Chapter 8

INSTALLATION AND MAINTENANCE RECORDS OF AUTOMATIC GAUGES

8.1 Installation Record of 6 Automatic Rain Gauges in Agos river basin

Station		Sta. Ines	Bo. Lumutan	Upper Matatio	Lagmac	Tuno	Longoy
Basin		Kaliwa	Kaliwa	Kanan	Kanan	Kanan	Kanan
Location	Altitude (m)	500	510	530	260	500	610
	Latitude (N)	14° 43.6′	14° 45.9′	14° 43.1′	14° 51.4′	14° 45.5′	14° 49.1′
	Longitude (E)	121° 19.9′	121° 21.9′	121° 28.0′	121° 27.1′	121° 32.3′	121° 31.2′
Recorder / Serial No.		Stevens /	Stevens /	Ikeda /	Ikeda /	Stevens /	Ikeda /
Date of Installation		Aug 2, 1979	Aug 4, 1979	Sep 8, 1979	Sep 13, 1979	Nov 11, 1979	Aug 16, 1979
Height of rain gauge above ground (m)		1.30	1.30	1.20	3.00	1.60	2.70
Remarks		Heliport can be constructed near gauge	20 minutes walking from heliport in front of gauge keeper's house	beside main logging road, Helicopter can land on the road.	Helicopter can land.	40 minutes walking from main logging road. Heliport can be constructed.	30 minutes walking from main logging road. Heliport can be constructed.

8.2 MAINTENANCE SCHEDULE AND RECORD OF AUTOMATIC - RAIN GAUGE

Station: Sta. Ines, Tanay, Rizal Recorder: Stevens S.No. _____

Descriptin	Date	Record Obtained		Next Maintenance		Remarks	Sign.
		Condition	Period	Chart	Battery		
Installation	June 7, '79			for one (1) year operation until May 25, 1980	Being replaced by gauge keaper	In the town of Sta. Ines El. 300 m.	Jorge Linayao
Shift	Aug. 2, '79					Shifted to newly selected hilltop	B.A. Dapula
1st Check Up	Nov. 2, '79	good	June 7, '79 & Aug. 2, '79 Aug. 2, '79 & Nov. 2, '79		Feb. 1, '80	Dry battery replaced with JICA Battery	A. Katayama

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MAINTENANCE SCHEDULE AND RECORD OF AUTOMATIC Rain GAUGE

Station: Lumutan, Gen. Nakar, Quezon Recorder: Stevens S.No. _____

Descriptin	Date	Record Obtained		Next Maintenance		Remarks	Sign.
		Condition	Period	Chart	Battery		
Installation	Aug. 4, '79			For 1 year operation until July 21, 1980	Being replaced by gauge keeper	On the ridge 20 min. walking from heliport	B.A. Dapula
1st Check Up	Nov. 2, '79	good	Aug. 4, '79 & Nov. 2, '79		Until Feb. 1, '80	JICA battery connected in parallel with dry cell	A. Katayama

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MAINTENANCE SCHEDULE AND RECORD OF AUTOMATIC Rain GAUGE

Station: Upper Matatio Recorder: Ikeda S.No. _____

Descriptin	Date	Record Obtained		Next Maintenance		Remarks	Sign.
		Condition	Period	Chart	Battery		
Installation	Sept. 8, '79					Baside main logging road.	B. A. Capula
1st Chock Up	Nov. 8, '79	good	Sept. 8, '79 S Nov. 8, '79	Feb. 7, '80	Feb. 7, '80	Some shelter on the G.I. Sheet is required against Susnshine.	A. Katayama

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MAINTENANCE SCHEDULE AND RECORD OF AUTOMATIC Rain GAUGE

Station: Lagmac Recorder: Ikeda S.No. _____

Descriptin	Date	Record Obtained		Next Maintenance		Remarks	Sign.
		Condition	Period	Chart	Battery		
Installation	Sept. 13, '79					Baside Kanan River	B.A. Dapula
1st Check Up	Nov. 8, '79	good	Sept. 13, '79 & Nov. 8, '79	Feb. 7, '80	Feb. 7, '80	Insecticide is required for Ant	B. Kobayama

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MAINTENANCE SCHEDULE AND RECORD OF AUTOMATIC Rain GAUGE

Station: Tuno Recorder: Stevens S.No. _____

Descriptin	Date	Record Obtained		Next Maintenance		Remarks	Sign.
		Condition	Period	Chart	Battery		
Installation	Mar. 23, '79					Beside Kanan River	J. Linayao
Shift	Aug. 8, '79					Shifted to newly selected higher place, beside old logging road.	F.R. Udasco
Replacement of Recorder	Nov. 11, '79	Out of order	Mar. 23, '79 & Aug. 7, '79 Aug. 8, '79 & Nov. 11, '79	Oct. 28, '80	Feb. 10, '80	Recorder replaced with new one dry battery only	B.A. Dapula

HYDROLOGY, NAPOCOR

MAINTENANCE SCHEDULE AND RECORD OF AUTOMATIC Rain GAUGE

Station: Longoy Recorder: Ikeda S.No. _____

Descriptin	Date	Record Obtained		Next Maintenance		Remarks	Sign.
		Condition	Period	Chart	Battery		
Installation	Aug. 16, '79					Thirty (30) min. walking from main logging road.	F. R. Udasco
1st Check Up	Nov. 10, '79	good	Aug. 16, '79 & Nov. 10, '79	Feb. 9, '80	Feb. 9, '80		B. A. Dapula

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8.3 MAINTENANCE SCHEDULE AND RECORD OF AUTOMATIC Water Level GAUGE

Station: Mahabang Lalim on Agos River Recorder: Stevens Model F S.No. _____

Descriptin	Date	Record Obtained		Next Maintenance		Remarks	Sign.
		Condition	Period	Chart	Battery		
Installation	Dec. 1978	Out of Order					
Reset	Sept. 19, '79			Sept. 5, '80	None	No record is available for G.H. less than 0.9 m. Stilling well shall be deepend.	
1st check up	Nov. 24, '79	good	Sept. 19, '79 ↓ Nov. 24, '79				

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MAINTENANCE SCHEDULE AND RECORD OF AUTOMATIC Water Level GAUGE

Station: N10 on Kaliwa River Recorder: Suiken 62 S.No. _____

Descriptin	Date	Record Obtained		Next Maintenance		Remarks	Sign.
		Condition	Period	Chart	Battery		
Installation	Nov. 19, '79			Feb. 8, '80 for 80 days operation	non		B. B. Bapula

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MAINTENANCE SCHEDULE AND RECORD OF AUTOMATIC Water Level GAUGE

Station: Binugawan on Kanan river Recorder: _____ S.No. _____

Descriptin	Date	Record Obtained		Next Maintenance		Remarks	Sign.
		Condition	Period	Chart	Battery		

HYDROLOGY, NAPOCOR

Chapter 9

MISCELLANEOUS RECORDS

9.1 List of Recording Chart received by NK by Nov 17, 1980

Station	Record Period		Remarks
	from	to	
Mahabang-Lalim G.S. on Agos River	Sep 19 '79	Nov 24 '79	
	Mar 11 '80	June 23 '80	
Nio G.S. on Kaliwa River	Nov 29 '79	Feb 8 '80	
	Feb 8 '80	May 6 '80	
	May 6 '80	July 22 '80	
Sta. Ines Rain Gauge	June 7 '79	Aug 2 '79	at old site
	Aug 2 '79	Nov 2 '79	
	July 23 '80	Oct 11 '80	
Bo. Lumutan Rain Gauge	Aug 4 '79	Nov 2 '79	
	May 30 '80	Oct 11 '80	
Tuno Rain Gauge	Mar 23 '79	Aug 7 '79	at old site
	Aug 8 '79	Nov 11 '79	
	Nov 11 '79	Feb 17 '80	
	May 16 '80	Aug 11 '80	
Upper Matatio Rain Gauge	Nov 8 '79	Feb 9 '80	
	Feb 9 '80	May 16 '80	
Longoy Rain Gauge	Nov 10 '79	Nov 25 '79	
	May 14 '80	Aug 12 '80	
Lagmac Rain Gauge	Nov 8 '79	Feb 11 '80	
	Feb 12 '80	Mar 5 '80	

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Rainfall Recording Chart of Sta. Ines

Roll No.	Start	End		Time difference in hour	Remarks
		by Chart	by gauge keeper		
1	JUNE 7/79 8:45	AUG. 2/79 14:50	AUG. 2/79 12:00	2.0	
2	AUG 2/79 14:15	NOV. 2/79 8:00	NOV. 2/79 10:00	5.0	
3	JUL 23'80	OCT 11'80			

Rainfall Recording Chart of Lumutan

Roll No.	Start	End		Time difference in hour	Remarks
		by Chart	by gauge keeper		
1	AUG. 4/79 12:00	NOV. 1/79 18:30	NOV. 2/79 12:55	17.5	
2	MAY 30/80	OCT 11/80			

Rainfall Recording Chart of Upper Matatio

Roll No.	Start	End		Time difference in hour	Remarks
		by Chart	by gauge keeper		
1	NOV. 8/79 11:08	FEB. 9/80 15:30	FEB. 9/80 15:24	1.0	
2	FEB 9/80 17:10	MAY 16/80 0:00	MAY 16/80 3:10	3.0	

Rainfall Recording Chart of Lagnac.

Roll No.	Start	End		Time difference in hour	Remarks
		by Chart	by gauge keeper		
1	NOV. 8/79 13:00	FEB. 11/80 17:00	FEB. 11/80 16:20		
2	FEB. 12/80 7:00	— (MAR. 5/80)	—		

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Rainfall Recording Chart of [illegible]

Roll No.	Start	End		Time difference in hour	Remarks
		by Chart	by gauge keeper		
1	MAR. 23/79 [illegible]	AUG. 7/79 10:30	AUG. 7/79 10:30	0	
2	AUG. 8/79 10:10	SEP. 8/79 4:00	SEP. 7/79 8:25	19.5	
	2	NOV. 11/79 8:00	NOV. 11/79 8:00	0	
3	NOV. 11/79 9:40	FEB. 17/80 21:00	[illegible]		
4	May 16/80	Aug 11/80			

Rainfall Recording Chart of Longoy

Roll No.	Start	End		Time difference in hour	Remarks
		by Chart	by gauge keeper		
1	NOV. 10/79 15:00	— (NOV. 25/79)	—		
2	May 14'80	Aug 12'80			

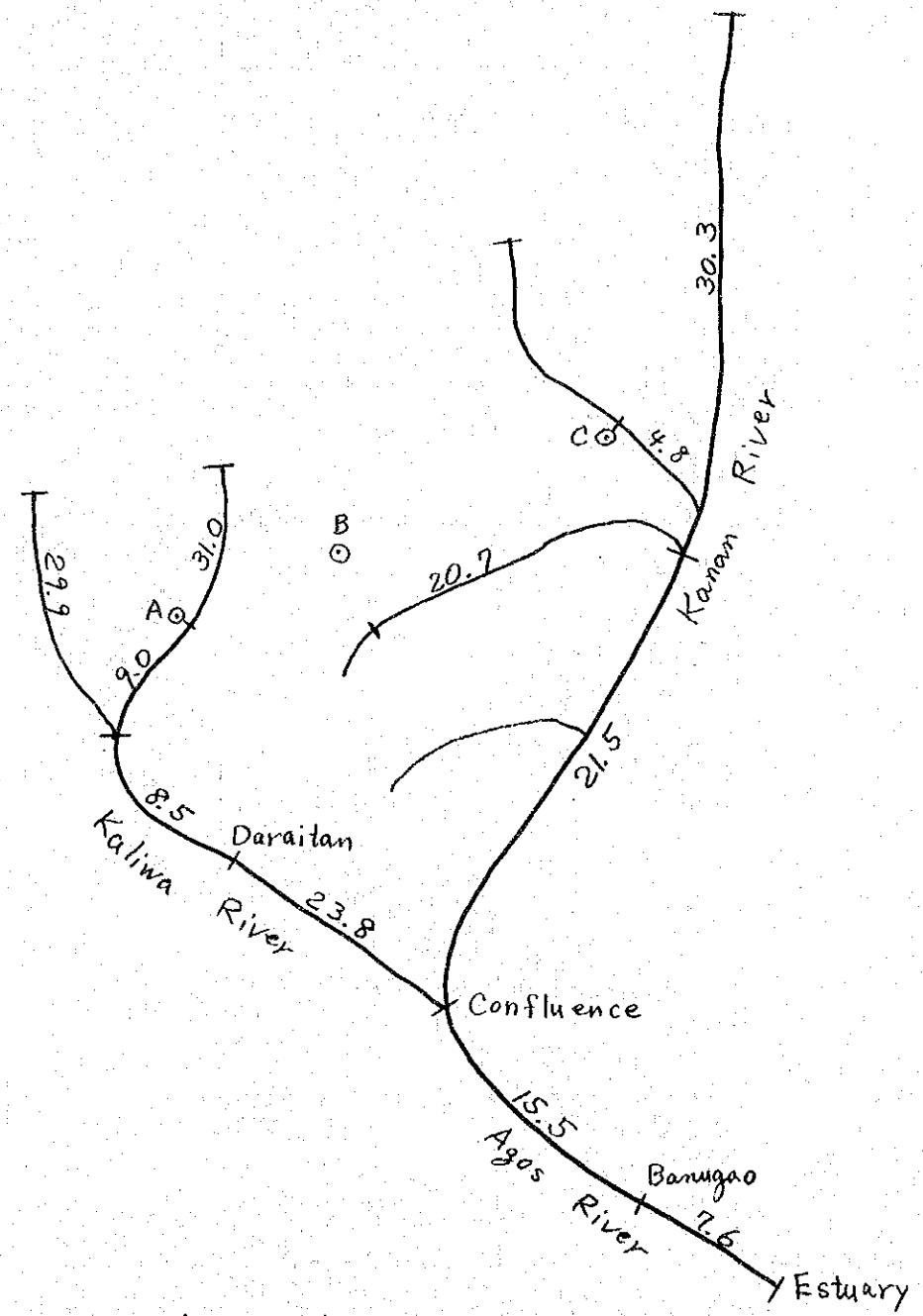
Water Level Recording Chart of Mahabang Salim

Roll No.	Start	End		Time difference in hour	Remarks
		by Chart	by gauge keeper		
1	APR. 15/80 11:30	NOV. 24/79 2:30	NOV. 24/79 2:30	0	
2	APR. 1/80 15:45	MAY 11/80 13:00	MAY 11/80 10:45	-2.0	
	MAY 11/80 11:00	MAY 30/80 9:00	MAY 31/80 11:30	-2.5	
	MAY 26/80 9:00	JUN. 27/80 3:00	JUN. 27/80 10:00	CA 120 hrs	

Water Level Recording Chart of Kaliwa Nio

Roll No.	Start	End by Chart	End by gauge keeper	Time difference in hour	Remarks
1	NOV. 22/79 13:00	JAN. 11/80 18:30	JAN. 11/80 18:15	0.25	
		JAN. 12/80 14:00	JAN. 12/80 13:30	0.5	
	JAN. 12/80 15:30	FEB. 9/80 4:00	FEB. 8/80 18:40	14.5	
2	FEB. 8/80 14:29	FEB. 21/80 12:30	FEB. 20/80 10:30	26.0	
	FEB. 20/80 10:38	FEB. 26/80 22:30	FEB. 26/80 10:00	12.5	
	FEB. 26/80 11:00	MAR. 12/80 18:00	MAR. 1/80 9:05	33.0	
	MAR. 11/80 10:35	MAR. 24/80 17:30	MAR. 23/80 13:53	27.5	
	MAR. 23/80 14:35	APR. 11/80 8:00	APR. 9/80 15:35	20.5	
	APR. 9/80 15:40	APR. 30/80 12:00	MAY 6/80 10:20	44	
3	MAY 6/80 11:08	MAY 28/80 23:00	MAY 22/80 11:25	35.5	
	MAY 22/80 11:37	MAY 28/80 1:00	?		
	MAY 27/80 16:02	JUN. 14/80 10:00	JUN. 14/80 9:59	0	
	JUN. 14/80 10:12				TEST
	JUN. 16/80 14:25	JUL. 22/80 20:00	JUL. 22/80 9:30	10.5	

9.2 Length of River Course in km²

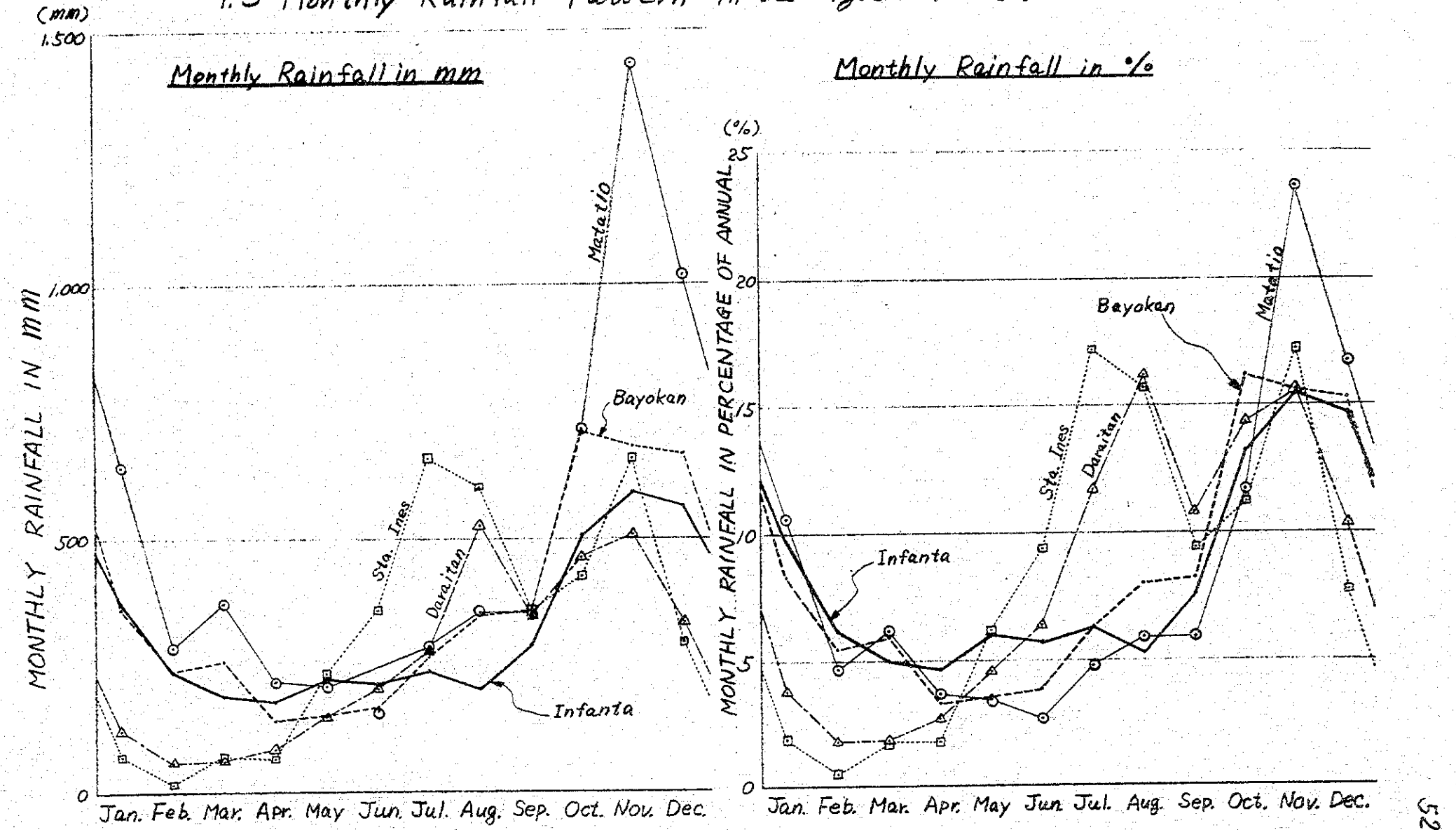


⊙ A; Centroid of Kaliwa river basin upper than the confluence

B; " of Agos "

C; " of Kanan "

9.3 Monthly Rainfall Pattern in the Agos River Basin



Lat: 14°-54'-35"N Alt: EL360.7 m
Long: 121°-09'-07"E

9.4 Monthly Rainfall at Ipo Dam (mm)

Month / Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Total	No. of Rainy Days
1925	59.2	108.1	100.9	21.1	158.2	1,030.1	776.7	623.0	539.3	410.8	189.4	125.1	4,141.9	173
26	29.1	5.6	17.2	148.6	207.3	862.5	602.5	697.8	382.2	272.2	249.0	69.8	3,543.8	152
27	25.4	4.3	57.8	165.8	515.3	549.4	892.8	1,075.8	336.3	531.5	72.6	54.9	4,281.9	135
28	77.8	55.9	22.3	78.0	294.9	546.4	337.5	277.0	752.7	88.7	279.7	90.1	2,901.0	156
29	91.3	8.9	0	135.7	439.8	417.7	947.9	484.6	820.9	359.6	207.1	178.6	4,092.1	148
30	71.0	0	23.9	44.7	665.9	799.8	1,140.5	559.2	396.3	148.6	388.1	295.9	4,533.9	145
31	94.0	4.1	42.1	52.1	245.1	426.5	328.4	1,152.6	394.0	260.3	322.6	208.1	3,529.9	171
32	5.4	11.7	17.7	5.6	234.8	697.9	947.4	285.8	452.8	366.1	342.4	158.8	3,526.4	170
33	85.8	3.5	3.3	16.5	171.9	422.9	628.6	451.8	573.3	461.6	189.5	63.5	3,072.2	157
34	13.7	33.6	0.8	69.6	626.5	249.9	791.0	493.6	968.2	428.5	608.5	107.8	4,391.7	169
35	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	21.0	35.6	5.1	45.7	57.2	346.2	632.5	585.0	375.9	280.4	59.2	142.1	2,585.9	169
37	18.1	15.0	75.2	0.6	339.4	332.9	1,056.3	884.5	521.2	376.5	429.5	231.1	4,280.3	190
38	64.9	0.8	84.1	125.2	219.3	347.0	394.7	392.7	410.3	306.8	336.9	75.0	2,757.7	184
39	26.2	2.8	22.1	50.3	359.0	402.6	525.8	669.4	407.4	228.9	271.7	358.7	3,324.9	187
1948	22.8	23.6	1.8	162.9	185.6	299.2	563.4	1,127.8	572.8	215.4	254.2	103.1	3,532.6	171
49	14.9	0	10.9	31.5	21.6	483.1	236.2	298.2	276.1	228.6	263.1	135.8	2,000.0	167
50	28.4	11.2	64.3	20.8	279.6	431.4	731.0	413.8	615.7	417.8	108.2	182.7	3,304.9	165
51	11.7	48.3	0	54.6	198.1	452.2	317.5	684.5	286.8	182.9	374.4	96.3	2,707.3	136
52	3.8	37.0	0	18.3	141.3	600.9	309.4	800.1	419.8	488.6	44.2	156.2	3,019.6	142
53	1.3	21.3	13.2	100.8	276.8	384.4	385.3	867.8	462.0	477.5	226.2	258.6	3,475.2	176
54	7.6	14.2	42.9	59.9	60.4	242.3	254.2	538.5	402.8	131.1	387.1	27.7	2,168.7	140
55	21.6	0.5	0.3	15.2	139.4	235.2	425.7	487.4	392.9	229.4	308.3	41.4	2,297.3	148
56	11.9	53.3	16.2	102.6	163.6	143.0	408.7	611.4	788.4	160.3	260.4	278.4	2,998.2	195
57	85.3	1.1	83.6	109.5	30.7	573.5	503.1	1,146.3	557.0	294.6	139.2	2.3	3,526.2	149
58	36.0	4.8	125.4	1.8	45.2	489.5	597.4	390.1	895.3	211.6	42.7	0.8	2,840.6	155
59	31.0	1.3	24.9	15.7	163.1	129.3	362.2	1,109.0	412.5	192.0	367.8	47.0	2,855.8	145
60	25.9	81.3	13.9	83.8	359.7	405.6	204.2	1,272.5	604.1	635.5	84.8	9.9	3,781.2	162
61	5.6	1.3	102.1	93.7	128.8	782.3	469.2	623.3	714.3	347.0	156.2	8.7	3,432.5	195
63	0	7.6	8.9	0	1.3	1,207.3	303.5	390.4	446.8	86.9	13.0	70.1	2,535.8	122
64	14.5	12.7	17.3	20.3	165.6	630.2	332.5	625.9	288.8	181.4	329.9	352.5	2,971.6	145
65	9.1	0	0	90.9	264.2	436.4	660.4	329.4	408.7	88.7	257.1	82.6	2,627.5	131
66	0	17.0	0	0	66.5	371.6	464.3	475.7	507.7	165.4	387.7	180.4	2,636.3	143
67	51.6	3.3	0	56.2	246.0	772.8	489.0	763.3	374.4	160.8	289.0	5.3	3,211.7	131
68	7.6	0	5.6	71.1	142.5	221.6	648.3	750.7	331.0	222.4	51.8	1.6	2,454.2	118
69	18.3	0	4.1	26.3	107.0	215.0	988.6	596.5	414.0	210.2	77.1	98.8	2,755.9	158
70	21.6	2.3	23.9	3.1	102.7	344.8	481.0	756.1	447.9	354.0	365.3	111.4	3,014.1	169
71	3.9	4.1	119.3	2.3	486.3	562.9	523.1	257.5	157.7	537.1	442.9	241.8	3,338.9	172
72	51.9	4.6	56.2	30.5	427.6	385.3	2,146.8	990.7	383.9	132.2	176.1	50.8	4,836.6	182
73	7.7	-	-	0	121.9	247.0	428.1	518.6	283.8	469.9	277.7	88.5	2,443.2	154
Total	1,176.9	640.7	1,207.3	2,131.3	8,860.1	18,478.6	23,235.7	25,458.3	18,776.0	11,341.8	9,630.6	4,792.2	125,729.5	6,177
Average	29.4	16.0	30.2	53.3	221.5	462.0	580.9	636.5	469.4	283.5	240.8	119.8	3,143.2	154

9.5 Monthly Rainfall at Manila (1/3)

Station: Port Area, Manila, Gauge Elevation: 17 m AMSL, Source: CDM and PAGASA (Unit: mm)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL TOTAL
1865	10.90	38.10	0.10	0.10	90.70	266.20	248.90	216.80	687.80	266.40	95.00	19.60	1940.60
1866	43.90	0.10	59.90	20.10	106.40	355.10	134.10	302.80	362.40	403.90	137.40	131.10	2057.20
1867	21.60	18.30	12.70	21.60	168.90	206.60	357.90	346.10	1469.60	280.20	59.10	12.90	2975.50
1868	6.90	0.10	0.10	0.10	74.90	393.70	286.00	286.50	462.00	162.30	267.50	2.00	1944.10
1869	35.60	11.20	0.10	40.90	129.30	276.90	360.80	407.70	446.30	589.80	200.70	41.90	2541.20
1870	82.50	24.60	33.00	21.10	194.00	199.10	390.10	423.40	273.80	133.80	210.80	46.00	2032.20
1871	9.60	6.60	11.20	0.10	12.70	375.70	269.70	248.90	351.30	189.00	141.50	7.90	1624.20
1872	15.20	9.90	28.20	39.90	89.40	168.60	206.70	798.80	257.30	198.10	133.30	32.00	1977.60
1873	20.10	12.70	13.90	100.80	58.90	354.30	261.90	388.40	146.00	317.70	37.80	1.00	1713.50
1874	14.00	5.10	2.30	43.20	37.10	110.20	284.50	421.90	115.60	138.20	45.50	15.00	1232.60
1875	99.30	28.20	24.10	2.30	0.10	49.50	330.20	490.80	486.90	134.10	98.50	33.00	1777.00
1876	28.40	3.60	9.40	29.70	185.70	222.20	470.10	339.60	520.40	58.20	61.50	61.50	1990.30
1877	2.60	0.20	0.20	0.10	200.40	233.90	602.00	1095.60	93.50	239.50	50.00	6.80	2525.90
1878	1.50	7.50	10.70	5.60	76.20	207.30	239.00	220.50	399.50	99.60	122.40	89.70	1479.50
1879	55.10	39.60	11.20	119.90	103.90	96.50	143.50	290.60	316.50	147.30	397.80	5.80	1727.00
1880	42.20	11.70	15.80	136.40	21.10	205.50	809.70	499.90	349.70	172.70	105.70	36.30	2406.70
1881	4.10	0.10	9.10	7.10	174.20	433.10	486.70	440.70	255.60	155.40	65.60	91.20	2122.90
1882	9.40	27.90	30.70	40.90	131.80	235.20	573.50	306.30	327.70	320.30	177.30	104.90	2285.90
1883	195.10	15.50	23.10	75.20	123.70	212.60	754.60	256.20	353.60	162.00	72.40	3.30	2247.50
1884	0.50	0.50	5.60	0.10	96.50	297.70	721.10	327.40	194.00	47.50	149.10	61.70	1901.70
1885	2.00	0.10	3.00	22.90	1.30	169.40	313.90	170.70	50.80	111.50	57.40	3.50	906.50
1886	3.00	41.90	0.10	31.50	107.20	220.00	225.80	248.40	233.20	363.50	63.50	89.10	1627.20
1887	13.50	4.60	100.30	27.20	256.80	135.60	378.70	142.70	738.10	210.00	142.00	117.10	2267.60
1888	16.00	0.10	18.80	14.20	28.20	265.40	680.70	355.30	138.20	200.10	53.30	36.80	1807.10
1889	96.00	10.70	4.80	3.50	0.10	167.70	292.90	339.10	117.30	198.90	152.60	347.00	1732.60
1890	14.20	15.50	16.50	77.20	69.60	255.10	492.80	130.80	536.70	224.50	209.80	45.50	2088.60
1891	18.80	1.80	4.10	4.10	97.80	655.60	642.60	276.10	477.80	39.40	306.60	59.20	2583.90
1892	43.70	17.00	27.20	13.70	76.20	114.30	231.10	151.10	377.20	77.70	100.50	52.80	1282.50
1893	14.20	5.60	18.00	20.80	184.40	24.90	234.20	276.90	475.60	63.80	94.20	9.40	1442.00
1894	9.90	3.30	62.00	22.10	108.20	281.20	209.80	189.50	399.30	224.50	59.90	108.70	1678.40
1895	26.70	1.50	11.40	5.60	246.90	539.50	178.60	349.50	463.80	78.20	167.60	15.50	2084.80
1896	1.00	7.60	10.70	4.80	168.90	156.50	221.70	650.20	424.70	109.20	29.70	0.20	1785.20
1897	12.20	0.10	22.40	25.60	36.30	96.00	245.90	263.60	263.10	121.70	73.90	142.70	1303.50
1898	54.10	10.40	65.50	35.60	167.10	329.70	288.00	419.30	325.10	245.10	277.60	14.20	2231.70
1899	42.40	3.00	30.00	70.30	65.30	217.40	1190.10	340.10	385.10	79.70	227.10	143.00	2793.50
1900	3.30	3.60	15.20	2.30	49.30	415.00	186.90	770.90	288.00	175.80	148.00	66.50	2124.80
1901	0.10	9.60	16.00	12.20	71.60	155.20	228.60	341.60	151.60	457.20	310.90	97.00	1851.60
1902	27.20	1.00	7.60	7.10	51.30	311.40	289.30	300.20	523.20	69.60	71.10	57.80	1716.80
1903	25.40	8.90	0.10	18.60	15.00	100.10	267.50	180.80	149.60	76.00	45.70	148.60	1035.70
1904	34.80	27.20	11.20	30.70	70.30	437.10	268.20	219.70	382.50	109.20	81.20	20.00	1692.10
1905	0.10	2.50	1.00	173.70	23.90	364.50	594.40	213.10	239.80	174.00	10.40	27.70	1825.10

Monthly Rainfall at Manila (2/3)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL TOTAL
1906	12.70	13.50	9.40	4.80	358.40	154.90	310.10	362.40	471.40	322.60	205.50	44.70	2270.40
1907	21.30	1.50	7.10	4.80	62.20	146.80	503.90	473.70	278.60	222.00	44.20	74.40	1840.50
1908	18.80	29.70	64.80	0.10	476.50	157.00	290.60	645.20	225.50	238.50	218.40	116.10	2481.20
1909	46.70	14.20	59.20	35.30	98.00	165.60	561.80	71.10	358.10	165.10	136.30	125.00	1836.40
1910	6.20	11.10	16.00	94.10	192.50	79.30	214.90	274.60	499.10	69.60	184.70	109.80	1751.90
1911	8.10	8.40	9.90	106.70	132.10	117.10	698.50	419.60	193.30	9.60	6.10	8.10	1717.50
1912	21.80	24.60	2.50	0.60	20.80	101.30	529.30	656.60	227.30	170.40	164.60	14.00	1934.00
1913	65.00	0.10	15.70	130.30	40.40	195.80	570.70	349.20	365.50	119.60	31.00	37.80	1921.10
1914	3.50	7.40	6.10	53.30	84.10	367.80	399.30	492.20	886.00	40.10	40.90	52.30	2435.00
1915	5.60	3.80	3.30	0.50	50.30	126.70	276.30	413.80	478.80	165.30	208.00	182.40	1914.60
1916	38.10	23.60	29.20	46.20	39.90	224.30	179.80	282.40	372.60	223.50	106.40	75.90	1641.90
1917	18.00	7.10	47.50	58.20	53.80	270.80	606.00	359.40	263.10	340.60	229.10	75.70	2329.30
1918	3.30	1.80	27.70	10.20	83.30	224.80	621.80	483.60	338.30	245.40	11.70	29.20	2081.10
1919	6.60	10.70	1.80	1.00	144.30	265.70	810.00	1983.00	176.00	357.40	138.40	25.60	3572.80
1920	1.80	24.90	1.80	10.40	141.00	346.70	702.50	322.60	326.40	79.20	123.70	117.80	2198.80
1921	0.20	44.40	8.60	28.40	59.70	328.20	487.60	1000.80	337.30	37.30	286.50	54.60	2620.80
1922	16.50	23.10	6.40	24.10	245.60	145.50	549.10	131.60	419.60	89.10	91.40	134.10	1678.10
1923	8.10	7.40	84.10	13.50	388.10	471.90	276.30	1147.60	381.20	31.00	595.60	23.10	3427.90
1924	56.60	1.30	15.00	8.60	174.00	242.80	511.00	654.00	119.10	378.70	305.80	73.10	2540.00
1925	5.30	18.00	19.30	8.90	121.90	606.50	554.20	546.30	323.60	244.10	71.40	8.90	2528.40
1926	73.20	0.50	2.00	0.80	85.60	661.20	218.90	324.90	214.10	269.20	50.50	46.80	1875.70
1927	8.10	1.80	13.00	75.70	271.30	323.10	471.70	588.00	136.90	253.90	81.30	51.60	2296.40
1928	9.10	40.60	9.40	33.30	103.10	335.00	308.60	701.40	495.20	80.40	117.60	14.20	1715.90
1929	20.10	0.20	4.60	6.60	181.10	126.10	773.70	603.10	348.00	255.00	171.20	41.40	2320.10
1930	47.20	12.40	4.10	11.70	364.20	400.00	450.50	185.20	268.50	86.90	58.70	51.00	1848.40
1931	14.20	6.10	1.80	37.10	99.10	301.20	180.30	1465.00	129.70	170.90	249.20	96.00	2951.60
1932	0.20	2.50	7.90	0.10	164.60	315.70	724.10	189.50	588.80	255.70	151.10	43.20	2423.40
1933	46.70	8.60	11.40	0.10	86.10	130.30	804.40	240.50	586.20	188.00	86.60	33.90	1922.20
1934	10.20	33.30	14.20	78.50	488.40	207.20	461.30	373.90	410.70	396.50	280.90	37.80	2692.70
1935	2.30	39.40	51.60	60.20	411.50	229.10	821.70	526.30	336.60	253.20	28.40	96.10	2861.60
1936	46.70	1.00	1.30	2.30	117.80	263.90	366.80	384.10	556.60	241.80	176.80	167.50	2307.20
1937	36.10	21.60	41.60	42.40	149.30	287.50	668.60	567.90	364.20	311.60	364.70	150.60	3026.50
1938	30.70	2.80	16.30	62.50	172.70	416.60	274.60	248.70	157.50	204.20	260.20	57.70	1924.70
1939	4.10	5.60	3.10	65.80	158.80	347.40	577.30	461.10	189.50	73.40	197.10	206.50	2290.10
1940	4.10	18.50	0.80	19.80	45.00	273.10	851.40	388.60	414.30	141.00	55.60	41.40	2254.60
1946	14.20	6.30	13.50	14.70	90.00	309.50	444.80	273.60	421.90	226.10	52.50	75.40	1922.50
1947	5.80	0.80	12.70	116.60	189.50	197.10	388.60	737.60	248.20	139.20	145.30	186.70	2368.10
1948	2.00	6.40	5.80	59.40	96.00	132.10	420.60	559.10	271.60	108.20	57.90	80.80	1899.90
1949	3.80	0.10	14.20	0.10	4.60	212.30	152.20	262.60	324.40	221.70	145.80	114.50	1456.10
1950	29.70	19.00	27.40	53.30	105.20	230.90	350.30	297.70	279.40	282.20	40.40	95.80	1811.30

Monthly Rainfall at Manila (3/3)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL TOTAL
1951	1.50	3.30	0.10	29.70	122.40	324.90	225.50	438.90	211.60	106.70	271.80	117.10	1853.50
1952	13.70	2.60	10.20	6.90	91.20	433.30	211.60	1376.20	153.20	351.80	43.40	132.30	2826.60
1953	5.30	6.60	14.20	45.00	146.10	415.00	250.20	593.60	411.00	295.20	95.80	138.20	2416.20
1954	1.80	3.10	38.60	8.10	113.80	249.20	145.60	368.40	251.00	165.90	152.90	21.30	1619.70
1955	5.40	6.90	0.10	13.20	92.50	80.30	223.00	190.20	324.60	140.20	153.20	7.40	1286.00
1956	7.90	36.10	2.30	75.20	151.90	116.60	193.90	504.70	785.90	70.90	100.60	156.20	2204.20
1957	52.30	1.50	22.40	17.40	0.10	231.40	220.50	442.70	311.10	203.70	46.20	19.30	1568.60
1958	8.10	4.10	0.10	9.70	65.80	405.10	982.50	240.30	441.50	218.40	41.90	6.10	2423.60
1959	25.70	1.30	19.00	0.80	119.60	10.20	282.70	495.60	153.70	154.90	219.70	109.50	1592.70
1960	24.60	18.00	2.50	49.80	350.80	296.20	160.80	790.40	384.30	411.50	51.30	8.10	2548.30
1961	0.30	7.90	7.10	2.80	152.10	614.20	387.10	438.40	324.40	225.00	116.80	4.10	2280.20
1962	3.30	0.30	14.50	64.00	50.30	108.20	999.00	352.00	562.40	30.70	91.40	7.90	2284.00
1963	0.50	0.50	0.30	1.30	15.70	543.80	379.20	226.30	502.70	101.10	54.40	58.40	1884.20
1964	9.30	1.30	42.50	21.00	102.40	438.20	240.50	483.00	245.10	209.20	272.20	102.70	2167.40
1965	10.70	9.30	2.30	67.05	221.10	206.40	403.50	398.10	285.60	131.40	92.80	36.40	1864.65
1966	4.20	14.80	0.10	0.10	468.60	96.10	270.50	365.40	741.40	77.40	237.50	85.00	2361.10
1967	23.70	8.70	1.00	1.80	39.30	725.00	225.50	362.40	343.80	166.70	80.10	5.60	1989.60
1968	6.30	0.10	7.10	0.10	95.60	110.40	420.50	467.50	312.50	99.50	12.90	1.00	1533.50
1969	5.90	0.10	14.90	5.60	14.80	169.00	334.70	384.70	389.60	219.10	47.00	86.00	1671.40
1970	5.90	0.30	2.60	11.80	44.00	163.70	425.40	358.60	885.10	256.50	97.00	0.10	2251.00
1971	3.00	3.90	45.00	52.10	116.60	303.10	333.30	211.00	94.80	309.60	270.00	145.40	1887.80
1972	38.70	0.10	42.20	1.80	162.60	417.80	1743.80	535.10	211.70	93.10	74.70	15.30	3336.90
1973	1.60	0.10	2.30	0.60	25.60	154.60	229.10	444.60	148.50	280.00	236.00	77.70	1600.70
1974	0.8	0.0	0.0	57.1	61.0	411.3	287.6	1188.1	36.4	319.6	352.5	130.0	2844.3
1975	16.5	3.3	0.5	26.4	58.0	261.4	212.9	483.1	261.7	310.7	100.0	110.8	1845.2
1976	40.4	2.0	0.5	0.0	918.4	177.9	0.0	0.0	0.0	61.8	43.8	87.9	1332.6
Mean (107 years)	20.94	10.08	16.18	30.64	131.99	261.72	416.06	432.79	353.57	186.79	136.89	66.71	2064.35

9.6 Natural Runoff at Angat Dam

(Drainage Area 568 km²)

(10^6 m³)

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Mean
1946	250.16	95.80	87.04	55.21	35.89	58.57	173.83	262.48	196.47	397.74	189.48	162.58	62.32
1947	93.74	33.14	89.37	30.58	47.67	178.59	288.73	329.18	198.55	194.45	565.06	490.15	80.52
1948	259.54	100.15	34.81	42.25	27.32	73.61	228.47	582.02	421.20	198.25	229.13	482.11	84.96
1949	122.14	70.88	65.88	20.99	31.87	59.87	81.15	112.76	157.85	155.35	368.06	433.90	53.29
1950	183.20	103.30	99.36	39.39	41.24	90.72	348.46	279.36	229.65	520.41	431.57	153.47	79.91
1951	220.97	64.83	44.46	60.91	89.72	74.65	106.60	573.18	169.78	144.10	70.24	480.77	66.60
1952	180.26	115.15	49.28	39.65	47.94	143.60	136.60	382.48	174.44	626.25	90.97	289.80	72.20
1953	155.08	142.73	82.76	46.39	70.97	127.27	123.47	395.06	177.81	282.57	349.92	780.25	86.72
1954	102.58	44.27	134.99	37.06	55.71	38.88	105.53	127.49	188.44	103.39	329.18	326.76	50.55
1955	300.52	57.09	38.03	51.84	51.15	101.61	111.15	127.22	254.02	166.60	336.96	196.86	56.86
1956	98.02	63.86	90.79	278.90	67.76	55.72	108.21	278.55	370.66	357.57	247.54	602.91	83.10
1957	232.75	53.94	28.39	19.95	10.17	52.61	268.11	658.62	749.09	913.07	795.48	128.30	124.00
1958	132.85	25.23	70.17	22.55	62.40	64.02	143.83	168.20	327.11	553.09	245.46	46.34	60.60
1959	87.04	72.57	158.03	33.95	57.86	25.66	72.99	203.15	165.96	106.65	413.54	287.01	53.41
1960	243.20	131.47	57.03	51.24	45.41	170.24	154.07	823.70	276.66	585.73	191.55	141.57	91.07
1961	125.68	76.71	83.76	42.44	104.52	261.88	318.68	225.35	331.55	451.80	336.65	117.01	78.51
1962	132.19	75.43	89.14	68.90	37.64	49.88	644.08	397.34	656.78	200.87	508.11	217.86	97.61
1963	87.05	114.86	43.96	45.77	15.69	158.54	90.31	145.37	213.76	50.86	58.89	145.19	37.11
1964													
1965													
1966													
1967													
1968	105.65	45.80	67.86	39.57	34.29	3.65	198.19	342.34	282.78	210.42	114.85	59.59	47.72
1969	73.94	24.27	36.34	28.29	18.65	37.73	226.39	239.99	163.16	118.88	140.40	263.53	43.49
1970	94.82	37.72	34.42	63.66	18.76	100.90	105.45	83.92	286.08	388.37	439.56	246.89	60.27
1971	60.57	61.72	88.34	49.64	121.04	325.12	336.26	72.36	45.11	471.21	468.21	795.90	93.40
1972	233.69	68.07	69.51	69.20	58.21	85.14	976.12	527.91	281.89	162.18	291.42	298.36	98.99
1973	96.53	67.27	38.75	22.54	55.37	28.11	82.97	96.03	120.41	440.42	370.58	223.85	52.09
1974	53.29	83.87	73.77	21.33	70.68	134.97	112.32						
Mean (1946–1973)	153.01	74.84	70.10	52.54	50.30	100.69	226.24	309.75	268.30	325.05	315.95	307.14	
in m³/sec	57.13	30.94	26.17	20.27	18.78	38.85	84.47	115.65	103.51	121.36	121.89	114.67	71.47

9.7 Monthly Average Natural Run-off in Different Rivers, converted per 100 km² of the Cathment Area (m^3/sec)

Name of River	Pantabangan 853 km²		Ambuklao 690 km²		Caliraya 91.5 km²		Ipo (or Katmon) 568 km²		Agos 904 km²		Presumed Umiray 224 km²		Q 224 km²
Name of Dam	Ditto		Ditto		Ditto		Angat		Ditto		Umiray		Umiray
	Q (m^3/sec)	% to Average	Q (m^3/sec)	% to Average	Q (m^3/sec)	% to Average	Q (m^3/sec)	% to Average	Q (m^3/sec)	% to Average			
Jan.	1.081	0.211	1.528	0.238	10.918	1.020	10.058	0.799	19,480	1.460	14.769	1.139	33.08
Feb.	0.722	0.141	0.962	0.150	6.393	0.598	5.447	0.433	12.710	0.953	9.078	0.700	20.33
Mar.	0.617	0.121	0.790	0.123	5.738	0.536	4.607	0.366	9.657	0.724	7.132	0.550	15.98
Apr.	0.706	0.138	0.929	0.145	4.951	0.463	3.569	0.284	6.515	0.488	5.042	0.389	11.29
May	1.318	0.258	1.965	0.306	5.770	0.539	3.306	0.263	5.741	0.430	4.523	0.349	10.13
Jun.	3.184	0.623	5.270	0.821	8.230	0.769	6.540	0.544	6.217	0.466	6.529	0.504	14.62
Jul.	8.352	1.634	13.707	2.135	9.978	0.933	14.871	1.182	8.739	0.655	11.805	0.911	26.44
Aug.	13.904	2.720	16.403	2.555	9.628	0.900	20,361	1.618	10,376	0.778	15.369	1.186	34.43
Sep.	12.919	2.528	14.123	2.200	10.590	0.990	18,224	1.448	10,553	0.791	14.388	1.110	32.23
Oct.	8.987	1.758	11.703	1.823	15.923	1.488	21,366	1.698	17,931	1.344	19.649	1.516	44.01
Nov.	6.006	1.175	5.948	0.926	18.612	1.740	21,460	1.705	24,226	1.816	22.843	1.716	51.17
Dec.	3.545	0.694	3.210	0.500	21.27	1.988	20,188	1.604	27,810	2.085	23.999	1.851	53.76
Ann. Aver.	5.111	1.000	6.420	1.000	10.699	1.000	12,583	1.000	13,341	1.000	12,962	1.000	29.03
Q_{MAX}/Q_{min}	22.53		20.76		430		6.49		4.84		5.31		

9.8 Average Specific Discharge and Discharge Ratio in Different Rivers

Catchment	Pantabangan (853 km²)		Ambuklao (690 km²)		Caliraya (91.5 km²)		Angat (568 km²)		Agos (904 km²)		Umiray (224 km²)	
	(m³/sec)	% to average	(m³/sec)	% to average	(m³/sec)	% to average	(m³/sec)	% to average	(m³/sec)	% to average	(m³/sec)	% to average
Jan.	9.22	0.211	10.54	0.238	9.99	1.020	57.13	0.799	176.1	1.460	33.1	1.139
Feb.	6.16	0.141	6.64	0.150	5.85	0.598	30.94	0.433	114.9	0.953	20.3	0.700
Mar.	5.26	0.121	5.45	0.123	5.25	0.536	26.17	0.366	87.3	0.724	16.0	0.550
Apr.	6.02	0.138	6.41	0.145	4.53	0.463	20.27	0.284	58.9	0.488	11.3	0.389
May	11.24	0.258	13.56	0.306	5.28	0.539	18.78	0.263	51.9	0.430	10.1	0.349
Jun.	27.16	0.623	36.36	0.821	7.53	0.769	38.85	0.544	56.2	0.466	14.6	0.504
Jul.	71.24	1.634	94.58	2.135	9.13	0.933	84.47	1.182	79.0	0.655	26.4	0.911
Aug.	118.6	2.720	113.18	2.555	8.81	0.900	115.65	1.618	93.8	0.778	34.4	1.186
Sep.	110.2	2.528	97.45	2.200	9.69	0.990	103.51	1.448	95.4	0.791	32.2	1.110
Oct.	76.66	1.758	80.75	1.823	14.57	1.488	121.36	1.698	162.1	1.344	44.0	1.516
Nov.	51.23	1.175	41.04	0.926	17.03	1.740	121.89	1.705	219.0	1.816	51.2	1.762
Dec.	30.24	0.694	22.15	0.500	19.46	1.988	114.67	1.604	251.4	2.085	53.8	1.851
Average	43.60	1.000	44.30	1.000	9.79	1.000	71.47	1.000	120.6	1.000	29.0	1.000
Years observed	1946 ~ 68		1957 ~ 74		1952 ~ 72		1946 ~ 63, 69 ~ 73		1950 ~ 72		———	
Period	23		18		21		24		23		———	
Ann. Ave. Run-off ($10^6 m^3/yr$)	1,375		1,397		308.82		2,253.9		3,503		915.	
Run-off per 100 km² (m^3/s)	5.11		6.42		10.70		12.58		13.34		12.96	
Effective Rain (mm)	1,611		2,025		3,374		3,967		4,207		4,088	

No.