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 JULY 2018

OVERVIEW

Harvesting of wet season corn had just began in some areas of the country. Good to normal yield is expected in Baler, Tayabas, Calapan, Panay Island, Catbalogan, Tacloban, and Bukidnon, while below normal yield is anticipated in CAR, Zamboanga del Norte and Davao Region. Land preparation, planting and transplanting activities for late planted, lowland 1st palay has now started in most parts of the country. Standing crops in Batanes, Baler, Casiguran, Tayabas, Ambulong, Calapan, Albay, Panay Island, Catbalogan, Tacloban, Bukidnon, Davao Region, Surigao del Sur and ARMM are in good crop condition. Meanwhile, standing crops in Catanduanes experienced moisture stress; while those in Pangasinan, CAR, Bataan and Zambales were affected by water logging.

Rainfall assessment during the month showed that near to above normal rainfall were received by most provinces of Ilocos Region, Cagayan Valley Region, Central Luzon, Benguet, Kalinga, Apayao, CALABARZOn, Metro Manila, MIMAROPA, most of Bicol Region, most of Western Visayas, and Davao Region. The provinces of Catanduanes and Surigao del Norte received way below normal rainfall, and the rest of the country received below normal rainfall conditions.

The weather systems that affected the country during the month were the Southwest (SW) monsoon, Low Pressure Areas (LPAs), localized thunderstorms and four (4) tropical cyclones (TCs), that developed/entered in the Philippine Area of Responsibility (PAR), namely: Typhoon (TY) "Gardo" (July 9 - 10), Tropical Storm (TS) "Henry" (July 15 -17), Severe Tropical Storm (STS) "Florita" (July 18-20) and Tropical Depression (TD) "Josie" (July 21-22). The Four TCs did not make landfall in any part of the country. However, all of these TCs enhanced the southwest monsoon which brought torrential rains and resulted to massive flooding in major portions of Bataan, Zambales and Pangasinan. These prompted the declaration of state of calamity over these areas, based on the reports of the National Disaster Risk Reduction Management Council (NDRRMC). Several floods and flash floods also occurred in Metro Manila. These incidents resulted to the suspension of classes and office works.

REGION I (Ilocos Region)

Land preparation, planting and transplanting activities for late-planted lowland palay had commenced across the region, in spite of heavy rains from the TC-enhanced Southwest Monsoon. The standing, late-planted upland palay may have also been partially affected.

CAR (Cordillera Autonomous Region)

Harvesting of wet season corn has begun across the region; there is an expected reduction in yield since the crops, in the maturing stage, were exposed to water-logging caused by heavy rains. The standing, vegetating upland 1st palay might also be affected. In spite of unfavorable conditions, land preparation, planting and transplanting activities for late-planted lowland 1st palay still commenced across the region.

REGION II (Cagayan Valley)

Land preparation, planting and transplanting activities of late-planted, lowland palay had just begun across the region. Adequate moisture is available during the month, which favors the standing late-planted upland palay in the Batanes

REGION III (Central Luzon)

Harvesting of wet season corn had just begun in Baler; normal to above normal yield is anticipated because crops experienced favorable weather and good crop condition from planting to maturity. The standing, vegetating upland palay and the late-planted upland palay are experiencing adequate moisture available during the month in the eastern parts of the region. Meanwhile, in the western side, particularly in Zambales and Bataan, the newly planted upland palay may be affected by water logging caused by torrential rains due to the enhanced Southwest Monsoon. In spite of that, land preparation, planting and transplanting activities of late-planted, lowland palay had just begun across the region.

REGION IV-A (CALABARZON)

Harvesting of wet season corn in Tayabas had already started; normal to above normal yield is expected in the area due to well distributed moisture which will be available from planting to maturity. Standing, newly-planted upland 1st palay are faring well in both Tayabas and Ambulong. In these same areas, the sufficient moisture available during the

group of Islands.	month favors land preparation, planting and transplanting of late-planted, lowland 1st palay.

REGION IV-B (MIMAROPA)

Harvesting of wet season corn in Calapan has now began; yield this season is expected to be good to normal because crops were in good condition from planting to maturity. Standing, upland 1st palay in Calapan is faring well. Sufficient moisture available during the month is favorable for all farming activities related to planting late-planted, lowland 1st palay in most parts of the region, except in Puerto Princesa.

REGION V (Bicol Region)

Land preparation, planting and transplanting of late-planted lowland palay in Masbate might be hampered due to the insufficient rainfall received in the area. Similarly, the standing, newly-planted lowland palay in Catanduanes were under moisture stress. Meanwhile, in Albay, the standing, lowland 1st palay in reproductive stage have recovered and were in good crop condition due to the sufficient moisture available during the month.

REGION VI (Western Visayas)

Harvesting of wet season corn had just began across the region; good to normal yield is anticipated this season. In Panay Island, ample amount of rainfall received during the month favors land preparation, planting and transplanting activities for late-planted lowland 1st palay. In the same way, the standing, newly-planted and late-planted upland 1st palay, including the vegetating upland 1st palay, were in good crop condition.

REGION VII (Central Visayas)

Any farm activities related to late-planted 1st upland palay have not commenced in any part of the region.

REGION VIII (Eastern Visayas)

Harvesting of wet season corn had just started in Catbalogan and Tacloban; good to normal yield is expected because crops experienced good condition from planting to maturity. Sufficient moisture available during the month favors all farming activities for late-planted lowland palay. Similarly, standing crops in these areas also benefited.

REGION IX (Zamboanga Peninsula)

Harvesting of wet season corn had just began in Zamboanga del Norte; the anticipated yield is below normal because crops experienced moisture stress during the critical stage of growth. Likewise, the standing, upland 1st palay have recovered and are now in good crop condition. On the other hand, any farming activities related late-planted lowland 1st palay will not be possible in Zamboanga del Sur due to insufficient moisture during the month.

REGION X (Northern Mindanao)

Harvesting of wet season corn in Bukidnon is now in progress: good yield is anticipated since the crops were in good condition from planting to maturity. Meanwhile, sufficient moisture favors land preparation, planting and transplanting activities related to late-planted lowland 1st palay. In contrary, the possibility of planting palay is low in Misamis Oriental, due to the minimal rainfall received by the area. The vegetating upland palay in Bukidnon are in good crop condition.

REGION XI (Davao Region)

Harvesting of wet season corn commences across the region; below normal yield may be anticipated because crops experienced moisture stress during the vegetation stage. Meanwhile, the standing, late-planted 1st upland palay, as well as the vegetating upland 1st palay, are faring well, due to sufficient moisture available during the month.

REGION XII (SOCCSKSARGEN)

Because of insufficient moisture during the month, any farming activities pertaining to planting rice and corn is not possible in any part of the region.

REGION XIII (CARAGA Region)

The standing lowland 1st palay in Surigao del Sur are in good crop condition because of favorable weather and sufficient moisture available during the month.

***ARMM** (Autonomous Region of Muslim Mindanao)*

Land preparation, planting and transplanting activities for the late-planted lowland 1st palay had just started across the region. Sufficient moisture available during the month favors such activities. Likewise, the standing upland 1st palay all over the region are in good condition and faring well.

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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				
Region I (Ilocos Reg.)								
Dagupan	129	88	444	97				
Vigan	137	93	233	58				
Laoag	130	88	238	73				
Region II (Cagayan Valley)								
Aparri	8	20	47	31				
Basco	86	86	150	85				
Tuguegarao	30	47	90	64				
Region III (Central Luzon)								
Iba	194	86	529	92				
Cabanatuan	64	71	153	66				
Baler	50	32	136	47				
Casiguran	41	37	150	76				
NCR (Metro Manila)								
Science Garden	149	95	357	95				
Region IV-A (CALABARZON)								
Ambulong	103	92	264	97				
Infanta	31	25	59	7				
Tayabas	47	44	118	51				
Region IV-B (MIMAROPA)								
Calapan	52	47	136	64				
Coron	72	59	426	98				
Cuyo	96	73	242	75				
Puerto Princesa	15	7	46	7				
Romblon	55	51	135	66				
San Jose	95	78	349	63				
Region V (Bicol Reg.)								
Daet	43	66	114	68				
Legaspi	33	20	86	15				
Masbate	22	34	50	10				
Virac Synop	46	39	57	8				
Region VI (Western Visayas)								
Roxas	75	68	115	37				
Region VII (Central Visayas)								
Mactan	30	20	70	32				
Dumaguete	16	17	38	10				
Tagbilaran	30	41	49	19				
Region VIII (Eastern Visayas)								
Catarman	30	27	59	8				
Catbalogan	35	32	85	22				
Tacloban	60	73	130	83				
Region IX (Zamboanga Peninsula)								
Dipolog	40	7	83	20				
Zamboanga	12	10	41	10				
Region X (Northern Mindanao)								
Lumbia	67	85	93	14				
Malaybalay	69	37	195	75				
Region XI (Davao Reg.)								
Davao	29	19	72	22				
Region XII (SOCCSKSARGEN)								
General Santos	15	19	48	39				

Region XIII (Caraga)								
Surigao	57	88	82	58				
Hinatuan	41	20	114	41				
ARMM *(Autonomous reg. of Muslim Mindanao)*								
Cotabato	57	15	134	53				

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		
Region V (Bicol Reg.)								
Daet	100	51	347	49	635	75		
Legaspi	163	68	292	24	512	25		
Virac	86	46	233	24	277	8		
Region VIII (Eastern Visayas)								
Catarman	46	17	297	34	415	22		
Region XIII (CARAGA)								
Hinatuan	224	53	592	54	914	88		
Surigao	83	47	422	63	516	73		

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		
Region I (Ilocos Reg.)								
Dagupan	77	14	688	78	1914	97		
Vigan	49	25	736	81	1107	58		
Laoag	28	15	644	80	1099	66		
Region II (Cagayan Valley)								
Aparri	3	5	45	5	221	12		
Basco	9	3	419	68	736	69		
Tuguegarao	7	3	145	14	407	32		
Region III (Central Luzon)								
Iba	34	7	1003	73	2306	83		
Cabanatuan	81	29	385	59	746	56		
Baler	245	56	421	47	753	46		
Casiguran	44	8	207	10	663	44		
Region IV-A (CALABARZON)								
Tayabas	131	42	301	44	577	49		
Region IV-B (MIMAROPA)								
Calapan	273	88	457	71	794	80		
Romblon	116	61	334	59	657	63		
Region V (Bicol Reg.)								
Masbate	4	12	104	14	215	7		
Region VI (Western Visayas)								
Roxas	175	78	440	69	600	54		
Region VII (Central Visayas)								
Cebu	84	51	194	47	350	37		
Dumaguete	24	27	81	15	169	7		
Tagbilaran	32	24	138	25	218	14		
Region VIII (Eastern Visayas)								
Catbalogan	287	92	433	78	627	47		
Tacloban	184	81	396	78	677	92		
Region IX (Western Mindanao)								
Dipolog	363	95	493	81	674	64		
Zamboanga	70	47	116	15	237	12		
Region X (Northern Mindanao)								
Malaybalay	304	90	566	76	1055	83		
Lumbia	89	32	344	47	446	39		
Region XI (Davao Reg.)								
Davao	216	86	319	51	507	58		
Region XII (SOCSARGEN)								
General Santos	38	29	86	12	220	29		
***ARMM** (Autonomous reg. of Muslim Mindanao)*								
Cotobato	193	46	380	25	679	56		

Table 4.0 Cumulative Yield Moisture Indices for Wet Season Corn (May - July 2018) in Millimeters and Percentile Rank.

STATIONS	MAY		JUNE		JULY	
	YMI	%RANK	YMI	%RANK	YMI	%RANK
CAR (Cordillera Autonomous Reg.)						
Baguio	283	46	764	69	1516	63
Region I (Ilocos Reg.)						
Dagupan	59	14	734	80	1610	97
Laoag	21	15	702	81	1028	71
Vigan	37	25	797	85	1062	73
Region II (Cagayan Valley)						
Aparri	2	5	49	5	174	12
Basco	7	3	460	75	686	75
Tuguegarao	5	3	157	17	345	37
Region III (Central Luzon)						
Iba	26	7	1097	76	2028	86
Cabanatuan	62	29	398	61	656	61
Baler	187	56	382	41	620	44
Casiguran	34	8	214	17	738	85
Region IV-A (CALABARZON)						
Tayabas	100	42	288	42	526	61
Region IV-B (MIMAROPA)						
Calapan	209	88	412	68	623	53
Romblon	89	61	329	58	445	20
Region V (Bicol Reg.)						
Masbate	3	12	114	14	367	31
Region VI (Western Visayas)						
Roxas	134	78	427	69	209	7
Region VII (Central Visayas)						
Cebu	64	47	186	36	538	63
Dumaguete	18	27	81	15	249	20
Tagbilaran	25	24	141	27	139	10
Region VIII (Eastern Visayas)						
Catbalogan	219	92	381	69	280	22
Tacloban	141	81	375	76	581	80
Region IX (Western Mindanao)						
Dipolog	278	95	422	71	504	68
Zamboanga	53	47	104	14	508	66
Region X (Northern Mindanao)						
Lumbia	68	32	350	80	177	7
Malaybalay	233	90	521	71	700	85
Region XI (Davao Reg.)						
Davao	165	86	279	42	656	68
Region XII (SOCSARGEN)						
General Santos	29	29	82	10	374	49

Table 5.0 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				
Region I (Ilocos Reg.)								
Dagupan	547	88	1656	97				
Vigan	615	93	951	66				
Laoag	551	88	963	76				
Region II (Cagayan Valley)								
Aparri	37	20	196	29				
Basco	366	86	653	85				
Tuguegarao	123	47	361	61				
Region III (Central Luzon)								
Iba	867	86	2046	92				
Cabanatuan	272	71	598	71				
Baler	158	32	458	49				
Casiguran	146	37	558	78				
Region IV-A (CALABARZON)								
Ambulong	415	92	982	97				
Tayabas	152	44	402	53				
Region IV-B (MIMAROPA)								
Coron	305	59	1552	98				
Cuyo	340	73	855	75				
Puerto Princesa	52	7	177	8				
Romblon	195	51	487	66				
San Jose	367	78	1298	63				
Region V (Bicol Reg.)								
Masbate	90	34	189	12				
Region VI (Western Visayas)								
Roxas	238	68	392	36				
Region VII (Central Visayas)								
Mactan, Cebu	98	20	239	32				
Dumaguete	51	17	131	8				
Tagbilaran	95	41	167	19				
Region VIII (Eastern Visayas)								
Catbalogan	131	32	306	24				
Tacloban	190	73	444	85				
Region IX (Zamboanga Peninsula)								
Dipolog	117	7	280	20				
Zamboanga	41	10	151	12				

Region X (Northern Mindanao)								
Lumbia	228	85	320	14				
Malaybalay	234	37	676	75				
Region XI (Davao Reg.)								
Davao	92	19	262	27				
Region XII (SOCCSKSARGEN)								
General Santos	43	19	163	44				

Table 6.0 Cumulative Yield Moisture Indices for Delayed Planted Lowland First Palay (June-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				
Region V (Bicol Reg.)								
Daet	173	66	434	68				
Legaspi	118	20	317	15				
Virac	149	39	190	7				
Region VIII (Eastern Visayas)								
Catarman	103	27	210	10				
Catbalogan	131	32	306	24				
Tacloban	190	73	444	85				
Region XIII (Caraga)								
Hinatuan	116	20	407	46				
Surigao	212	88	297	61				

Table 7.0 Cumulative Yield Moisture Indices for Lowland First Palay (July - October 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						
Region I (Ilocos Reg.)								
Dagupan	993	92						
Laoag	369	59						
Vigan	301	36						
Region II (Cagayan Valley)								
Basco	257	69						
Tuguegarao	213	68						
Region III (Central Luzon)								
Iba	1055	83						
Cabanatuan	292	56						
Region IV-A (CALABARZON)								
Ambulong	507	93						
Tayabas	223	64						
Region IV-B (MIMAROPA)								
Calapan	273	80						
Coron	1116	98						
Cuyo	461	81						
P. Princesa	112	31						
Romblon	262	66						
San Jose	830	97						
Region V (Bicol Reg.)								
Masbate	89	19						
Region VI (Western Visayas)								
Roxas	129	25						
Region VII (Central Visayas)								
Cebu	126	49						
Dumaguete	71	24						
Tagbilaran	65	22						
Region VIII (Eastern Visayas)								
Catbalogan	157	29						
Tacloban	227	88						
Region IX (Zamboanga Peninsula)								
Zamboanga	98	37						
Region X (Northern Mindanao)								
Lumbia	82	31						

Malaybalay	396	90						
Region XII (SOCCSKSARGEN)								
General Santos	108	75						
ARMM *(Autonomous reg. of Muslim Mindanao)*								
Cotabato	242	75						

Table 8.0 Decadal and cumulative decadal rainfall for the month of JULY 2018 [actual values (in mm) and percent of normal].						
	REGION	***DECADE***	***ACTUAL JUNE***	***% Normal of Actual***	***CUMULATIVE JAN- JULY***	***% Normal Cumulative***
R01	Ilocos Region	19	102	63	971.0	120
		20	414	264	1385.2	144
		21	245	98	1630.1	134
CAR	CAR	19	92	72	790.6	105
		20	237	185	1027.8	116
		21	135	68	1162.5	108
R02	Cagayan Valley	19	106	115	759.4	87
		20	170	187	929.2	97
		21	85	80	1014.4	95
R03	Central Luzon	19	124	75	1059.7	116
		20	391	304	1451.2	139
		21	223	132	1674.0	138
R04-A	CALABARZON	19	92	90	1203.7	130
		20	175	169	1379.1	134
		21	155	160	1534.6	136
R04-B	MIMAROPA	19	117	122	853.0	137
		20	204	210	1057.5	147
		21	219	179	1276.7	152
NCR	NCR	19	83	62	1098.1	161
		20	438	346	1535.9	190
		21	201	112	1737.2	176
R05	Bicol Region	19	69	81	1602.9	145
		20	46	51	1648.6	138
		21	57	90	1706.1	135
R06	Western Visayas	19	73	86	1035.7	156
		20	84	95	1120.0	149
		21	49	45	1168.8	136
R07	Central Visayas	19	44	72	1049.4	176
		20	50	90	1099.8	169
		21	38	72	1138.0	162
R08	Eastern Visayas	19	67	90	2470.2	204
		20	71	95	2541.5	198
		21	57	108	2598.5	194
R09	Zamboanga Peninsula	19	80	110	1366.2	191
		20	64	98	1430.1	183
		21	19	30	1449.0	172
R10	Northern Mindanao	19	83	88	1178.9	128
		20	57	72	1235.5	124
		21	112	135	1347.4	124
R11	Davao Region	19	111	198	1292.2	115
		20	48	96	1340.3	114
		21	51	93	1391.2	113
R12	SOCCSKSARGEN	19	65	104	851.4	124
		20	79	134	930.0	125
		21	66	126	996.0	125
	CARAGA	19	60	87	1865.5	111
		20	72	115	1937.3	111
		21	66	110	2003.8	111
	ARMM	19	69	93	901.1	130
		20	67	96	968.1	127
		21	70	117	1038.2	126

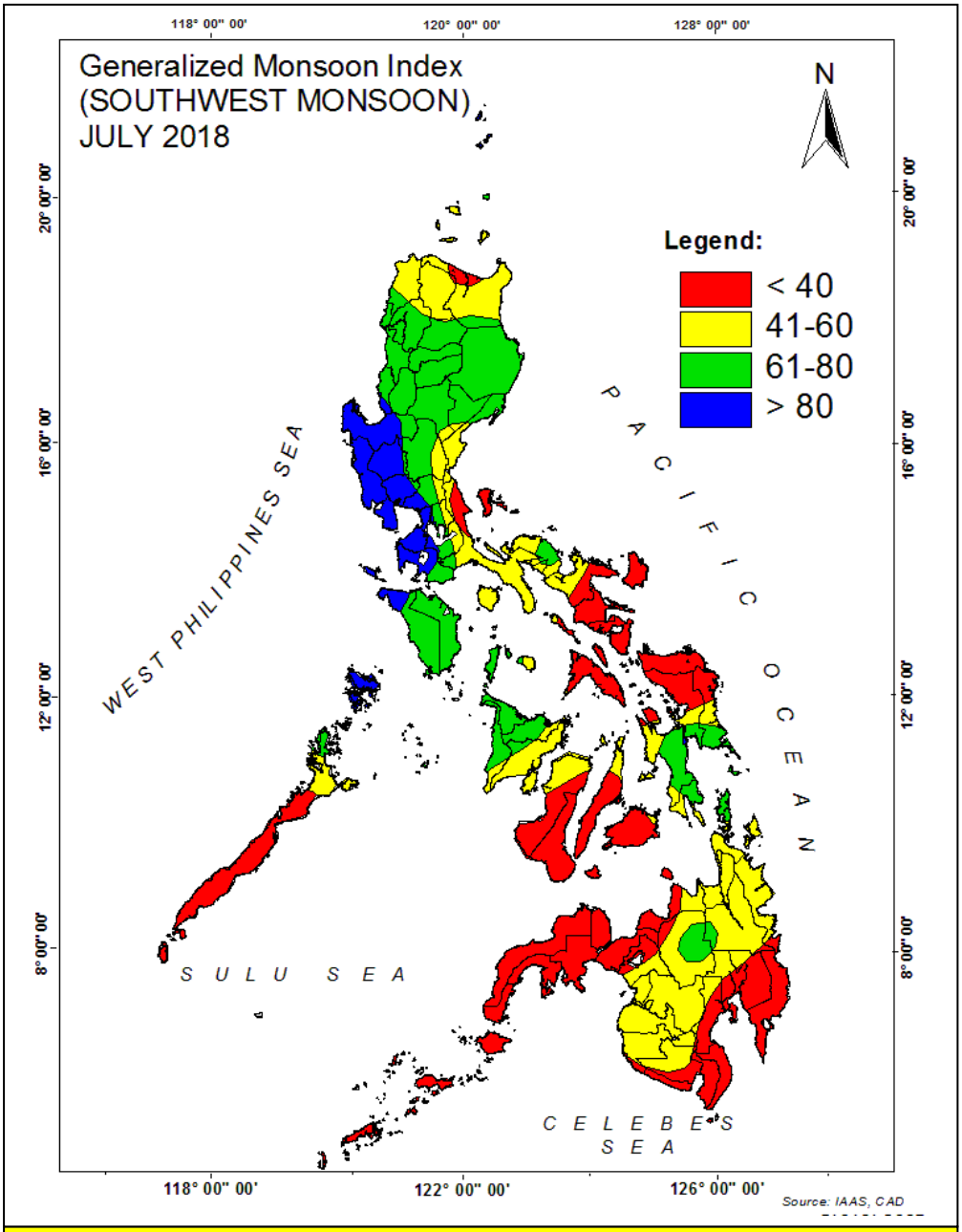


Fig. 1. Spatial Analysis of Generalized Southwest Monsoon Index Ending JULY 2018 in Percentile Rank

Fig. 2 Cumulative Raingall during the Passage of Tropical Cyclone for the month JULY 2018

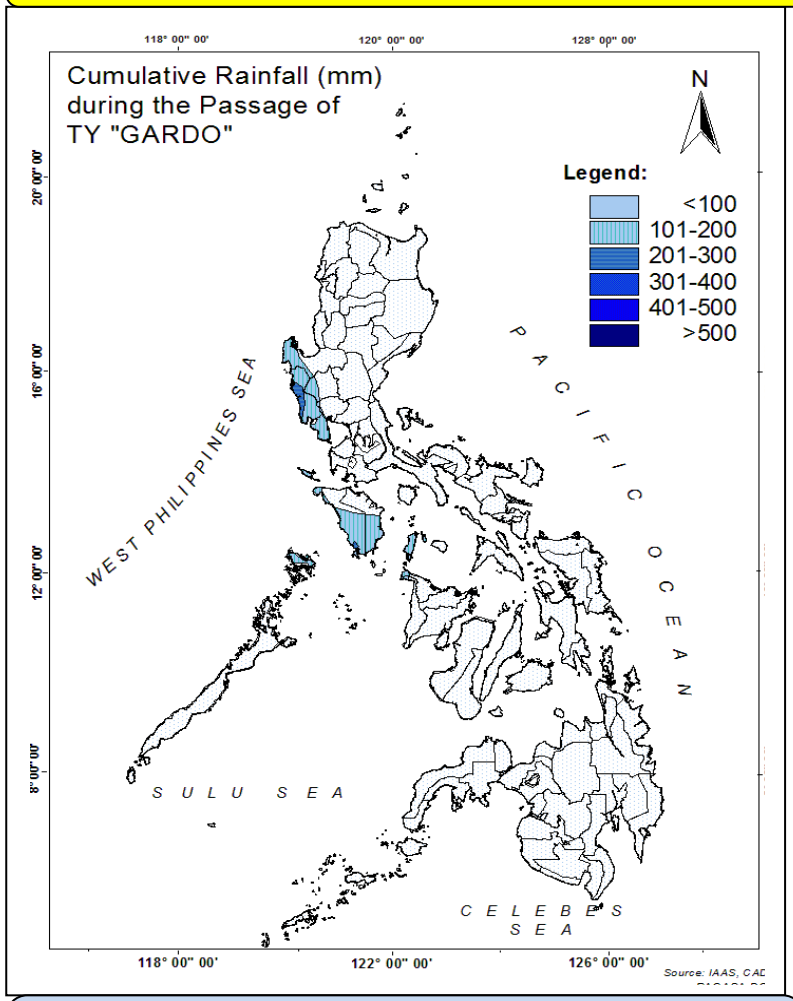


Fig. 2.a. Actual Cumulative Rainfall during the Passage of Typhoon (TY) "GARDO"
(July 9-10, 2018)

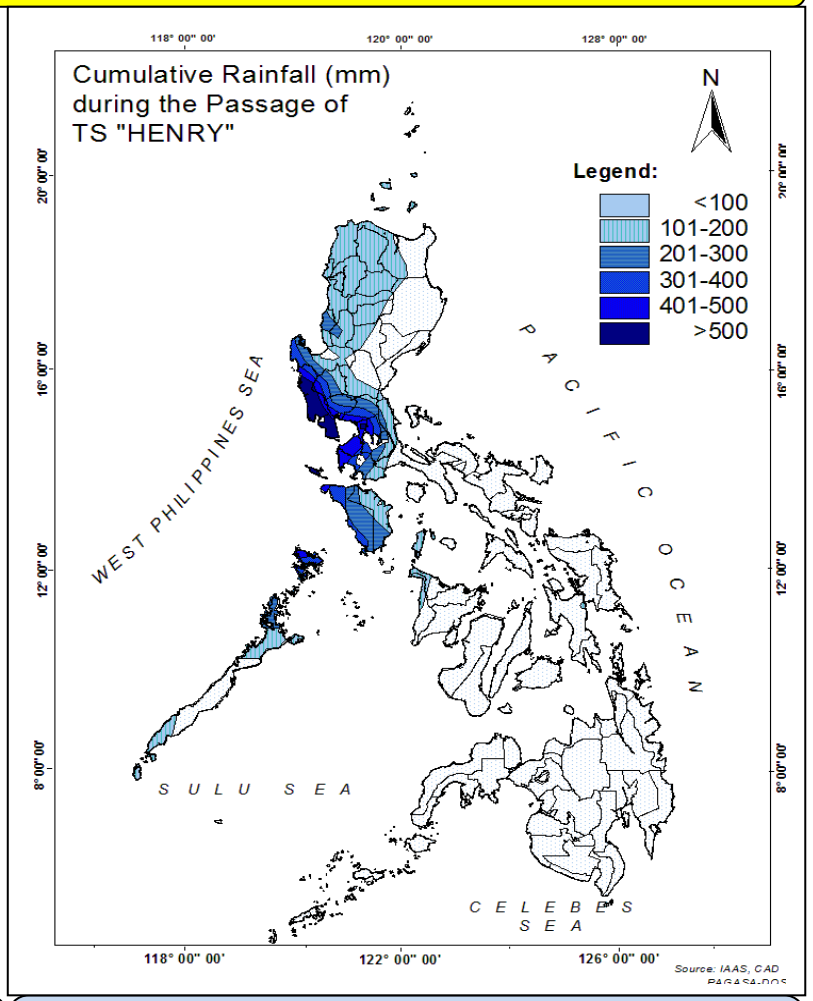


Fig. 2.b. Actual Cumulative Rainfall during the Passage of Tropical Storm (TS) "HENRY"
(July 15-17, 2018)

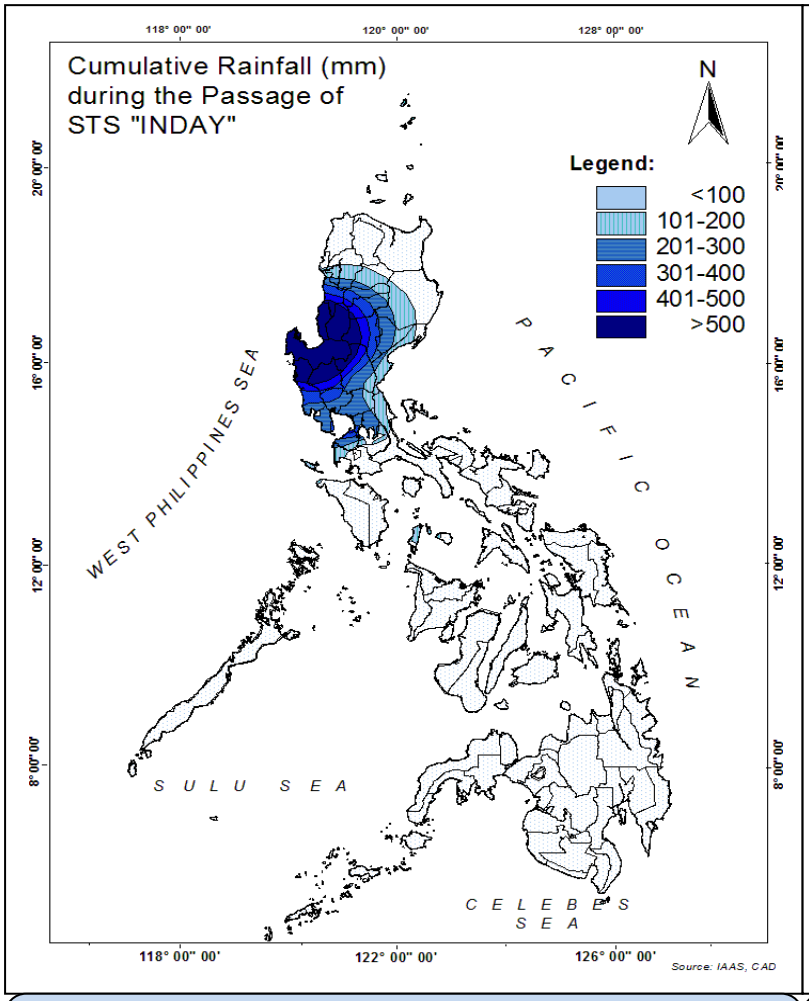


Fig. 2.c. Actual Cumulative Rainfall during the Passage of Severe Tropical Storm (STS) "INDAY" (July 18-20, 2018)

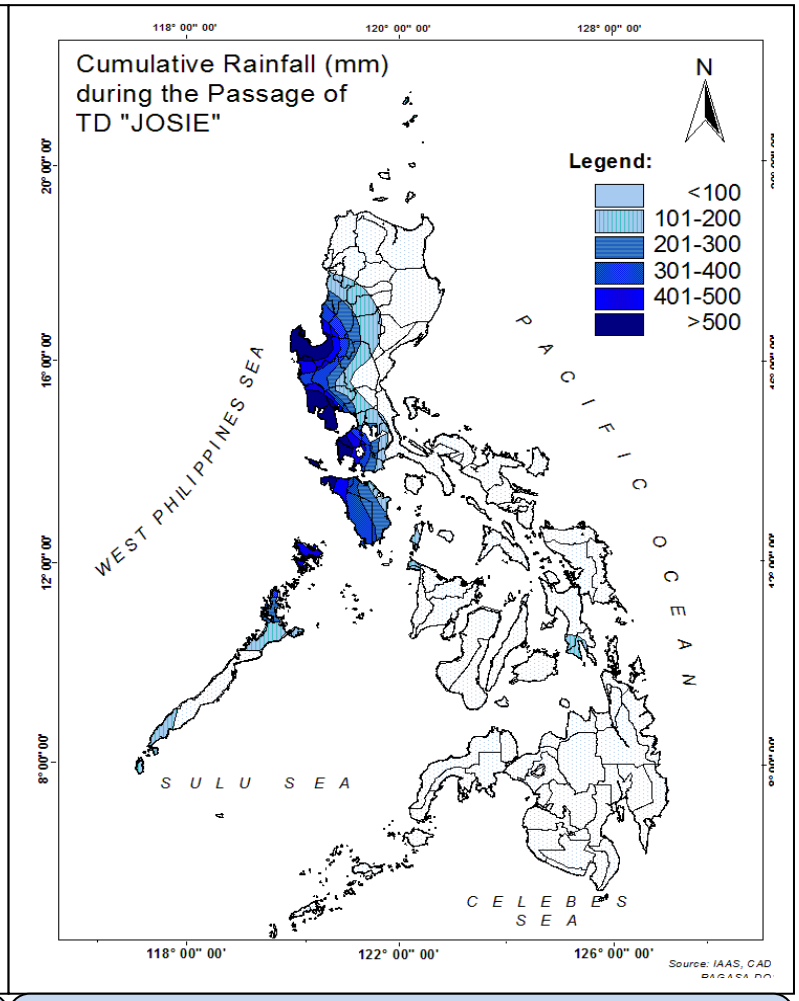
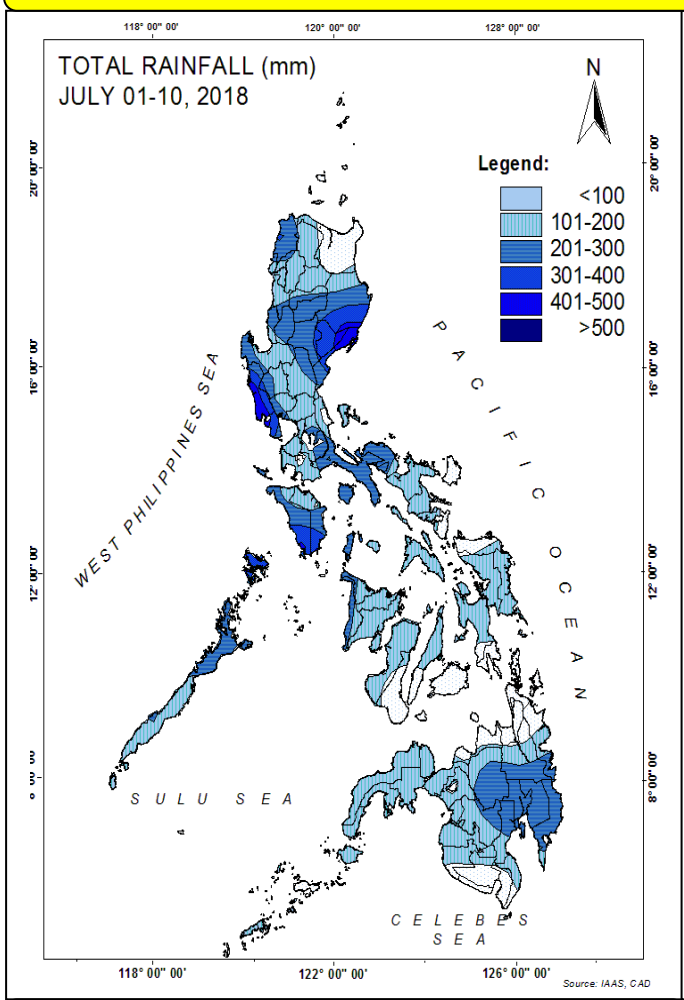
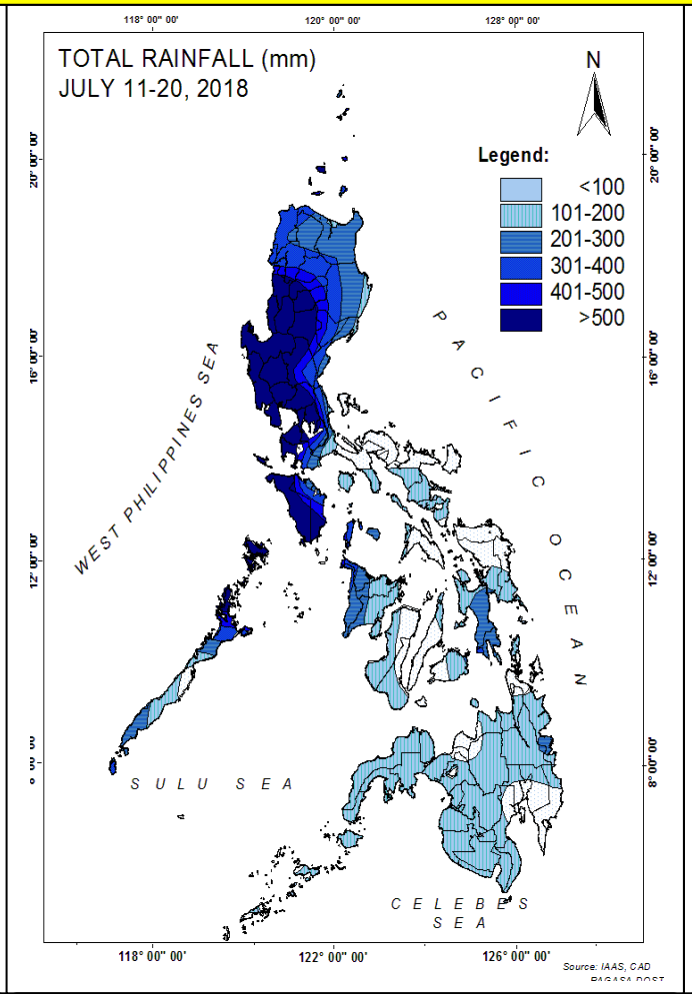


Fig. 2.d. Actual Cumulative Rainfall during the Passage of Tropical Depression (TS) "JOSIE" (July 21-22, 2018)

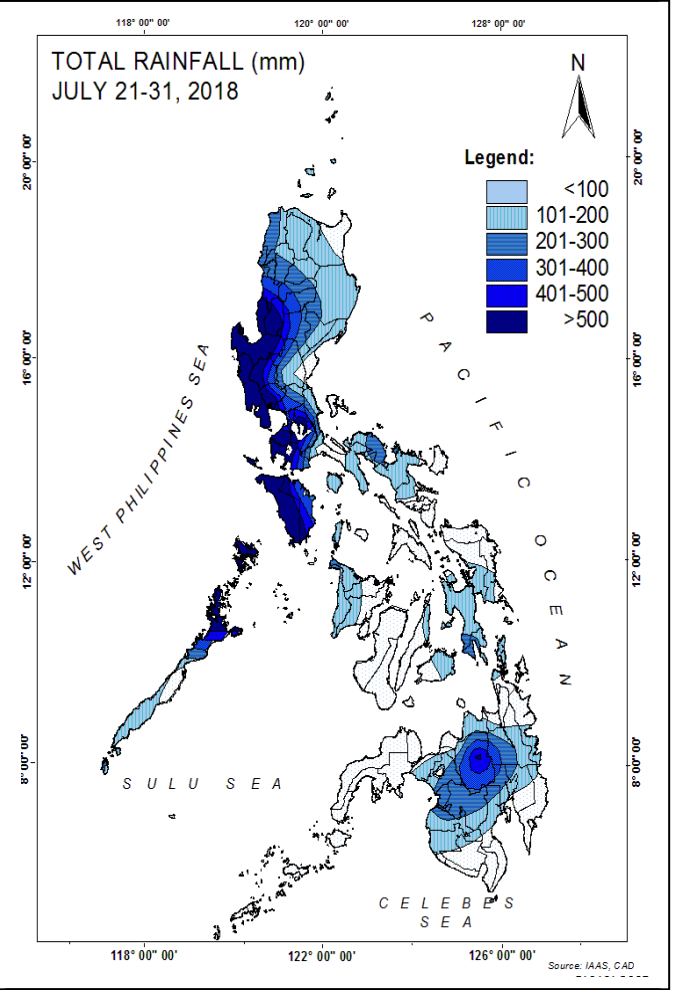
Fig. 3 Ten days actual rainfall distribution in the Philippines for the month JULY 2018



A. Decade 1 – JULY 01-10, 2018

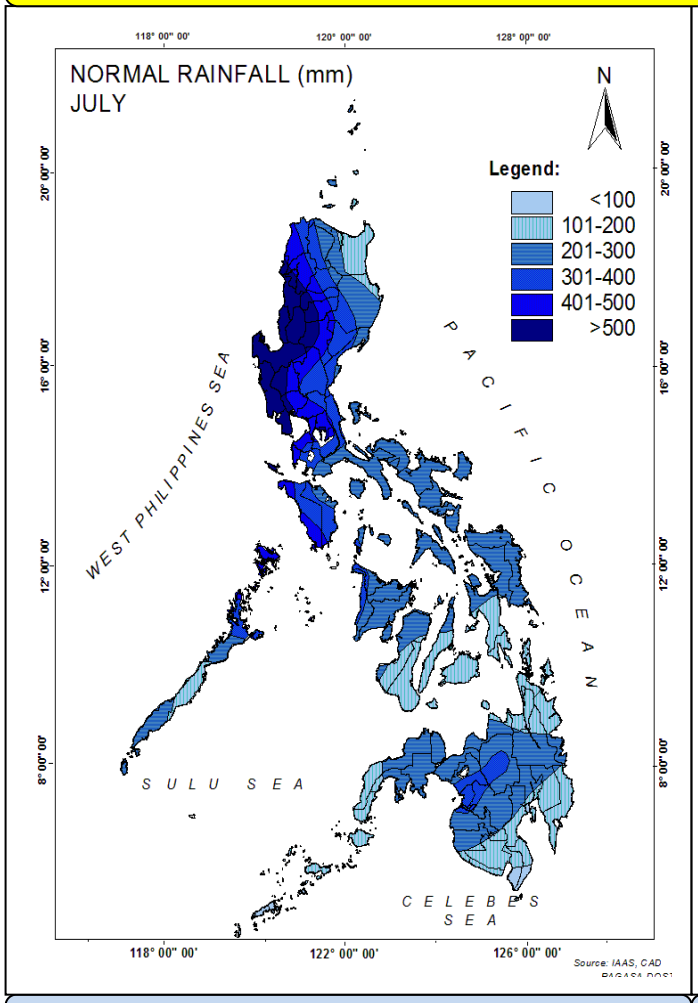


B. Decade 2 – JULY 11-20, 2018

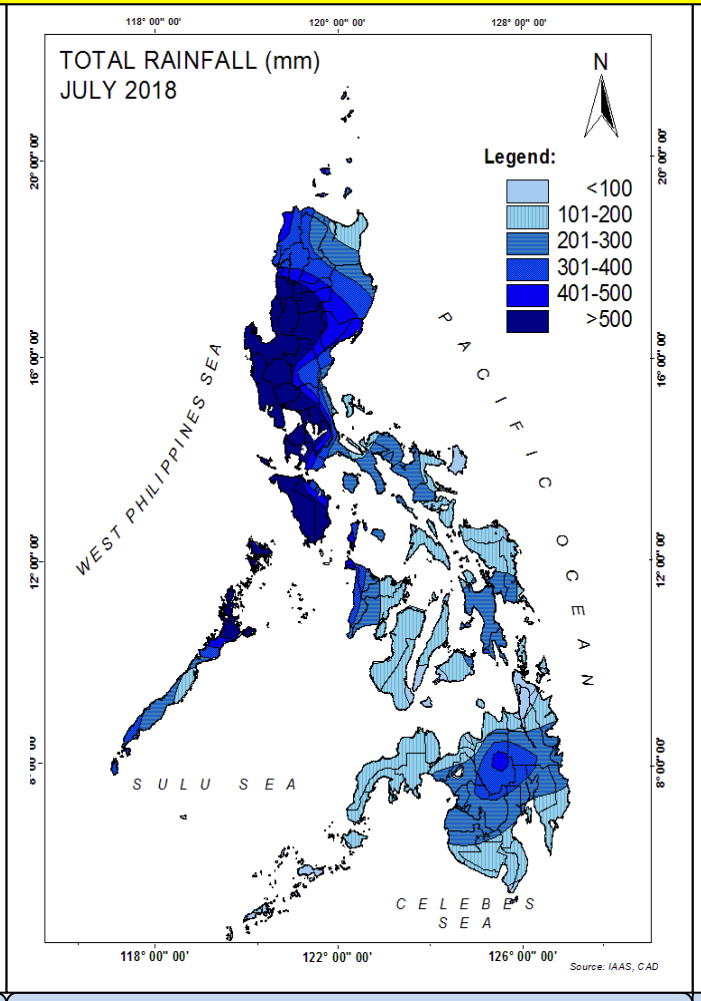


C. Decade 3 – JULY 21-31, 2018

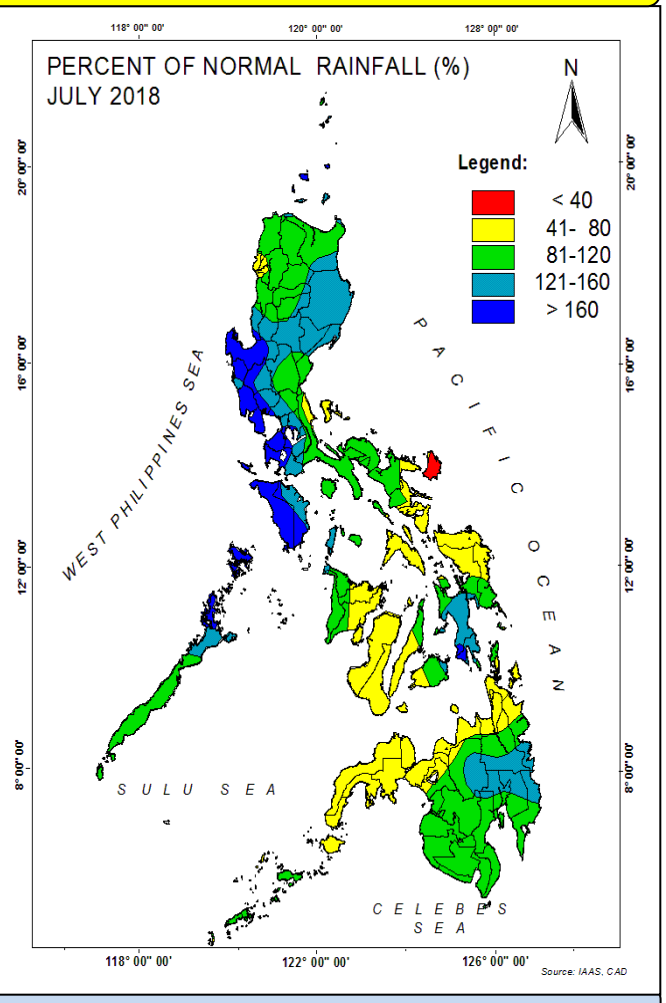
Fig. 4 Rainfall in the Philippines for the month of JULY 2018



A. Normal Rainfall (mm)



B. Actual Rainfall (mm)



C. Percent of Normal Rainfall (%)

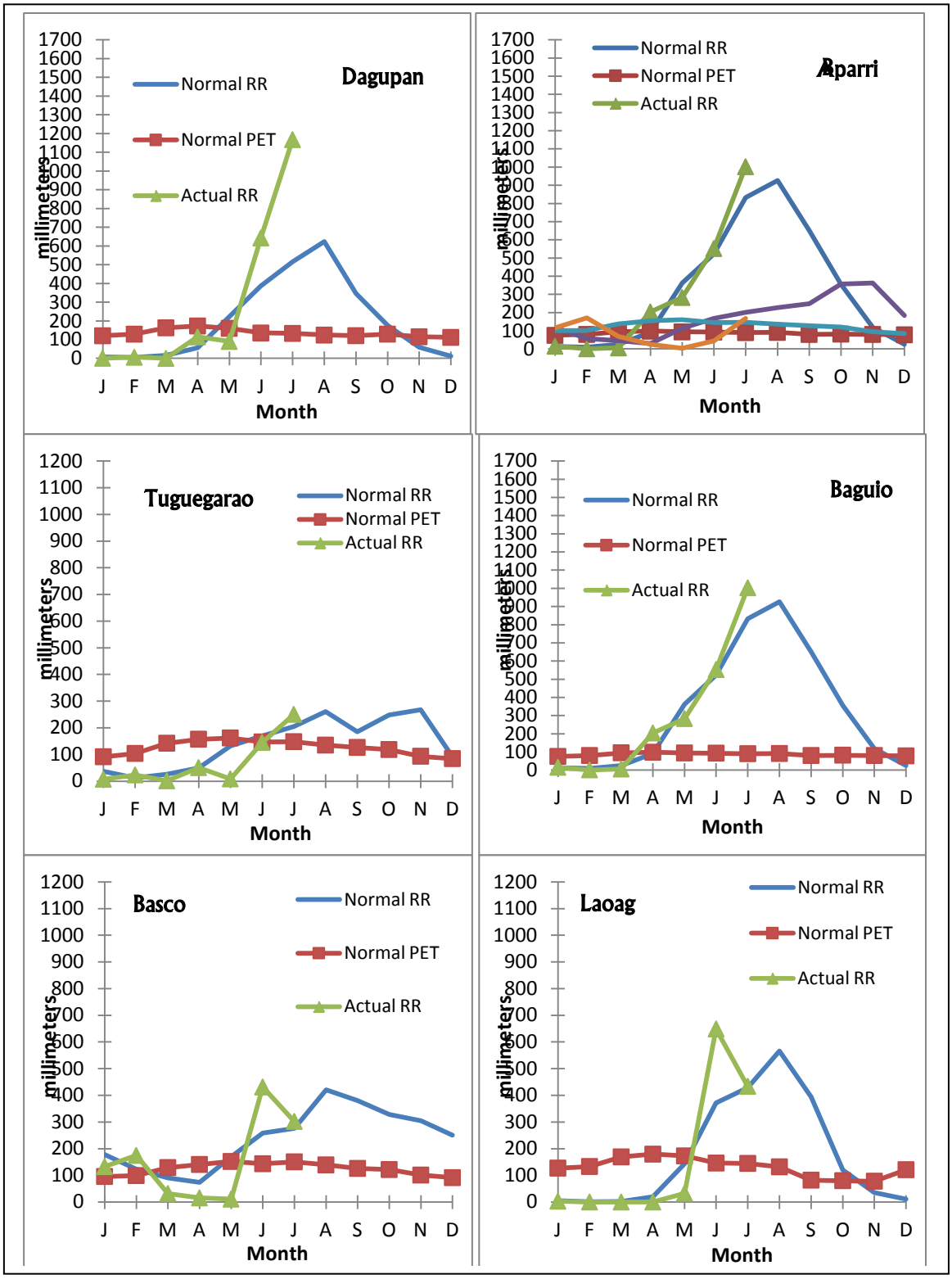


Fig.5.0. Comparison of normal rainfall and potential evapotranspiration with the actual monthly rainfall at Laoag, Basco, Baguio, Aparri, Dagupan, and Tuguegarao.

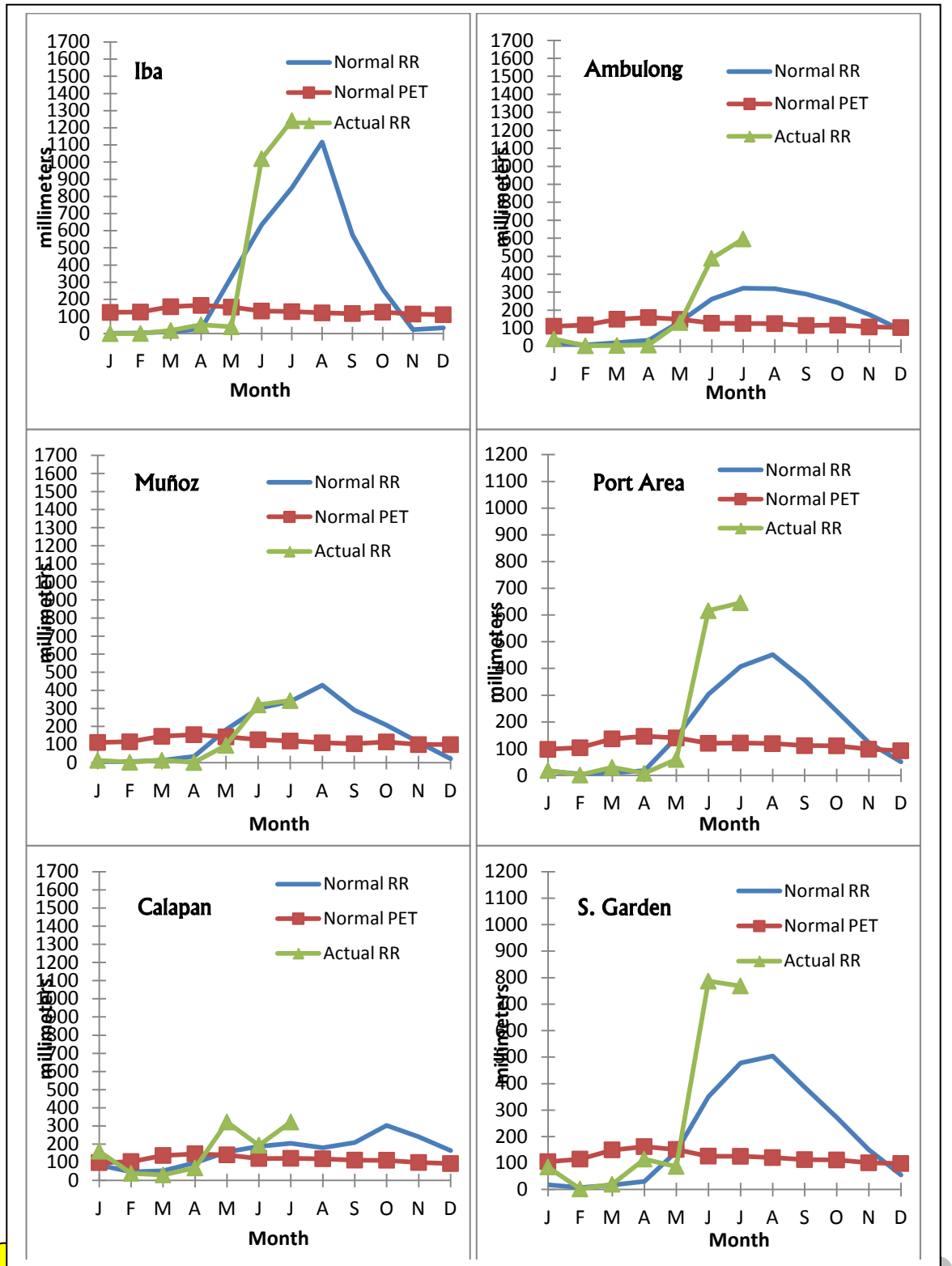
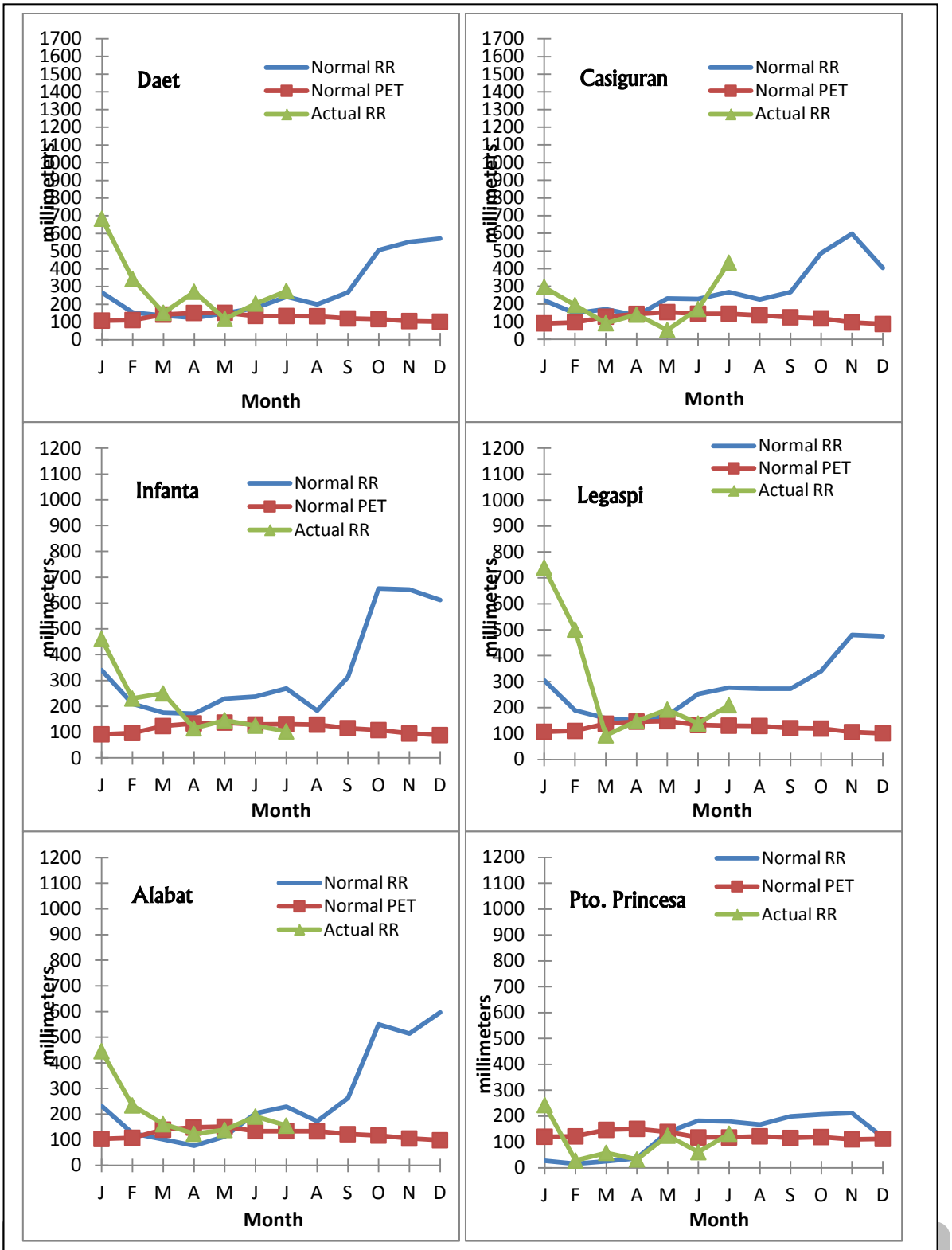
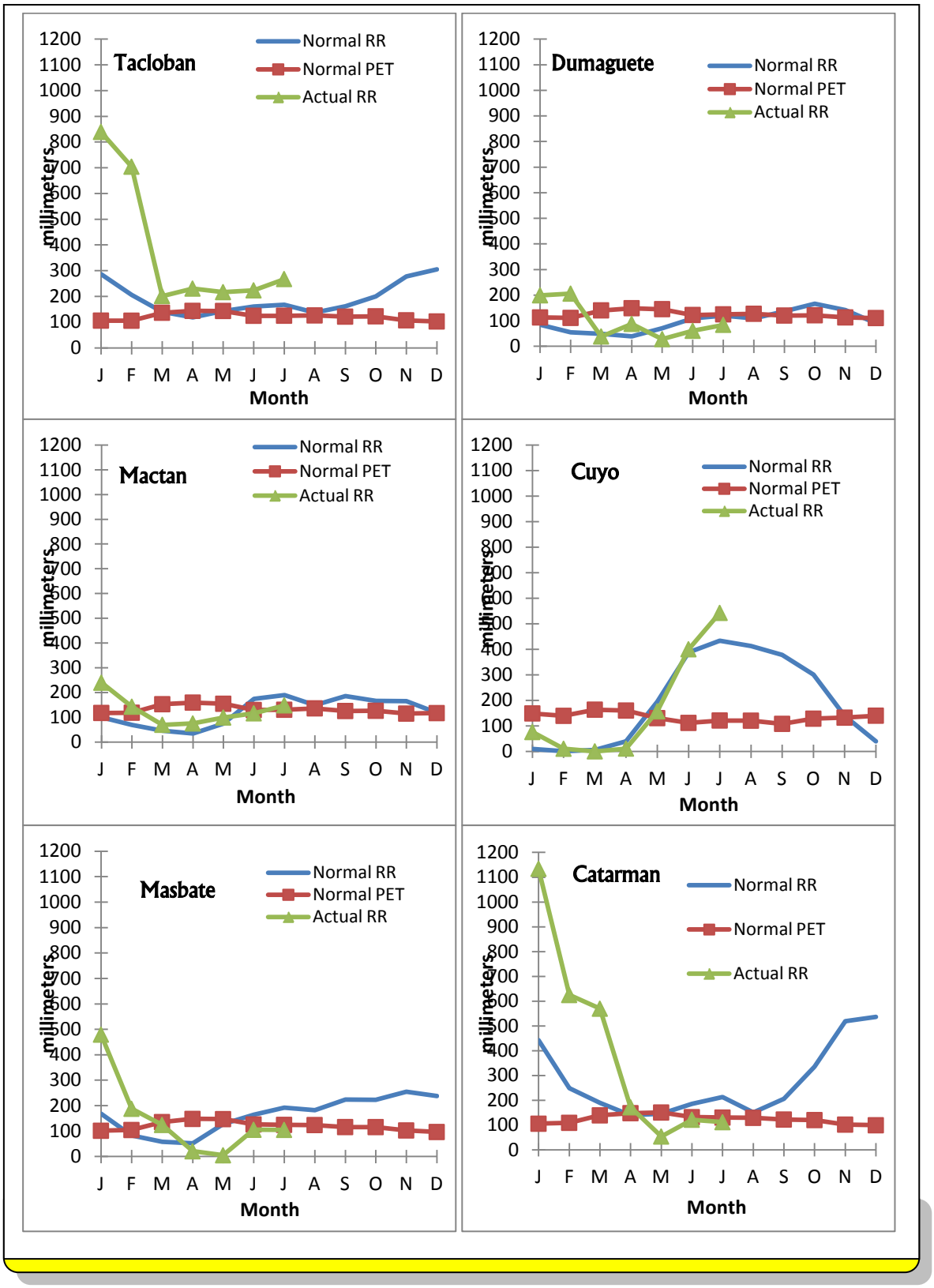


Fig. 5.a. Comparison of normal rainfall and potential evapotranspiration with the actual monthly rainfall at Iba, Ambulong, Muñoz, Port Area, Calapan, and Science Garden.



Rainfall at Daet, Casiguran, Infanta, Legaspi, Alabat, and Puerto Princesa.


Tacloban
Normal RR
Normal PET
Actual RR
millimeters
Month
J F M A M J J A S O N D
Dumaguete
Mactan
Cuyo
Masbate
Catarman

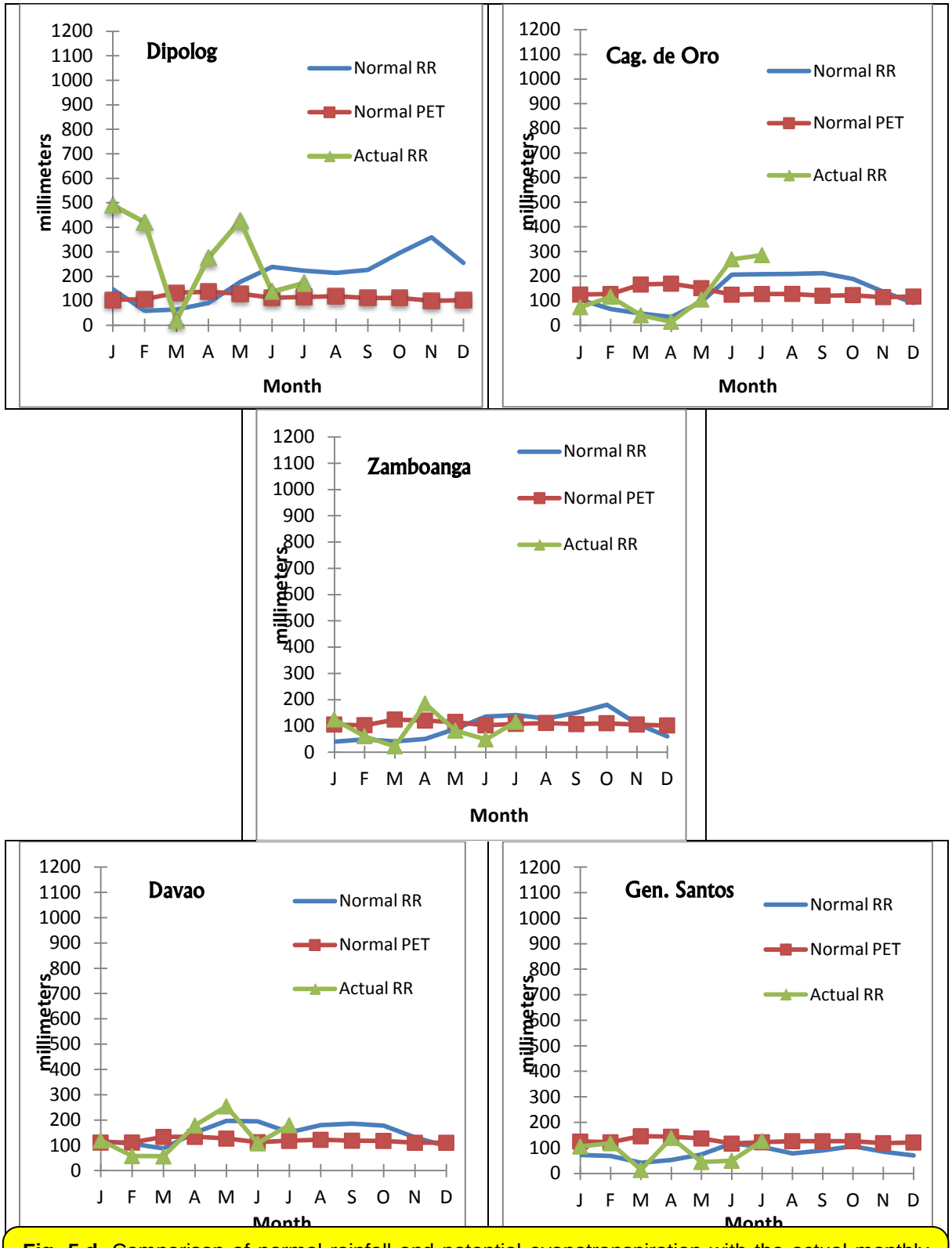


Fig. 5.d. Comparison of normal rainfall and potential evapotranspiration with the actual monthly rainfall at Davao, General Santos, Zamboanga, Cagayan de Oro, Dipolog, and Catarman.