

Table 3.5.5 Production Cost of Mango Orchard per Hectare

Unit: Pesos/ha

Year	Fixed costs	Pruning	Weeding	Fertilization	Irrigation	Flower Induction	Fruit Bagging	Integrated Pest Management	Harvesting	Total Cost
1	117,477		5,500	175	1,250			601		125,003
2	3,920	180	5,500	350	1,250			811		12,011
3	800	180	5,500	462	1,250			2,496		10,688
4	800	283	5,500	575	1,875	705	2,155	13,074	300	25,267
5	800	283	5,500	688	1,875	888	2,348	15,952	510	28,844
6	11,700	385	4,250	100	1,875	1,150	2,843	18,831	925	42,059
7	3,920	385	4,250	1,562	1,875	1,412	3,463	21,709	1,450	40,026
8	800	447	4,250	2,125	2,500	1,675	5,058	24,857	1,995	43,707
9	800	487	4,250	2,688	2,500	1,938	5,110	27,446	2,770	47,989
10	400	613	4,250	3,250	2,500	2,200	6,285	30,344	3,565	53,407
11	11,300	613	4,000	3,812	2,500	2,462	6,380	34,873	5,340	71,280
12	3,520	863	4,000	4,375	2,500	2,725	7,765	37,661	7,135	70,544
13	400	863	4,000	4,938	3,125	2,988	7,780	40,540	8,910	73,544
14	400	1,050	4,000	5,500	3,125	3,250	9,395	43,418	11,955	82,093
15	400	1,050	4,000	6,562	3,125	3,512	9,495	46,296	15,480	89,920
16	11,300	1,050	4,000	6,562	3,125	3,512	9,495	46,296	15,480	100,820
17	3,520	1,050	4,000	6,562	3,125	3,512	9,495	46,296	15,480	93,040
18	400	1,050	4,000	6,562	3,125	3,512	9,495	46,296	15,480	89,920
19	400	1,050	4,000	6,562	3,125	3,512	9,495	46,296	15,480	89,920
20	400	1,050	4,000	6,562	3,125	3,512	9,495	46,296	15,480	89,920
Total	173,457	12,932	88,750	69,972	48,750	42,465	115,552	590,389	137,735	1,280,002

Table 3.5.6 Construction Cost of Agriculture Development in Lahar Area

Unit: Pesos

Area-1 : Bucao, Mid-Stream, Right Side (Barangay Poonbato)

Development Area: 225 ha

No	Item	Unit	Unit Rate	Quantity	Amount	Disbursement Rate		
						Year-1	Year-2	Year-3
1	River Training Work	L.S.	60,329,298	1	60,329,298	50%	50%	
2	Land Development	ha	16,500	225	3,712,500		100%	
3	Soil Improvement	ha	5,200	225	1,170,000		50%	50%
4	Fertilizer Provision	ha	9,980	225	2,245,500		50%	50%
5	Water Supply System	unit	59,500	45	2,677,500		50%	50%
TOTAL					70,134,798	30,164,649	36,923,649	3,046,500

Area-2 : Bucao, Mid-Stream, Right Side (Barangay Malombo)

Development Area: 31 ha

No	Item	Unit	Unit Rate	Quantity	Amount	Disbursement Rate		
						Year-1	Year-2	Year-3
1	River Training Work	L.S.	57,329,346	1	57,329,346	50%	50%	
2	Land Development	ha	16,500	31	511,500		100%	
3	Soil Improvement	ha	5,200	31	161,200		50%	50%
4	Fertilizer Provision	ha	9,980	31	309,380		50%	50%
5	Water Supply System	unit	59,500	7	416,500		50%	50%
TOTAL					58,727,926	28,664,673	29,619,713	443,540

Area-3 : Bucao, Downstream, Right Side at Swampy Area (Barangay San Juan)

Development Area: 200 ha

No	Item	Unit	Unit Rate	Quantity	Amount	Disbursement Rate		
						Year-1	Year-2	Year-3
1	River Training Work	L.S.	48,675,385	1	48,675,385	50%	50%	
2	Land Development	ha	16,500	200	3,300,000		100%	
3	Soil Improvement	ha	5,200	200	1,040,000		50%	50%
4	Fertilizer Provision	ha	9,980	200	1,996,000		50%	50%
5	Water Supply System	unit	59,500	40	2,380,000		50%	50%
TOTAL					57,391,385	24,337,693	30,345,693	2,708,000

Area-4 : Bucao, Downstream, Right Side at River Area (Barangay San Juan)

Development Area: 120 ha

No	Item	Unit	Unit Rate	Quantity	Amount	Disbursement Rate		
						Year-1	Year-2	Year-3
1	River Training Work	L.S.	74,976,048	1	74,976,048	50%	50%	
2	Land Development	ha	16,500	120	1,980,000		100%	
3	Soil Improvement	ha	5,200	120	624,000		50%	50%
4	Fertilizer Provision	ha	9,980	120	1,197,600		50%	50%
5	Water Supply System	unit	59,500	24	1,428,000		50%	50%
TOTAL					80,205,648	37,488,024	41,092,824	1,624,800

Area-5 : Marella River, Left Side facing Mapanuepe Lake (Barangay Aglao)

Development Area: 300 ha

No	Item	Unit	Unit Rate	Quantity	Amount	Disbursement Rate		
						Year-1	Year-2	Year-3
1	River Training Work	L.S.	46,860,030	1	46,860,030	50%	50%	
2	Land Development	ha	16,500	300	4,950,000		100%	
3	Soil Improvement	ha	5,200	300	1,560,000		50%	50%
4	Fertilizer Provision	ha	9,980	300	2,994,000		50%	50%
5	Water Supply System	unit	59,500	60	3,570,000		50%	50%
TOTAL					59,934,030	23,430,015	32,442,015	4,062,000

Area-6 : Sto-Tomas, Middle stream, Right Side (Barangay Santa Fe)

Development Area: 600 ha

No	Item	Unit	Unit Rate	Quantity	Amount	Disbursement Rate		
						Year-1	Year-2	Year-3
1	River Training Work	L.S.	15,620,010	1	15,620,010	50%	50%	
2	Land Development	ha	16,500	600	9,900,000		100%	
3	Soil Improvement	ha	5,200	600	3,120,000		50%	50%
4	Fertilizer Provision	ha	9,980	600	5,988,000		50%	50%
5	Water Supply System	unit	59,500	120	7,140,000		50%	50%
TOTAL					41,768,010	7,810,005	25,834,005	8,124,000

Area-7 : Sto-Tomas, Middle stream, Left Side (Barangay San Rafael)

Development Area: 250 ha

No	Item	Unit	Unit Rate	Quantity	Amount	Disbursement Rate		
						Year-1	Year-2	Year-3
1	River Training Work	L.S.	156,200,100	1	156,200,100	50%	50%	
2	Land Development	ha	16,500	250	4,125,000		100%	
3	Soil Improvement	ha	5,200	250	1,300,000		50%	50%
4	Fertilizer Provision	ha	9,980	250	2,495,000		50%	50%
5	Water Supply System	unit	59,500	50	2,975,000		50%	50%
TOTAL					167,095,100	78,100,050	85,610,050	3,385,000

Table 3.5.7 Project Cost of Community Road

Unit: Pesos

No.	Work Item	(as of 2002)	Year					
			2002	2003	2004	2005	2006	2007
Route-A1 (L=16.0km)								
1	Civil Work							
	Road Improvement	64,913,000			12,982,600	32,456,500	19,473,900	
	Bridge	53,434,000			10,686,800	37,403,800	5,343,400	
	Causeway	0				0	0	
	Retaining Wall	0						
	Total of Civil Works	118,347,000		0	23,669,400	69,860,300	24,817,300	0
2	Administration and Engineering Service	35,504,100		14,201,640	7,100,820	7,100,820	7,100,820	
3	Physical Contingency (10%)	15,385,110		1,420,164	3,077,022	7,696,112	3,191,812	0
4	Total (1+2+3)	169,236,210		15,621,804	33,847,242	84,657,232	35,109,932	0
5	Price Escalation (4% per year)	19,921,170		624,872	2,761,935	10,570,641	5,963,722	0
6	Total Cost (4+5)	189,157,380		16,246,676	36,609,177	95,227,873	41,073,654	0
Route-A2 (L=32.0km)								
1	Civil Work							
	Road Improvement	131,782,000			26,356,400	65,891,000	39,534,600	
	Bridge	331,348,000			66,269,600	231,943,600	33,134,800	
	Causeway	57,782,000				28,891,000	28,891,000	
	Retaining Wall	0						
	Total of Civil Works	520,912,000		0	92,626,000	326,725,600	101,560,400	0
2	Administration and Engineering Service	156,273,600		62,509,440	31,254,720	31,254,720	31,254,720	
3	Physical Contingency (10%)	67,718,560		6,250,944	12,388,072	35,798,032	13,281,512	0
4	Total (1+2+3)	744,904,160		68,760,384	136,268,792	393,778,352	146,096,632	0
5	Price Escalation (4% per year)	87,854,452		2,750,415	11,119,533	49,168,740	24,815,764	0
6	Total Cost (4+5)	832,758,612		71,510,799	147,388,325	442,947,092	170,912,396	0
Route-B (L=14.8km)								
1	Civil Work							
	Road Improvement	56,086,000			16,825,800	39,260,200		
	Bridge	23,913,000			4,782,600	11,956,500	7,173,900	
	Causeway	6,521,000				3,260,500	3,260,500	
	Retaining Wall	0						
	Total of Civil Works	86,520,000		0	21,608,400	54,477,200	10,434,400	0
2	Administration and Engineering Service	25,956,000		10,382,400	5,191,200	5,191,200	5,191,200	
3	Physical Contingency	11,247,600		1,038,240	2,679,960	5,966,840	1,562,560	0
4	Total (1+2+3)	123,723,600		11,420,640	29,479,560	65,635,240	17,188,160	0
5	Price Escalation (4% per year)	13,977,392		456,826	2,405,532	8,195,479	2,919,556	0
6	Total Cost (4+5)	137,700,992		11,877,466	31,885,092	73,830,719	20,107,716	0
Route-C (L=44.9km)								
1	Civil Work							
	Road Improvement	183,043,000			54,912,900	128,130,100		
	Bridge	131,521,000			26,304,200	65,760,500	39,456,300	
	Causeway	14,130,000				7,065,000	7,065,000	
	Retaining Wall	94,565,000						
	Total of Civil Works	423,259,000		0	81,217,100	200,955,600	46,521,300	0
2	Administration and Engineering Service	126,977,700		50,791,080	25,395,540	25,395,540	25,395,540	
3	Physical Contingency	55,023,670		5,079,108	10,661,264	22,635,114	7,191,684	0
4	Total (1+2+3)	605,260,370		55,870,188	117,273,904	248,986,254	79,108,524	0
5	Price Escalation (4% per year)	56,331,038		2,234,808	9,569,551	31,089,420	13,437,260	0
6	Total Cost (4+5)	661,591,408		58,104,996	126,843,455	280,075,674	92,545,784	0
OVERALL								
1	Civil Work							
	Road Improvement	435,824,000			130,747,200	305,076,800		
	Bridge	540,216,000			108,043,200	270,108,000	162,064,800	
	Causeway	78,433,000				39,216,500	39,216,500	
	Retaining Wall	94,565,000						
	Cost for Route-C	1,149,038,000		0	238,790,400	614,401,300	201,281,300	0
2	Total of Civil Works	1,149,038,000		0	238,790,400	614,401,300	201,281,300	0
3	Administration and Engineering Service	344,711,400		137,884,560	68,942,280	68,942,280	68,942,280	
4	Physical Contingency	149,374,940		13,788,456	30,773,268	68,334,358	27,022,358	0
5	Total (1+2+3)	1,643,124,340						
5	Price Escalation (4% per year)	178,036,287		6,066,921	27,622,085	93,857,514	50,489,767	0
6	Total Cost (4+5)	1,821,160,627		157,739,937	366,128,033	845,535,452	347,735,705	0

**Table 3.6.1 Project Cost of the Study on Sabo and Flood Control
for Western River Basin of Mount Pinatubo (for Full Development Scheme)**

(Unit : x 1,000 Peso)

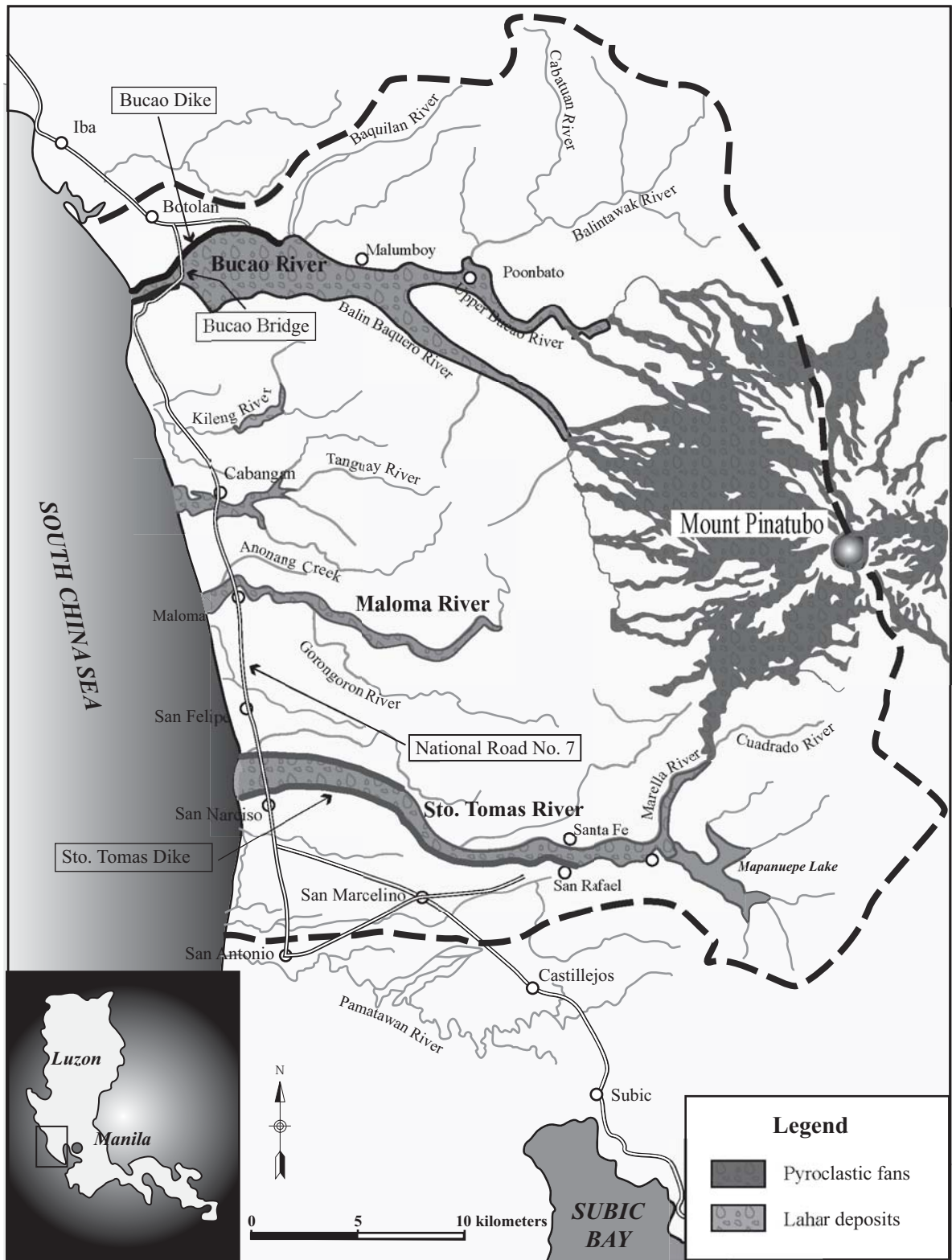
No.	Description	Construction cost	Land Acquisition and	Government Administration	Engineering Service	Price Contingency	Physical Contingency	Total
1	Sabo and Flood Control Structure							
1.1	Bucao river basin	1,034,500	44,878	31,035	165,520	249,529	152,546	1,678,008
1.2	Sto. Tomas river basin	1,192,128	37,988	35,764	190,741	324,850	178,147	1,959,618
	Sub total (1)	2,226,628	82,866	66,799	356,261	574,379	330,693	3,637,626
2	Non-Structure Measure							
2.1	Flood /Mudflow Monitoring & Warning Sys	33,559	0	1,007	40,035	0	7,460	82,061
2.2	Evacuation center	322,400	0	9,672	51,584	0	38,366	422,022
	Sub total (2)	355,959	0	10,679	91,619	0	45,826	504,082
3	Community Based Disaster Prevention and Social Development							
3.1	Extension of ongoing community based forest management	576,895	0	17,307	92,303	0	68,651	755,156
3.2	Agricultural development	535,257	0	16,058	85,641	0	63,696	700,651
3.3	Community road rehabilitation	1,149,038	0	0	344,711	178,036	149,374	1,821,159
3.4	Establishment of the Aeta assistance station	7,260	0	1,075	363	0	6,000	14,698
	Sub total (3)	2,268,450	0	34,440	523,018	178,036	287,720	3,291,664
	Total	4,851,037	82,866	111,917	970,898	752,415	664,239	7,433,372

Note:

1. Land acquisition cost of Item 2 is included in the construction cost.
2. Price contingency for Item 2 and Item 3 is not subject to estimate because of uncertain implementation schedule.

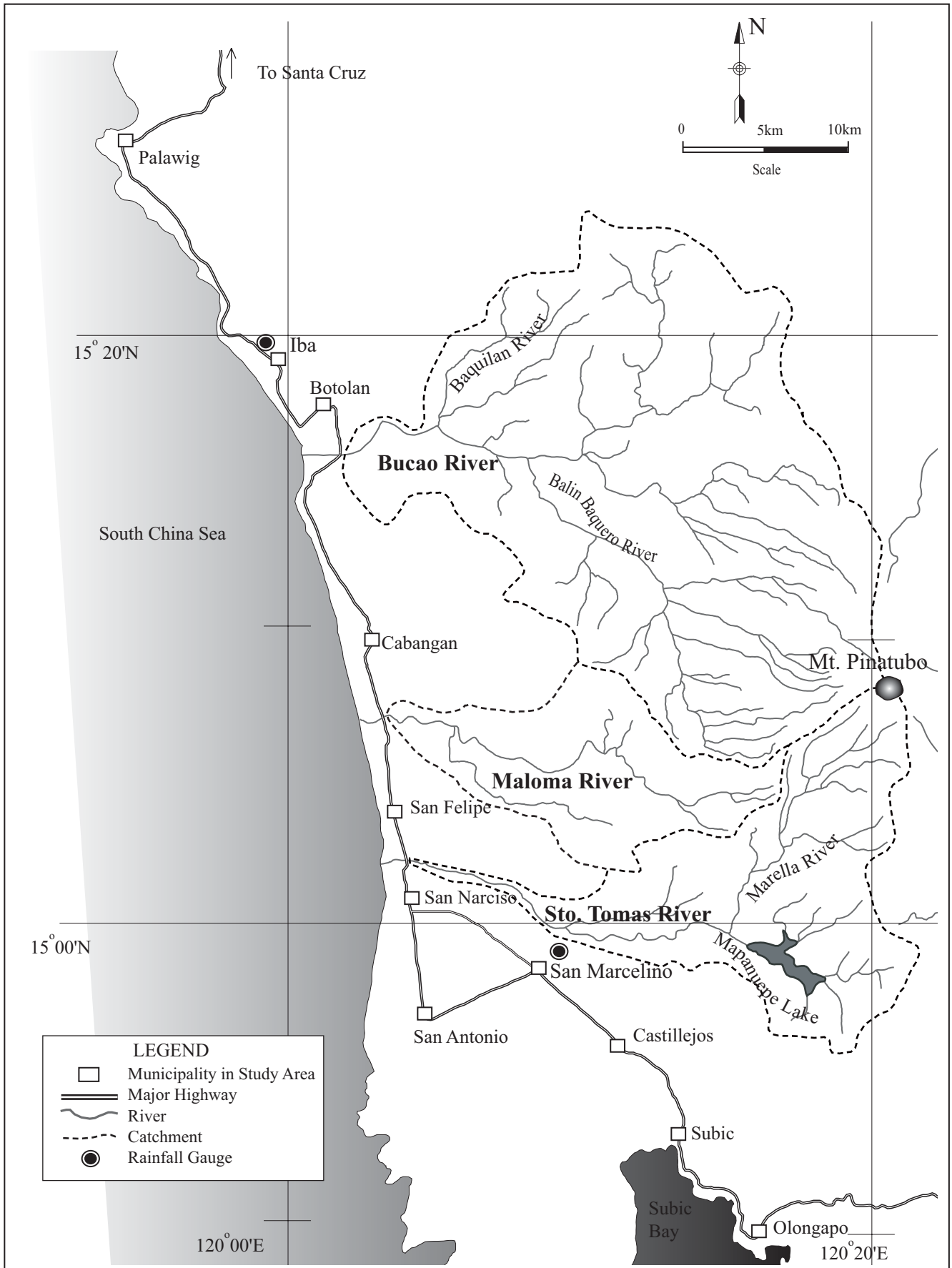
*The Study on Sabo and Flood Control for Western River Basins of Mount Pinatubo
in the Republic of the Philippines
Final Report
Supporting Report*

Figures



THE GOVERNMENT OF THE PHILIPPINES
 THE DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
**The Study on Sabo and Flood Control for
 Western River Basins of Mount Pinatubo
 in the Republic of the Philippines**
 JAPAN INTERNATIONAL COOPERATION AGENCY

Figure 1.1.1
Location of the Works



LEGEND

- Municipality in Study Area
- ══ Major Highway
- ~ River
- - - Catchment
- Rainfall Gauge

THE GOVERNMENT OF THE PHILIPPINES
 THE DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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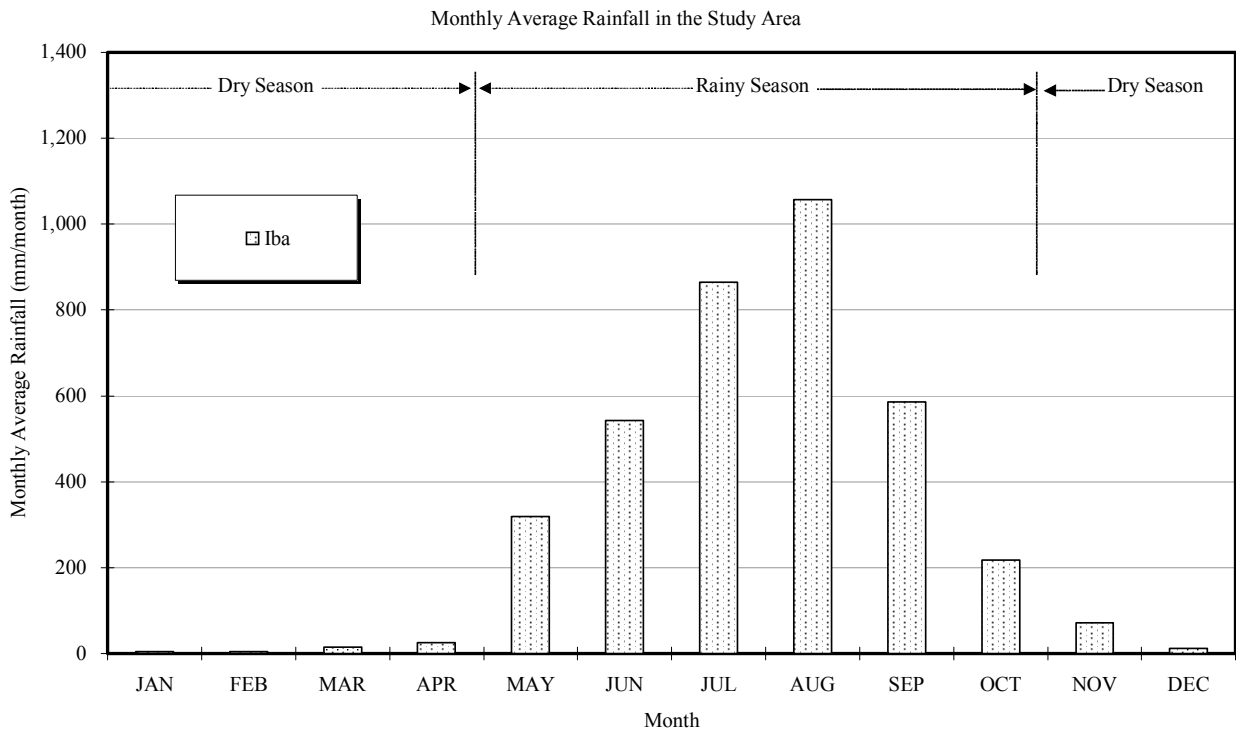
JAPAN INTERNATIONAL COOPERATION AGENCY

Figure 1.2.1
**Location of Selected Rainfall Gauge Stations
 for Construction Planning**

Station: Iba

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total
1976	0.0	0.0	13.1	8.6	1,968.5	365.4	414.9	651.2	833.0	41.6	13.4	64.7	4,374
1977	29.7	0.0	0.9	11.9	281.2	242.4	945.1	982.7	997.9	18.1	390.3	0.6	3,901
1978	0.0	0.7	1.0	2.3	368.1	577.0	609.5	2,296.7	761.4	585.8	4.1	20.0	5,227
1979	0.3	2.8	0.0	30.7	660.6	100.1	986.9	1,405.2	162.0	163.1	32.9	6.8	3,551
1980	0.0	0.8	18.2	44.9	328.7	204.2	1,214.7	662.1	1,096.7	187.6	284.3	0.0	4,042
1981	1.4	2.0	0.0	1.0	107.8	1,003.8	883.9	1,022.9	262.3	265.2	90.7	3.2	3,644
1982	0.2	10.4	43.7	19.4	83.6	680.5	1,622.4	793.7	673.3	57.2	67.6	34.8	4,087
1983	9.6	5.8	0.0	0.0	5.2	198.4	355.4	916.1	399.8	164.8	65.0	0.0	2,120
1984	0.0	0.0	16.7	75.7	195.1	801.8	738.4	1,787.6	135.0	326.5	10.0	20.4	4,107
1985	4.6	1.2	94.3	49.6	113.8	1,807.2	270.8	1,020.5	415.2	267.1	55.7	18.8	4,119
1986	0.0	4.8	0.0	38.0	470.8	310.9	1,182.6	1,391.8	391.4	160.9	52.0	21.2	4,024
1987	2.4	0.0	0.0	1.0	69.3	682.8	660.7	634.8	432.2	46.1	26.6	5.3	2,561
1988	6.6	22.6	33.4	53.3	576.6	563.1	814.8	724.2	428.0	619.6	30.8	0.7	3,874
1989	-	19.0	49.6	0.0	243.1	358.0	754.0	1,356.8	754.0	160.2	40.0	0.4	-
1990	1.8	-	0.0	0.0	229.6	1,019.0	885.2	668.4	556.0	116.0	32.6	0.4	-
1991	3.2	3.2	25.6	12.4	57.0	515.8	857.6	1,147.1	1,138.8	211.0	47.4	2.0	4,021
1992	0.3	0.0	0.0	69.1	190.8	355.9	1,127.2	1,340.6	618.9	109.4	24.2	2.5	3,839
1993	0.1	0.0	1.0	43.4	43.9	281.0	936.4	1,024.3	520.1	533.0	91.6	17.4	3,492
1994	19.0	11.4	-	46.0	158.5	487.2	1,461.9	495.3	273.3	108.2	0.0	0.7	-
1995	-	0.0	0.0	0.0	245.9	318.6	555.4	811.1	860.7	206.9	68.7	28.7	-
Average	4.4	4.5	15.7	25.4	319.9	543.7	863.9	1,056.7	585.5	217.4	71.4	12.4	3,812

Note: "-" indicates there are missing data



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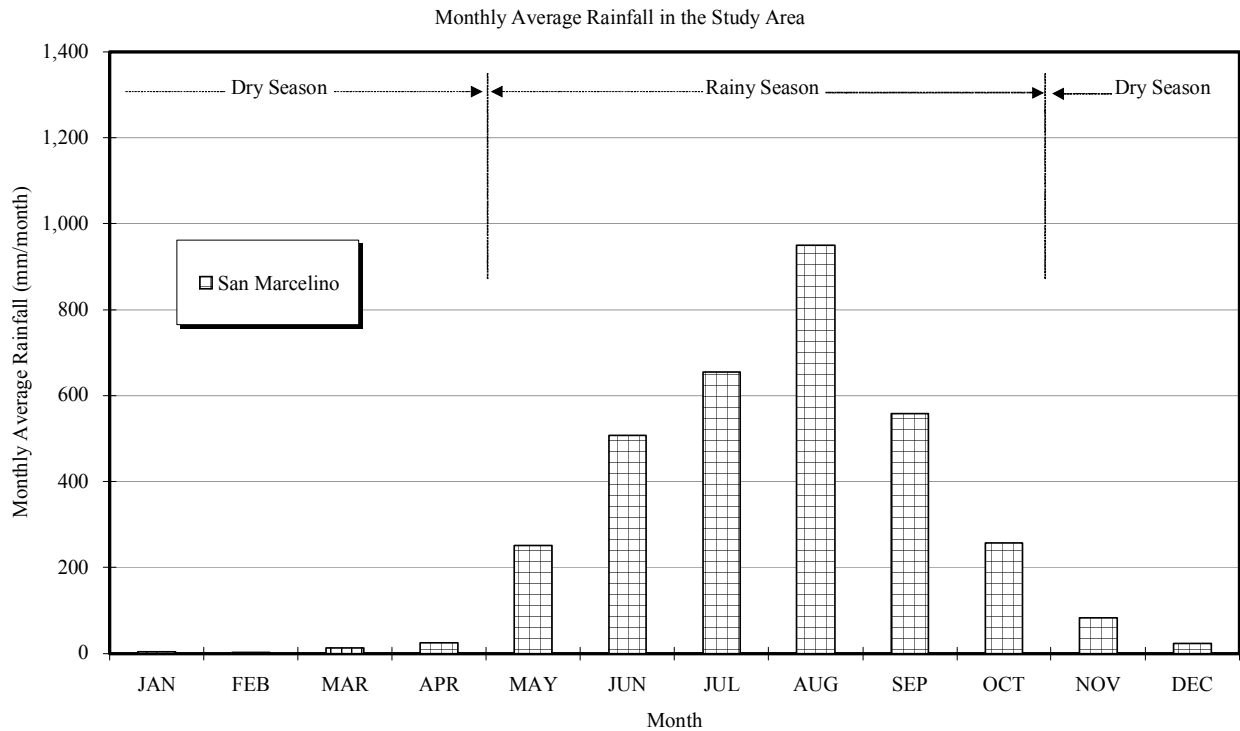
Figure 1.2.2

Monthly Rainfall in Iba

Station: San Marcelino

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total
1976	1.2	0.0	0.0	52.0	1,427.3	518.9	549.8	827.1	595.7	106.7	0.0	74.8	4,154
1977	17.7	0.0	97.2	0.0	259.0	89.9	1,039.1	1,102.1	979.3	126.3	539.4	0.0	4,250
1978	0.0	0.0	0.0	5.0	368.1	323.2	661.7	2,324.1	487.6	643.0	47.9	240.8	5,101
1979	0.2	1.3	0.0	5.5	326.6	266.2	455.2	1,664.4	306.7	-	24.9	36.4	-
1980	0.8	0.0	39.0	6.4	287.7	111.6	806.5	426.5	528.0	158.1	187.1	12.2	2,564
1981	1.6	0.0	-	56.9	145.6	1,222.5	690.0	1,128.8	360.5	245.7	142.7	13.9	-
1982	1.9	1.8	0.0	29.4	95.4	708.1	919.9	897.0	600.7	143.5	32.4	15.7	3,446
1983	15.4	6.0	0.0	0.0	0.0	227.1	395.3	834.1	462.1	317.6	2.7	0.0	2,260
1984	1.4	0.0	1.2	98.9	200.0	885.1	363.5	934.0	172.3	343.7	19.7	4.8	3,025
1985	0.0	0.0	37.8	29.8	54.8	1,321.7	449.5	812.0	441.1	331.9	82.0	0.0	3,561
1986	0.0	2.7	0.0	0.0	278.3	329.4	1,041.3	1,364.2	615.7	212.9	137.2	1.1	3,983
1987	0.0	0.0	0.0	1.0	57.9	640.5	-	465.7	492.7	154.3	51.2	3.9	-
1988	12.8	11.0	0.1	46.0	517.6	554.1	605.8	397.5	238.3	554.3	46.8	0.0	2,984
1989	1.5	0.0	74.5	52.6	249.6	258.0	790.0	970.8	738.1	226.8	54.5	0.0	3,416
1990	0.0	0.0	0.3	0.0	259.8	1,157.8	672.5	882.7	583.9	85.1	46.2	0.0	3,688
1991	0.0	7.7	0.0	24.6	54.5	451.3	624.7	1,393.0	1,242.5	82.2	47.3	0.0	3,928
1992	0.0	0.0	0.0	33.0	101.0	279.8	541.0	1,116.6	646.1	161.6	17.4	0.0	2,897
1993	0.0	0.0	1.4	2.8	0.4	285.2	834.6	723.1	573.6	670.9	33.6	11.7	3,137
1994	24.6	8.6	0.2	40.0	173.3	350.3	779.9	291.0	220.4	61.8	3.8	0.8	1,955
1995	0.4	0.6	0.0	0.0	169.2	174.4	229.0	430.9	866.9	259.6	137.4	41.9	2,310
Average	4.0	2.0	13.2	24.2	251.3	507.8	655.2	949.3	557.6	257.2	82.7	22.9	3,333

Note: "-" indicates there are missing data



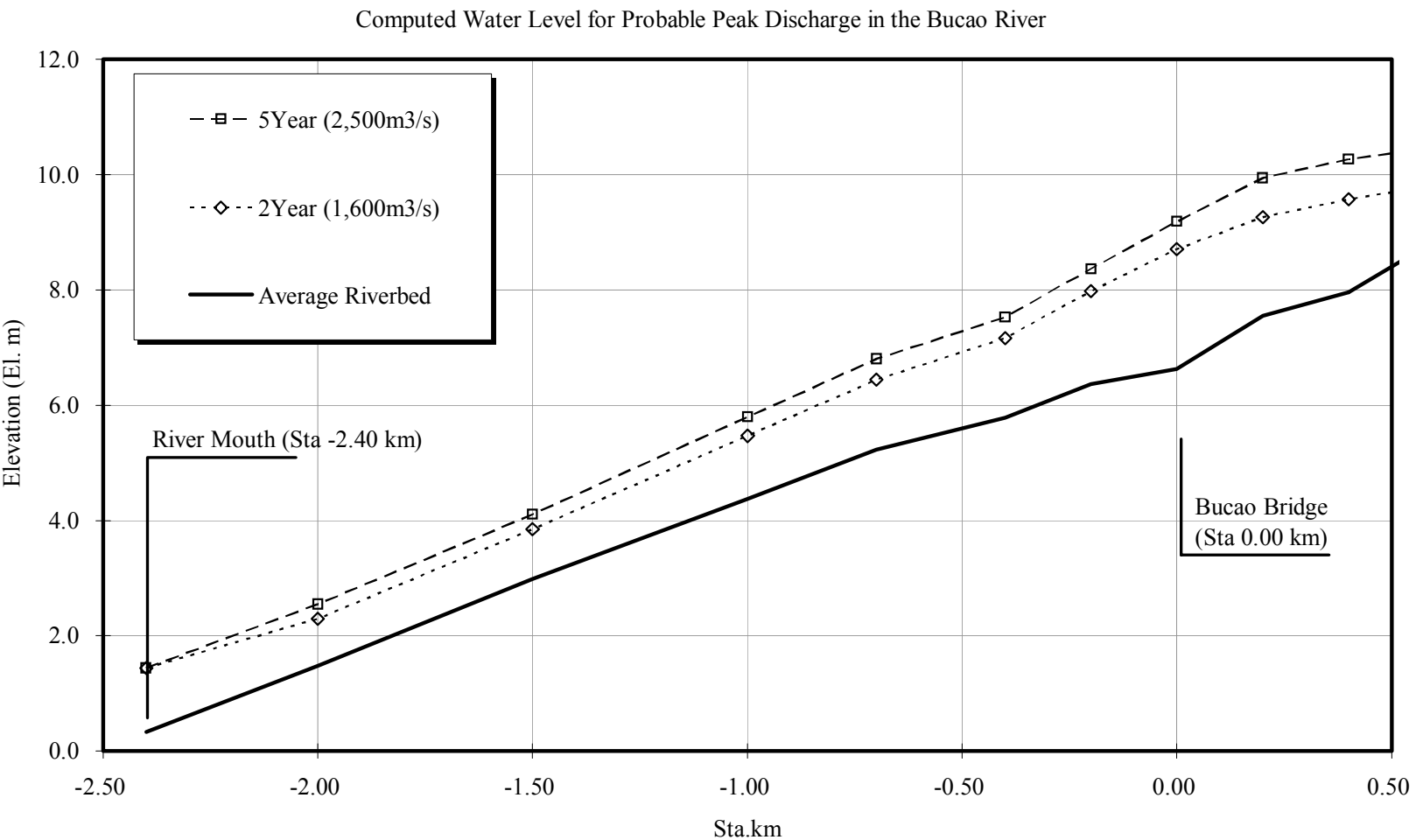
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Figure 1.2.3

Monthly Rainfall in San Marcelino



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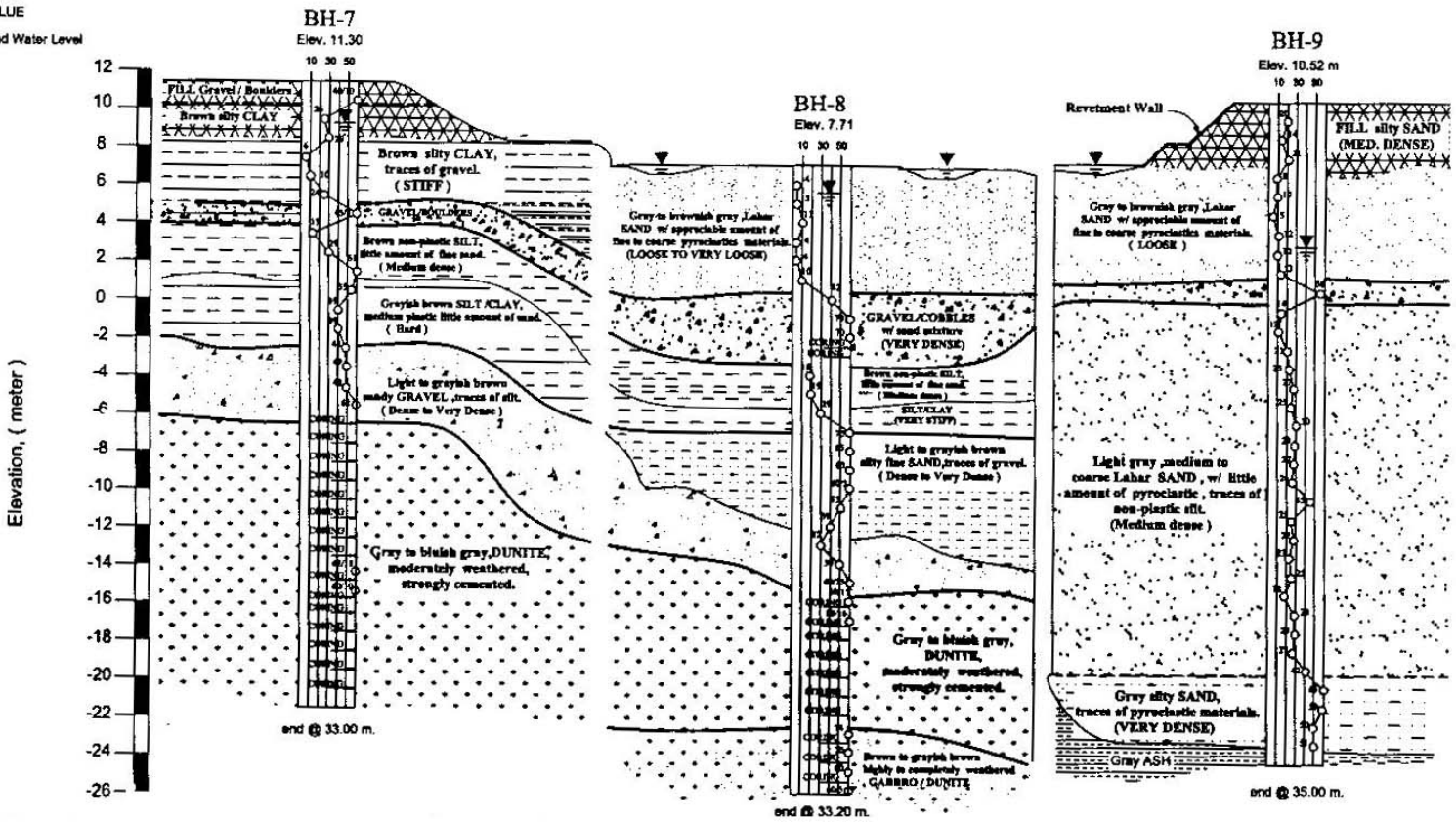
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Figure 1.2.4

**Computed Water Level for Probable Peak
Flood Discharge in the Bucao River**

LEGEND:
 ○ N - VALUE
 ▽ Ground Water Level



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Figure 1.2.5

Subsoil Condition at the Bucao Bridge