CLIMATE IMPACT ASSESSMENT

for
Philippine Agriculture
(Rice and Corn)

Impact Assessment and Applications Section (IAAS)
Climatology and Agrometeorology Division (CAD)
Philippine Atmospheric, Geophysical and Astronomical Services Administration **(PAGASA)**
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PREFACE

The Impact Assessment and Applications Section (IAAS) of Climatology and Agrometeorology Division (CAD) regularly issue this monthly/bulletin which will provide users such as food security managers, economic policy makers, agricultural statisticians and agricultural extension officials with qualitative information on the current and potential effects of climate and weather variability on rainfed crops, particularly rice and corn. This bulletin, entitled "Climate Impact Assessment for Agriculture in the Philippines", represents a method for converting meteorological data into economic information that can be used as supplement to information from other available sources.

For example, an agricultural statistician or economist involved in crop production and yield forecast problems can combine the assessment with analysis from area survey results, reports on the occurrence of pests and diseases, farmers' reports and other data sources.

The impact assessments are based on agroclimatic indices derived from historical rainfall data recorded for the period 1951 to the present. The indices, expressed in raw values percent of normals and percentile ranks, together with real time meteorological data (monthly rainfall, in percent of normal), percent of normal cumulative rainfall, as well as the occurrence of significant event such as typhoons, floods and droughts are the tools used in the assessment of crop performance. Crop reports from PAGASA field stations are also helpful.

The narrative impact assessment included in the bulletin depicts the regional performance of upland, 1st lowland and 2nd lowland palay; and dry and wet season corn crops, depending on the period or the season. Tabulated values of normal rainfall and generalized monsoon and yield moisture indices are provided for ready reference. Spatial analysis of rainfall, percent of normal rainfall and the generalized monsoon indices in percentile ranks are also presented on maps to help users visualize any unusual weather occurring during the period. The generalized monsoon indices in particular, are drought indicators; hence, the tables (see Appendices) together with the threshold values can be used in assessing drought impact, if there are any. It also helps assess any probable crop failure.

It is hoped therefore that this bulletin would help provide the decision-makers, planners and economist with timely and reliable early warning/information on climatic impact including the potential for subsistence food shortfalls, thereby enabling them to plan alternate cropping, if possible, food assistance strategies/mitigation measures to reduce the adverse impact of climate and eventually improve disaster preparedness.

Impact assessment for other principal crops such as sugarcane and coconut, for energy and for water resources management, are from time to time will be included in the forthcoming issues of this bulletin.

The IAAS of CAD will appreciate suggestions/comments from end-users and interested parties for the improvement of this bulletin.

Definition of Terms

The Generalized Monsoon Index (GMI) helps determine the performance of the rains during the season and serves as a good indicator of potential irrigation supplies. It is a tool used to assess rainfed crops.

The GMI for the southwest monsoon (GMIsw) in an area during June to September is defined as follows:

$$GMIsw = W_6P_6 + W_7P_7 + W_8P_8 + W_9P_9$$

The GMI for the northeast monsoon (GMIne) in an area during October to January is defined as:

$$GMIne = W_{10}P_{10} + W_{11}P_{11} + W_{12}P_{12} + W_1P_1$$

where:

W = weight coefficient of monthly rainfall for the season;

P = rainfall amount in the i^{th} month (i = 1 for January, 2 = for February, etc.)

The Yield Moisture Index (YMI) is a simple index that helps the users assess agroclimatic crop conditions during the crop season. The YMI for a particular crop is defined as follows:

$$YMI = \sum_{i}^{n} [P_i K_i]$$

where:

i = crop stage (1 = planting/transplanting, 2 = vegetative, 3 = flowering, 4 = maturity, etc.)

n = total no. of crop stages;

P = rainfall during the i^{th} crop stage; and

K = appropriate crop coefficient for the i^{th} crop stage.

Tentatively, the threshold values of categories of indices for interpretation being adopted for both **YMI and GMI** are as follows:

Percentile Rank	Interpretation
> 80	Potential for flood damage
41 - 80	Near normal to above- normal crop condition
21 - 40	Moderate drought impact with reduced yield
11 - 20	Drought impact with major yield losses
< 10	Severe drought impact with crop failure and potential food shortages

AGROCLIMATIC / CROP ASSESSMENT FOR AUGUST 2018

OVERVIEW

Harvesting of upland and lowland 1st palay have just begun in some areas of the country. Good to normal yield is expected in Baler, Tayabas, Calapan, Albay, Panay Island, Catbalogan, Tacloban, Bukidnon, Surigao del sur and ARMM, while below normal yield is anticipated in CAR, and Davao Region. Standing crops in Batanes, Tayabas, Ambulong, Calapan, Camarines Norte, Panay Island, Bukidnon, and ARMM are in good condition. Those in Tuguegarao, Baler, Tayabas, Calapan, Catanduanes, Catbalogan, Tacloban and Surigao del Norte have experienced moisture stress. In Pangasinan, CAR, Nueva Ecija and Zambales, the standing crops suffered from water logging.

Rainfall assessment for the month of August showed that most parts of Cordillera Administrative Region (CAR), Regions I and III, including the provinces of Batanes, Nueva Viscaya and Rizal experienced above normal rainfall conditions. However, most parts of Southern Luzon, Visayas and Mindanao received below to way below normal rainfall while the rest of the country experienced near normal rainfall conditions.

The weather systems that affected the country during the month were the enhanced Southwest (SW) monsoon, Low Pressure Areas (LPAs), localized thunderstorms, ridge of High Pressure Areas (HPAs) and the passage of two (2) tropical cyclones (TCs), namely: Tropical Storm (TS) "Karding" (August 7 -10) and Tropical Depression (TD) "Luis" (August 23-24). Both TCs enhanced the Southwest monsoon and brought moderate to heavy rains that resulted to flooding in most parts of Luzon. Over 150,000 families were affected. Class and work suspensions were also declared due to floodings in Region I, II, III, CAR, CALABARZON and Metro Manila, based on the report of the National Disaster Risk and Management Council (NDRRMC).

REGION I (Ilocos Region)

The standing, late-planted lowland palay as well as the vegetating, late-planted upland palay might be moderately affected by water-logging due to heavy rains brought by the strong southwest monsoon that was influenced by tropical cyclones.

CAR (Cordillera Autonomous Region)

Harvesting of upland 1st palay has begun across the region; yield is expected to be minimal because crops exposed to water-logging due to heavy rains brought by tropical cyclones that affected the country during maturing stage. The standing vegetating late-planted upland as well as the July-planted, lowland 1st palay might also be affected.

REGION II (Cagayan Valley)

The vegetating, late-planted upland palay and the standing, newly-planted lowland palay in the Batanes group of islands is faring well due to adequate moisture available during the month. While in Tuguegarao, July-planted, lowland palay experienced moisture stress.

REGION III (Central Luzon)

Harvesting of upland palay had just begun in Baler; good to normal yield is anticipated because crops were in good condition during the critical stage of growth and development. The standing, vegetating late-planted upland palay experienced moisture stress due to insufficient moisture available during the month in the eastern parts of the region. While in the western part, particularly in Zambales and Nueva Ecija, the newly-planted, lowland palay and the vegetating, upland palay may be affected by water logging caused by the enhanced southwest monsoon.

REGION IV-A (CALABARZON)

Harvesting of upland 1st palay in Tayabas now started; good to normal yield is expected in the area due to well distributed moisture that was available from planting to maturity. The standing palay crops, however, might have experienced moisture stress due to excess rain. This available moisture, on the other hand, is sufficient for the vegetating, late-planted upland 1st palay and late-planted, lowland palay in Ambulong.

REGION IV-B (MIMAROPA)

Harvesting of upland palay in Calapan has now begun: yield this season is expected to be good because crops were in good condition during the critical stage of growth. Standing upland and lowland 1st palay in the City might experience moisture stress because of the minimal rainfall in August. In contrast, standing palay crops in other parts of the region are faring well due to sufficient moisture available during the month.

REGION V (Bicol Region)

Harvesting of lowland 1st palay in Albay had just started, good yield is anticipated because crops recovered from moisture stress and fared well until maturity. The standing, vegetating lowland palay in Catanduanes are still under moisture stress. On the other hand, the standing, lowland 1st palay in Camarines Norte are in good condition due to the sufficient moisture available during the month.

REGION VI (Western Visayas)

Harvesting of upland 1st palay had just begun across the region; good to normal yield is expected this season. Sufficient amount of rainfall received during the month is favorable for the standing, late-planted lowland 1st palay and upland, 1st palay across the region, they are now in good condition.

REGION VII (Central Visayas)

Farming activities that involves planting the late-planted 1st upland palay could not commence because of the insufficient moisture across the region.

REGION VIII (Eastern Visayas)

Harvesting of upland 1st palay had just started in Catbalogan and Tacloban; good yield is anticipated because crops experienced sufficient moisture condition during the critical stage of growth. Meanwhile, standing crops in these areas might suffer moisture stress because of the insufficient rainfall received during the month.

REGION IX (Zamboanga Peninsula)

Harvesting of upland 1st palay had just begun in Zamboanga del norte; the anticipated yield is below normal because crops suffered moisture stress starting from flowering to grain filling.

REGION X (Northern Mindanao)

Harvesting of upland palay in Bukidnon is now in progress: good to normal yield is likely because crops were in good moisture condition from planting to maturity. Meanwhile, sufficient moisture available during the month favors standing, late-planted upland palay and the newly-planted, lowland 1st palay. Such crops are faring well.

REGION XI (Davao Region)

Harvesting of upland 1st palay has commenced across the region; below normal yield may be expected because crops experienced moisture stress during the vegetation stage.

REGION XII (SOCCSKSARGEN)

Moisture is still insufficient across the region; thus any farming activity for rice and corn could not commence.

REGION XIII (CARAGA Region)

Harvesting of lowland 1st palay in Surigao del Sur has begun; good yield is expected because crops recovered from the moisture stress experienced last July. Meanwhile, the standing, late-planted lowland palay in Surigao del Norte which are in vegetating stage were moderately stressed due to the insufficient rainfall in the area from July to August.

ARMM *(Autonomous Region of Muslim Mindanao)*

Harvesting of lowland 1st palay had just begun across the region; good to normal yield is expected this season because the crops were in good condition from planting to maturity. Similarly, standing late-planted lowland 1st palay are faring well because of the sufficient moisture available during the month.

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TABLE 1.0 GENERALIZED SOUTHWEST MONSOON INDICES
for June to September 2018 In Millimeters and Percentile Rank.

STATIONS	JUNE		JULY		AUGUST		SEPTEMBER	
	GMI	%RANK	GMI	%RANK	GMI	%RANK	GMI	%RANK
CAR (Cordillera Administrative Reg.)								
Baguio	99	78	380	71	962	95		
Region I (Ilocos Reg.)								
Dagupan	129	88	444	97	743	97		
Vigan	137	93	233	58	607	81		
Laoag	130	88	238	73	569	93		
Region II (Cagayan Valley)								
Aparri	8	20	47	31	98	37		
Basco	86	86	150	85	331	88		
Tuguegarao	30	47	90	64	136	37		
Region III (Central Luzon)								
Iba	194	86	529	92	851	83		
Cabanatuan	64	71	153	66	298	73		
Baler	50	32	136	47	167	42		
Casiguran	41	37	150	76	171	53		
NCR (Metro Manila)								
Science Garden	149	95	357	95	586	95		
Region IV-A (CALABARZON)								
Ambulong	103	92	264	97	315	90		
Infanta	31	25	59	7	103	10		
Tayabas	47	44	118	51	162	61		
Region IV-B (MIMAROPA)								
Calapan	52	47	136	64	161	53		
Coron	72	59	426	98	497	93		
Cuyo	96	73	242	75	319	61		
Puerto Princesa	15	7	46	7	84	5		
Romblon	55	51	135	66	175	58		
San Jose	95	78	349	63	499	93		
Region V (Bicol Reg.)								
Daet	43	66	114	68	195	85		
Legaspi	33	20	86	15	137	14		
Masbate	22	34	50	10	73	5		
Virac Synop	46	39	57	8	94	7		
Region VI (Western Visayas)								
Roxas	75	68	115	37	249	90		
Region VII (Central Visayas)								
Mactan	30	20	70	32	84	29		
Dumaguete	16	17	38	10	66	19		
Tagbilaran	30	41	49	19	72	24		
Region VIII (Eastern Visayas)								
Catarman	30	27	59	8	108	20		
Catbalogan	35	32	85	22	119	22		
Tacloban	60	73	130	83	151	73		
Region IX (Zamboanga Peninsula)								
Dipolog	40	7	83	20	118	10		
Zamboanga	12	10	41	10	85	25		
Region X (Northern Mindanao)								
Lumbia	67	85	93	14	124	36		
Malaybalay	69	37	195	75	255	58		
Region XI (Davao Reg.)								
Davao	29	19	72	22	141	58		
Region XII (SOCCSKSARGEN)								
General Santos	15	19	48	39	62	29		
Region XIII (Caraga)								
Surigao	57	88	82	58	98	34		
Hinatuan	41	20	114	41	160	46		

***ARMM** (Autonomous reg. of Muslim Mindanao)*								
Cotabato	57	15	134	53	220	81		

TABLE 2.0 CUMULATIVE YIELD MOISTURE INDICES FOR LOWLAND FIRST PALAY
(May - August 2018) in Millimeters and Percentile Rank.

STATIONS	*MAY*		*JUNE*		*JULY*		*AUGUST*	
	YMI	% RANK	YMI	% RANK	YMI	% RANK	YMI	% RANK
Region IV-A (CALABARZON)								
Infanta	124	36	324	27	432	15	563	8
Region V (Bicol Reg.)								
Daet	100	51	347	49	635	75	875	76
Legaspi	163	68	292	24	512	25	665	19
Virac	86	46	233	24	277	8	389	5
Region VIII (Eastern Visayas)								
Catarman	46	17	297	34	415	22	559	25
Region XIII (CARAGA)								
Hinatuan	224	53	592	54	914	88	1049	83
Surigao	83	47	422	63	516	73	566	56

TABLE 3.0 CUMULATIVE YIELD MOISTURE INDICES FOR UPLAND PALAY
(May – August 2018) in Millimeters and Percentile Rank.

STATIONS	MAY		JUNE		JULY		AUGUST	
	YMI	% RANK	YMI	% RANK	YMI	% RANK	YMI	% RANK
CAR (Cordillera Autonomous Reg.)								
Baguio	241	46	766	68	1818	64	3550	95
Region I (Ilocos Reg.)								
Dagupan	77	14	688	78	1914	97	2805	97
Vigan	49	25	736	81	1107	58	2222	81
Laoag	28	15	644	80	1099	66	2085	83
Region II (Cagayan Valley)								
Aparri	3	5	45	5	221	12	374	12
Basco	9	3	419	68	736	69	1274	85
Tuguegarao	7	3	145	14	407	32	542	22
Region III (Central Luzon)								
Iba	34	7	1003	73	2306	83	3265	83
Cabanatuan	81	29	385	59	746	56	1177	58
Baler	245	56	421	47	753	46	847	34
Casiguran	44	8	207	10	663	44	727	27
Region IV-A (CALABARZON)								
Tayabas	131	42	301	44	577	49	710	42
Region IV-B (MIMAROPA)								
Calapan	273	88	457	71	794	80	870	64
Romblon	116	61	334	59	657	63	776	49
Region V (Bicol Reg.)								
Masbate	4	12	104	14	215	7	281	3
Region VI (Western Visayas)								
Roxas	175	78	440	69	600	54	1000	80
Region VII (Central Visayas)								
Cebu	84	51	194	47	350	37	392	31
Dumaguete	24	27	81	15	169	7	253	7
Tagbilaran	32	24	138	25	218	14	286	15
Region VIII (Eastern Visayas)								
Catbalogan	287	92	433	78	627	47	728	31
Tacloban	184	81	396	78	677	92	739	80
Region IX (Western Mindanao)								
Dipolog	363	95	493	81	674	64	779	42
Zamboanga	70	47	116	15	237	12	367	14
Region X (Northern Mindanao)								
Malaybalay	304	90	566	76	1055	83	1234	68
Lumbia	89	32	344	47	446	39	539	32
Region XI (Davao Reg.)								
Davao	216	86	319	51	507	58	711	61
Region XII (SOCSARGEN)								
General Santos	38	29	86	12	220	29	264	19
ARMM *(Autonomous reg. of Muslim Mindanao)*								

Cotobato	193	46	380	25	679	56	936	37

TABLE 4.0 CUMULATIVE YIELD MOISTURE INDICES FOR DELAYED PLANTED UPLAND PALAY
(June to September 2018) in Millimeters and Percentile Rank.

STATIONS	*JUNE*		*JULY*		*AUGUST*		SEPTEMBER	
	YMI	%RANK	YMI	%RANK	YMI	%RANK	YMI	%RANK
CAR (Cordillera Administrative Reg.)								
Baguio	470	78	1422	69	3336	95		
Region I (Ilocos Reg.)								
Dagupan	547	88	1656	97	2640	97		
Vigan	615	93	951	66	2183	88		
Laoag	551	88	963	76	2052	92		
Region II (Cagayan Valley)								
Aparri	37	20	196	29	365	19		
Basco	366	86	653	85	1249	88		
Tuguegarao	123	47	361	61	510	37		
Region III (Central Luzon)								
Iba	867	86	2046	92	3105	85		
Cabanatuan	272	71	598	71	1074	71		
Baler	158	32	458	49	562	37		
Casiguran	146	37	558	78	628	37		
Region IV-A (CALABARZON)								
Ambulong	415	92	982	97	1150	86		
Tayabas	152	44	402	53	549	49		
Region IV-B (MIMAROPA)								
Coron	305	59	1552	98	1784	92		
Cuyo	340	73	855	75	1106	51		
Puerto Princesa	52	7	177	8	302	5		
Romblon	195	51	487	66	618	41		
San Jose	367	78	1298	63	1793	93		
Region V (Bicol Reg.)								
Masbate	90	34	189	12	262	3		
Region VI (Western Visayas)								
Roxas	238	68	392	36	824	78		
Region VII (Central Visayas)								
Mactan, Cebu	98	20	239	32	286	27		
Dumaguete	51	17	131	8	224	12		
Tagbilaran	95	41	167	19	242	17		
Region VIII (Eastern Visayas)								
Catbalogan	131	32	306	24	418	12		
Tacloban	190	73	444	85	512	61		
Region IX (Zamboanga Peninsula)								
Dipolog	117	7	280	20	396	10		
Zamboanga	41	10	151	12	294	17		
Region X (Northern Mindanao)								
Lumbia	228	85	320	14	423	34		

Malaybalay	234	37	676	75	875	49		
Region XI (Davao Reg.)								
Davao	92	19	262	27	488	47		
Region XII (SOCCSKSARGEN)								
General Santos	43	19	163	44	212	27		

TABLE 5.0 CUMULATIVE YIELD MOISTURE INDICES FOR DELAYED PLANTED LOWLAND FIRST PALAY
(June to September 2018) in Millimeters and Percentile Rank.

STATIONS	*JUNE*		*JULY*		*AUGUST*		*SEPTEMBER*	
	YMI	% RANK	YMI	% RANK	YMI	% RANK	YMI	% RANK
Region IV-A (CALABARZON)								
Infanta	106	25	204	7	348	3		
Region V (Bicol Reg.)								
Daet	173	66	434	68	699	78		
Legaspi	118	20	317	15	486	8		
Virac	149	39	190	7	313	3		
Region VIII (Eastern Visayas)								
Catarman	103	27	210	10	369	10		
Catbalogan	131	32	306	24	418	12		
Tacloban	190	73	444	85	512	61		
Region XIII (Caraga)								
Hinatuan	116	20	407	46	556	32		
Surigao	212	88	297	61	353	29		

TABLE 6.0 CUMULATIVE YIELD MOISTURE INDICES FOR LOWLAND FIRST PALAY
(June to September 2018) in Millimeters and Percentile Rank.

STATIONS	*JULY*		*AUGUST*		SEPTEMBER		OCTOBER	
	YMI	%RANK	YMI	%RANK	YMI	%RANK	YMI	%RANK
CAR (Cordillera Administrative Reg.)								
Baguio	852	68	2584	95				
Region I (Ilocos Reg.)								
Dagupan	993	92	1883	95				
Laoag	369	59	1354	86				
Vigan	301	36	1416	80				
Region II (Cagayan Valley)								
Basco	257	69	795	86				
Tuguegarao	213	68	347	42				
Region III (Central Luzon)								
Iba	1055	83	2013	75				
Cabanatuan	292	56	723	66				
Region IV-A (CALABARZON)								
Ambulong	507	93	660	71				
Tayabas	223	64	356	49				
Region IV-B (MIMAROPA)								
Calapan	273	80	348	46				
Coron	1116	98	1325	93				
Cuyo	461	81	688	49				
P. Princesa	112	31	226	19				
Romblon	262	66	380	39				
San Jose	830	97	1278	92				
Region V (Bicol Reg.)								
Masbate	89	19	155	7				
Region VI (Western Visayas)								
Roxas	129	25	529	78				
Region VII (Central Visayas)								
Cebu	126	49	168	25				
Dumaguete	71	24	156	25				
Tagbilaran	65	22	133	12				
Region VIII (Eastern Visayas)								
Catbalogan	157	29	258	10				
Tacloban	227	88	289	51				
Region IX (Zamboanga Peninsula)								
Zamboanga	98	37	228	53				
Region X (Northern Mindanao)								
Lumbia	82	31	175	32				
Malaybalay	396	90	576	53				
Region XII (SOCCSKSARGEN)								
General Santos	108	75	152	44				
ARMM *(Autonomous reg. of Muslim Mindanao)*								
Cotabato	242	75	499	56				

TABLE 7.0 DECADAL AND CUMULATIVE DECADAL RAINFALL
For the month of AUGUST 2018
[actual values (in mm) and percent of normal]

	REGION	*DECADE*	*ACTUAL AUG*	*% Normal of Actual*	*CUMULATIVE JAN- AUG*	*% Normal Cumulative*
R01	Ilocos Region	22	173	90	1802.8	128
		23	515	217	2317.7	141
		24	427	184	2744.7	146
CAR	CAR	22	64	46	1226.9	100
		23	402	226	1628.7	116
		24	343	174	1971.6	123
R02	Cagayan Valley	22	157	176	1171.6	101
		23	167	175	1338.8	107
		24	103	93	1441.8	106
R03	Central Luzon	22	134	79	1807.7	131
		23	355	209	2163.1	140
		24	133	88	2296.1	135
R04-A	CALABARZON	22	59	75	1593.6	132
		23	106	107	1699.7	130
		24	56	72	1755.4	127
R04-B	MIMAROPA	22	127	144	1403.2	151
		23	85	76	1487.8	143
		24	34	34	1521.9	133
NCR	NCR	22	113	72	1849.8	162
		23	381	197	2230.4	167
		24	71	50	2301.0	156
R05	Bicol Region	22	72	139	1777.9	135
		23	15	25	1793.4	130
		24	73	119	1866.1	130
R06	Western Visayas	22	89	101	1257.5	133
		23	27	24	1284.9	121
		24	151	175	1436.0	125
R07	Central Visayas	22	32	65	1169.6	155
		23	15	26	1184.2	146
		24	55	100	1239.6	143
R08	Eastern Visayas	22	28	58	2626.5	190
		23	4	6	2630.2	182
		24	91	174	2720.9	182
R09	Zamboanga Peninsula	22	62	113	1511.3	168
		23	42	63	1552.9	161
		24	39	60	1592.1	155
R10	Northern Mindanao	22	43	56	1390.1	120
		23	44	64	1433.7	117
		24	69	83	1502.5	115
R11	Davao Region	22	26	51	1417.6	110
		23	18	33	1435.9	107
		24	121	197	1556.5	111
R12	SOCCSKSARGEN	22	48	98	1043.6	123
		23	40	73	1083.1	120
		24	66	120	1149.4	120
	CARAGA	22	50	90	2054.3	110
		23	14	28	2068.6	108
		24	48	91	2116.1	108
	ARMM	22	74	131	1112.3	127
		23	49	80	1161.3	124
		24	60	91	1221.4	122

FIG. 1.0 Spatial Analysis of GENERALIZED SOUTHWEST MONSOON INDEX
Ending AUGUST 2018 in Percentile Rank

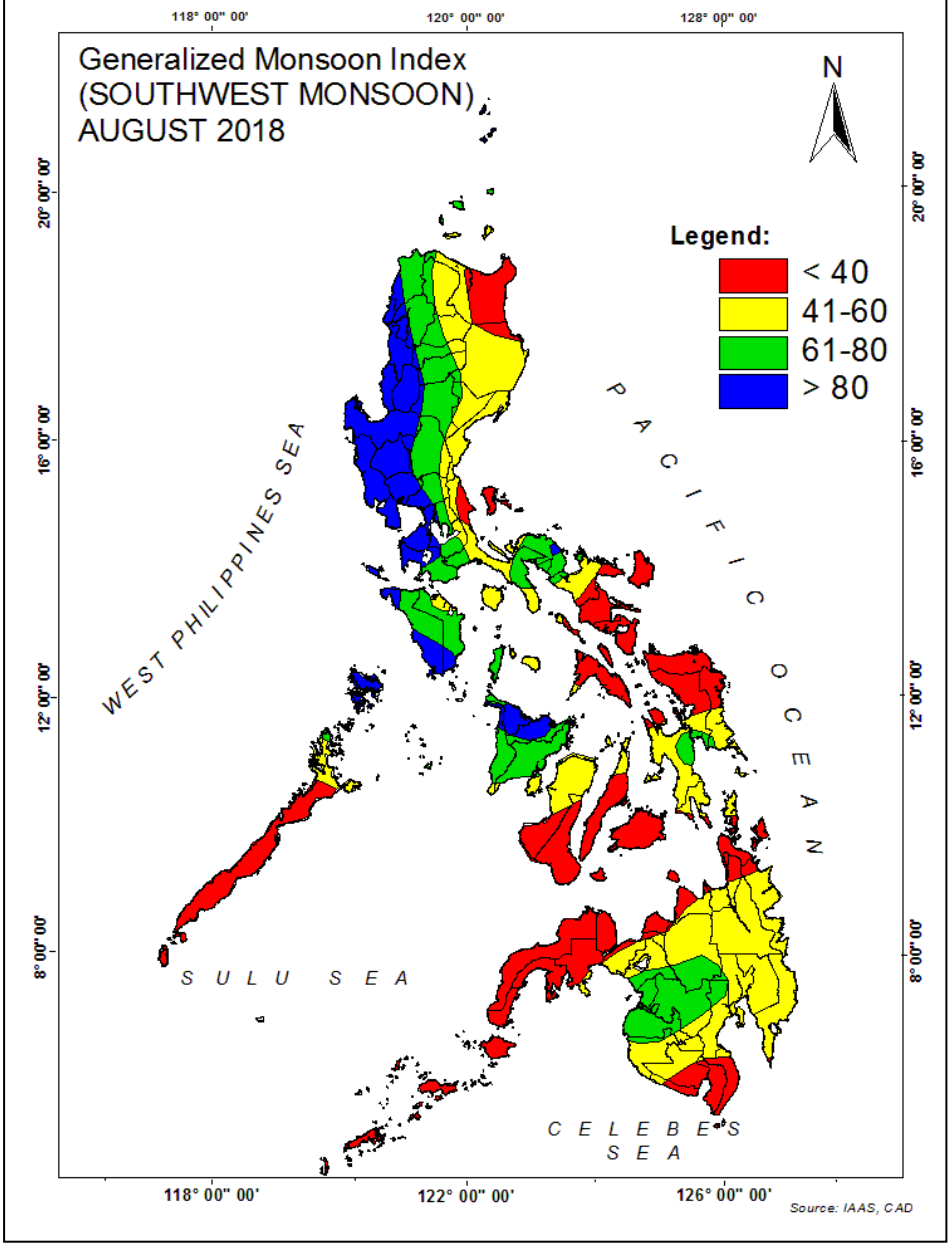


FIG. 2.0 ACTUAL CUMULATIVE RAINFALL DURING THE PASSAGE OF TROPICAL CYCLONE IN THE PHIL. FOR THE MONTH OF AUGUST 2018

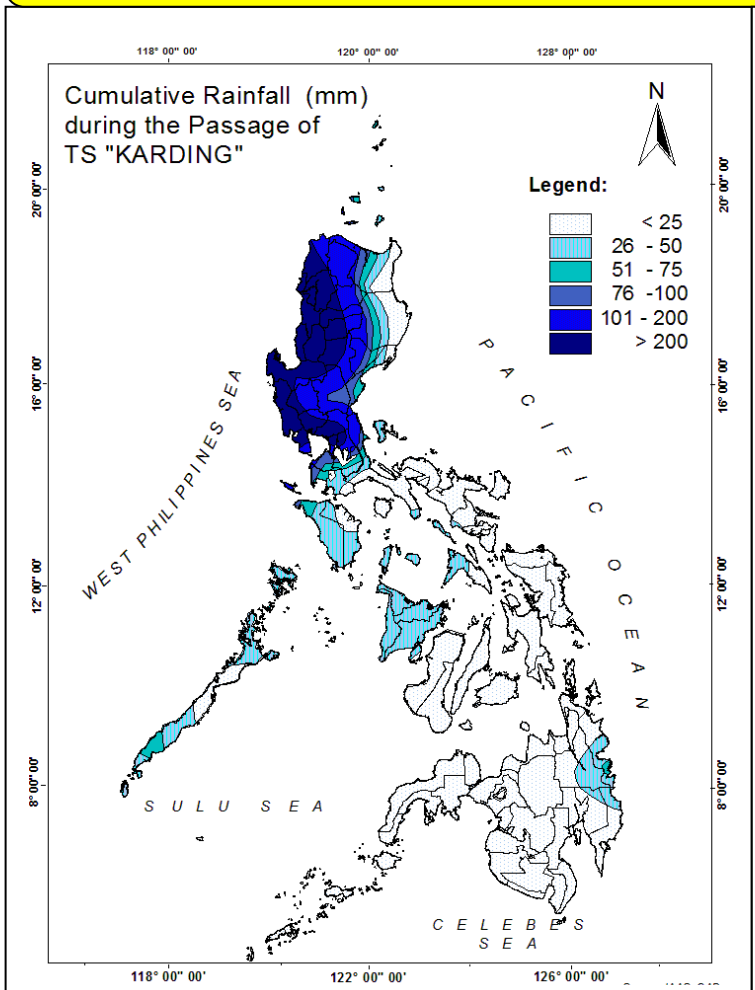


Fig. 2.a. Actual Cumulative Rainfall during the Passage of Tropical Storm (TS) "KARDING" (August 7-11, 2018)

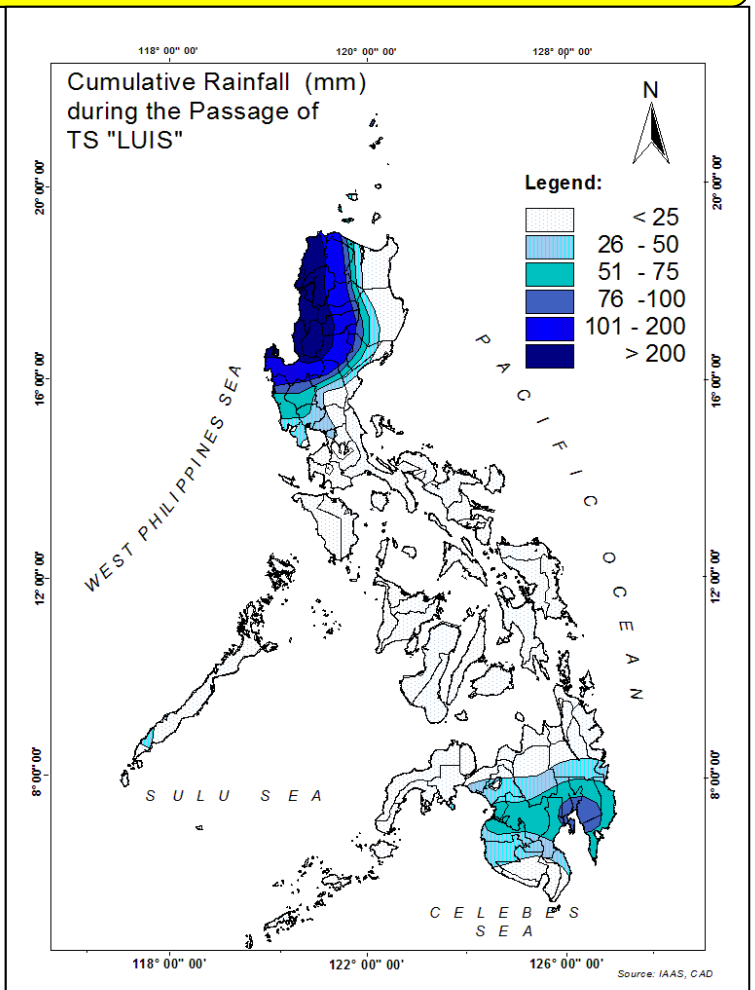
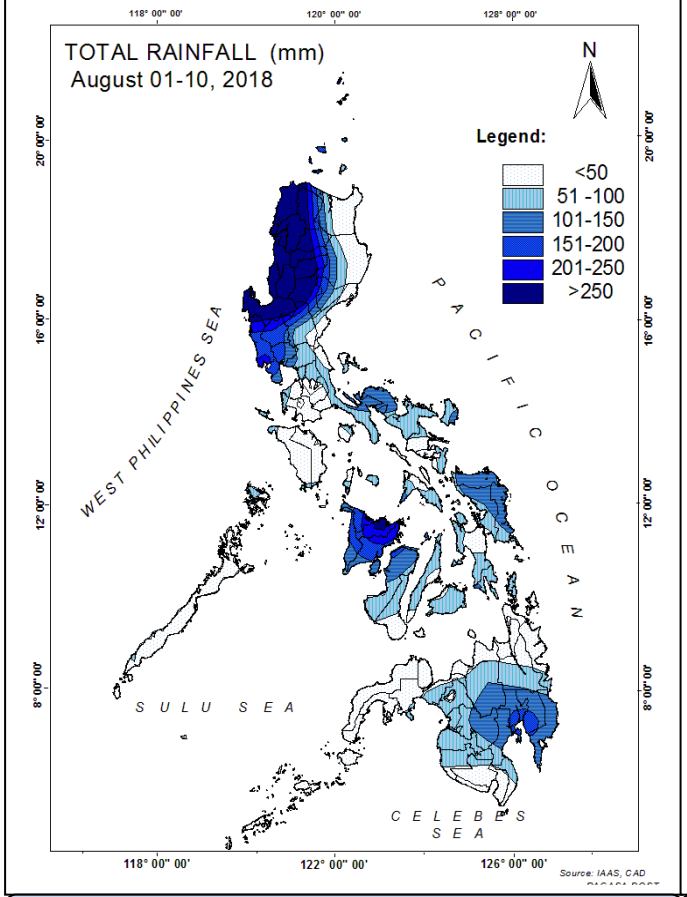
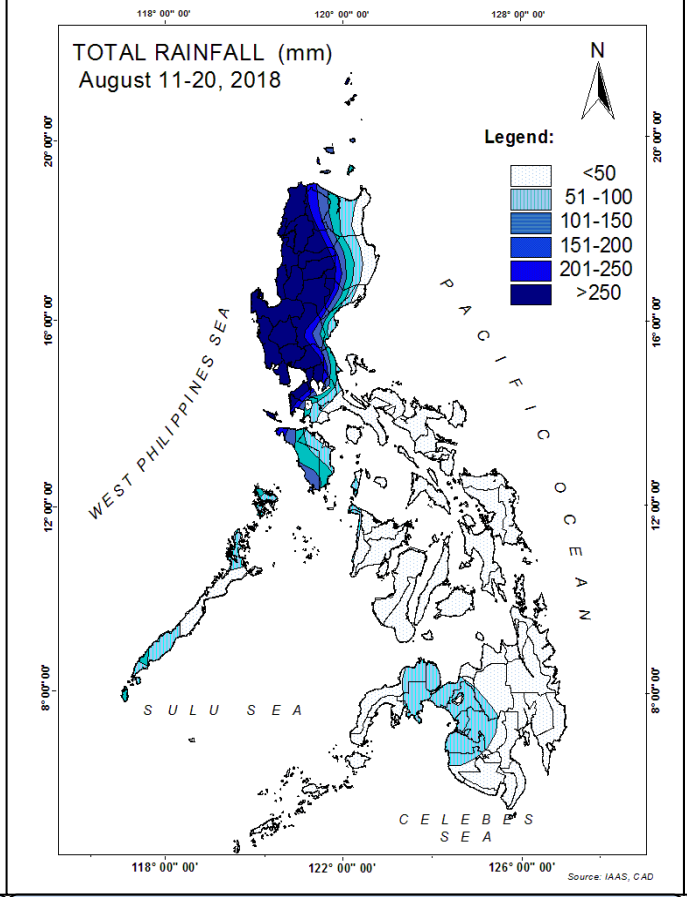


Fig. 2.b. Actual Cumulative Rainfall during the Passage of Tropical Storm (TS) "LUIS" (August 23-24, 2018)

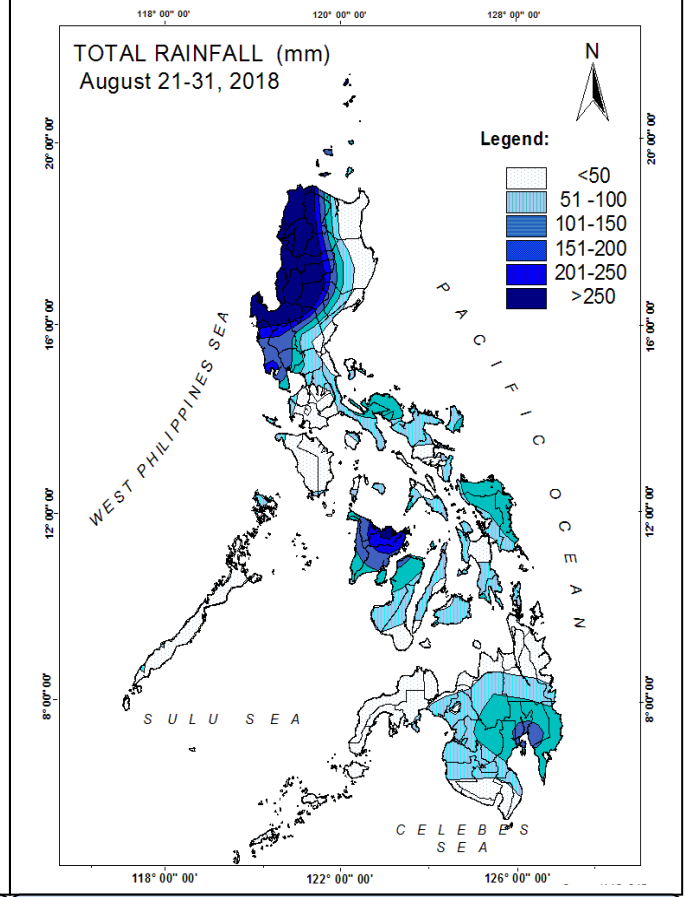
FIG. 3.0 TEN DAYS ACTUAL RAINFALL DISTRIBUTION IN THE PHILIPPINES for the month of AUGUST 2018



A. Decade 1 – AUGUST 01-10, 2018

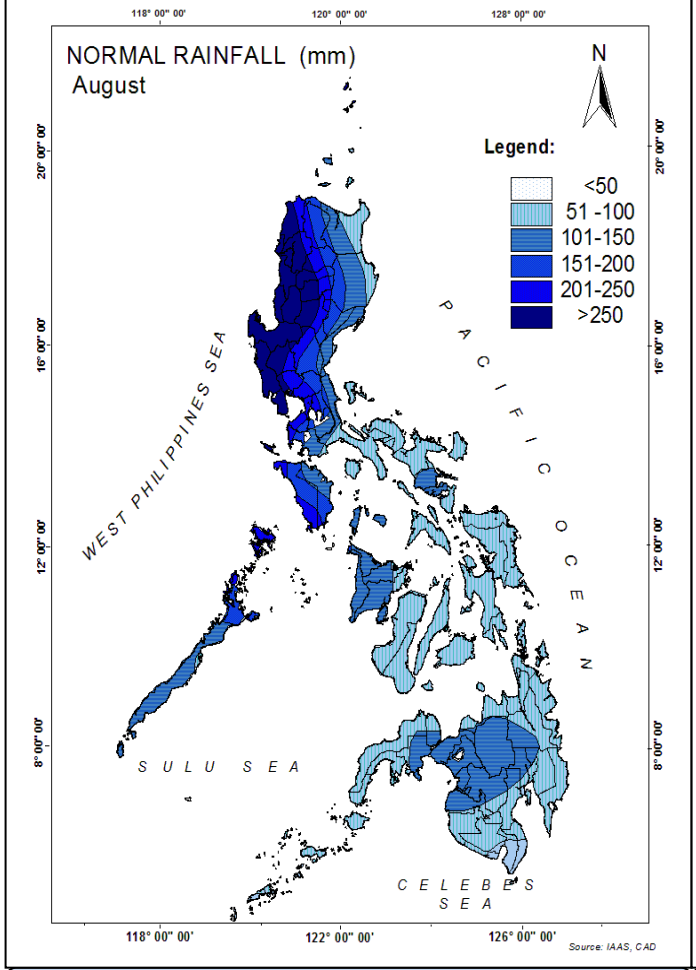


B. Decade 2- AUGUST 11-20, 2018

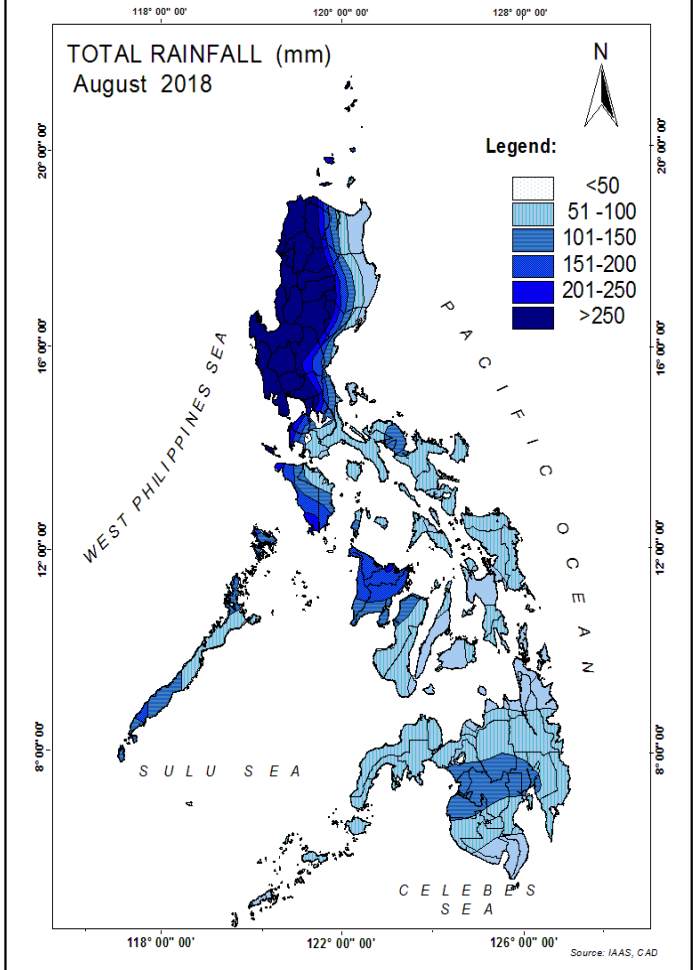


C. Decade 3 – AUGUST 21-31, 2018

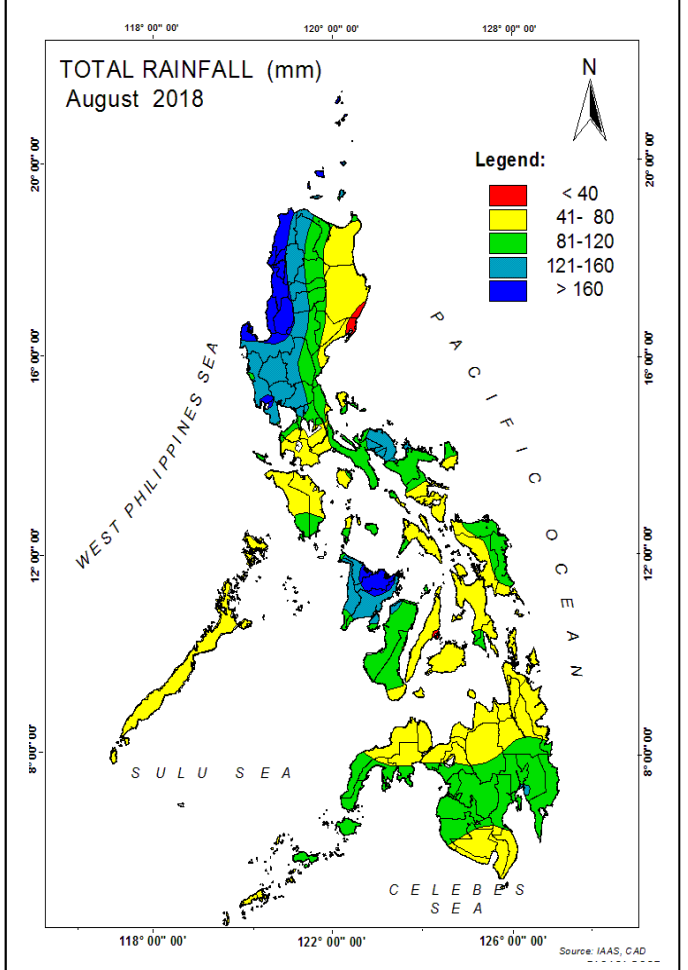
FIG. 4.0 RAINFALL IN THE PHILIPPINES for the month of AUGUST 2018



A. Normal Rainfall (mm)



B. Actual Rainfall (mm)



C. Percent of Normal Rainfall (%)

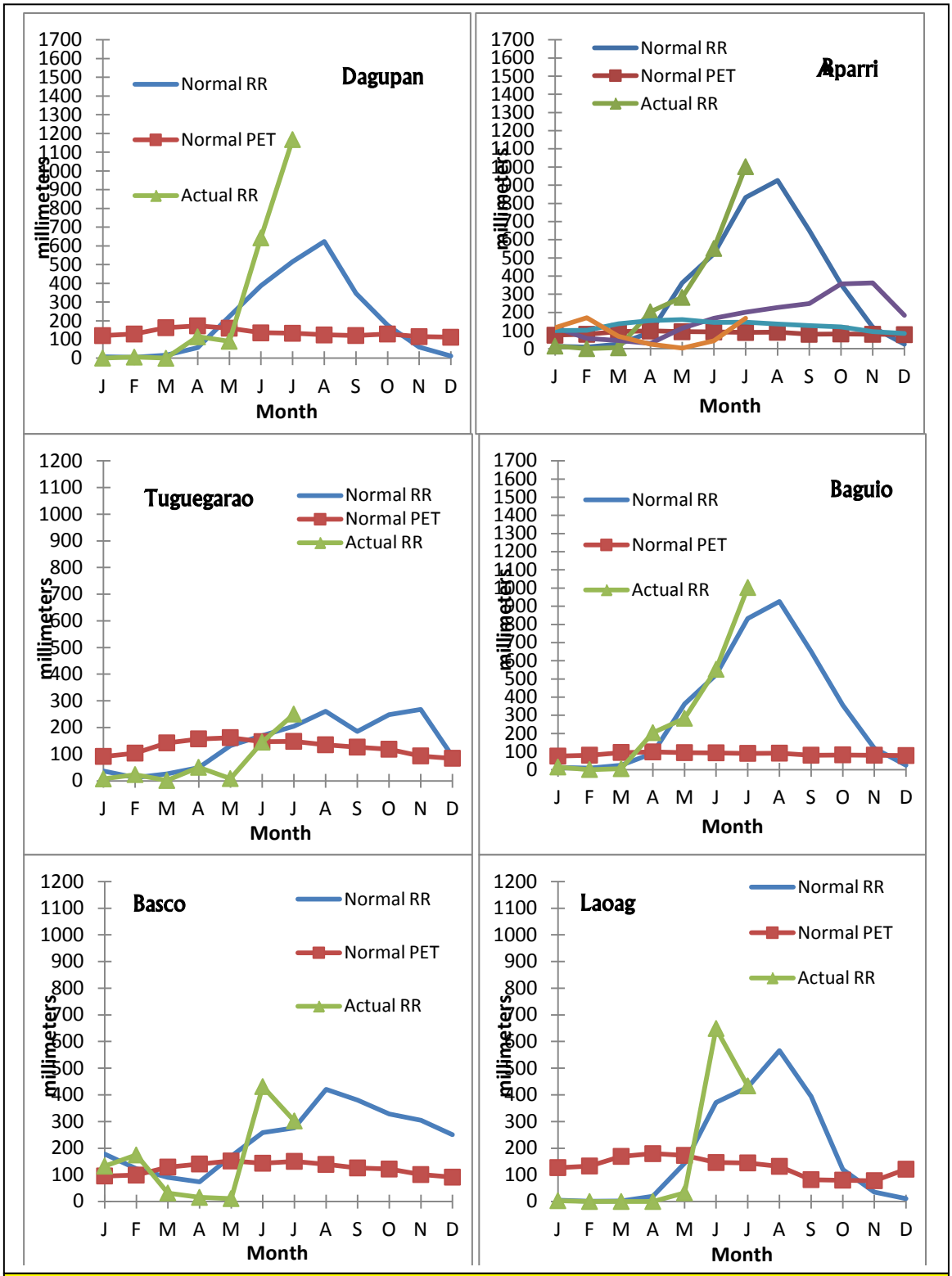


Fig. 5.0 Comparison of normal rainfall and potential evapotranspiration with the actual monthly rainfall at Laoag, Basco, Baguio, Aparri, Dagupan, and Tuguegarao.

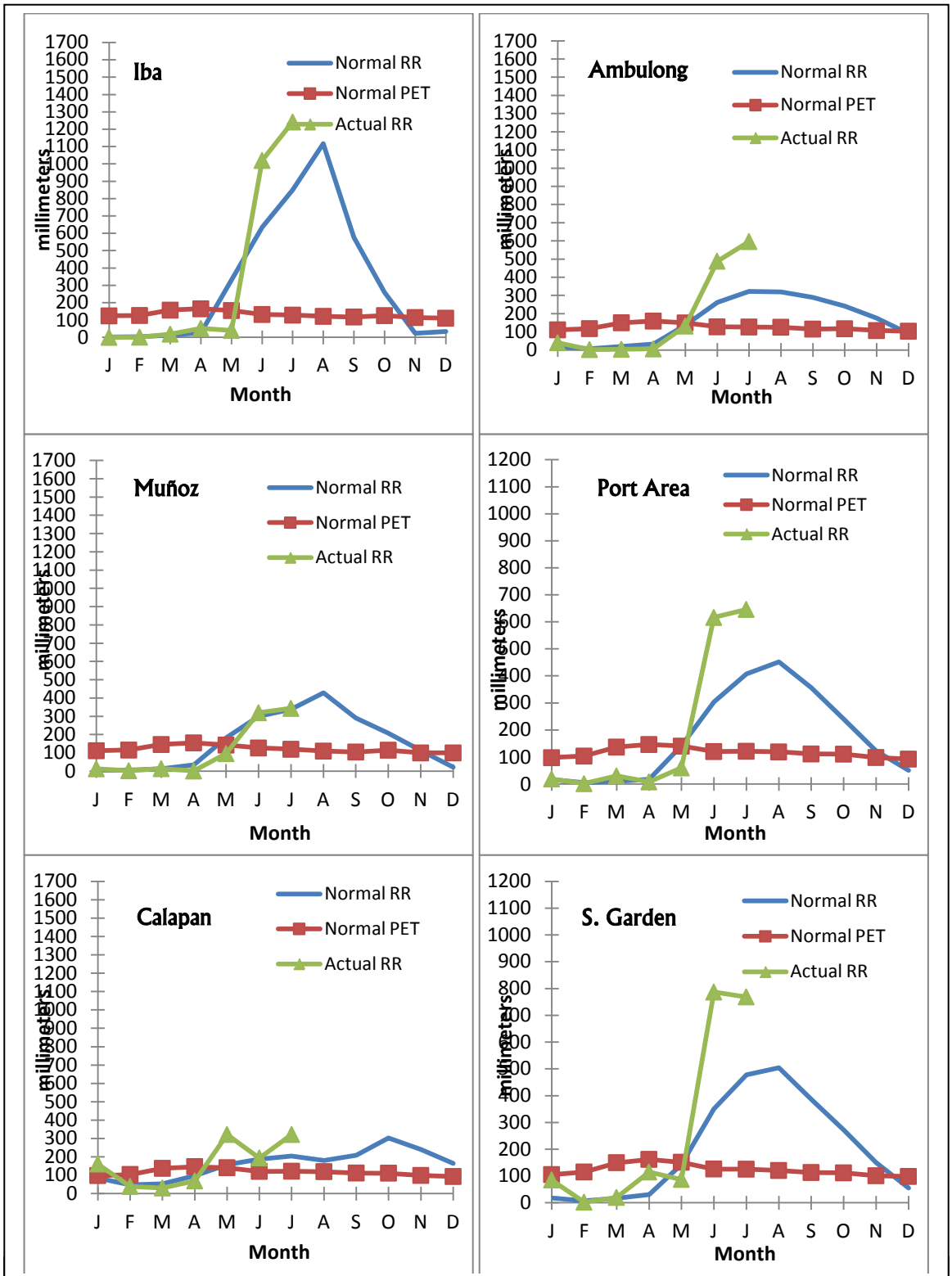
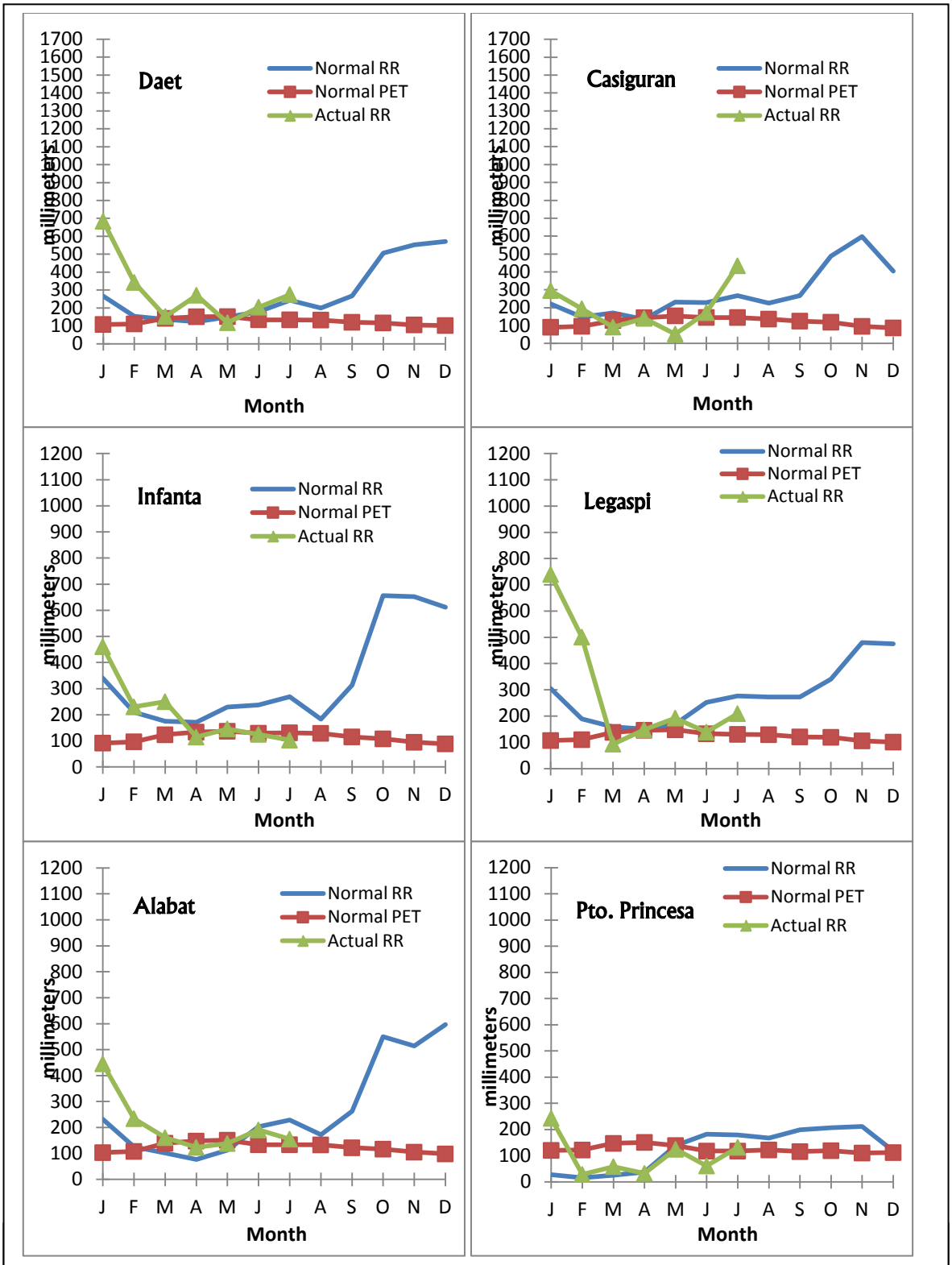
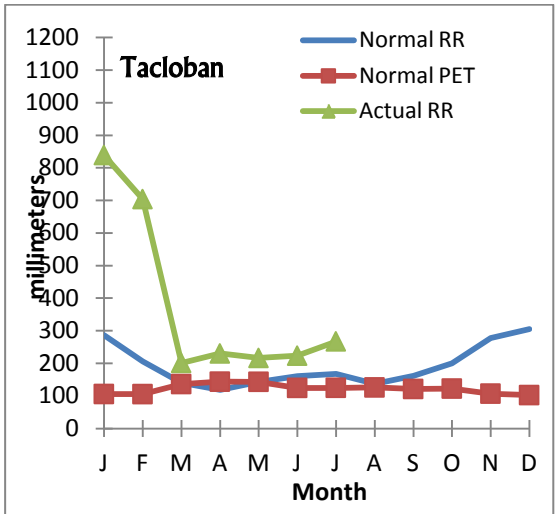
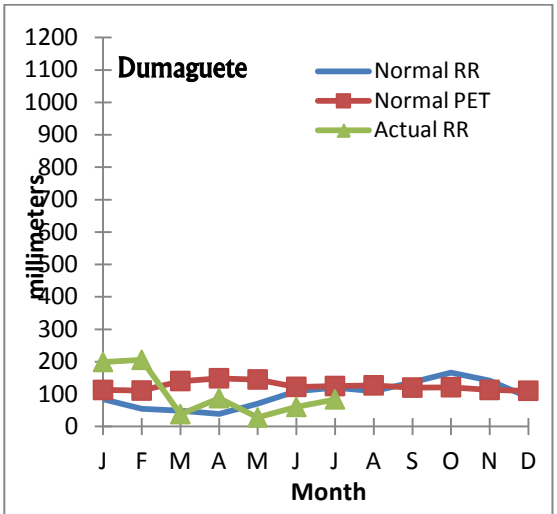


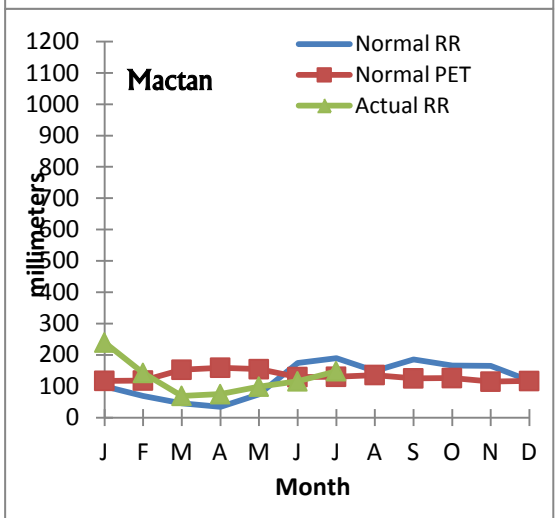
Fig 5a. Comparison of normal rainfall and potential evapotranspiration with the actual monthly rainfall at Iba, Ambulong, Muñoz, Port Area, Calapan, and Science Garden.

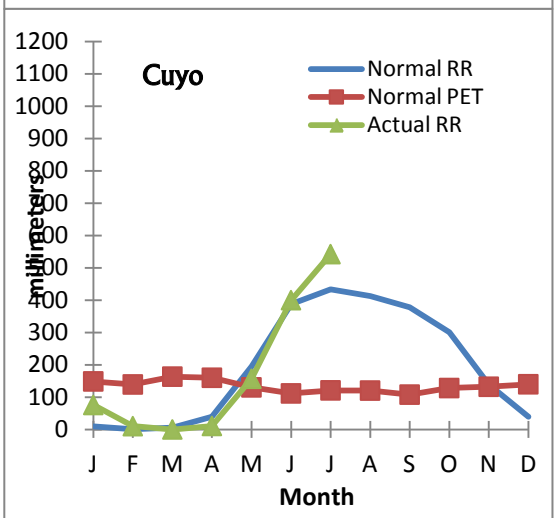


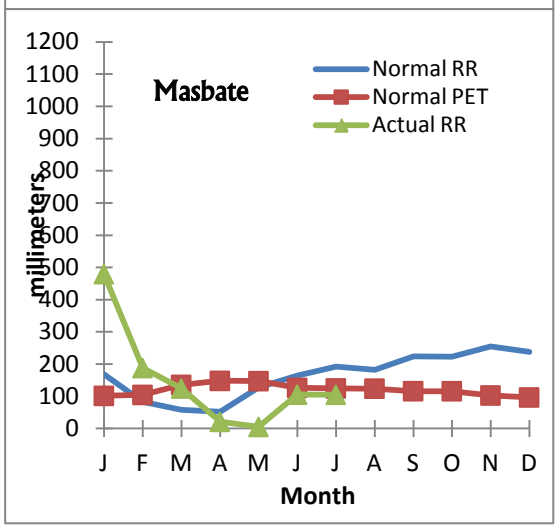
with the actual monthly rainfall at Daet, Casiguran, Infanta, Legaspi, Alabat, and Puerto Princesa.

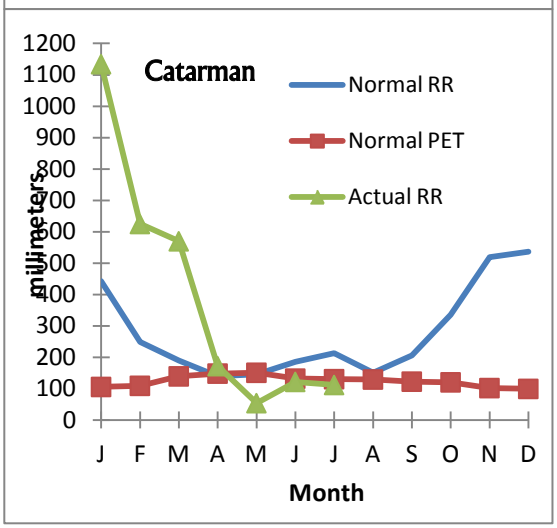












Catarman and Dumaguete.

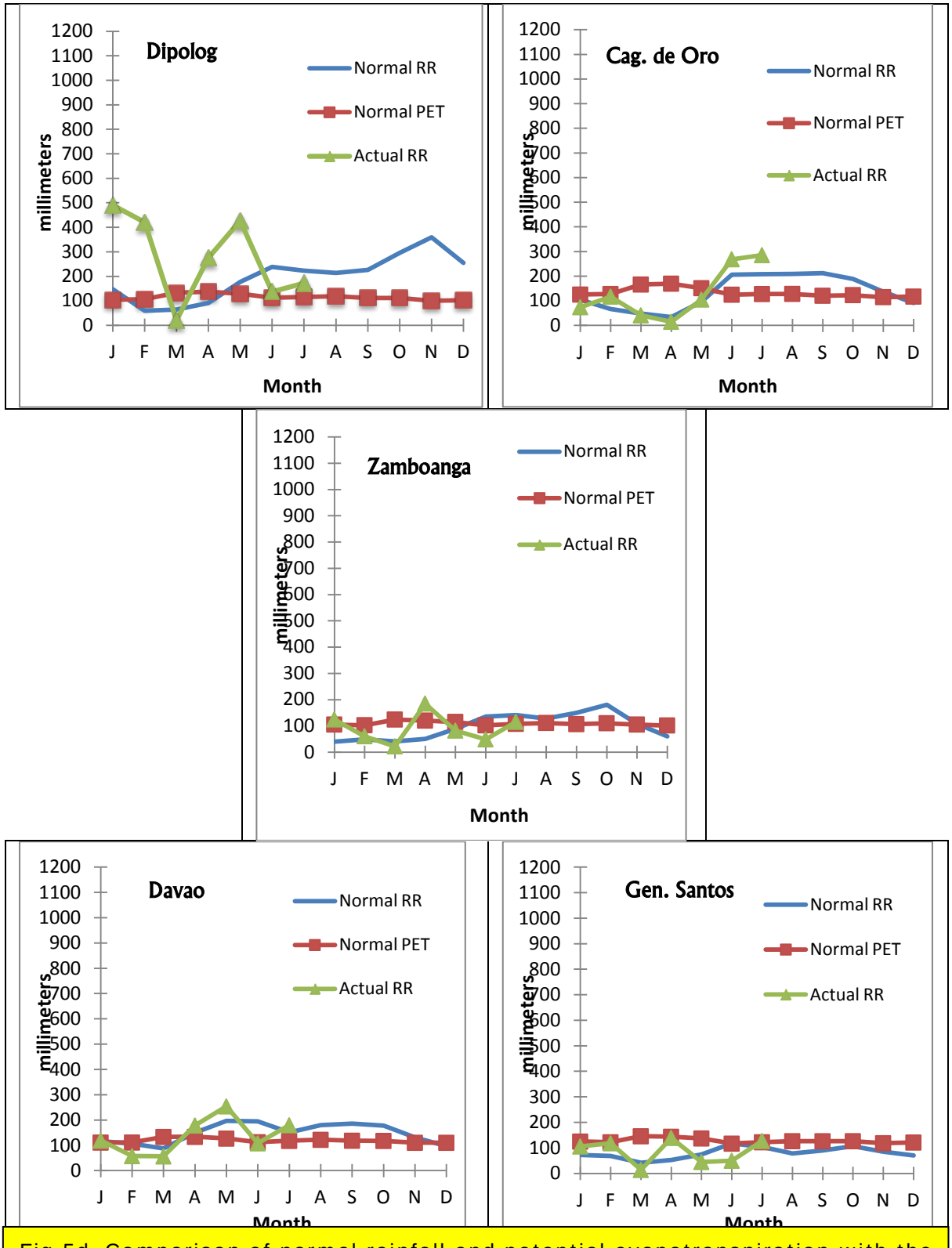


Fig 5d. Comparison of normal rainfall and potential evapotranspiration with the actual monthly rainfall at Davao, General Santos, Zamboanga, Cagayan de Oro, and Dipolog.