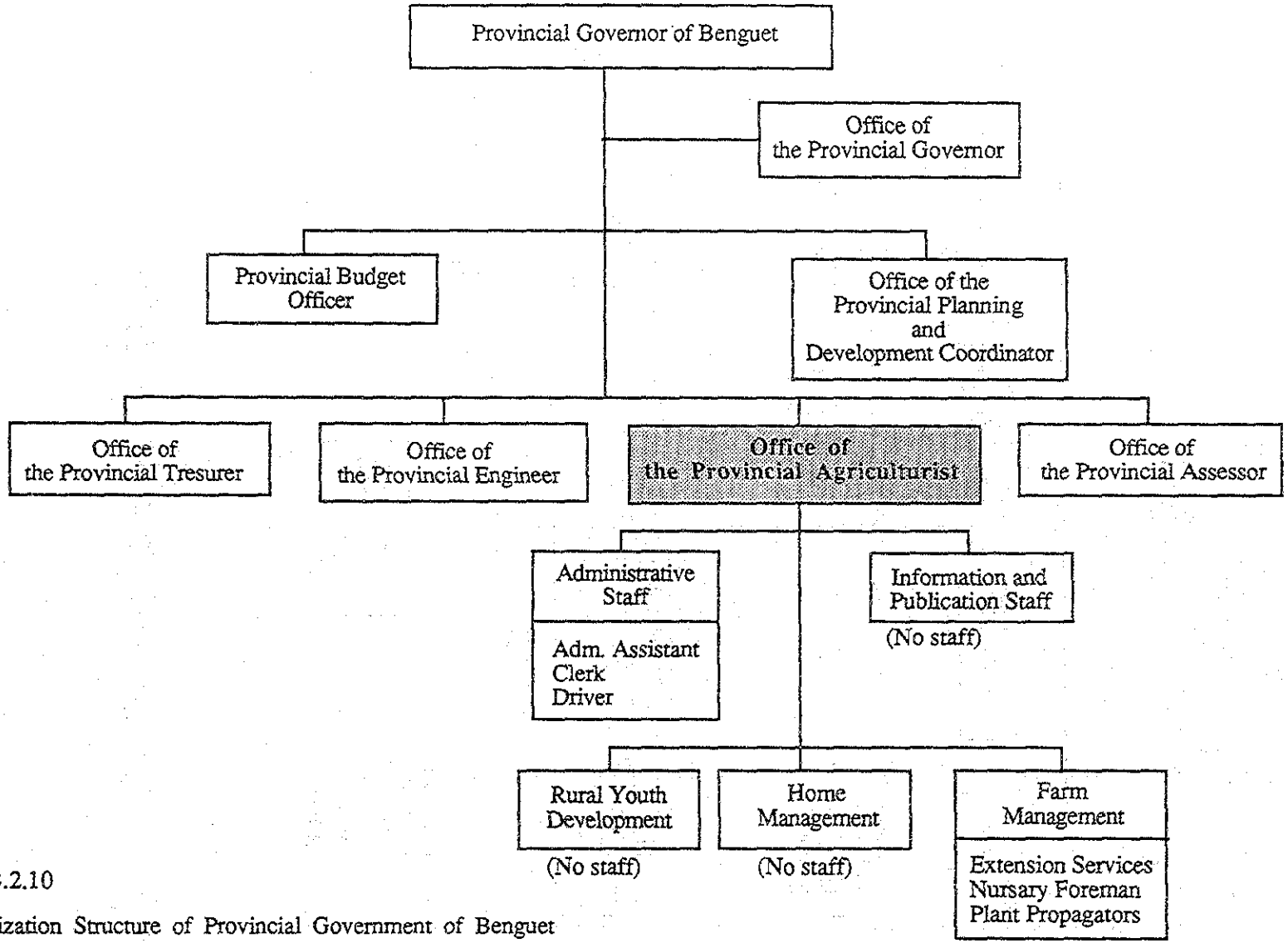


Fig. B.2.10

Organization Structure of Provincial Government of Benguet

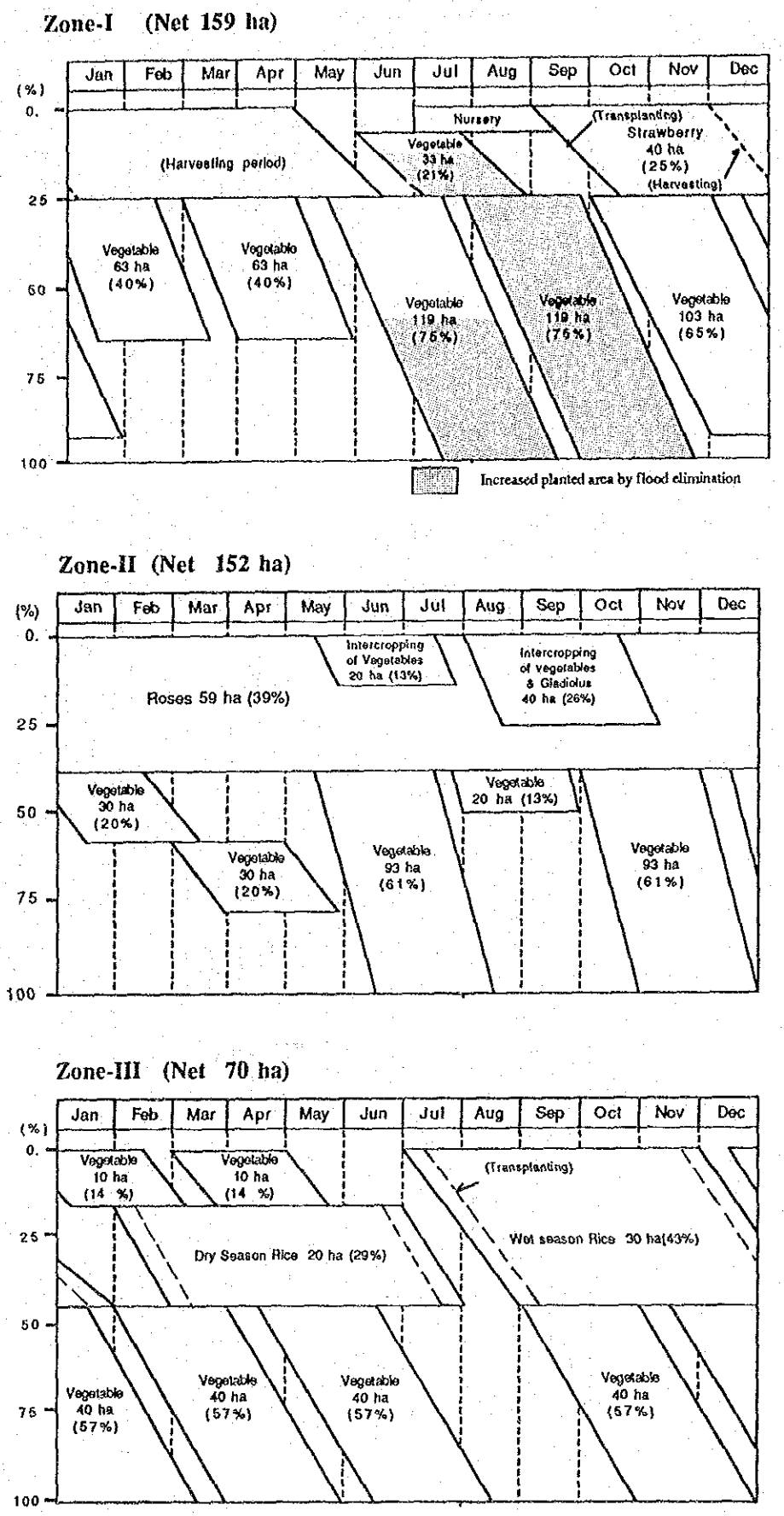


Fig. B.3.1 Proposed Cropping Pattern

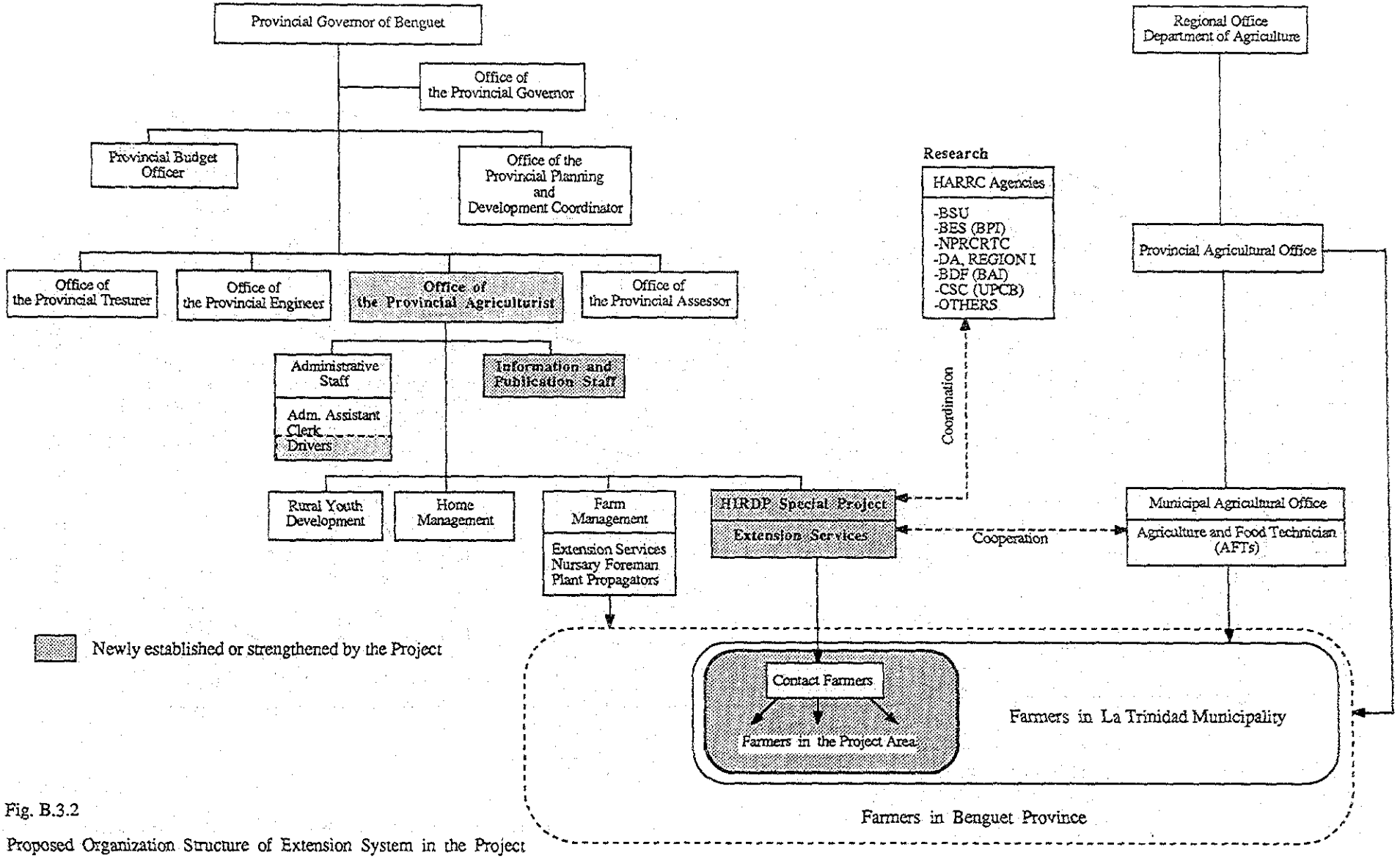


Fig. B.3.2

Proposed Organization Structure of Extension System in the Project

APPENDIX C

METEOROLOGY AND HYDROGEOLOGY

APPENDIX C METEOROLOGY AND HYDROLOGY

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1. CLIMATE AND RIVER BASIN

1.1 Climate

Meteorologically the study area falls under Type I illustrated in Fig. C.1.1. The Type is characterized by two pronounced seasons, the dry season from November to April and the wet season from May to October.

It is a highland area of the Central Cordillera, frequently attacked not only by the northeast and southwest monsoon but also by cyclones. Accordingly, annual rainfall has been recorded above 3,500 mm on average, so that this is a special region in the Philippines in meteorological terms.

1.2 River Basin

The major river flowing down through the Study Area is the Balili, which is a tributary of the Naguilian river flown into the China Sea. The Balili river has numerous tributary creeks and rivers including the Wangal creek as shown in Fig.C.1.2.

Longitudinal form of these creeks and rivers are relatively steep, therefore the coefficient of river regime which indicate characteristics of runoff between in the wet and the dry season, are calculated at more than 500. Accordingly, most of streams in and around the Project area may flow out in form of a rapid stream so that water utilization may become ineffective.

Drainage area, river length and river bed gradient of creeks and rivers concerned with the Project area are as follows:

Stream name	Drainage area (km2)	Length (km)	River bed gradient (%)	Remarks
Balili river (1)	13.1	4.0	5.0	upstream from the confluence with Ambiong (S) creek
Ambiong (S) creek	1.8	1.8	5.6	
Ambiong (N) creek	3.1	3.2	11.9	
Lubas creek	2.2	3.0	10.0	
Tawang creek	0.9	1.5	10.0	
Balili river (2)	18.3	3.5	1.3	upstream from the confluence with Bolo creek to the confluence with Ambiong (S) creek
Bolo creek	6.8	3.5	0.3	
Wangal creek	6.8	5.0	8.0	
Bineng creek	1.9	1.6	15.3	
Peril creek	3.4	3.4	17.3	
Balili river (3)	19.0	5.1	15.2	upstream from the confluence with Boleweng creek to the confluence with Bolo creek
Bedeweng creek	2.0	2.1	21.0	
Bahong creek	6.1	2.4	13.8	
Alapang creek	2.2	3.0	13.0	
Alno creek	1.4	1.8	15.0	

2. METEOROLOGY

2.1 Meteorological Data

2.1.1 Data collection

Meteorological stations of PAGASA concerned with the Project area are the Baguio and BSU stations.

Details of both stations are as follows:

- Baguio station

Location	16°25' N, 120°30' E, EL 1410.39 m
Jurisdiction	PAGASA
Duration of observation	1949, January -
Substance	(1) Daily atmospheric pressure (2) Temperature (by dry-bulb and wet-bulb thermometer) (3) Temperature (4) Rainfall (Automatic rainfall gauge) (5) Direction and velocity of wind (6) Duration of sunshine (7) Cloudiness (8) Evaporation (9) Others.

- BSU station

Location	16°27' N, 120°35' E, 1344.02 m
Jurisdiction	PAGASA
Duration of observation	1977, January -
Substance	(1) Direction and velocity of wind (2) Dry and wet bulb temperature (3) Temperature (4) Rainfall (5) Duration of sunshine (6) Evaporation (7) Others.

Moreover, rainfall data were collected at several stations in Benguet Province. The stations are listed below:

Rainfall Stations Located in Adjacent of the Study Area					
Station	Lat. N	Long. E	Elevation	Period Data Collected	Agency
			m	1981	Ministry of
Bolis Atok	16°34'	120°41'	1,614	- 1984	Natural Resources
Ambuklao Bokod	16°27'38"	120°43'38"	756	1984.1 - 1987.4	NPC
Bobok, Bokod	16°27'25"	120°49'39"	1,366	1984.1 - 1987.4	NPC
Binga, Itogon	16°23'52"	120°43'38"	528	1984.1 - 1987.4	NPC
Balatoc Itogon	16°22'	120°14'	914	1984.1 - 1987.4	PAGASA
Dalupirip Itogon	16°19'38"	120°43'44"	489	1985.8 - 1987.4	Bureau of Forestry
Los-oc Tublay	16°27'53"	120°40'59"	1,749	1985.8 - 1987.4	Bureau of Forestry
Yangyang Bokod	16°28'34"	120°47'11"	800	1985.9 - 1987.4	Bureau of Forestry
Bangao Kabayan	16°37'34"	120°50'	1,160	1986.1 - 1986.12	Bureau of Forestry
Suay Kabayan	16°37'34"	120°50'	1,160	1986.1 - 1986.12	Bureau of Forestry

Location of the stations are shown in Fig.C.2.1, which includes stream flow stations.

Collected term of the meteorological data at the stations are presented in Fig.C.2.2.

2.1.2 Rainfall measurement

During survey period, five daily rainfall gauges were installed by the JICA Team in the Project area for further study of areal rainfall distribution.

The location of the rain gauges installed are shown in Fig.C.2.3. Recorded data are shown in Table C.2.1, and the observed monthly rainfall are tabulated below :

Gauging Station	Altitude (m)	Rainfall in 1987 (mm) Oct.	Nov.	Dec.
(Baguio PAGASA)	1410.4	502.5	9.5	27.7
(BSU PAGASA)	1344.0	480.0	15.1	40.0
Ambiong	1530.0	781.0	15.0	16.4
Puguis	1325.0	913.7	8.9	29.6
Bahong	1225.0	681.8	0.0	35.5
Wangal	1230.0	713.6	6.8	73.5
Bineng	980.0	669.7	5.6	49.2

2.2 Meteorological Data Analysis

Data of the BSU station are the most suitable for the meteorological analysis because it located inside of the Project area. However the station has only eleven years data, it is insufficient for probable and stochastic analysis.

On the other hand, the Baguio station locates at several kilometers south of La Trinidad and has nearly 40 year observation data, which covers virtually all meteorological factors.

As a high correlation on meteorological data between the BSU Station and the Baguio station was obtained as shown in Fig.C.2.4, data of the Baguio station was decided to use for a stochastic analysis.

Rainfall data of the BSU station is preferable to that of the Baguio station for water resources availability study due to the location inside of the Project area. Rainfall data of the Baguio and BSU stations are compared in Table C.2.2.

Annual mean temperature measured at the Baguio station is 19.4 °C, considerably lower than the average throughout the country of 27 °C.

Average relative humidity is as high as 85 percent due to higher altitude, which gives rise to meteorologically unstable atmospheric conditions all the year round.

Annual rainfall is 3,651 mm on an average. Almost all of the rainfall is recorded in the wet season, and monthly average rainfall in August goes up to 897 mm.

Annual amount of evaporation measured by the open pan is 1,080 mm at the Baguio station. The difference between the value of the potential evaporation estimated by the Penman method and the observed valve is very small and not significant.

Every monthly metrological data are shown in Table C.2.3 to Table C.2.21, and summarized in Table C.2.22 and Table C.2.23 for the Baguio station and the BSU station respectively.

2.2.1 Areal rainfall characteristic

Correlation coefficients of rainfall among twelve stations located adjacent to the Study area were computed as shown in Table C.2.24. According to the results, only the Baguio station shows a significant correlation with the BSU station in La Trinidad. It may be concluded that rainfall in and around the Project area is largely localized. Moreover, the comparison of rainfall data among the stations installed by JICA in the Project area, shows good correlation with rainfall occurrence, but the quantities of rainfall among the data are rather different. These are presented in Fig.C.2.5.

2.2.2 Probable rainfall intensity curve

At the Baguio Station, observation of rainfall has been continuously executed by automatic rainfall gauge.

With the series of collected data, the rainfall intensity records on any duration i.e., ten minutes, thirty minutes, one hour, three hours, six hours, twelve hours and twenty four hours are also available. Using such data, probable rainfall intensity curve on certain return period was formulated as shown in Fig.C.2.6 and Table C.2.25, and summarized below :

Return period	Rainfall Intensity curve
year	
2	$r = \frac{51.890}{T^{0.434} - 0.044}$
5	$r = \frac{60.829}{T^{0.342} - 0.165}$
10	$r = \frac{64.849}{T^{0.295} - 0.240}$

20	$r = \frac{67.449}{T^{0.258} - 0.308}$
30	$r = \frac{68.574}{T^{0.239} - 0.345}$
50	$r = \frac{69.544}{T^{0.218} - 0.389}$
100	$r = \frac{70.625}{T^{0.194} - 0.441}$
200	$r = \frac{71.207}{T^{0.174} - 0.489}$

r : rainfall intensity (mm/hr)
T: duration of rainfall (hr)

Moreover, data of annual maximum rainfall with in one day to three days are listed in Table C.2.26, and analyzed probable rainfall on the said data are as shown in Table C.2.27.

2.2.3 Potential evaporation (ETo)

Data of the open pan evaporation in the BSU station are not utilized because of short term observation and partly missing of the data.

Difference between the value of ETo estimated by Penman method and the value of open pan evaporation observed at the Baguio station is very small as presented in Table C.2.28 and Fig. C.2.7. Therefore, the ETo for the Project study will be estimated by open pan evaporation data of the Baguio station.

2.2.4 Rainfall during typhoon

Observed rainfall data at the Baguio station during term of the most severe typhoons in last ten years, is summarized in Table C.2.29, Fig. C.2.8 and Fig. C.2.9.

According to the data, almost storms seem to fury within two days, at most three days. Therefore, duration of flood simulation to be carried out in this study should be taken more than two or three days.

3. HYDROLOGY

3.1 Streamflow Data

Five gauging stations of streamflow have been operated by DPWH around the Study area as shown in Fig. C.2.1, and the data of the streamflow at those stations have collected as shown in Fig. C.3.1.

The duration and quantity of rainfall is areally varied in accordance with locations. In order to compare the hydrological homogeneous between the Study area and five river basins said above, the correlation coefficients between annual rainfall of the Baguio station and annual runoff of the following gaging stations were computed as follows:

River	Gauging Station	Catchment area (km)	Correlation coefficient
Naguilian R.	Mamatling	304.0	0.87
Bokod R.	Bokod	102.0	0.61
Twin R	Baloy	87.0	-
Agno R.	Adaoay	246.0	0.17
Agno R.	San Roque	1225.0	-

As shown in the above, only the Naguilian river is hydrologically correlated, because the river is the mainstream of the Balili river.

3.2 Streamflow Measurement

Two automatic water stage gauges were installed in the Ambiong creek and the Wangal creek which are tributaries of the Balili river, and five water stage staffs were installed in small creeks flowing into the Project area.

The location of the installations is shown in Fig. C.3.2.

As for automatic gauges, the observating condition of the gauges was periodically inspected, and the recording chart was monthly interchanged and processed.

Reading and recording of water stage staffs had been carried out two times a day. Moreover, discharge measurements were carried out at every sites to formulate the rating curves.

Collected streamflow data of those stations are listed as follows:

Station	Catchment area (km^2)	Equipment	Observed term	Remarks
Wangal	5.0	Automatic gauge	88' Sep. - Dec.	No available data were collected because of frequent mischief.
		Staff	88' Sep. - Dec.	Reliable data were collected.
Ambiong	1.8	Automatic gauge	88' Aug. -	Good data for flood analysis were partly collected.
Balili	23.0	Staff	88' Nov.	Only partly data were collected because the staff was flown by flood.
Pico	1.5	Staff	88' Sep. - Dec.	Unreliable data were included because of afflux by temporary weir.
Poblacion	30.0	Staff	88' Sep.	No data were collected.
Bahong	1.8	Staff	88' Sep. - Dec.	Reliable data were collected.
Bineng	0.6	Staff	88' Sep. - Dec.	Reliable data were collected.

Rating curves of the gauging sites which transform the value of the water stage to the value of runoff are shown in Fig.C.3.3. The observed daily runoff of each gauging site is listed in Table.C.3.1.

3.3 Runoff Estimation for Long Term

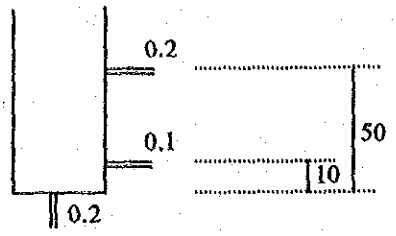
3.3.1 Simulation model

The Sugawara's tank model is applied for runoff estimation. The tank model is composed four tanks which have a few orifices. Rainfall is inputted into the first tank, and calculate direct runoff and seepage which will be inputted to the below tanks. Same number of calculation will be carried out in every tanks. Sum of direct runoff from respective tanks is regarded as estimated runoff from the catchment.

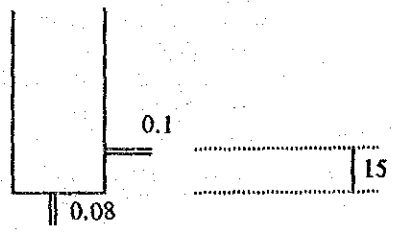
3.3.2 Model's parameter

Tank model parameters were fixed so as to accord observed runoff with the estimated runoff as much as possible.

The obtained tank model parameters which could estimate realistic runoff of every stations, have been illustrated below :



Ho* = 0 mm



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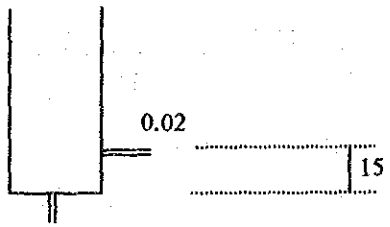
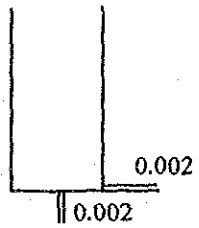


Ho = 25 mm



Ho = 380 mm

* Ho : Initial storage height

The comparison of estimated runoff and observed runoff at the gauging sites are shown in Fig.C.3.4.

3.3.3 Estimated runoff

Runoff from the Balili river basin was estimated by means of the tank model mentioned above.

Rainfall data of BSU station from 1977 to 1987 was used for the estimation.

The result is summarized below:

Year	Rainfall (mm)	Estimated runoff (MCM)	
		Balili River (31.4 km^2)	Wangal Creek (5.5 km^2)
1977	3676.8	89.12	15.61
1978	3406.3	82.33	14.42
1979	2903.4	69.01	12.09
1980	4524.0	114.24	20.01
1981	3987.7	99.56	17.44
1982	4033.6	99.62	17.45
1983	2372.6	55.01	9.63
1984	3428.7	81.13	14.21
1985	4362.4	105.60	18.50
1986	4057.7	102.59	17.97
1987	2574.9	60.54	10.60

Estimated runoff and runoff coefficient are listed in Table C.3.2 respectively.

3.4 Runoff Analysis for Flood

3.4.1 Simulation model

Plenty of methodologies for runoff analysis have been released so far. In this Project, the following two conditions should be considered for selecting the method for runoff analysis among these.

a. Topographic condition of the Project area is considerably steep, therefore, liner runoff model like as the unit graph method cannot be expected to obtain reasonable result.

b. The divided watershed model is recommendable to check up the results with the discharge data of the Ambiong creek in which automatic water stage gage was installed by JICA team.

Under the above conditions, it was decided that the kinematic wave method should be adopted. it is regarded as a reasonable hydrologic model explained below.

The Kinematic Wave method, or Characteristic method, an approach which utilizes hydraulic equations to solve unsteady flow in open channels, can be reasonably adopted to simulate overland and channel flows. The basic concepts are presented below.

(1) Equation of Motion and Continuity

The equation of motion and continuity for unsteady flow at constant lateral inflow is as follows:

$$\frac{\partial u}{\partial t} + \alpha u \frac{\partial u}{\partial x} - (\alpha - 1)\frac{u\partial A}{A\partial t} + g\cos\theta \frac{h}{x} = g\sin\theta - \frac{\tau o}{\rho R} - \frac{\alpha u g}{A} \quad \text{---------- (1)}$$

$$\frac{\partial A}{\partial t} + \frac{\partial u}{\partial x} = q \quad \text{---------- (2)}$$

Where, q: lateral inflow in unit length of the channel

u: mean velocity

A: water area

h: water depth

R: hydraulic radius

Q: discharge

α: coefficient

θ: canal slope

ρ: density of water

τo: shear stress on the canal bottom

g: gravitational acceleration

x: distance

t: time

Determination of the exact solution of the above equations is extremely elaborate and complex. However, approximate solutions are obtained by assuming the lateral inflow to be steady and uniform as follows:

$\alpha = 1$ and the shear stress to be given by the equation

$$\frac{\tau o}{R\rho} = \frac{n^2 g u^2}{R^{3/4}}$$

Where n is the coefficient of roughness. The approximate characteristic solution to the equation is as follows:

$$\frac{dx}{dt} = \left(1 - \frac{2}{3\beta}\right)u + \frac{(1 - 2/3\beta)\,ugR^{4/3}}{2n^2gAu + gR^{4/3}} \quad \text{---------- (3)}$$

Where $\frac{dA}{dt} = q$ ---------- (4)

or $\frac{dQ}{dx} = q$ ---------- (5)

subject to $= (R/A)/(dR/dA)$

The relation of A and u can be given as follows :

$$u = \sqrt{\{(1+\frac{2}{3\beta})+\frac{gR^{4/3}}{2gn^2A}\}^2+\frac{R^{4/3}}{n^2}\sin\theta - \frac{2(1-2/3\beta)\,u\,(qR^{4/3}/2gn^2A)^2}{u+qR^{4/3}/2gn^2A}} - (1+\frac{2}{3\beta})\frac{qR^{4/3}}{2gn^2A}$$

---------- (6)

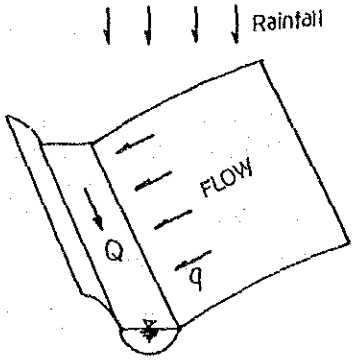
When $q = 0$

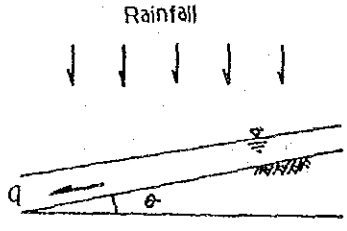
$$\frac{dx}{dt} = (1-\frac{2}{3\beta})$$ ---------- (7)

$A = \text{const}$ or $Q = \text{const}$ ---------- (8)

$$Q = Au = \frac{A}{n}R^{2/3}(\sin\theta)^{1/2}$$ ---------- (9)

Overland flow





(2) Overland flow

The continuity and flow equations of overland flow can be expressed as:

$$\frac{\partial h}{\partial t} + \frac{\partial q}{\partial x} = \alpha r \quad \text{---------- (10)}$$

$$h = kq^P \quad \text{---------- (11)}$$

Where, : lateral inflow in unit length of the channel

h : water depth

r : rainfall intensity

α : constant

k,p : characteristic constants of flow

assuming the manning formula,

$$q = \frac{h}{n} R^{2/3} i^{1/2}$$

as the resistance equation, Equation (11)

can be derived:

$$h = \left(\frac{n}{i^{1/2}}\right)^{0.6} q^{0.6} \quad \text{---------- (12)}$$

Therefore,

$$k = \left(\frac{n}{i^{1/2}}\right)^{0.6}$$

and $p = 0.6$

(3) Channel flow

The continuity and flow equation of channel flow can be expressed as same as overland flow:

$$\frac{\partial W}{\partial t} + \frac{\partial Q}{\partial x} = q \quad \text{---------- (13)}$$

$$W = KQ^P \quad \text{---------- (14)}$$

Where, Q: discharge in channel
W: water area
q: lateral inflow in unit length of the channel
K,P: characteristic constants of channel

K,P should be determined in considering the relation between area and discharge of actual channel section.

3.4.2 Probable flood discharge

No flood records for the Balili river have been obtained so far. Flood analysis by the Kinematic Wave method was carried out with probable rainfall intensity curves, with the reference observed hydrograph at the tributary of the Balili river.

According to the analysis, provable flood discharge of the Balili river at 31.4 km^2 catchment area decided as follows :

(Unit : m^3/s)

Return period	Provable flood discharge of Balili river
2 years	254
5 years	349
10 years	498
20 years	577
30 years	612
50 years	679
100 years	771

3.4.3 Estimated runoff

Estimation of runoff for flood is indispensable for inundation analysis mentioned in G. Drainage and Flooding. The details of conditions and results are described in the Appendix G. In order to reasonably estimate of effective rainfall, the relation between rainfall and rainfall losses of the Balili river basin were analyzed as shown in Fig.C.3.5.

Table C.2.1 Daily Rainfall Record in the Project Area (1/3)

OCT. 1987

	BAGUIO PAGASA		BSU PAGASA		AMBIONG		PUGUIS		BAHONG		WANGAL		BINENG	
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2.2	2.2	0.0	0.0	0.0	0.0	4.5	4.5	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	2.2	0.8	0.8	0.0	0.0	1.0	5.5	15.5	15.5	0.0	0.0	0.0	0.0
4	15.8	18.0	22.0	22.8	0.0	0.0	0.0	5.5	7.5	23.0	0.0	0.0	1.2	1.2
5	5.6	23.6	6.4	29.2	0.5	0.5	13.6	19.1	0.0	23.0	18.2	18.2	12.6	13.8
6	0.0	23.6	0.0	29.2	20.5	21.0	5.8	24.9	7.5	30.5	0.0	18.2	8.5	22.3
7	0.0	23.6	0.0	29.2	0.6	21.6	0.0	24.9	0.0	30.5	0.0	18.2	0.0	22.3
8	0.0	23.6	0.0	29.2	0.0	21.6	0.0	24.9	0.0	30.5	0.0	18.2	0.0	22.3
9	0.0	23.6	0.0	29.2	0.0	21.6	0.0	24.9	0.0	30.5	0.0	18.2	0.0	22.3
10	35.8	59.4	3.5	32.7	0.0	21.6	0.0	24.9	0.0	30.5	0.0	18.2	0.0	22.3
Sub-Total	59.4		32.7		21.6		24.9		30.5		18.2		22.3	
11	12.0	71.4	10.0	42.7	0.0	21.6	1.5	26.4	15.2	45.7	7.0	25.2	6.5	28.8
12	1.4	72.8	0.0	42.7	18.5	40.1	15.2	41.6	7.8	53.5	5.5	30.7	8.7	37.5
13	0.2	73.0	1.0	43.7	0.0	40.1	1.5	43.1	3.7	57.2	4.5	35.2	4.4	41.9
14	0.0	73.0	0.0	43.7	0.5	40.6	0.0	43.1	2.7	59.9	6.0	41.2	2.8	44.7
15	0.0	73.0	0.0	43.7	0.0	40.6	0.0	43.1	0.0	59.9	0.0	41.2	0.0	44.7
16	0.0	73.0	0.0	43.7	0.0	40.6	0.0	43.1	0.0	59.9	0.0	41.2	0.0	44.7
17	0.0	73.0	0.0	43.7	0.0	40.6	0.0	43.1	0.0	59.9	0.0	41.2	0.0	44.7
18	0.0	73.0	0.0	43.7	0.0	40.6	0.0	43.1	0.0	59.9	0.0	41.2	0.0	44.7
19	0.1	73.1	0.0	43.7	0.0	40.6	0.0	43.1	0.0	59.9	0.0	41.2	5.1	49.8
20	30.0	103.1	36.0	79.7	0.5	41.1	15.5	58.6	45.0	104.9	7.3	48.5	0.0	49.8
Sub-Total	43.7		47.0		19.5		33.7		74.4		30.3		27.5	
21	0.0	103.1	0.8	80.5	30.0	71.1	28.0	86.6	12.5	117.4	11.2	59.7	14.4	64.2
22	0.0	103.1	0.0	80.5	0.0	71.1	0.5	87.1	1.5	118.9	0.0	59.7	0.0	64.2
23	270.4	373.5	238.2	318.7	203.2	274.3	143.0	230.1	82.8	201.7	135.1	194.8	94.3	158.5
24	113.4	486.9	118.2	436.9	473.7	748.0	627.4	857.5	419.6	621.3	466.0	660.8	447.5	606.0
25	1.0	487.9	2.9	439.8	24.5	772.5	22.3	879.8	18.4	639.7	32.7	693.5	31.8	637.8
26	0.0	487.9	0.0	439.8	0.0	772.5	0.0	879.8	0.0	639.7	0.0	693.5	0.0	637.8
27	3.2	491.1	11.2	451.0	0.0	772.5	6.7	886.5	20.4	660.1	3.5	697.0	6.1	643.9
28	0.0	491.1	0.0	451.0	0.0	772.5	1.3	887.8	0.0	660.1	0.0	697.0	0.0	643.9
29	0.0	491.1	1.4	452.4	8.5	781.0	6.9	894.7	9.9	670.0	0.0	697.0	0.0	643.9
30	11.0	502.1	4.0	456.4	0.0	781.0	3.4	898.1	0.0	670.0	8.2	705.2	16.0	659.9
31	0.4	502.5	23.6	480.0	0.0	781.0	15.6	913.7	11.8	681.8	8.4	713.6	9.8	669.7
Sub-Total	399.4		400.3		739.9		855.1		576.9		665.1		619.9	
Total	502.5		480.0		781.0		913.7		681.8		713.6		669.7	

Table C.2.1 Daily Rainfall Record in the Project Area (2/3)

NOV. 1987

	BAGUIO PAGASA		BSU PAGASA		AMBIONG		PUGUIS		BAHONG		WANGAL		BINENG	
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	5.6
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6
Sub-Total	0.0		0.0		0.0		0.0		0.0		0.0		5.6	
11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6
13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6
15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6
16	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6
17	0.0	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6
18	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6
19	1.5	1.7	6.4	6.6	0.0	0.0	0.0	0.0	0.0	0.0	6.8	6.8	0.0	5.6
20	0.0	1.7	0.0	6.6	9.5	9.5	3.1	3.1	0.0	0.0	0.0	6.8	0.0	5.6
Sub-Total	1.7		6.6		9.5		3.1		0.0		6.8		0.0	
21	4.4	6.1	1.0	7.6	0.0	9.5	1.3	4.4	0.0	0.0	0.0	6.8	0.0	5.6
22	0.4	6.5	0.0	7.6	0.0	9.5	0.0	4.4	0.0	0.0	0.0	6.8	0.0	5.6
23	0.0	6.5	0.0	7.6	0.0	9.5	0.0	4.4	0.0	0.0	0.0	6.8	0.0	5.6
24	0.0	6.5	0.0	7.6	0.0	9.5	0.0	4.4	0.0	0.0	0.0	6.8	0.0	5.6
25	0.0	6.5	0.0	7.6	0.0	9.5	0.0	4.4	0.0	0.0	0.0	6.8	0.0	5.6
26	3.0	9.5	3.0	10.6	5.5	15.0	0.0	4.4	0.0	0.0	0.0	6.8	0.0	5.6
27	0.0	9.5	0.0	10.6	0.0	15.0	3.1	7.5	0.0	0.0	0.0	6.8	0.0	5.6
28	0.0	9.5	0.0	10.6	0.0	15.0	0.0	7.5	0.0	0.0	0.0	6.8	0.0	5.6
29	0.0	9.5	0.0	10.6	0.0	15.0	0.0	7.5	0.0	0.0	0.0	6.8	0.0	5.6
30	0.0	9.5	4.5	15.1	0.0	15.0	0.0	7.5	0.0	0.0	0.0	6.8	0.0	5.6
31	0.0	9.5	0.0	15.1	0.0	15.0	1.4	8.9	0.0	0.0	0.0	6.8	0.0	5.6
Sub-Total	7.8		8.5		5.5		5.8		0.0		0.0		0.0	
Total	9.5		15.1		15.0		8.9		0.0		6.8		5.6	

Table C.2.1 Daily Rainfall Record in the Project Area (3/3)

DEC. 1987

	BAGUIO PAGASA		BSU PAGASA		AMBIONG		PUGUIS		BAHONG		WANGAL		BINENG	
1	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.2	0.0	0.0	3.1	3.1	0.0	0.0	0.0	0.0	0.0	0.0
3	1.2	1.2	0.0	0.2	0.0	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0
4	3.4	4.6	4.8	5.0	0.1	0.1	3.1	6.2	0.0	0.0	12.5	12.5	10.5	10.5
5	17.6	22.2	16.0	21.0	10.5	10.6	7.0	13.2	12.0	12.0	15.0	27.5	9.0	19.5
6	0.0	22.2	0.4	21.4	4.0	14.6	9.2	22.4	13.0	25.0	0.0	27.5	9.3	28.8
7	0.0	22.2	0.0	21.4	0.0	14.6	0.0	22.4	0.0	25.0	0.0	27.5	0.0	28.8
8	0.0	22.2	0.0	21.4	0.0	14.6	0.0	22.4	0.0	25.0	0.0	27.5	0.0	28.8
9	2.2	24.4	1.8	23.2	1.5	16.1	0.0	22.4	0.0	25.0	0.0	27.5	0.0	28.8
10	1.6	26.0	6.4	29.6	0.3	16.4	0.0	22.4	4.0	29.0	4.5	32.0	2.4	31.2
Sub-Total	26.0		29.6		16.4		22.4		29.0		32.0		31.2	
11	0.0	26.0	0.0	29.6	0.0	16.4	2.1	24.5	0.0	29.0	0.0	32.0	0.0	31.2
12	0.0	26.0	0.0	29.6	0.0	16.4	0.0	24.5	0.0	29.0	0.0	32.0	0.0	31.2
13	0.0	26.0	0.0	29.6	0.0	16.4	0.0	24.5	0.0	29.0	0.0	32.0	0.0	31.2
14	0.0	26.0	0.0	29.6	0.0	16.4	0.0	24.5	0.0	29.0	0.0	32.0	0.0	31.2
15	0.0	26.0	0.0	29.6	0.0	16.4	0.0	24.5	0.0	29.0	0.0	32.0	0.0	31.2
16	0.0	26.0	0.0	29.6	0.0	16.4	0.0	24.5	0.0	29.0	0.0	32.0	0.0	31.2
17	0.4	26.4	0.0	29.6	0.0	16.4	0.0	24.5	0.0	29.0	0.0	32.0	0.0	31.2
18	0.2	26.6	0.0	29.6	0.0	16.4	0.0	24.5	0.0	29.0	0.0	32.0	0.0	31.2
19	0.0	26.6	0.0	29.6	0.0	16.4	0.0	24.5	0.0	29.0	0.0	32.0	0.0	31.2
20	0.0	26.6	0.0	29.6	0.0	16.4	0.0	24.5	0.0	29.0	0.0	32.0	0.0	31.2
Sub-Total	0.6		0.0		0.0		2.1		0.0		0.0		0.0	
21	0.0	26.6	0.0	29.6	0.0	16.4	0.0	24.5	0.0	29.0	0.0	32.0	0.0	31.2
22	0.0	26.6	0.0	29.6	0.0	16.4	0.0	24.5	0.0	29.0	0.0	32.0	0.0	31.2
23	1.1	27.7	10.4	40.0	0.0	16.4	5.1	29.6	6.5	35.5	41.5	73.5	18.0	49.2
24	0.0	27.7	0.0	40.0	0.0	16.4	0.0	29.6	0.0	35.5	0.0	73.5	0.0	49.2
25	0.0	27.7	0.0	40.0	0.0	16.4	0.0	29.6	0.0	35.5	0.0	73.5	0.0	49.2
26	0.0	27.7	0.0	40.0	0.0	16.4	0.0	29.6	0.0	35.5	0.0	73.5	0.0	49.2
27	0.0	27.7	0.0	40.0	0.0	16.4	0.0	29.6	0.0	35.5	0.0	73.5	0.0	49.2
28	0.0	27.7	0.0	40.0	0.0	16.4	0.0	29.6	0.0	35.5	0.0	73.5	0.0	49.2
29	0.0	27.7	0.0	40.0	0.0	16.4	0.0	29.6	0.0	35.5	0.0	73.5	0.0	49.2
30	0.0	27.7	0.0	40.0	0.0	16.4	0.0	29.6	0.0	35.5	0.0	73.5	0.0	49.2
31	0.0	27.7	0.0	40.0	0.0	16.4	0.0	29.6	0.0	35.5	0.0	73.5	0.0	49.2
Sub-Total	1.1		10.4		0.0		5.1		6.5		41.5		18.0	
Total	27.7		40.0		16.4		29.6		35.5		73.5		49.2	

Table C.2.2 Rainfall data of BAGUIO PAGASA and BSU PAGASA Stations

Unit: mm

	BAGUIO PAGASA			BSU PAGASA (La Trinidad)		
	Dry 1)	Wet 2)	Annual	Dry	Wet	Annual
1949	213.5	2554.2	2767.7			
1950	378.2	4078.0	4456.2			
1951	217.8	3494.0	3711.8			
1952	433.6	2126.5	2560.1			
1953	913.1	2859.7	3772.8			
1954	621.9	1902.0	2523.9			
1955	248.8	1924.8	2173.6			
1956	461.0	2991.4	3452.4			
1957	183.4	2777.7	2961.1			
1958	87.8	2837.0	2924.8			
1959	397.3	1614.6	2011.9			
1960	555.4	3265.4	3720.8			
1961	262.3	3166.4	3428.7			
1962	140.7	3343.4	3484.1			
1963	120.2	3625.5	3745.7			
1964	498.3	3943.3	4441.6			
1965	368.2	2518.5	2886.7			
1966	311.1	2968.3	3279.4			
1967	359.3	5181.3	5540.6			
1968	80.3	4850.2	4930.5			
1969	202.5	3738.3	3940.8			
1970	230.4	2631.2	2861.6			
1971	286.9	3421.9	3708.8			
1972	185.2	689.9	7167.1			
1973	121.1	2476.2	2597.3			
1974	809.5	5305.0	6114.5			
1975	148.9	2171.6	2320.5			
1976	170.9	4132.9	4303.8			
1977	253.2	3356.4	3609.6	373.0	3303.8	3676.8
1978	120.1	3645.5	3765.6	195.9	3210.4	3406.3
1979	188.7	2771.0	2959.7	201.8	2701.6	2903.4
1980	944.9	3462.6	4407.5	995.3	3528.7	4524.0
1981	490.0	3340.3	3830.3	370.0	3617.7	3987.7
1982	383.2	3320.1	3703.3	367.0	3666.6	4033.6
1983	139.2	2077.9	2217.1	197.8	2124.8	2322.6
1984	294.5	3487.4	3781.9	289.9	3138.8	3428.7
1985	422.0	4343.0	4765.0	441.5	3920.9	4362.4
1986	98.8	4616.8	4715.6	159.2	3898.9	4058.1
1987	74.8	2651.4	2726.2	100.7	2474.2	2574.9

1) Dry season : November - April
2) Wet season : May - October

Table C.2.3 Mean Temperature

Station: BAGUIO PAGASA

Unit : °C

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
1949	16.8	18.3	18.3	20.1	20.7	19.9	19.3	19.3	19.1	19.1	18.7	-	-
1950	17.9	18.4	19.4	20.0	20.3	19.5	18.5	18.5	19.3	18.8	18.4	17.3	18.9
1951	18.4	18.2	19.0	20.5	19.6	19.3	19.4	18.3	19.3	19.5	19.5	18.5	19.1
1952	18.3	19.2	19.8	20.1	20.5	19.8	19.4	18.7	19.2	19.7	19.1	19.3	19.4
1953	17.5	19.1	19.7	20.1	20.1	19.5	19.1	19.0	19.0	19.7	19.2	18.5	19.2
1954	18.5	18.7	19.1	20.2	20.7	20.1	19.8	18.7	17.3	18.8	17.7	17.8	19.0
1955	17.5	18.0	19.0	19.6	20.3	19.6	19.1	19.0	19.6	19.4	19.0	16.6	18.9
1956	18.0	18.6	19.6	20.2	20.2	19.8	19.4	18.8	18.1	19.4	18.8	18.2	19.1
1957	18.1	18.3	19.9	20.5	20.7	19.7	19.6	19.2	18.8	19.2	18.1	19.0	19.3
1958	18.5	18.2	20.0	20.5	20.7	19.4	19.1	19.3	19.2	19.7	18.7	18.4	19.3
1959	17.8	19.2	19.4	20.3	20.5	20.7	19.8	18.8	19.3	19.0	18.7	18.8	19.4
1960	18.8	18.9	19.7	20.3	20.9	19.7	20.5	18.8	19.8	19.4	19.7	18.2	19.6
1961	16.8	19.9	19.9	20.9	20.7	20.2	18.3	18.8	19.0	19.1	19.1	19.0	19.3
1962	17.3	17.8	20.4	20.7	20.9	20.4	19.2	19.5	19.2	19.4	18.9	18.0	19.3
1963	11.1	16.0	18.9	19.7	20.7	18.7	19.1	19.8	19.2	19.7	19.6	18.6	18.4
1964	18.9	18.6	19.4	20.4	20.3	19.6	19.8	18.6	19.5	19.4	18.5	17.6	19.2
1965	16.7	18.5	18.9	20.0	19.7	19.5	18.7	19.3	19.5	19.6	19.7	19.3	19.1
1966	18.4	19.3	19.9	20.6	19.3	20.3	19.9	19.4	18.4	19.7	19.2	19.3	19.5
1967	17.5	17.7	18.7	19.7	20.5	19.2	19.5	18.5	19.3	18.9	18.6	17.4	18.8
1968	17.3	17.0	19.6	19.4	20.3	20.3	19.8	18.8	19.1	18.7	18.0	18.4	18.9
1969	18.8	17.8	19.7	20.5	20.9	20.2	19.6	19.4	19.4	19.3	18.7	18.6	19.4
1970	17.8	18.1	19.7	20.7	20.6	19.9	19.4	18.8	18.9	19.3	19.4	19.0	19.3
1971	16.1	18.0	18.2	19.7	-	19.6	18.9	19.1	19.2	19.2	18.7	18.6	-
1972	17.7	18.3	17.9	20.1	20.4	20.1	18.1	18.6	19.9	20.1	19.9	19.2	19.1
1973	18.2	19.2	19.5	21.0	21.0	20.4	19.7	19.5	20.2	19.5	19.9	18.2	19.7
1974	16.6	18.4	18.9	20.5	20.2	19.6	19.7	18.2	19.4	19.1	18.5	18.7	19.0
1975	18.8	18.1	19.6	20.7	20.8	20.3	19.7	18.5	20.0	19.5	19.1	18.1	19.4
1976	17.0	17.5	19.0	20.1	19.5	19.7	19.7	18.8	19.4	20.0	19.1	18.8	19.1
1977	19.1	17.5	19.2	20.5	20.6	20.8	19.8	19.6	18.7	19.9	18.8	18.5	19.4
1978	17.9	18.2	20.5	20.7	21.2	20.1	19.7	18.9	19.2	19.2	19.4	17.6	19.4
1979	17.9	19.3	20.0	20.6	20.1	20.8	20.3	18.8	20.3	19.5	19.4	17.6	19.6
1980	18.3	17.5	-	-	-	-	20.0	20.2	19.7	20.2	19.6	18.3	-
1981	16.5	18.8	20.2	21.2	20.9	20.2	20.0	19.1	20.4	20.3	19.6	18.1	19.6
1982	17.0	18.7	20.4	20.7	21.1	21.2	19.4	19.3	19.8	19.9	19.8	19.3	19.7
1983	18.7	18.6	20.0	21.4	23.9	21.6	21.1	19.1	20.7	20.4	19.4	18.4	20.3
1984	18.7	19.1	20.5	21.0	20.8	20.2	20.1	18.7	20.3	19.6	19.8	18.6	19.8
1985	17.6	20.3	20.2	21.1	20.8	19.4	19.9	18.6	20.1	19.5	19.8	18.4	19.6
1986	17.1	17.2	19.8	20.9	20.1	20.2	20.1	18.8	19.2	19.6	19.5	18.2	19.2
1987	17.5	18.3	-	21.2	21.3	20.7	20.5	20.1	20.1	22.4	20.7	19.5	-
AVERAGE	17.6	18.4	19.5	20.4	20.6	20.0	19.6	19.0	19.4	19.6	19.1	18.4	19.3

Table C.2.4 Maximum Temperature

Station : BAGUIO PAGASA

Unit: °C

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
1949	21.3	23.0	23.4	24.7	25.3	23.6	22.7	22.7	22.4	22.7	22.5	22.5	23.1
1950	22.7	23.1	24.2	24.4	24.0	22.9	21.3	21.5	22.9	22.3	22.4	21.7	22.8
1951	23.0	22.9	24.2	25.0	23.2	22.7	22.8	20.7	22.3	23.6	23.2	22.3	23.0
1952	22.7	24.2	24.7	24.5	24.4	23.2	22.6	22.4	22.6	23.5	23.2	22.6	23.4
1953	22.1	24.0	24.7	24.3	24.0	22.8	22.5	21.8	22.1	23.6	22.9	22.2	23.1
1954	23.3	23.7	23.6	24.6	25.1	23.9	23.9	21.9	21.4	22.8	21.5	22.2	23.2
1955	21.9	23.1	24.2	23.9	24.3	23.2	22.4	22.3	23.5	23.1	22.7	21.2	23.0
1956	22.4	23.6	24.7	24.5	24.3	23.5	23.2	21.9	20.7	23.3	22.6	21.8	23.0
1957	22.8	23.8	24.9	25.4	25.4	23.2	23.6	22.2	21.9	23.0	22.2	23.4	23.5
1958	23.4	22.8	25.2	25.5	25.0	22.4	23.2	23.5	22.4	23.7	23.1	23.4	23.6
1959	23.0	24.4	24.3	25.6	25.1	25.3	23.8	22.4	23.4	23.9	23.2	23.5	24.0
1960	23.8	23.7	25.1	24.8	25.4	23.2	24.7	21.6	23.8	23.6	24.6	23.3	24.0
1961	22.6	25.4	24.9	26.3	25.0	24.0	21.0	22.0	22.4	23.5	23.7	24.0	23.7
1962	22.6	23.8	25.8	25.9	25.7	24.7	22.3	23.5	22.7	23.9	23.5	22.9	23.9
1963	20.2	21.9	24.6	25.1	25.5	21.7	22.4	23.2	22.0	24.0	24.4	22.7	23.1
1964	24.1	24.0	24.6	25.6	24.4	23.3	23.6	21.3	23.0	23.2	21.7	21.5	23.4
1965	21.2	21.8	24.0	24.8	23.5	22.9	21.8	22.9	23.3	23.8	23.7	23.9	23.1
1966	23.2	24.2	25.2	25.3	24.7	24.1	23.5	22.4	21.2	23.7	22.4	23.1	23.6
1967	22.0	22.8	23.6	23.8	24.7	22.2	22.7	20.6	22.7	22.6	22.6	21.8	22.7
1968	21.9	22.1	24.6	24.0	24.3	24.3	23.0	21.5	22.1	22.9	22.8	23.5	23.1
1969	23.6	23.0	24.6	25.1	24.9	23.6	22.7	22.6	22.5	23.3	22.7	22.6	23.4
1970	21.9	22.7	24.3	25.2	24.7	23.2	22.6	21.5	22.1	22.4	22.8	22.9	23.0
1971	20.5	22.4	23.0	24.2	23.8	22.9	21.9	22.4	22.6	22.7	22.4	22.2	22.6
1972	21.8	23.3	22.7	24.8	24.5	23.7	19.6	21.2	23.7	24.7	24.3	23.9	23.2
1973	23.1	24.2	25.0	26.2	25.0	24.1	22.8	22.7	24.0	23.0	23.9	22.4	23.9
1974	21.2	23.4	23.8	25.3	24.3	22.9	23.6	20.5	23.3	22.2	22.1	22.4	22.9
1975	22.6	23.0	24.5	25.5	25.1	23.9	24.0	21.1	23.9	23.2	23.7	21.9	23.5
1976	21.7	22.7	23.7	25.0	22.9	23.4	23.4	22.1	23.1	24.2	23.4	23.2	23.2
1977	23.6	22.9	24.6	24.7	25.1	25.2	23.4	23.3	21.6	24.9	23.4	23.6	23.9
1978	23.6	23.7	25.8	25.7	25.8	23.9	23.4	21.5	22.4	22.5	23.1	23.6	23.8
1979	23.2	24.7	25.3	25.4	23.8	24.9	24.2	21.6	24.6	23.8	23.7	22.4	24.0
1980	23.2	23.0	-	-	-	-	23.9	24.1	23.5	24.5	23.7	23.0	-
1981	21.4	24.5	26.2	26.5	25.4	24.1	23.8	22.0	24.5	24.7	23.9	23.0	24.2
1982	22.6	24.3	26.2	25.5	25.9	25.6	22.5	22.6	23.7	24.6	24.4	23.5	24.3
1983	23.5	24.3	25.7	27.2	26.8	26.2	25.3	23.6	25.1	24.5	24.2	23.6	25.0
1984	23.7	24.8	25.7	26.2	25.4	24.1	24.4	21.7	25.1	23.4	24.4	24.2	24.4
1985	23.2	26.0	25.9	25.2	25.5	22.4	24.1	21.8	24.6	23.6	24.5	23.6	24.2
1986	22.9	22.2	25.8	24.6	24.2	24.4	24.1	21.6	23.2	23.7	24.0	23.4	23.7
1987	23.1	24.8	26.8	26.2	25.9	24.6	24.5	23.8	24.0	24.7	25.6	24.4	24.9
AVERAGE	22.6	23.5	24.7	25.2	24.8	23.7	23.1	22.2	23.0	23.5	23.3	22.9	23.5

Table C.2.5 Minimum Temperature

Station : BAGUIO PAGASA

Unit: °C

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
1949	12.4	13.6	13.3	15.7	16.2	16.3	16.0	16.1	15.9	15.6	14.8	14.8	15.1
1950	13.1	13.8	14.7	15.6	16.7	16.2	15.8	15.5	15.8	15.4	14.4	13.0	15.0
1951	13.8	13.5	13.9	16.1	16.1	16.0	16.1	15.9	16.1	15.6	15.9	14.7	15.3
1952	14.0	14.3	15.1	15.8	16.8	16.6	16.2	15.7	15.8	16.1	15.1	14.9	15.5
1953	13.0	14.3	14.8	16.1	16.3	16.3	15.8	16.2	15.9	16.0	15.6	15.0	15.4
1954	13.8	13.9	14.8	16.0	16.4	16.3	15.9	15.6	15.4	14.9	14.1	13.5	15.1
1955	13.2	12.9	13.7	15.4	16.5	16.1	15.7	15.7	15.8	15.8	15.2	12.2	14.9
1956	13.5	13.7	14.4	15.9	16.2	16.2	15.6	15.6	15.5	15.5	15.0	14.6	15.2
1957	13.4	12.8	14.9	15.6	15.9	16.3	16.0	16.2	15.7	15.4	14.0	14.5	15.1
1958	13.6	13.3	14.7	15.5	16.4	16.5	16.0	16.1	16.1	15.7	14.3	13.4	15.1
1959	12.6	13.9	14.4	15.0	15.9	16.3	15.8	15.2	14.8	14.1	14.2	14.0	14.7
1960	13.9	14.1	14.2	15.7	16.3	16.2	16.2	16.0	15.8	15.1	14.7	13.1	15.1
1961	11.0	13.1	14.8	15.5	16.4	16.3	15.5	15.6	15.5	14.8	14.5	14.0	14.8
1962	12.1	11.0	15.0	15.5	16.0	16.1	16.1	15.5	15.7	14.9	14.2	13.1	14.6
1963	11.1	11.2	13.1	14.2	15.8	15.7	15.8	16.3	16.3	15.3	14.7	14.4	14.5
1964	13.7	13.1	14.2	15.2	16.2	15.9	16.0	15.8	15.9	15.5	15.3	13.6	15.0
1965	12.1	14.7	13.7	15.2	15.9	16.0	15.6	15.7	15.7	15.3	15.7	14.7	15.0
1966	13.6	14.4	14.6	15.9	16.4	16.4	16.2	16.3	15.5	15.6	16.0	15.5	15.5
1967	13.0	12.5	13.7	15.6	16.2	16.2	16.2	16.3	15.8	15.1	14.6	12.9	14.8
1968	12.7	11.8	14.5	14.7	16.3	16.3	16.6	16.7	16.0	14.5	13.2	13.2	14.7
1969	13.9	12.5	14.7	15.9	16.9	16.8	16.4	16.1	16.2	15.3	14.7	14.5	15.3
1970	13.7	13.4	15.1	16.1	16.5	16.6	16.2	16.1	15.7	16.1	16.0	15.1	15.6
1971	11.7	13.6	13.4	15.2	16.2	16.2	15.9	15.8	15.8	15.7	14.9	14.9	14.9
1972	13.5	13.3	13.0	15.4	16.2	16.5	16.5	15.8	16.0	15.4	15.5	14.5	15.1
1973	13.2	14.2	14.0	15.8	16.9	16.7	16.6	16.2	16.3	16.0	15.9	14.3	15.5
1974	12.0	13.3	13.9	15.6	16.0	16.2	15.7	15.9	15.4	16.0	14.9	14.9	15.0
1975	13.7	13.2	14.4	15.5	16.5	16.4	18.9	15.9	15.7	15.9	14.3	14.3	15.4
1976	12.3	12.7	14.2	15.1	16.0	15.9	16.0	15.4	15.6	15.8	14.9	12.5	15.1
1977	14.4	12.7	13.7	15.7	15.9	16.3	19.3	15.9	15.6	14.9	14.2	13.3	15.2
1978	12.2	12.6	15.1	15.7	16.6	16.3	15.9	16.2	16.0	15.9	14.3	14.6	15.1
1979	12.6	13.9	14.6	15.9	16.2	16.6	16.4	15.9	16.0	15.2	15.1	12.8	15.1
1980	13.3	16.4	14.4	15.8	16.5	15.8	16.1	16.2	15.9	15.9	15.4	13.5	15.4
1981	11.6	13.1	14.2	15.7	16.4	16.3	16.2	16.2	16.2	15.9	15.3	13.1	15.0
1982	11.3	13.1	14.6	15.9	16.3	16.7	16.3	15.9	15.8	15.1	15.2	15.0	15.1
1983	13.9	12.8	14.2	15.4	20.9	17.0	16.9	16.2	16.3	16.3	14.6	13.3	15.7
1984	13.4	13.3	15.3	15.8	16.2	16.3	15.7	15.7	15.5	15.8	15.1	13.2	15.1
1985	12.1	14.6	14.6	15.8	16.0	16.4	15.6	15.4	15.1	15.4	15.0	13.3	14.9
1986	11.6	11.6	13.7	15.3	16.0	16.0	16.0	16.1	15.3	15.6	15.6	13.0	14.7
1987	11.9	11.8	14.3	16.1	16.6	16.7	16.5	16.3	16.0	20.0	15.7	14.6	15.5
AVERAGE	12.9	13.3	14.3	15.6	16.4	16.3	16.2	15.9	15.8	15.6	14.9	14.1	15.1

Table C.2.6 Dry Bulb Temperature

Station: BAGUIO PAGASA

Unit: °C

YEAR	JAN.	FEB.	MAR.	APR.	MAY.	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
1949	15.6	16.9	17.5	19.2	19.7	18.9	18.3	18.3	18.2	18.2	17.9	-	-
1950	16.7	17.1	18.3	19.0	18.9	18.3	17.6	17.7	18.3	17.9	17.5	16.2	17.8
1951	17.2	16.9	17.7	19.6	18.6	18.4	18.6	17.7	18.6	18.5	18.6	17.6	18.2
1952	17.3	17.9	18.7	19.0	19.4	18.8	18.3	17.8	18.0	19.0	18.2	17.7	18.3
1953	16.3	17.6	18.6	19.2	19.1	18.7	18.2	18.2	18.1	18.9	18.5	17.6	18.3
1954	17.5	17.6	18.0	19.2	19.8	19.3	18.7	17.9	17.7	18.0	15.9	16.9	18.0
1955	16.5	16.8	17.8	18.1	19.4	18.8	18.0	18.0	18.7	18.4	18.0	15.1	17.8
1956	16.7	17.4	18.3	19.0	19.1	19.0	18.4	18.0	17.7	18.5	17.9	17.4	18.1
1957	16.8	16.8	18.6	19.1	19.5	18.9	18.8	18.5	18.0	18.4	17.2	17.9	18.2
1958	17.2	16.9	18.7	19.5	19.6	18.6	18.3	18.8	18.2	18.8	17.8	16.9	18.3
1959	16.6	18.0	18.3	19.3	19.4	19.7	18.9	18.1	18.8	18.3	18.1	17.9	18.5
1960	17.6	17.3	18.7	19.2	19.7	18.8	18.9	18.1	18.8	18.5	18.8	17.2	18.5
1961	15.5	17.8	18.6	19.9	19.7	19.1	17.8	17.9	18.0	18.3	18.2	18.0	18.2
1962	16.0	16.5	19.2	19.7	20.1	19.4	18.4	18.6	18.7	18.8	18.3	17.2	18.4
1963	14.7	15.4	17.7	18.8	19.9	18.0	18.3	18.9	18.5	18.8	18.7	17.5	17.9
1964	17.7	17.2	18.3	19.5	19.7	18.8	18.9	18.0	18.8	18.6	17.7	16.7	18.3
1965	15.6	17.2	17.6	19.2	18.9	18.6	17.9	18.6	18.6	18.7	18.9	18.3	18.2
1966	17.3	18.1	18.9	19.8	18.7	19.6	19.1	18.6	17.8	18.9	18.6	18.5	18.7
1967	16.6	16.4	17.7	19.0	19.7	15.6	18.6	17.8	18.3	18.2	17.9	16.4	17.7
1968	16.2	16.0	18.6	14.4	19.4	19.3	19.1	18.3	18.6	18.1	17.1	17.2	17.7
1969	17.5	16.7	18.8	19.6	20.1	19.6	18.8	18.7	18.7	18.6	17.9	17.7	18.6
1970	16.9	16.9	18.8	19.8	19.8	19.1	18.7	18.1	18.1	18.6	18.6	18.3	18.5
1971	15.2	16.9	17.3	18.8	-	18.8	18.2	18.3	18.1	18.6	17.9	17.8	-
1972	16.6	17.3	16.7	19.0	19.3	19.3	18.0	17.9	19.0	19.4	19.1	18.2	18.3
1973	17.2	18.1	18.4	20.0	20.1	19.3	18.9	18.4	19.2	18.9	19.1	17.3	18.7
1974	15.2	17.1	17.8	19.5	19.2	18.9	18.6	17.8	18.6	18.7	17.8	17.9	18.1
1975	17.3	17.2	18.7	19.7	19.8	19.3	18.9	18.0	18.7	18.7	18.3	17.2	18.5
1976	15.8	16.5	18.0	19.2	18.8	18.8	18.8	18.0	18.4	19.3	18.3	17.6	18.1
1977	18.0	16.9	18.1	19.6	19.4	19.7	18.7	18.7	17.9	19.0	17.9	15.1	18.3
1978	16.8	16.8	19.4	19.8	20.0	19.0	18.5	18.0	18.2	18.5	17.8	18.0	18.4
1979	16.8	18.1	18.8	19.5	19.0	19.4	19.1	18.0	19.0	18.4	18.5	16.5	18.4
1980	17.1	17.5	18.7	20.0	19.4	20.0	18.9	18.9	-	19.2	18.6	17.1	-
1981	15.2	17.6	18.9	19.9	19.6	18.8	18.9	18.2	19.3	19.1	18.6	16.9	18.4
1982	15.6	17.3	18.9	19.4	19.8	19.9	18.5	18.2	18.5	18.8	18.5	18.1	18.5
1983	17.2	17.2	18.8	20.3	20.4	20.3	19.9	18.9	19.3	19.2	18.1	17.2	18.9
1984	17.0	17.7	19.2	19.7	19.2	19.1	18.8	18.0	19.3	18.4	18.7	17.4	18.5
1985	16.3	18.9	19.1	19.2	19.5	18.3	18.7	18.1	18.7	18.6	18.7	17.2	18.4
1986	16.3	16.4	18.8	20.2	19.1	19.1	18.8	18.2	18.5	18.8	18.7	17.2	18.3
1987	16.2	16.9	19.4	20.2	20.1	19.6	19.3	19.1	19.1	19.5	19.6	18.3	18.9
AVERAGE	16.6	17.2	18.4	19.3	19.5	19.0	18.6	18.2	18.5	18.7	18.2	17.3	18.3

Table C.2.7 Wat Bulb Temperature

Station: BAGUIO PAGASA

Unit: °C

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
1949	13.5	10.9	15.6	17.1	17.3	17.3	17.1	17.2	17.1	17.2	15.7	-	-
1950	14.7	15.1	15.9	17.4	17.7	17.4	17.0	17.0	17.5	16.7	16.0	11.3	16.1
1951	15.1	15.3	15.6	17.0	17.2	17.3	17.3	17.2	17.3	17.2	16.8	15.4	16.6
1952	15.1	15.3	16.3	17.1	17.9	17.7	17.3	17.1	17.1	17.4	16.6	15.8	16.7
1953	14.5	15.5	16.3	17.3	17.6	17.4	17.1	17.4	17.2	16.7	17.0	15.8	16.7
1954	15.2	15.5	16.0	17.3	17.8	17.7	17.4	17.0	16.9	16.8	15.2	14.5	16.4
1955	14.0	14.1	14.9	16.6	17.6	17.0	16.8	16.8	17.2	17.1	16.2	13.3	16.0
1956	14.9	15.2	15.5	17.0	17.2	17.4	17.1	17.1	16.8	16.9	16.2	15.3	16.4
1957	14.8	14.4	16.5	17.4	17.3	17.6	17.4	17.5	17.1	17.0	15.1	15.8	16.5
1958	14.7	14.8	16.2	17.0	17.8	17.6	-	17.2	17.4	17.2	15.4	14.6	-
1959	14.3	15.5	16.3	16.6	17.5	18.0	11.4	17.3	17.4	16.6	16.3	15.7	16.1
1960	15.5	15.4	16.4	17.5	17.9	17.7	17.9	17.9	17.5	17.0	16.2	15.1	16.8
1961	12.9	15.1	16.5	17.4	18.0	17.6	17.1	17.2	17.3	16.8	15.7	15.6	16.4
1962	14.2	13.8	16.7	17.4	18.1	17.9	17.6	17.5	17.5	17.3	16.2	15.2	16.6
1963	13.0	13.4	15.0	16.3	17.7	17.1	17.2	17.8	17.6	17.3	16.6	15.7	16.2
1964	15.1	14.1	16.1	16.8	18.2	17.5	17.7	17.4	17.6	17.2	16.5	14.9	16.6
1965	13.4	14.6	15.5	17.0	17.5	17.5	17.0	17.3	14.4	17.1	16.8	14.8	16.1
1966	17.3	15.8	16.3	17.6	17.6	18.0	17.5	17.6	17.0	17.3	16.8	16.1	17.1
1967	14.1	13.7	15.2	17.0	17.8	17.6	17.6	17.3	17.4	16.9	15.3	14.3	16.2
1968	14.0	13.5	16.0	15.8	17.6	17.6	17.9	17.6	17.6	16.1	14.8	14.2	16.1
1969	14.7	14.2	16.3	17.4	18.4	18.1	17.5	17.3	17.5	17.1	15.8	15.7	16.7
1970	15.1	14.6	16.5	17.4	17.9	17.7	15.7	17.3	17.0	17.1	16.6	15.9	16.6
1971	13.3	14.7	15.0	16.9	-	17.5	17.2	17.0	17.1	17.0	16.1	15.7	-
1972	14.5	14.6	17.2	17.0	17.7	17.9	17.6	17.0	17.7	17.3	16.6	15.7	16.7
1973	14.8	15.5	15.4	17.1	18.2	18.0	17.7	17.4	17.6	17.3	16.9	15.2	16.8
1974	13.4	14.8	15.5	17.2	17.4	17.6	17.3	17.1	17.0	17.4	16.2	15.4	16.4
1975	15.1	14.9	16.5	17.2	18.0	17.7	17.3	17.1	17.2	17.5	16.3	15.5	16.7
1976	10.4	14.5	15.9	16.7	17.6	17.5	17.7	16.9	17.3	17.4	16.4	15.8	16.2
1977	16.4	14.5	15.8	17.4	17.0	18.1	17.6	17.6	17.2	17.4	16.4	15.1	16.7
1978	14.7	14.6	17.0	17.4	17.9	17.9	17.5	17.6	17.4	17.3	15.9	16.0	16.8
1979	14.7	15.9	16.3	17.6	17.6	18.0	18.1	17.4	17.7	17.0	16.9	14.6	16.8
1980	15.2	-	16.2	17.8	18.0	17.8	17.9	17.8	17.6	17.7	17.3	15.5	-
1981	13.5	15.1	16.2	17.7	18.1	17.9	17.8	17.7	17.9	17.7	16.8	15.1	16.8
1982	13.6	15.1	16.5	18.0	18.2	18.6	17.9	15.5	17.6	17.3	16.6	16.7	16.8
1983	15.7	15.2	16.7	17.1	17.8	18.7	18.5	18.0	18.2	17.8	16.6	15.5	17.2
1984	15.5	15.6	17.3	17.9	18.0	18.0	17.9	17.5	18.0	17.4	16.9	15.6	17.1
1985	14.7	16.7	17.0	17.9	18.3	17.8	17.7	17.6	17.7	17.3	17.2	15.5	17.1
1896	14.4	14.4	16.7	17.9	18.0	17.8	17.9	17.7	17.6	17.4	17.5	15.7	16.9
1987	14.5	14.6	16.8	18.2	18.5	18.7	18.2	18.1	18.3	18.4	18.0	16.6	17.4
AVERAGE	14.5	14.8	16.1	17.2	17.8	17.7	17.3	17.3	17.3	17.2	16.4	15.3	16.6

Table C.2.8 Relative Humidity

Station : BAGUIO PAGASA

Unit: %

YEAR	JAN.	FEB.	MAR.	APR	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
1949	80	79	84	82	80	87	89	91	91	91	82	-	-
1950	93	82	80	87	90	92	94	93	93	89	85	86	89
1951	82	85	81	77	88	90	88	95	90	89	85	81	86
1952	80	77	81	85	87	90	92	93	92	78	86	88	86
1953	84	82	81	85	87	89	90	93	92	81	87	85	86
1954	80	81	83	84	84	86	88	93	93	90	84	79	85
1955	78	76	75	85	85	85	89	90	87	89	84	83	84
1956	84	80	76	84	85	86	88	91	92	86	85	82	85
1957	83	80	83	86	81	88	88	91	93	88	81	82	85
1958	78	81	79	79	86	91	91	87	94	87	80	80	84
1959	79	79	83	77	84	86	87	94	88	85	85	81	84
1960	82	84	80	86	85	90	91	96	89	87	80	81	86
1961	76	77	82	79	86	87	89	94	94	87	79	80	84
1962	84	76	79	80	84	87	93	90	90	87	82	82	85
1963	84	82	77	79	81	92	90	90	92	87	81	84	85
1964	78	76	81	78	87	89	89	95	89	88	89	83	85
1965	80	77	82	81	88	90	92	87	89	87	82	71	84
1966	77	81	78	81	90	87	87	91	93	87	85	80	85
1967	78	76	79	83	84	91	91	95	92	89	77	80	85
1968	80	77	78	78	85	85	89	94	91	83	79	73	83
1969	75	77	78	81	86	87	88	88	89	87	81	82	83
1970	83	79	80	80	84	88	89	93	90	87	82	79	85
1971	82	80	79	83	-	88	91	88	91	86	84	81	-
1972	81	76	82	83	86	88	96	92	89	82	79	78	84
1973	78	77	74	76	84	89	89	91	86	86	81	81	83
1974	79	79	80	79	84	89	80	94	86	88	86	80	84
1975	80	79	89	79	85	86	86	91	86	89	83	82	85
1976	82	85	81	79	89	87	90	90	90	84	83	84	85
1977	86	78	80	81	80	86	90	90	-	86	86	80	-
1978	81	80	80	80	82	90	91	96	93	89	83	82	86
1979	81	81	78	84	88	88	91	94	88	88	86	82	86
1980	83	79	78	81	88	81	91	90	91	87	88	85	85
1981	84	83	77	81	87	92	90	95	88	88	84	83	86
1982	81	80	79	88	86	89	95	94	92	87	83	87	87
1983	86	82	82	74	78	86	88	92	90	88	87	84	85
1984	86	81	84	93	89	90	92	95	89	91	84	84	88
1985	85	81	82	89	90	95	91	95	91	88	87	84	88
1986	82	87	82	82	90	89	92	95	92	88	98	86	89
1987	84	79	78	-	86	92	90	91	93	90	86	85	-
AVERAGE	82	80	80	82	86	88	90	92	90	87	84	82	85

Table C.2.9 Open Pan Evaporation

Station: BAGUIO PAOASA

Unit: mm/day

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
1949													
1950													
1951													
1952													
1953													
1954													
1955													
1956													
1957													
1958													
1959													
1960													
1961													
1962													
1963													
1964													
1965													
1966													
1967	3.3	4.0	4.1	3.6	3.5	3.0	-	1.5	2.4	-	3.7	2.6	-
1968	2.1	3.7	4.4	3.8	2.9	3.3	2.8	2.2	2.5	2.7	2.8	3.7	3.1
1969	3.8	3.7	4.2	3.8	3.2	3.3	2.8	3.2	2.1	2.9	4.3	5.4	3.6
1970	5.1	6.0	6.3	4.1	3.0	3.0	2.2	1.6	2.9	2.5	2.6	2.7	3.5
1971	2.5	3.2	-	3.2	3.2	2.7	2.0	3.7	2.3	2.3	2.3	2.6	-
1972	2.9	3.7	3.2	3.7	3.0	3.1	2.5	2.3	2.6	3.2	3.4	3.2	3.1
1973	3.1	3.3	4.5	4.2	2.8	2.6	2.3	2.1	2.1	2.5	3.0	2.6	2.9
1974	2.4	2.8	3.2	3.8	3.3	2.1	2.5	1.1	2.5	1.9	2.5	2.9	2.6
1975	3.1	3.7	4.2	3.8	3.2	3.1	2.9	2.0	4.0	-	2.7	2.9	-
1976	3.2	3.2	2.9	4.2	2.1	2.4	2.5	1.6	2.2	2.9	2.8	2.8	2.7
1977	2.5	3.8	4.2	3.7	3.4	3.6	2.6	2.6	1.5	3.2	2.5	3.1	3.1
1978	3.2	3.3	3.9	3.7	3.8	2.4	2.5	1.2	1.8	2.0	2.4	3.0	2.8
1979	3.2	3.3	4.2	3.4	2.4	2.8	2.3	1.6	2.4	2.6	2.7	2.9	2.8
1980	3.0	3.8	3.9	4.3	2.7	3.3	2.4	2.7	2.3	2.9	2.3	2.5	3.0
1981	2.7	3.4	4.5	4.3	3.0	1.7	2.5	1.3	2.8	2.7	2.7	2.7	2.9
1982	3.1	3.8	4.0	2.9	3.0	2.8	1.9	3.6	2.2	2.8	3.1	2.3	3.0
1983	3.0	3.3	3.8	4.7	4.0	3.5	2.9	2.2	-	2.9	2.5	2.8	-
1984	2.5	3.4	3.4	3.3	2.7	2.8	2.6	1.4	2.5	1.7	2.9	2.0	2.6
1985	2.7	3.7	3.8	3.0	3.1	1.8	-	2.5	2.6	2.6	2.7	2.6	-
1986	2.8	2.8	4.1	2.2	2.2	-	2.1	1.1	2.4	2.0	2.0	2.9	-
1987	2.8	3.4	4.6	3.4	2.9	2.6	2.9	2.0	2.2	2.5	2.7	2.3	2.9
AVERAGE	3.0	3.6	4.1	3.7	3.0	2.8	2.5	2.1	2.4	2.6	2.8	2.9	2.9

Table C.2.10 Duration of Sunshine

Station: BAGUIO PAOASA

Unit: min/day

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
1949	-	-	-	-	-	-	-	-	-	-	-	-	-
1950	-	318.0	-	449.0	419.4	378.1	260.7	308.3	337.2	262.0	376.0	411.0	-
1951	487.2	413.5	457.0	364.4	263.2	226.0	230.0	118.0	256.3	283.7	260.6	296.3	304.7
1952	298.3	373.6	347.5	287.9	282.3	221.3	203.0	-	-	-	315.6	285.0	-
1953	369.5	412.9	474.5	388.1	450.6	408.7	340.5	-	-	-	-	-	-
1954	-	-	-	383.6	362.9	394.0	313.5	190.0	220.5	333.0	383.0	435.2	-
1955	428.2	509.0	582.0	468.4	313.0	273.0	-	-	-	-	-	-	-
1956	-	-	-	-	-	-	-	-	-	-	-	-	-
1957	-	-	-	-	-	-	-	-	-	-	-	-	-
1958	-	-	-	-	-	-	-	-	-	-	-	-	-
1959	-	-	-	-	-	-	-	-	-	-	-	-	-
1960	-	-	-	-	-	-	-	-	-	-	-	-	-
1961	-	-	-	-	-	-	-	-	-	-	-	-	-
1962	-	-	-	-	-	-	-	-	-	-	-	-	-
1963	-	-	-	-	-	-	-	-	-	-	-	-	-
1964	-	-	-	-	-	-	-	-	-	-	-	-	-
1965	-	-	-	-	-	-	-	-	-	-	-	-	-
1966	-	-	-	-	-	-	-	-	-	-	-	-	-
1967	-	-	456.8	417.2	432.9	241.7	226.0	93.0	227.6	282.2	411.9	403.8	-
1968	381.2	507.4	461.6	378.6	339.0	370.4	25.3	134.4	192.9	333.8	437.5	550.4	342.7
1969	493.8	516.0	437.6	450.2	375.5	340.0	268.6	269.6	197.1	340.1	362.6	417.6	372.4
1970	481.3	512.9	464.2	492.4	417.3	301.4	260.7	142.3	224.4	254.3	344.7	438.7	361.2
1971	455.0	457.3	468.8	434.0	401.5	272.6	183.7	254.5	235.8	801.9	298.4	402.6	388.8
1972	404.1	581.1	428.1	473.2	353.4	324.6	55.4	154.6	800.2	468.8	475.2	513.7	419.4
1973	509.8	465.2	517.2	501.6	373.2	294.8	227.6	177.9	290.4	272.1	396.0	380.7	367.2
1974	432.6	489.0	444.3	492.6	350.1	279.2	329.0	85.7	318.4	228.8	329.0	409.2	349.0
1975	467.7	419.0	455.6	467.0	372.4	295.0	318.6	70.5	285.9	279.0	408.8	501.5	345.1
1976	401.2	520.0	413.0	522.9	257.9	320.3	301.1	194.1	263.8	423.7	377.8	322.3	359.8
1977	361.2	481.5	483.1	472.2	380.5	354.4	184.2	264.4	126.2	391.4	356.8	527.2	365.3
1978	554.3	501.2	485.2	451.0	394.4	195.2	266.3	38.9	126.0	211.2	357.8	381.9	325.3
1979	546.0	522.0	455.0	413.6	279.7	230.0	247.7	158.3	273.0	312.1	375.6	410.7	352.0
1980	413.4	517.7	452.7	498.0	266.7	367.4	239.0	278.9	200.0	323.2	342.6	394.1	357.8
1981	105.5	523.5	516.8	488.2	359.4	178.2	246.0	78.0	-	317.2	387.2	-	-
1982	503.6	477.9	-	-	383.6	290.8	54.8	85.0	179.8	970.1	428.2	326.9	-
1983	373.0	532.3	524.1	749.3	-	412.8	343.5	186.3	278.0	322.8	317.0	-	-
1984	381.9	493.7	410.5	444.6	319.2	244.4	294.8	62.3	318.0	388.7	407.8	432.4	333.2
1985	428.7	502.9	453.6	182.0	-	-	293.7	-	262.4	314.9	341.0	395.0	-
1986	434.9	432.2	492.9	437.0	246.8	295.8	275.0	82.5	234.4	284.7	296.4	414.2	327.2
1987	478.2	535.9	302.9	-	362.1	-	282.4	263.2	-	348.3	383.6	343.9	-
AVERAGE	424.6	480.6	457.7	444.3	350.3	300.4	239.0	160.5	267.7	356.2	366.8	399.8	354.0

Table C.2.11 Average Wind Velocity

Station: BAGUIO PAGASA

Unit: m/s

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
1949	-	-	-	-	-	-	-	-	-	-	-	-	-
1950	-	2.9	2.7	2.3	2.4	3.1	3.6	3.2	2.5	3.3	3.0	2.6	-
1951	2.6	2.5	2.5	2.6	3.0	2.9	3.0	4.0	3.1	2.7	2.8	3.0	2.9
1952	2.5	2.8	2.4	2.4	2.4	3.4	3.3	3.0	2.9	2.8	2.2	2.6	2.7
1953	2.6	2.8	2.5	2.3	2.9	3.5	2.7	3.4	2.5	2.7	2.7	2.7	2.8
1954	2.3	2.4	2.3	2.3	2.5	2.7	2.6	2.7	2.7	2.4	3.0	2.9	2.6
1955	2.8	2.5	2.2	2.2	2.5	2.9	2.5	2.7	2.5	2.1	2.3	2.5	2.5
1956	2.6	2.2	2.5	2.6	2.5	2.7	2.7	3.0	2.6	2.3	2.1	2.4	2.5
1957	2.5	2.3	2.0	2.1	2.2	2.4	2.6	3.0	2.8	2.4	2.4	2.1	2.4
1958	2.6	2.2	1.9	2.0	2.2	2.0	2.5	2.5	2.1	2.2	2.1	2.0	2.2
1959	-	2.4	2.0	2.1	1.8	2.0	2.5	2.1	1.8	1.9	2.1	2.1	-
1960	2.0	2.0	2.0	1.8	1.8	2.7	2.2	3.1	1.8	2.2	2.2	1.8	2.1
1961	1.8	1.8	1.8	1.8	2.2	2.2	2.2	2.2	1.8	1.8	1.8	1.8	1.9
1962	1.8	1.8	1.8	1.8	1.8	1.8	2.2	2.2	2.2	1.3	2.2	1.8	1.9
1963	-	2.2	1.8	1.8	1.3	2.2	1.8	2.2	2.2	1.3	1.3	1.8	-
1964	2.1	2.1	1.5	2.1	2.1	2.6	2.1	2.6	2.1	2.6	2.1	2.1	2.2
1965	2.1	2.1	1.5	1.5	1.5	2.1	2.6	2.1	1.5	1.5	2.1	2.6	1.9
1966	2.1	2.1	2.1	1.5	3.1	2.1	2.1	2.1	2.1	1.0	2.6	2.1	2.1
1967	2.6	2.1	2.1	2.1	2.1	-	2.1	2.6	1.5	2.6	3.6	2.1	-
1968	2.1	2.1	2.1	2.1	1.5	2.1	2.6	2.6	3.1	1.5	2.1	2.1	2.2
1969	2.1	2.1	2.1	2.1	2.1	2.1	2.6	2.1	2.1	1.5	2.1	2.1	2.1
1970	2.1	2.1	2.1	1.5	1.5	2.1	1.5	2.1	2.1	2.6	2.6	2.1	2.0
1971	1.5	2.1	2.1	1.5	-	2.6	2.6	2.1	2.1	2.1	2.1	2.1	-
1972	1.0	1.5	1.5	1.5	1.5	1.5	3.1	1.5	1.0	0.5	1.5	1.0	1.4
1973	1.0	1.5	1.5	1.5	1.5	1.5	2.1	1.5	1.5	2.6	1.5	1.5	1.6
1974	1.5	2.1	1.5	1.5	1.5	2.1	1.5	2.1	1.5	3.6	2.6	2.1	2.0
1975	2.6	1.5	1.5	2.1	1.5	1.5	1.0	2.1	1.5	2.1	1.5	2.6	1.8
1976	2.1	1.5	1.5	1.5	3.1	3.1	2.1	2.1	2.1	1.0	1.5	1.5	1.9
1977	1.0	2.1	1.0	1.5	1.5	2.1	2.1	2.6	-	1.0	2.1	1.5	-
1978	1.5	1.5	1.5	2.1	1.5	1.5	2.1	2.6	2.1	2.6	1.5	2.6	1.9
1979	2.1	1.5	2.1	1.5	2.1	2.6	2.1	2.6	1.5	2.1	2.1	2.1	2.0
1980	2.1	2.1	2.1	1.5	2.1	1.5	2.6	2.1	2.1	2.1	1.5	1.5	1.9
1981	1.5	1.5	2.1	1.5	1.0	2.1	1.5	2.1	2.1	1.5	2.1	1.5	1.7
1982	2.0	1.5	1.5	1.5	1.5	1.7	2.6	2.0	2.0	2.0	2.0	2.0	1.9
1983	2.0	2.0	2.0	2.3	2.1	-	2.0	2.1	3.0	-	2.0	-	-
1984	3.0	3.0	3.0	2.0	2.0	2.1	1.0	2.0	2.1	2.0	2.0	2.0	2.2
1985	-	2.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0	1.0	1.0	-
1986	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	3.0	2.0	2.0	1.6
1987	2.0	2.0	2.0	1.0	1.0	3.0	2.0	3.0	2.0	2.0	2.0	2.0	2.0
AVERAGE	2.0	2.1	1.9	1.9	1.9	2.3	2.3	2.4	2.1	2.1	2.1	2.1	2.1

Table C.2.12 Monthly Rainfall

Station: BAGUIO PAGASA

UNIT: mm

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
1949	0.0	0.8	95.3	54.4	74.7	283.5	700.0	370.3	616.2	509.5	31.5	31.5	2767.7
1950	23.9	11.4	114.8	152.7	290.3	350.0	1075.7	1504.7	408.7	448.6	43.9	31.5	4456.2
1951	19.1	3.6	16.8	59.2	374.1	491.0	927.9	958.3	591.3	151.4	94.7	24.4	3711.8
1952	19.1	24.4	31.8	200.4	330.2	347.5	267.7	668.8	306.1	206.2	101.3	56.6	2560.1
1953	2.8	13.2	36.8	102.6	320.8	512.8	462.0	1189.2	274.6	100.3	706.9	50.8	3772.8
1954	0.0	1.5	140.0	103.4	108.5	109.7	245.1	622.6	405.1	411.0	373.4	3.6	2523.9
1955	5.3	0.5	3.6	142.7	221.7	178.8	447.0	323.6	555.8	197.9	94.7	2.0	2173.6
1956	11.9	24.4	17.8	149.6	325.9	208.3	309.1	627.1	1199.4	321.6	232.2	25.1	3452.4
1957	6.1	0.0	32.0	27.9	101.3	816.4	288.5	601.2	810.8	159.5	106.2	11.2	2961.1
1958	36.8	1.8	2.8	30.7	197.9	744.0	841.0	305.6	558.3	190.2	10.9	4.8	2924.8
1959	9.9	0.0	93.5	22.4	234.4	261.6	241.0	492.8	264.7	120.1	262.1	9.4	2011.9
1960	35.1	113.3	29.5	289.1	348.0	249.7	275.3	1917.4	270.3	204.7	68.3	20.1	3820.8
1961	0.0	0.0	119.9	62.7	190.0	574.8	1028.2	611.6	565.2	196.6	72.1	7.6	3428.7
1962	3.3	0.0	9.1	90.7	263.9	184.9	1239.0	668.8	832.6	154.2	29.7	7.9	3484.1
1963	9.7	4.3	9.9	7.9	125.5	1092.5	489.5	383.8	1458.0	76.2	42.4	46.0	3745.7
1964	3.2	0.8	18.9	158.4	233.1	520.4	299.9	1873.9	572.3	443.7	202.9	114.1	4441.6
1965	2.6	22.4	118.6	200.1	459.9	503.3	712.6	371.3	364.8	106.6	24.5	0.0	2886.7
1966	19.6	6.9	45.3	26.8	733.6	241.8	374.3	601.8	936.7	60.1	175.4	37.1	3279.4
1967	1.8	4.6	12.1	230.9	197.9	1417.9	423.8	1141.1	440.3	1560.3	109.1	0.8	5540.6
1968	4.2	0.0	6.4	51.1	275.5	346.7	1043.7	1672.3	1480.8	31.2	18.6	0.0	4930.5
1969	8.0	0.8	7.2	85.9	354.0	382.3	1211.8	616.3	894.9	279.0	52.0	48.6	3940.8
1970	21.2	2.9	21.3	68.8	340.6	417.4	405.9	676.8	616.0	174.5	65.4	50.8	2861.6
1971	12.7	12.1	4.2	144.4	162.6	489.6	1321.2	756.6	385.5	306.4	66.7	46.8	3708.8
1972	18.8	1.8	12.3	80.2	328.3	455.4	4774.5	1040.9	331.9	50.9	46.5	25.6	7167.1
1973	0.6	0.0	1.1	51.5	106.2	372.5	418.7	537.4	225.2	816.2	54.4	13.5	2597.3
1974	20.1	0.0	7.4	97.2	272.4	549.7	389.5	1487.5	332.4	2273.5	636.1	48.7	6114.5
1975	17.1	0.0	2.3	57.9	220.2	239.4	152.2	789.9	474.4	295.5	28.5	43.1	2320.5
1976	21.6	0.0	38.9	21.4	1304.5	1224.8	377.3	677.0	373.0	176.3	81.5	7.5	4303.8
1977	30.2	0.0	5.6	30.8	295.3	159.3	694.5	794.2	1274.3	138.8	186.5	0.0	3609.5
1978	0.0	0.0	5.8	64.6	265.9	424.1	613.9	1412.9	583.9	344.8	20.0	29.7	3765.6
1979	0.0	1.4	1.4	117.1	410.1	239.1	586.7	1078.4	250.6	206.1	20.7	48.1	2959.7
1980	1.0	1.9	16.8	4.8	1040.1	88.3	1323.3	237.6	562.2	210.8	885.0	35.4	4407.2
1981	38.6	2.8	0.0	241.8	248.2	629.5	466.2	1165.4	634.7	196.3	206.4	0.4	3830.3
1982	0.0	22.7	21.5	168.2	228.9	340.2	1146.8	921.4	444.6	238.2	123.8	47.0	3703.3
1983	40.4	15.4	10.4	0.0	95.6	202.9	279.3	932.0	391.7	176.4	72.2	0.8	2217.1
1984	10.6	0.0	54.8	209.5	525.6	442.6	286.1	1511.5	397.7	323.9	17.3	2.3	3781.9
1985	7.4	46.0	57.5	219.7	410.7	1540.9	189.5	1424.6	512.1	265.2	76.0	15.4	4765.0
1986	18.2	10.9	6.7	3.6	509.4	226.8	1495.7	1208.1	1030.2	146.6	41.5	17.9	4715.6
1987	0.0	0.0	8.2	29.4	234.5	381.0	304.6	816.7	413.5	502.5	9.5	27.7	2727.6
AVERAGE	12.3	9.0	31.8	99.0	327.2	467.7	721.3	897.2	591.3	327.5	140.8	25.5	3650.6

Table C.2.13 Mean Temperature

Station: BSU PAGASA

Unit: °C

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC	ANNUAL AVERAGE
1977	17.6	17.7	17.7	19.3	19.8	20.7	20.5	20.3	18.7	18.9	18.5	17.0	18.9
1978	16.2	16.9	18.8	20.2	20.6	20.3	19.8	20.1	19.9	19.9	18.0	18.8	19.1
1979	16.5	17.8	18.8	20.4	20.3	21.2	20.2	19.8	20.3	19.7	19.4	17.2	19.3
1980	17.4	17.4	18.7	20.1	20.4	21.0	20.1	20.2	20.0	19.9	18.5	17.4	19.3
1981	16.2	16.7	18.3	20.1	20.5	20.6	20.3	19.5	20.1	19.5	18.9	17.4	19.0
1982	16.2	17.2	18.5	19.8	20.1	21.2	19.9	19.8	20.2	18.9	18.8	18.5	19.1
1983	17.7	16.5	18.7	20.0	20.2	20.8	20.1	19.7	19.8	20.0	18.2	16.7	19.0
1984	16.8	17.0	19.0	19.5	19.5	20.1	19.3	18.9	19.8	19.9	19.1	17.6	18.9
1985	15.9	19.0	18.7	19.9	19.9	19.8	20.0	20.6	20.1	19.5	19.3	17.7	19.2
1986	17.8	16.8	18.9	19.8	20.2	19.8	20.1	19.6	19.2	19.9	19.6	17.0	19.1
1987	16.3	15.9	18.6	20.1	20.5	20.9	20.9	20.3	20.0	19.8	19.8	18.8	19.3
AVERAGE	16.8	17.2	18.6	19.9	20.2	20.6	20.1	19.9	19.8	19.6	18.9	17.6	19.1

Table C.2.14 Maximum Temperature

Station: BSU PAGASA

Unit: °C

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
1977	23.0	23.1	22.8	24.5	24.5	25.1	23.8	23.7	22.0	23.5	23.0	22.7	23.5
1978	21.6	22.1	24.1	25.1	25.3	24.0	23.4	22.4	22.9	23.5	23.1	23.4	23.4
1979	22.3	23.4	24.2	25.0	23.9	25.1	23.9	22.7	24.6	24.2	24.3	23.1	23.9
1980	22.8	23.2	24.7	25.4	23.7	25.5	23.6	23.8	23.2	24.0	23.3	22.5	23.8
1981	21.0	22.6	24.4	25.6	24.8	24.2	23.2	30.3	24.7	24.2	23.8	22.3	24.3
1982	21.8	23.0	24.6	24.1	24.7	25.0	22.5	22.4	23.6	23.6	24.0	23.1	23.5
1983	22.9	23.0	25.0	26.0	25.6	24.7	23.7	22.3	23.9	23.9	23.0	22.7	23.9
1984	21.9	22.7	23.8	24.5	23.2	23.4	23.0	21.6	24.0	23.3	24.2	23.5	23.3
1985	22.1	25.2	24.8	24.5	23.8	22.4	24.0	22.3	23.8	23.5	24.1	23.2	23.6
1986	22.8	22.3	24.9	25.3	24.0	24.2	23.8	22.4	22.9	23.2	24.1	22.7	23.6
1987	22.5	22.8	25.7	25.4	25.4	24.8	24.7	24.4	24.0	24.4	25.1	24.2	24.5
AVERAGE	22.2	23.0	24.5	25.0	24.4	24.4	23.6	23.5	23.6	23.8	23.8	23.0	23.7

Table C.2.15 Minimum Temperature

Station: BSU PAGASA

Unit: ℃

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
1977	12.6	11.3	11.8	13.9	15.2	16.3	17.2	17.0	16.8	14.1	14.3	11.7	14.4
1978	10.7	11.2	13.6	15.1	16.2	16.7	16.5	17.7	16.9	16.5	13.6	13.9	14.9
1979	10.5	12.5	12.7	15.8	16.8	17.5	16.6	16.9	16.0	15.3	14.5	11.3	14.7
1980	12.0	11.6	12.7	14.8	16.7	16.6	16.7	16.6	16.8	15.9	14.8	12.1	14.8
1981	11.4	10.9	11.6	14.7	16.2	17.0	16.6	16.5	15.5	14.8	14.1	12.5	14.3
1982	10.7	11.5	11.9	15.5	15.0	17.4	17.5	17.1	16.7	14.2	13.6	14.0	14.6
1983	12.5	10.0	13.2	14.1	14.8	17.0	16.6	16.7	15.8	16.2	13.5	10.9	14.3
1984	11.8	11.4	14.2	14.6	15.8	16.9	19.4	16.3	15.4	16.4	14.1	15.5	15.2
1985	09.6	12.9	12.6	15.3	15.2	17.1	16.1	17.2	16.5	15.5	14.6	12.3	14.6
1986	12.1	11.3	13.0	14.1	16.5	15.5	16.4	17.0	15.6	16.0	15.2	11.4	14.5
1987	10.1	09.8	12.0	14.8	15.6	17.1	17.1	16.1	15.9	15.2	14.5	13.4	14.3
AVERAGE	11.3	11.3	12.7	14.8	15.8	16.8	17.0	16.8	16.2	15.5	14.3	12.6	14.6

Table C.2.16 Dry Bulb Temperature

Station: BSU PAGASA

Unit: ℃

YEAR	JAN.	FEB.	MAR.	APR.	MAY.	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
1977	16.5	16.9	18.0	20.2	20.6	21.3	20.6	20.3	19.5	19.9	18.5	17.3	19.1
1978	15.4	15.8	18.7	20.5	21.3	20.6	20.1	19.6	19.8	19.7	17.9	18.4	19.0
1979	15.1	16.8	17.8	20.9	20.9	21.7	20.8	19.5	20.7	20.0	19.6	17.2	19.3
1980	16.4	16.1	19.2	20.5	20.7	21.3	20.3	20.5	20.0	20.3	19.2	16.5	19.3
1981	15.3	16.7	18.5	21.1	21.6	20.9	20.6	19.8	20.6	20.8	19.5	17.6	19.4
1982	15.4	16.8	18.6	20.6	21.2	21.1	20.1	19.5	19.8	19.6	18.9	18.3	19.2
1983	16.9	15.5	19.0	20.8	21.6	21.9	21.4	20.3	20.8	20.4	18.7	16.6	19.5
1984	16.3	16.8	19.6	20.6	21.0	20.9	20.7	19.4	20.8	20.3	19.5	16.4	19.4
1985	15.6	18.4	18.8	20.3	21.1	19.1	20.5	19.8	19.9	19.9	19.7	17.1	19.2
1986	16.1	15.9	18.7	20.4	20.6	20.9	20.2	19.8	20.4	20.4	19.6	16.6	19.1
1987	15.6	14.8	18.3	20.7	21.8	21.3	-	20.7	20.5	20.5	20.4	18.5	-
AVERAGE	15.9	16.4	18.7	20.6	21.1	21.0	20.5	19.9	20.3	20.2	19.2	17.3	19.3

Table C.2.17 Wet Bulb Temperature

Station: BSU PAGASA

Unit: °C

YEAR	JAN.	FEB.	MAR.	APR.	MAY.	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
1977	15.1	15.0	16.7	19.8	18.6	19.2	19.1	18.8	18.4	17.8	16.6	15.2	17.5
1978	13.6	13.8	16.4	17.4	18.3	18.4	18.6	18.0	18.0	17.6	15.7	16.1	16.8
1979	13.4	14.6	15.5	19.7	18.4	18.9	19.1	18.3	18.5	17.6	17.4	14.4	17.2
1980	14.3	13.7	16.1	17.3	18.4	18.7	18.6	18.8	18.3	18 .2	17.5	14.8	17.1
1981	13.2	14.6	15.3	17.7	19.1	18.9	18.6	18.7	18.6	18.3	17.5	14.8	17.1
1982	12.8	14.4	16.2	18.5	18.9	19.1	18.8	18.4	18.3	17. 8	16.6	16.7	17.2
1983	15.3	14.0	16.6	17.0	17.8	19.2	19.1	18.7	18.6	18.5	16.8	14.1	17.1
1984	14.7	14.9	17.2	17.8	18.7	18.8	18.6	18.3	18.4	18.2	16.9	14.1	17.2
1985	13.6	15.7	16.2	18.4	18.7	18.4	18.5	18.7	18.3	16.6	17.7	14.9	17.1
1986	14.0	14.1	16.1	17.3	18.5	18.8	18.6	18.5	18.0	18.0	17.6	14.5	17.0
1987	13.4	12.6	15.2	17.9	18.9	19.7	-	19.0	18.9	18.3	17.7	16.4	-
AVERAGE	13.9	14.3	16.1	18.1	18.6	18.9	18.8	18.6	18.4	17.9	17.1	15.1	17.1

Table C.2.18 Relative Humidity

Station: BSU PAGASA

Unit: °C

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC	ANNUAL AVERAGE
1977	87	83	81	83	84	84	88	87	91	82	83	81	85
1978	84	82	81	74	77	82	86	87	84	83	80	80	82
1979	84	81	77	66	79	78	86	90	82	80	81	75	80
1980	81	78	74	74	81	79	86	86	86	82	84	84	81
1981	80	81	72	73	80	83	83	90	83	79	83	75	80
1982	74	77	78	82	80	83	88	90	87	85	89	86	83
1983	85	85	78	68	69	78	81	86	81	83	83	76	79
1984	84	83	80	77	81	83	83	90	80	82	78	79	82
1985	81	75	78	84	80	94	83	92	86	73	84	80	83
1986	80	83	78	74	82	83	86	89	80	91	93	81	83
1987	79	75	73	77	77	87	-	86	86	82	78	82	-
AVERAGE	82	80	77	76	79	83	85	88	84	82	83	80	82

Table C.2.19 Duration of Sunshine

Station: BSU PAGASA

Unit: min/day

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANNUAL AVERAGE
1977													
1978	478	451	391	368	339	219	205	107	195	242	346	374	310
1979	484	469	424	355	280	303	236	171	290	286	335	365	333
1980	409	466	422	428	275	316	237	277	213	342	301	381	339
1981	345	443	476	425	303	190	233	092	287	263	313	348	310
1982	429	435	400	330	342	297	166	128	237	346	386	232	311
1983	329	481	452	472	384	335	256	138	273	274	320	431	345
1984	311	393	318	397	273	252	287	067	291	188	374	232	282
1985	383	474	319	282	321	069	298	066	198	266	283	379	278
1986	402	466	397	358	245	284	238	080	218	266	302	376	303
1987	424	467	510	344	294	243	245	246	244	339	363	330	337
AVERAGE	399	455	411	376	306	251	240	137	245	281	332	345	315

Table C.2.20 Average Wind Velocity

Station: BSU PAGASA

Unit: °C

YEAR	JAN.	FEB.	MAR.	APR.	MAY.	JUNE	JULY	AUG.	SEPT	OCT.	NOV.	DEC.	ANNUAL AVERAGE
1977	1.5	2.6	2.1	1.5	1.0	2.1	2.6	2.1	2.6	1.0	2.0	2.1	1.9
1978	2.1	1.5	1.0	2.1	1.5	2.1	2.1	2.1	2.1	2.1	1.5	2.1	1.9
1979	1.0	1.5	1.5	1.5	1.5	2.6	2.1	2.6	1.5	1.5	1.5	2.1	1.7
1980	1.0	1.0	1.5	2.1	2.6	2.1	3.1	1.5	2.1	1.0	1.0	1.0	1.7
1981	2.1	1.0	1.5	1.0	1.5	2.1	2.1	1.5	1.5	1.0	1.5	2.1	1.6
1982	1.5	1.5	1.0	0.5	1.0	1.5	2.6	1.5	1.5	0.5	1.0	1.0	1.3
1983	1.0	0.5	1.0	1.5	1.0	2.1	1.5	2.1	1.0	1.5	0.5	1.0	1.2
1984	0.5	0.5	1.0	1.0	1.5	2.1	1.5	2.1	1.0	0.5	1.0	0.5	1.1
1985	0.5	0.5	0.0	0.0	0.5	1.5	1.0	1.5	1.0	1.5	0.5	0.5	0.8
1986	1.5	1.0	1.0	1.5	1.5	1.0	2.6	2.1	1.0	2.1	1.0	0.5	1.4
1987	2.0	0.5	1.0	2.1	0.5	1.0	1.5	1.5	0.5	1.0	1.0	0.5	1.1
AVERAGE	1.3	1.1	1.1	1.3	1.3	1.8	2.1	1.9	1.4	1.2	1.1	1.2	1.4

Table C.2.21 Monthly Rainfall

Station: BSU PAGASA

Unit: mm

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
1977	26.5	0.0	109.1	39.1	288.5	180.6	616.5	827.9	1226.0	164.3	197.8	0.5	3676.8
1978	0.0	5.1	21.3	32.1	325.3	406.3	621.5	1131.3	451.3	274.7	64.8	72.6	3406.3
1979	8.9	0.3	1.3	128.0	481.8	249.9	628.1	865.1	279.3	197.4	14.3	49.0	2903.4
1980	0.0	2.0	25.3	17.8	1004.5	175.3	1225.6	245.3	639.5	238.5	895.5	54.7	4524.0
1981	21.3	1.0	0.0	117.6	294.7	752.5	518.5	1118.2	659.6	274.2	228.8	1.3	3987.7
1982	0.0	20.0	5.1	185.4	345.7	410.8	1310.1	846.6	549.6	203.8	121.4	35.1	4033.6
1983	43.3	21.5	15.5	9.7	157.0	297.9	289.0	893.1	372.0	165.8	107.0	0.8	2372.6
1984	18.6	0.0	42.5	195.4	395.1	383.8	378.3	1355.0	290.5	335.4	30.4	3.0	3428.0
1985	22.0	21.4	64.0	175.9	398.0	1241.7	234.1	1367.8	459.6	219.7	152.5	5.7	4362.4
1986	8.6	11.2	19.2	44.7	497.8	284.9	1106.8	1096.7	790.4	121.9	41.7	33.8	4057.7
1987	0.0	0.0	6.1	39.5	260.0	392.2	253.1	707.7	381.2	480.0	15.1	40.0	2574.9
AVERAGE	13.6	7.5	28.1	89.6	404.4	434.2	652.9	950.4	554.5	243.2	169.9	27.0	3575.2

Table C.2.22 Summary of Observed Data in BAGUIO PAGASA Station

Averaged for 1949 - 1987

Items	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
Mean Temperature (°C)	17.6	18.4	19.5	20.4	20.6	20.6	20.0	19.6	19.4	19.6	19.1	18.4
Maximum Temperature (°C)	22.6	23.5	24.7	25.2	24.8	23.7	23.1	22.2	23.0	23.5	23.3	22.9
Minimum Temperature (°C)	12.9	13.3	14.3	15.6	16.4	16.3	16.2	15.9	15.8	15.6	14.9	14.1
Dry Bulb Temperature (°C)	16.6	17.2	18.4	19.3	19.5	19.0	18.6	18.2	18.5	18.7	18.2	17.3
Wet Bulb Temperature (°C)	14.5	14.8	16.1	17.2	17.8	17.7	17.3	17.3	17.3	17.2	16.4	15.3
Relative Humidity (%)	82	80	80	82	86	88	90	92	90	87	84	82
Open Pan Evaporation (mm/day)	3.0	3.6	4.1	3.7	3.0	2.8	2.5	2.1	2.4	2.6	2.8	2.9
Duration of Sunshine (min)	425	481	458	444	350	300	239	161	268	356	367	400
Average Wind Velocity (m/sec)	2.0	2.1	1.9	1.9	1.9	2.3	2.3	2.4	2.1	2.1	2.1	2.1
Monthly Rainfall (mm/month)	12.3	9.0	31.8	99.0	327.2	467.0	721.3	897.2	591.3	327.5	140.8	25.5

Table C.2.23 Summary of Observed Data in BSU PAGASA Station

Averaged for 1977 - 1987

Items	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
Mean Temperature (°C)	16.8	17.2	18.6	19.9	20.2	20.6	20.1	19.9	19.8	19.6	18.9	17.6
Maximum Temperature (°C)	22.2	23.0	24.5	25.0	24.4	24.4	23.6	23.5	23.6	23.8	23.8	23.0
Minimum Temperature (°C)	11.3	11.3	12.7	14.8	15.8	16.8	17.0	16.8	16.2	15.5	14.3	12.6
Dry Bulb Temperature (°C)	15.9	16.4	18.7	20.6	21.1	21.0	20.5	19.9	20.3	20.2	19.2	17.3
Wet Bulb Temperature (°C)	13.9	14.3	16.1	18.1	18.6	18.9	18.8	18.6	18.4	17.9	17.1	15.1
Relative Humidity (%)	82	80	77	76	79	83	85	88	84	82	83	80
Open Pan Evaporation (mm/day)	*	*	*	*	*	*	*	*	*	*	*	*
Duration of Sunshine (min)	399	455	411	376	306	251	240	137	245	281	332	345
Average Wind Velocity (m/sec)	1.3	1.1	1.3	1.5	1.3	1.8	2.1	1.9	1.4	1.2	1.1	1.2
Monthly Rainfall (mm/month)	13.6	7.5	28.1	89.6	404.4	434.2	652.9	950.4	554.5	243.2	169.9	27.0

* : missing data

Table C.2.24 Daily Rainfall Correlation Coefficients

Analyzed for 1986

Station	Baguio	BSU	Ambuklao	Bobok	Binga	Balatoc	Dalupirip	Los-oc	Yangyang	Bangao	Suay
Baguio	—	0.97	0.65	0.67	0.40	0.57	0.41	0.73	0.69	0.59	0.65
BSU	0.97	—	0.64	0.69	0.41	0.57	0.42	0.72	0.64	0.60	0.65
Ambuklao	0.65	0.64	—	0.39	0.78	0.89	0.77	0.78	0.78	0.83	0.96
Bobok	0.69	0.69	0.39	—	0.34	0.39	0.38	0.45	0.42	0.43	0.43
Binga	0.40	0.41	0.78	0.34	—	0.89	0.93	0.67	0.59	0.67	0.76
Balatoc	0.59	0.59	0.89	0.39	0.89	—	0.89	0.79	0.70	0.79	0.90
Dalupirip	0.41	0.42	0.77	0.38	0.93	0.89	—	0.69	0.57	0.71	0.79
Los-oc	0.73	0.72	0.78	0.45	0.67	0.79	0.69	—	0.65	0.70	0.79
Yangyang	0.69	0.64	0.78	0.42	0.59	0.70	0.57	0.65	—	0.71	0.79
Bangao	0.59	0.60	0.83	0.43	0.67	0.79	0.71	0.70	0.71	—	0.91
Suay	0.65	0.65	0.96	0.43	0.76	0.90	0.79	0.79	0.79	0.91	—

Table C.2.25 Probable Rainfall Intensity and Proposed Rainfall Intensity Curve

duration / Return period	min 10	min 30	hr 1	hr 3	hr 6	hr 12	hr 24	Rainfall Intensity Curve
Year 2	125.0	077.9	051.9	030.9	24.3	18.5	13.7	$\frac{51.890}{T^{0.434} - 0.044}$
5	161.4	098.9	071.2	046.6	36.9	28.5	21.3	$\frac{60.829}{T^{0.342} - 0.165}$
10	186.1	112.0	084.9	057.8	45.8	35.4	26.8	$\frac{64.849}{T^{0.295} - 0.240}$
20	210.2	124.1	098.4	069.3	54.6	42.3	32.3	$\frac{67.449}{T^{0.258} - 0.308}$
30	224.3	131.0	106.5	076.1	59.8	46.3	35.7	$\frac{68.574}{T^{0.239} - 0.345}$
50	242.1	139.4	116.8	085.0	66.4	51.4	40.0	$\frac{69.544}{T^{0.218} - 0.389}$
100	266.6	150.6	131.2	097.4	75.6	58.5	46.0	$\frac{70.625}{T^{0.194} - 0.441}$
200	291.6	161.6	146.0	110.4	85.1	65.8	52.3	$\frac{71.207}{T^{0.174} - 0.489}$

Table C.2.26 Annual Maximum Rainfall (1 day - 3 days)

BAGUIO PAGASA Station

Year	1 day Rainfall	2 days Rainfall	3 days Rainfall	Notes
1949	204.5	319.3	401.3	
1950	237.7	373.9	496.1	
1951	487.1	540.8	558.5	
1952	109.0	151.1	173.0	
1953	548.4	636.5	663.5	
1954	208.3	287.8	296.4	
1955	388.9	401.1	404.6	
1956	233.9	329.9	333.8	
1957	291.1	483.4	491.2	
1958	140.5	252.0	299.7	
1959	227.1	242.8	246.6	
1960	225.6	384.3	509.0	
1961	155.7	272.3	338.6	
1962	284.2	537.0	682.5	
1963	319.5	488.7	742.4	
1964	369.6	635.3	701.3	
1965	368.0	395.9	397.0	
1966	269.3	403.2	435.7	
1967	979.4	1354.2	1360.0	Max. record
1968	649.7	806.7	858.3	
1969	512.2	747.4	850.5	
1970	119.7	181.5	224.7	
1971	379.5	683.2	787.1	
1972	437.3	743.0	966.8	
1973	379.7	566.1	598.6	
1974	781.4	875.3	881.4	
1975	163.6	203.0	218.2	
1976	605.3	807.2	961.0	
1977	359.1	475.3	542.6	
1978	534.2	819.8	857.8	
1979	285.4	381.5	457.3	
1980	730.3	811.9	834.2	
1981	228.8	410.4	445.5	
1982	237.3	348.9	410.1	
1983	217.8	321.7	457.1	
1984	381.8	658.7	790.4	
1985	344.5	574.5	726.7	
1986	709.6	1101.7	1223.6	
1987	333.5	468.7	478.2	

Table C.2.27 Probable Rainfall (BAGUIO PAGASA Station)

(1 day rainfall)

RETURN PERIOD	PROB. VALUE (mm)
2	325.0
3	407.1
5	504.4
10	634.0
20	765.4
30	844.1
40	901.1
50	945.7
60	983.1
100	1,089.0
150	1,175.8
200	1,238.4

(2 day rainfall)

RETURN PERIOD	PROB. VALUE (mm)
2	479.5
3	588.6
5	710.9
10	865.1
20	1,013.5
30	1,099.4
40	1,160.4
50	1,207.3
60	1,246.3
100	1,354.8
150	1,441.7
200	1,503.4

(3 day rainfall)

RETURN PERIOD	PROB. VALUE (mm)
2	549.7
3	669.3
5	800.5
10	962.2
20	1,114.5
30	1,201.4
40	1,262.5
50	1,309.3
60	1,348.0
100	1,454.9
150	1,539.7
200	1,599.5

Table C.2.28 Estimated ETo by Penman Method

Items	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
T mean °Ç	17.6	18.4	19.5	20.4	20.6	20.0	19.6	19.0	19.4	19.6	19.1	18.4
RH mean %	82	80	80	82	86	88	90	92	90	87	84	82
n hours	7.1	8.0	8.6	8.4	5.8	5.0	4.0	2.7	4.5	5.9	6.1	6.7
n/N	0.63	0.68	0.64	0.59	0.45	0.38	0.31	0.21	0.34	0.43	0.54	0.58
V km/day	173	181	164	164	164	199	199	207	181	181	181	181
Ra mm/day	12.0	13.3	14.7	15.6	16.0	15.9	15.9	15.7	15.0	13.9	12.4	11.6
ea mmbr	20.0	21.2	22.7	24.0	24.3	23.4	22.8	22.0	22.6	22.7	22.3	21.3
ed mmbr	16.3	16.9	18.2	19.6	20.8	20.7	20.5	20.0	20.4	19.7	18.7	17.4
f(u)	0.75	0.75	0.72	0.7	0.72	0.8	0.8	0.83	0.77	0.76	0.76	0.75
Rns	5.16	5.85	6.32	6.4	5.76	5.25	4.77	4.08	4.65	4.87	4.71	4.64
f(T)	14.0	14.3	14.3	14.6	14.7	14.6	14.5	14.4	14.5	14.5	14.4	14.3
f(ed)	0.16	0.16	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.15	0.16
f(n/N)	0.69	0.69	0.60	0.60	0.55	0.57	0.46	0.37	0.46	0.55	0.60	0.69
RnI	1.55	1.58	1.22	1.23	1.13	0.77	0.93	0.75	0.93	1.12	1.30	1.58
ETo *	2.71	3.19	3.62	3.62	3.20	3.03	2.59	2.26	2.49	2.65	2.57	2.42

Notes: W= 0.7 *C=0.8