



CLIMATE IMPACT ASSESSMENT

for
**Philippine Agriculture
(Rice and Corn)**



Impact Assessment and Applications Section (IAAS)
Climatology and Agrometeorology Division (CAD)
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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 (GMIs_w) in an area during June to September is defined as follows:

$$GMIs_w = W_6P_6 + W_7P_7 + W_8P_8 + W_9P_9$$

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

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

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 2020

OVERVIEW

Harvesting of lowland and upland 1st palay had just started in some parts of the country; good to normal yield is expected in CAR, Nueva Ecija, Baler, Casiguran, Infanta, Tayabas, Legaspi, Catanduanes, Catarman, Catbalogan, Bukidnon, Davao and Surigao del Sur. In Ilocos Norte, Basco and Tuguegarao below normal yield is anticipated because crops suffered moisture stress during the critical stage of growth and development.

Meanwhile, the standing delay-planted lowland and upland 1st palay crops planted in June and lowland 1st palay planted in July are faring well in Ilocos region, CAR, Tuguegarao, Bataan, Nueva Ecija, Baler, Casiguran, CALABARZON, Coron, Cuyo, Romblon, San Jose, most of Region V, Panay Island, Mactan, Eastern Visayas, Dipolog, El Salvador, Malaybalay, Davao, and ARMM. However, in Calapan, Pto Princesa, Dumaguete and Zamboanga del Sur, palay crops suffered moisture stress because of the minimal rainfall received in those areas.

The weather systems that affected the country during the month were the Southwest (SW) monsoon, the intertropical convergence zone (ITCZ), easterlies, low pressure areas (LPAs), localized thunderstorms and the passage of six (6) tropical cyclones (TCs), namely: Tropical Storm (TS) "Enteng" (Aug 8-9), Tropical Depression (TD) "Ferdie" (Aug 9-10), Tropical Depression (TD) "Gener" (Aug 10), Tropical Depression (TD) "Helen" (Aug 17), Severe Tropical Storm (STS) "Igme" (Aug 21-22) and Typhoon (TY) "Julian" (Aug 28-31). These TCs did not make landfall. Nonetheless, TS "Enteng", TD "Ferdie" and TY "Julian" slightly enhanced the Southwest monsoon which brought heavy precipitation in some parts of western Luzon.

REGION I (Ilocos Region)

Harvesting of upland 1st palay had just started in Ilocos Norte; below normal yield is expected because crops suffered moisture stress during the critical stage of growth, although crops recovered during the reproductive stage. The standing, delay-planted upland 1st palay in Ilocos Sur and Pangasinan, as well as the lowland 1st palay due this October across the region are in good crops condition because of sufficient moisture during the month.

CAR (Cordillera Autonomous Region)

Harvesting of upland 1st palay had just begun across the region; good to normal harvest may be expected because of the sufficient rainfall received by the crops from planting to maturity. The standing, newly-planted lowland 1st palay, as well as the late-planted, upland 1st palay were in good crops condition because of adequate moisture available during the month.

REGION II (Cagayan Valley)

Harvesting of upland 1st palay had just begun in Cagayan Valley; below normal yield is expected because crops suffered moisture deficiency during its critical stage of growth and development. During the month, the standing, newly-planted lowland 1st palay due this coming October in Tuguegarao is in good crops condition because of sufficient rainfall received.

REGION III (Central Luzon)

Harvesting of upland 1st palay has commenced in Nueva Ecija and Aurora province; the probability of good to normal yield is expected this season because the crops were in good condition. The standing late-planted, upland 1st palay in Bataan, and Aurora provinces and lowland 1st palay planted last month in Bataan and Nueva Ecija are currently in good crop condition due to the sufficient rainfall received in those areas during the month.

REGION IV-A (CALABARZON)

Harvesting of lowland 1st palay in Infanta and upland 1st palay in Tayabas is now on-going; good to normal yield is expected because the crops were in good condition from planting to maturity. The standing late-planted upland 1st palay in Tayabas and lowland 1st palay in Batangas and Tayabas are faring well because of sufficient rainfall received in those areas during the month.

REGION IV-B (MIMAROPA)

During the month, due to sufficient moisture available, the standing delay-planted, upland 1st palay as well as the newly-planted lowland 1st palay in most parts of the region experienced good crops condition except in Calapan and Pto. Princesa.

REGION V (Bicol Region)

Harvesting of lowland 1st palay in Legaspi and Catanduanes had just begun: good to normal yield is anticipated because crops were in good condition from planting to maturity. Likewise, the vegetating delay-planted, lowland 1st palay in most parts of the region are in good condition because of the sufficient moisture available during the month.

REGION VI (Western Visayas)

Sufficient rainfall received during the month favors the standing delay-planted upland 1st palay now in reproductive stage as well as the newly-planted lowland 1st palay due this coming October.

REGION VII (Central Visayas)

The standing newly-planted lowland 1st palay in Cebu is in good crops condition unlike in Dumaguete, due to lesser amount of rainfall available during the month, rice crops experience moisture stress.

REGION VIII (Eastern Visayas)

Harvesting of lowland 1st palay in Catarman and upland 1st palay in Catbalogan has now started; good to normal yield is expected because crops were in good condition throughout the growing season. Likewise, the standing late-planted, lowland 1st palay in Catarman, Catbalogan and Tacloban, the late-planted upland 1st palay and the newly-planted lowland 1st palay due on October in Catbalogan and Tacloban are faring well.

REGION IX (Zamboanga Peninsula)

The standing late-planted, upland palay in Zamboanga del Norte are in good condition unlike in Zamboanga del Sur, where the crops suffered moisture stress due to the minimal rainfall received during the month.

REGION X (Northern Mindanao)

Harvesting of upland 1st palay in Bukidnon had just begun; good to normal harvest is expected this season because crops were in good condition from planting to maturity. The standing late-planted, upland 1st palay and the newly-planted, lowland 1st palay due this coming October in Bukinon and Misamis Oriental are in good condition because of sufficient moisture available during the month.

REGION XI (Davao Region)

Harvesting of upland 1st palay had just started across the region; good to normal yield is expected because crops were in good crop condition throughout its growing period. Likewise, the standing late-planted, upland 1st palay is faring well

REGION XII (SOCCSKSARGEN)

The possibility of planting rice crops in any part of the region is low because of the minimal rainfall received in the area.

REGION XIII (CARAGA Region)

Harvesting of lowland 1st palay had just started in Surigao del Sur; good to normal yield is anticipated because crops experienced sufficient moisture throughout its growing season. The standing late-planted, lowland 1st palay across the region is faring well.

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

The newly-planted, lowland 1st palay due this coming October are in good crop condition due to the sufficient moisture available during the month.

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**TABLE 1.0 GENERALIZED SOUTHWEST MONSOON INDICES
FOR JUNE TO SEPTEMBER 2020 in Millimeters and Percentile Rank.**

STATIONS	JUNE		JULY		AUGUST		SEPTEMBER	
	GMI	%RANK	GMI	%RANK	GMI	%RANK	GMI	%RANK
CAR (Cordillera Administrative Reg.)								
Baguio	61	49	157	20	269	5		
Region I (Ilocos Reg.)								
Dagupan	41	24	122	17	254	12		
Vigan	49	46	121	20	198	7		
Laoag	14	5	93	12	198	5		
Region II (Cagayan Valley)								
Aparri	10	29	51	34	113	49		
Basco	2	5	26	7	119	12		
Tuguegarao	14	17	55	22	114	29		
Region III (Central Luzon)								
Iba	84	54	192	15	359	5		
Cabanatuan	14	2	71	7	181	15		
Baler	93	76	191	83	280	90		
Casiguran	47	46	112	39	184	61		
NCR (Metro Manila)								
Science Garden	40	32	136	24	250	15		
Region IV-A (CALABARZON)								
Ambulong	26	24	95	20	150	10		
Infanta	70	68	155	73	235	93		
Tayabas	86	83	146	68	239	90		
Region IV-B (MIMAROPA)								
Calapan	111	88	222	95	261	93		
Coron	34	17	77	5	155	7		
Cuyo	89	66	204	71	322	71		
Puerto Princesa	40	59	79	66	101	27		
Romblon	95	93	181	88	295	100		
San Jose	43	22	136	20	230	12		
Region V (Bicol Reg.)								
Daet	36	54	100	51	156	71		
Legaspi	40	29	74	12	139	17		
Masbate	27	44	43	5	93	17		
Virac Synop	57	56	115	56	206	83		
Region VI (Western Visayas)								
Roxas	86	76	204	88	305	95		
Region VII (Central Visayas)								
Mactan	27	20	102	54	230	100		
Dumaguete	38	63	102	90	130	88		
Tagbilaran	38	63	62	41	102	71		
Region VIII (Eastern Visayas)								
Catarman	47	54	111	59	166	68		
Catbalogan	44	56	129	54	181	54		
Tacloban	90	93	130	83	207	95		
Region IX (Zamboanga Peninsula)								
Dipolog	76	59	144	71	260	95		
Zamboanga	79	95	110	93	141	83		
Region X (Northern Mindanao)								
Lumbia	58	68	134	78	220	93		
Malaybalay	105	90	194	71	351	95		
Region XI (Davao Reg.)								
Davao	91	90	132	90	185	90		
Region XII (SOCCSKSARGEN)								
General Santos	31	66	46	34	79	56		
Region XIII (Caraga)								
Surigao	41	66	86	63	153	93		
Hinatuan	154	98	230	100	293	95		
ARMM (Autonomous reg. of Muslim Mindanao)								
Cotabato	88	73	149	59	221	76		

**TABLE 2.0 CUMULATIVE YIELD MOISTURE INDICES FOR
LOWLAND FIRST PALAY in Millimeters and Percentile Rank.
(May - August 2020)**

STATIONS	MAY		JUNE		JULY		AUGUST	
	YMI	% RANK	YMI	% RANK	YMI	% RANK	YMI	% RANK
Region IV-A (CALABARZON)								
Infanta	328	95	592	90	925	85	1089	88
Region V (Bicol Reg.)								
Daet	119	63	280	51	542	54	778	78
Legaspi	244	93	401	68	544	29	737	29
Virac	193	83	401	71	634	66	906	78
Region VIII (Eastern Visayas)								
Catarman	394	100	573	95	830	95	993	93
Region XIII (CARAGA)								
Hinatuan	278	76	765	98	1099	98	1286	93
Surigao	98	63	269	61	444	61	642	76

TABLE 3.0 CUMULATIVE YIELD MOISTURE INDICES FOR UPLAND PALAY in Millimeters and Percentile Rank. (May - August 2020)

STATIONS	MAY		JUNE		JULY		AUGUST	
	YMI	% RANK	YMI	% RANK	YMI	% RANK	YMI	% RANK
CAR (Cordillera Autonomous Reg.)								
Baguio	244	41	564	39	928	24	1259	5
Region I (Ilocos Reg.)								
Dagupan	66	15	263	12	578	12	969	12
Vigan	103	44	347	37	629	17	858	5
Laoag	128	44	193	17	526	17	840	7
Region II (Cagayan Valley)								
Aparri	56	27	106	20	292	22	478	29
Basco	178	68	190	20	307	10	586	12
Tuguegarao	260	100	325	73	504	68	680	49
Region III (Central Luzon)								
Iba	113	41	534	34	952	12	1449	7
Cabanatuan	181	71	248	32	476	10	805	22
Baler	46	7	97	5	154	5	206	5
Casiguran	356	93	542	83	816	76	1031	68
Region IV-A (CALABARZON)								
Tayabas	166	73	481	56	716	17	990	22
Region IV-B (MIMAROPA)								
Calapan	58	22	448	59	896	85	1013	80
Romblon	123	63	500	93	845	83	1184	93
Region V (Bicol Reg.)								
Masbate	116	73	236	56	301	17	449	22
Region VI (Western Visayas)								
Roxas	111	59	414	63	890	88	1192	93
Region VII (Central Visayas)								
Cebu	31	32	128	17	423	41	803	90
Dumaguete	115	80	249	71	507	95	590	90
Tagbilaran	58	44	193	61	291	39	413	49
Region VIII (Eastern Visayas)								
Catbalogan	157	71	338	54	667	61	823	56
Tacloban	101	46	419	78	579	66	807	88
Region IX (Western Mindanao)								
Dipolog	131	61	419	63	657	54	871	61
Zamboanga	111	90	412	95	542	93	634	85
Region X (Northern Mindanao)								
Malaybalay	149	29	548	73	894	63	1362	85
Lumbia	100	59	319	63	615	80	872	83
Region XI (Davao Reg.)								
Davao	130	41	452	85	630	90	788	83
Region XII (SOCSARGEN)								
General Santos	33	24	134	41	197	22	294	27
ARMM (Autonomous reg. of Muslim Mindanao)								
Cotobato	131	37	419	56	657	46	871	39

TABLE 4.0 CUMULATIVE YIELD MOISTURE INDICES FOR DELAYED PLANTED UPLAND PALAY
in Millimeters and Percentile Rank. (June -September 2020)

STATIONS	JUNE		JULY		AUGUST		SEPTEMBER	
	YMI	%RANK	YMI	%RANK	YMI	%RANK	YMI	%RANK
<i>CAR (Cordillera Administrative Reg.)</i>								
Baguio	286	49	615	22	981	5		
<i>Region I (Ilocos Reg.)</i>								
Dagupan	176	24	461	17	893	10		
Vigan	218	49	474	22	726	10		
Laoag	58	5	360	12	706	5		
<i>Region II (Cagayan Valley)</i>								
Aparri	45	29	213	34	419	39		
Basco	10	5	117	7	424	10		
Tuguegarao	58	17	220	22	414	27		
<i>Region III (Central Luzon)</i>								
Iba	377	54	755	17	1305	5		
Cabanatuan	60	2	267	5	629	7		
Baler	294	76	636	83	930	85		
Casiguran	167	46	414	41	651	51		
<i>Region IV-A (CALABARZON)</i>								
Ambulong	106	24	348	20	530	7		
Tayabas	281	83	494	63	797	78		
<i>Region IV-B (MIMAROPA)</i>								
Coron	144	17	296	5	552	7		
Cuyo	316	66	720	71	1108	61		
Puerto Princesa	136	59	299	63	371	22		
Romblon	337	93	649	88	1024	95		
San Jose	165	22	507	22	816	12		
<i>Region V (Bicol Reg.)</i>								
Masbate	107	44	166	5	330	10		
<i>Region VI (Western Visayas)</i>								
Roxas	271	76	701	90	1035	95		
<i>Region VII (Central Visayas)</i>								
Mactan, Cebu	87	20	354	56	773	100		
Dumaguete	120	63	353	93	445	83		
Tagbilaran	121	63	209	41	343	49		
<i>Region VIII (Eastern Visayas)</i>								
Catbalogan	162	56	460	51	633	49		
Tacloban	284	93	430	78	682	90		
<i>Region IX (Zamboanga Peninsula)</i>								
Dipolog	222	59	481	71	862	90		
Zamboanga	269	95	387	93	488	78		
<i>Region X (Northern Mindanao)</i>								
Lumbia	197	68	465	78	749	90		
Malaybalay	356	90	670	71	1187	93		
<i>Region XI (Davao Reg.)</i>								
Davao	288	90	450	90	623	85		
<i>Region XII (SOCCSKSARGEN)</i>								
General Santos	90	66	147	32	254	41		

TABLE 5.0 CUMULATIVE YIELD MOISTURE INDICES FOR DELAYED PLANTED LOWLAND FIRST PALAY in Millimeters and Percentile Rank. (June -September 2020)

STATIONS	JUNE		JULY		AUGUST		SEPTEMBER	
	YMI	% RANK	YMI	% RANK	YMI	% RANK	YMI	% RANK
Region IV-A (CALABARZON)								
Infanta	237	68	537	76	799	85		
Region V (Bicol Reg.)								
Daet	144	54	381	35	564	54		
Legaspi	141	29	270	8	484	10		
Virac	137	34	291	10	461	24		
Region VIII (Eastern Visayas)								
Catarman	161	54	393	42	573	68		
Catbalogan	162	56	460	35	633	49		
Tacloban	284	93	430	53	682	90		
Region XIII (Caraga)								
Hinatuan	436	98	738	68	944	95		
Surigao	153	66	311	43	529	80		

TABLE 6.0 CUMULATIVE YIELD MOISTURE INDICES FOR LOWLAND FIRST PALAY in Millimeters and Percentile Rank. (July-October 2020)

STATIONS	JULY		AUGUST		SEPTEMBER		OCTOBER	
	YMI	%RANK	YMI	%RANK	YMI	%RANK	YMI	%RANK
CAR (Cordillera Administrative Reg.)								
Baguio	294	22	626	5				
Region I (Ilocos Reg.)								
Dagupan	255	29	646	12				
Laoag	269	46	583	10				
Vigan	229	32	457	7				
Region II (Cagayan Valley)								
Basco	95	20	374	27				
Tuguegarao	145	51	321	41				
Region III (Central Luzon)								
Iba	339	15	836	5				
Cabanatuan	185	22	513	24				
Region IV-A (CALABARZON)								
Ambulong	217	39	381	20				
Tayabas	190	37	465	71				
Region IV-B (MIMAROPA)								
Calapan	363	88	480	73				
Coron	135	5	367	7				
Cuyo	362	54	713	59				
P. Princesa	146	66	211	15				
Romblon	279	66	619	85				
San Jose	306	32	586	15				
Region V (Bicol Reg.)								
Masbate	53	2	201	12				
Region VI (Western Visayas)								
Roxas	385	90	687	93				
Region VII (Central Visayas)								
Cebu	239	76	618	100				
Dumaguete	209	95	292	80				
Tagbilaran	79	24	201	54				
Region VIII (Eastern Visayas)								
Catbalogan	266	66	422	59				
Tacloban	130	44	358	76				
Region IX (Zamboanga Peninsula)								
Zamboanga	105	39	197	34				
Region X (Northern Mindanao)								
Lumbia	240	80	497	88				
Malaybalay	280	59	748	90				
Region XII (SOCCSKSARGEN)								
General Santos	51	27	148	37				
ARMM (Autonomous reg. of Muslim Mindanao)								
Cotabato	193	49	407	41				

TABLE 7.0 DECADAL AND CUMULATIVE DECADAL RAINFALL
For the month of AUGUST 2020
[actual values (in mm) and percent of normal]

	REGION	DECADE	ACTUAL AUG	% Normal of Actual	CUMULATIVE JAN.-AUG	% Normal Cumulative
R01	Ilocos Region	22	68	35	805.1	57
		23	175	74	979.8	60
		24	99	42	1078.4	57
CAR	CAR	22	68	48	837.4	69
		23	120	68	957.9	68
		24	68	34	1026.0	64
R02	Cagayan Valley	22	85	95	1017.5	88
		23	110	115	1127.6	90
		24	30	27	1157.8	85
R03	Central Luzon	22	131	77	1009.0	73
		23	160	94	1169.0	75
		24	64	42	1233.0	72
R04-A	CALABARZON	22	86	109	1045.5	87
		23	123	124	1168.7	89
		24	9	12	1177.9	85
R04-B	MIMAROPA	22	102	116	818.1	88
		23	61	55	879.0	84
		24	22	21	900.6	79
NCR	NCR	22	157	100	928.8	81
		23	126	65	1054.5	79
		24	18	13	1072.5	72
R05	Bicol Region	22	88	171	1074.7	82
		23	108	174	1182.9	86
		24	7	12	1190.1	83
R06	Western Visayas	22	187	212	1060.3	112
		23	102	90	1162.4	109
		24	17	20	1179.4	103
R07	Central Visayas	22	86	178	871.6	116
		23	127	228	999.0	124
		24	6	12	1005.4	116
R08	Eastern Visayas	22	112	232	1487.5	107
		23	74	124	1561.9	108
		24	6	11	1567.8	105
R09	Zamboanga Peninsula	22	121	218	897.8	100
		23	95	144	992.6	103
		24	29	44	1021.5	99
R10	Northern Mindanao	22	139	183	1074.5	93
		23	131	191	1205.4	98
		24	66	80	1271.4	97
R11	Davao Region	22	74	144	1268.3	99
		23	46	84	1314.6	98
		24	63	103	1377.2	98
R12	SOCCSKSARGEN	22	96	198	710.1	84
		23	42	79	752.5	84
		24	36	66	788.6	83
	CARAGA	22	111	199	1824.6	98
		23	97	191	1921.3	101
		24	47	90	1968.2	100
	ARMM	22	88	156	799.7	91
		23	66	107	865.4	92
		24	35	54	900.6	90

FIG. 1.0 Spatial Analysis of GENERALIZED SOUTHWEST MONSOON INDEX Ending AUGUST 2020 in Percentile Rank

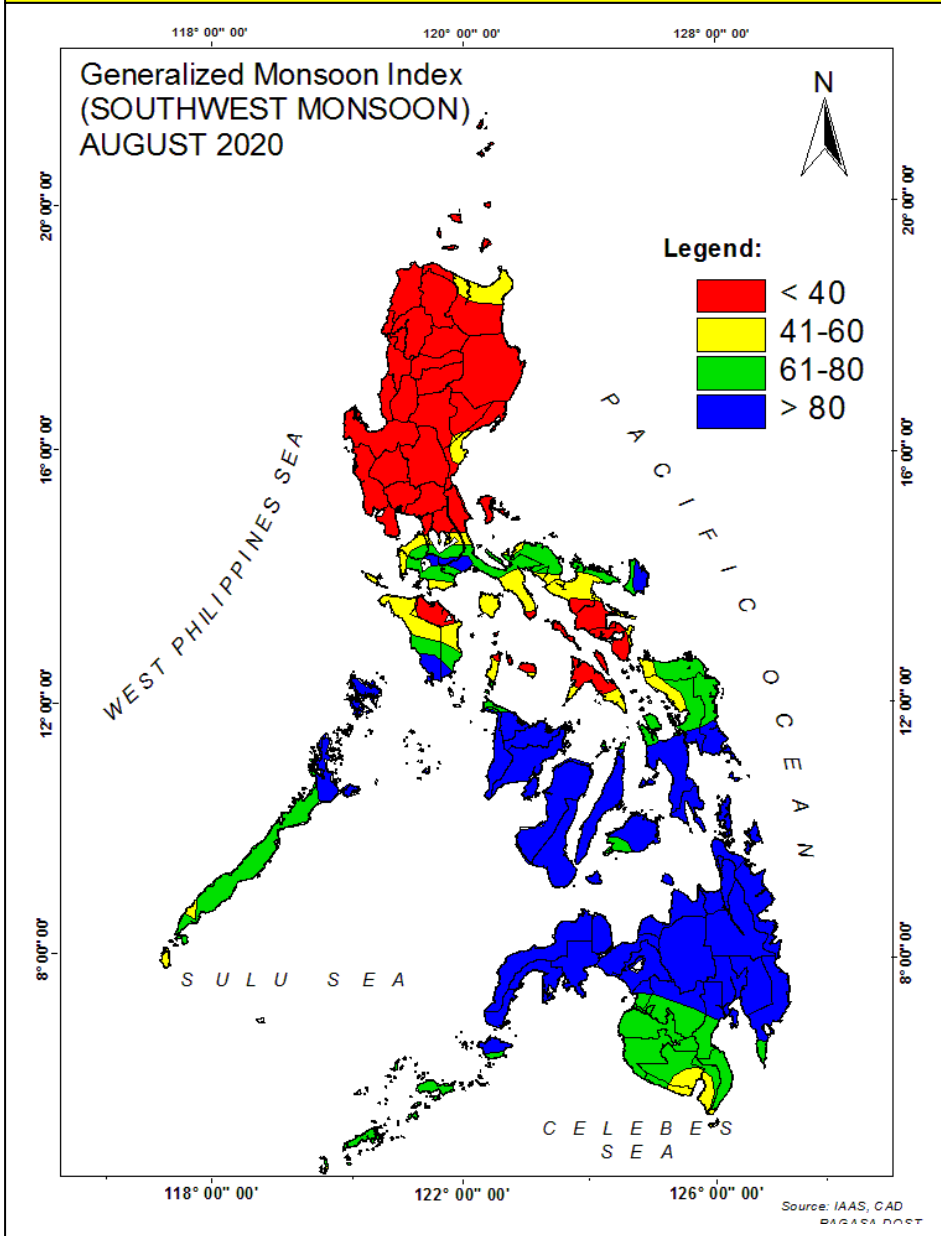


FIG. 2.0 ACTUAL CUMULATIVE RAINFALL DURING THE PASSAGE OF TROPICAL CYCLONE IN THE PHIL. FOR THE MONTH OF AUGUST 2020

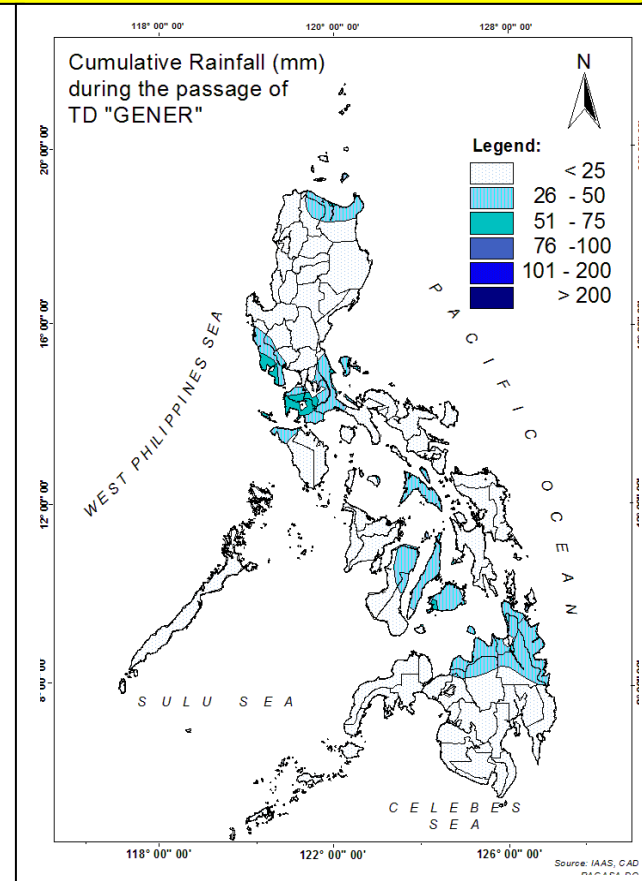
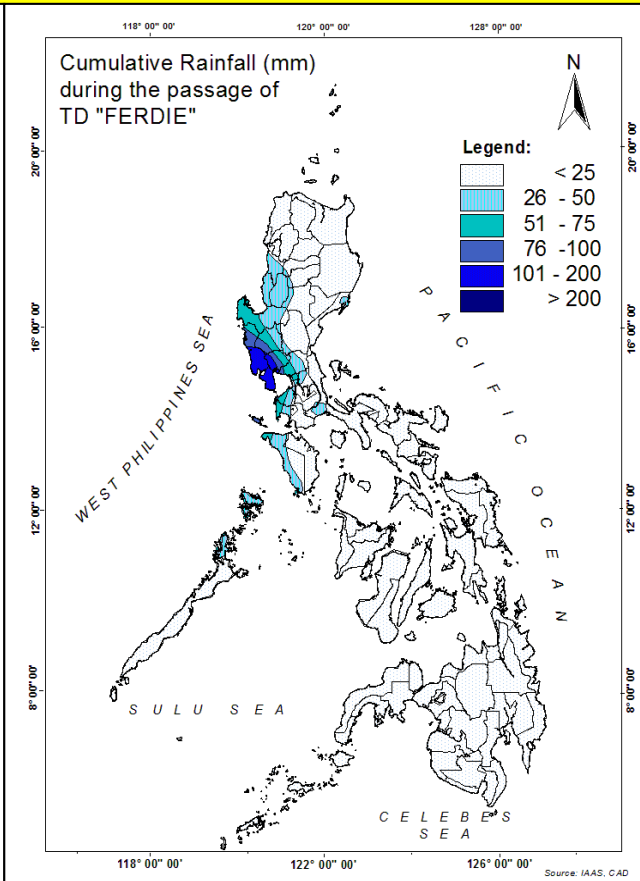
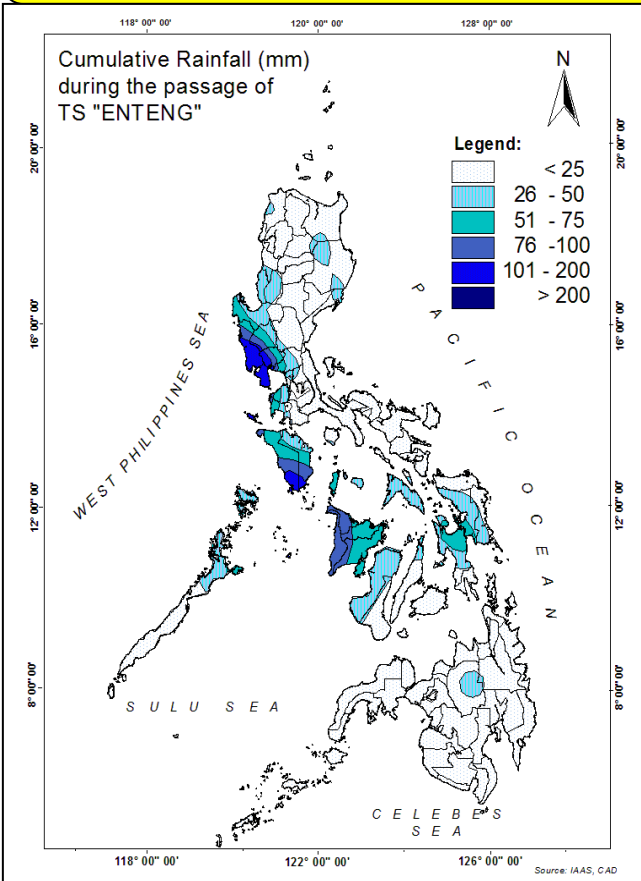


Fig. 2.a. Actual Cumulative Rainfall during the Passage of Tropical Storm (TS) "ENTENG" (Aug. 08-09, 2020)

Fig. 2.b. Actual Cumulative Rainfall during the Passage of Tropical Depression (TD) "FERDIE" (Aug. 9-10, 2020)

Fig. 2.c. Actual Cumulative Rainfall during the Passage of Tropical Depression (TD) "GENER" (Aug. 13, 2020)

FIG. 2.1 ACTUAL CUMULATIVE RAINFALL DURING THE PASSAGE OF TROPICAL CYCLONE IN THE PHIL. FOR THE MONTH OF AUGUST 2020

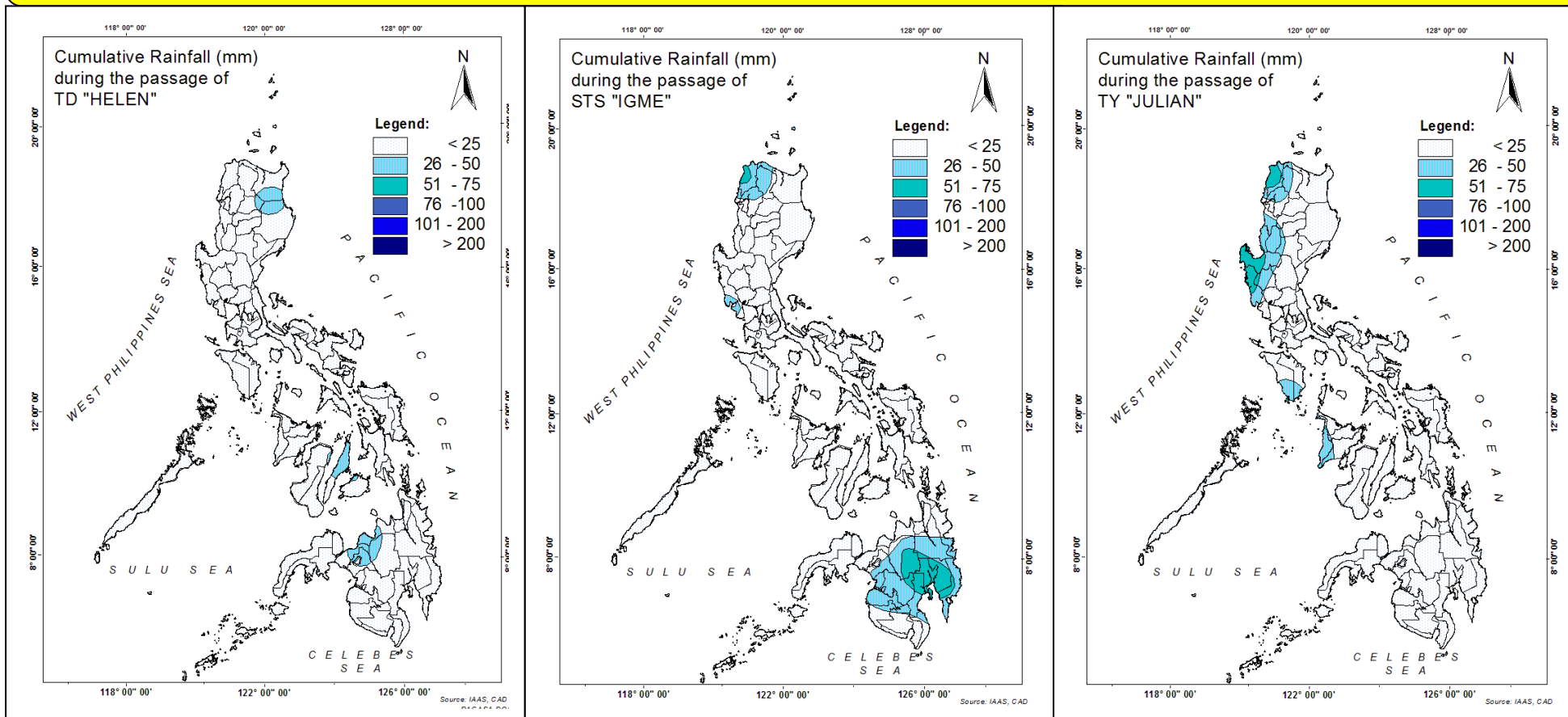


Fig. 2.d. Actual Cumulative Rainfall during the Passage of Tropical Depression (TD) "HELEN" (Aug. 17, 2020)

Fig. 2.e. Actual Cumulative Rainfall during the Passage of Tropical Storm (STS) "IGME" (Aug. 21-22, 2020)

Fig. 2.f. Actual Cumulative Rainfall during the Passage of Typhoon (TY) "JULIAN" (Aug. 28-31, 2020)

FIG 3.0 TEN DAYS ACTUAL RAINFALL DISTRIBUTION IN THE PHILIPPINES for the month of AUGUST 2020

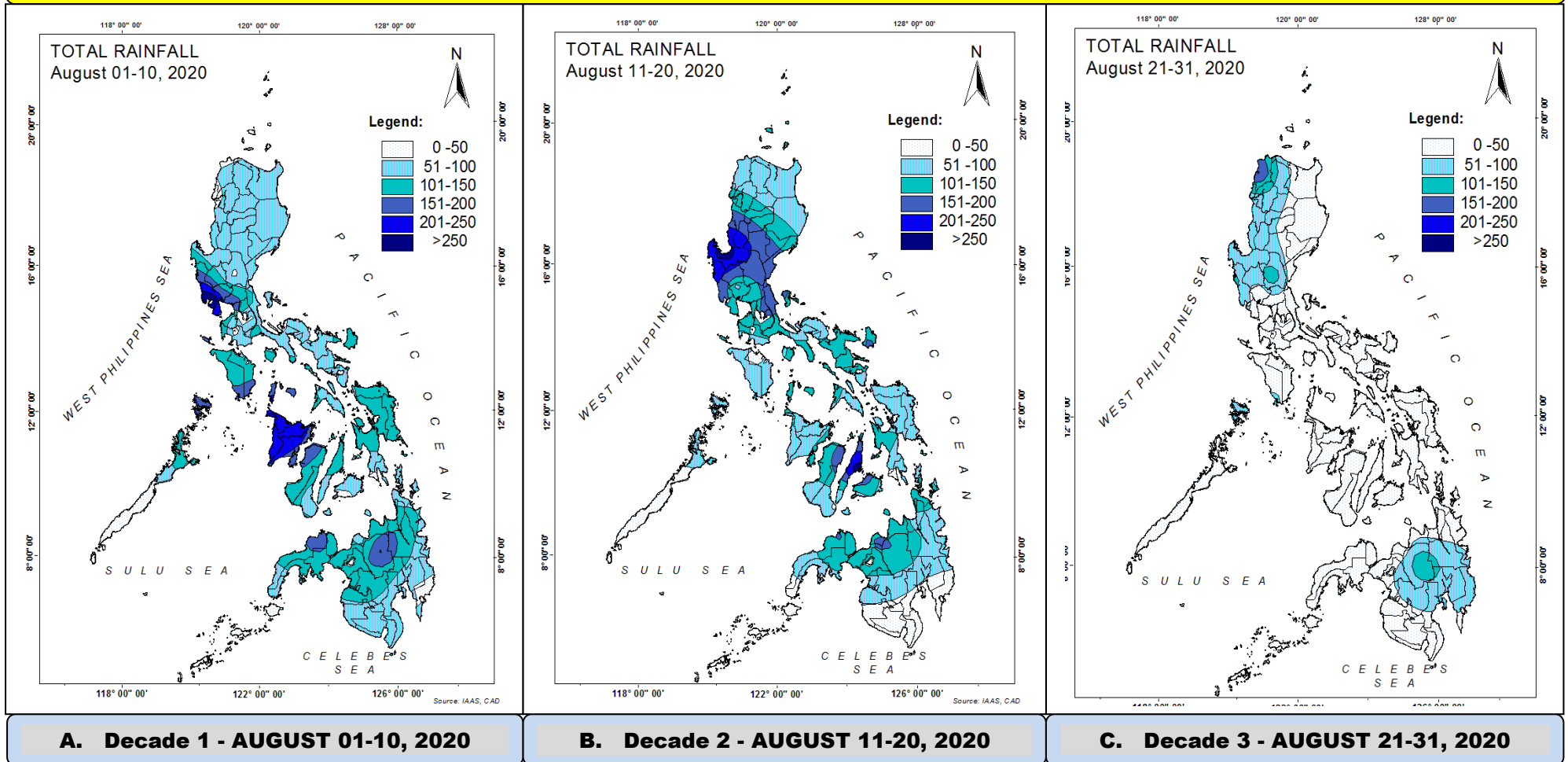
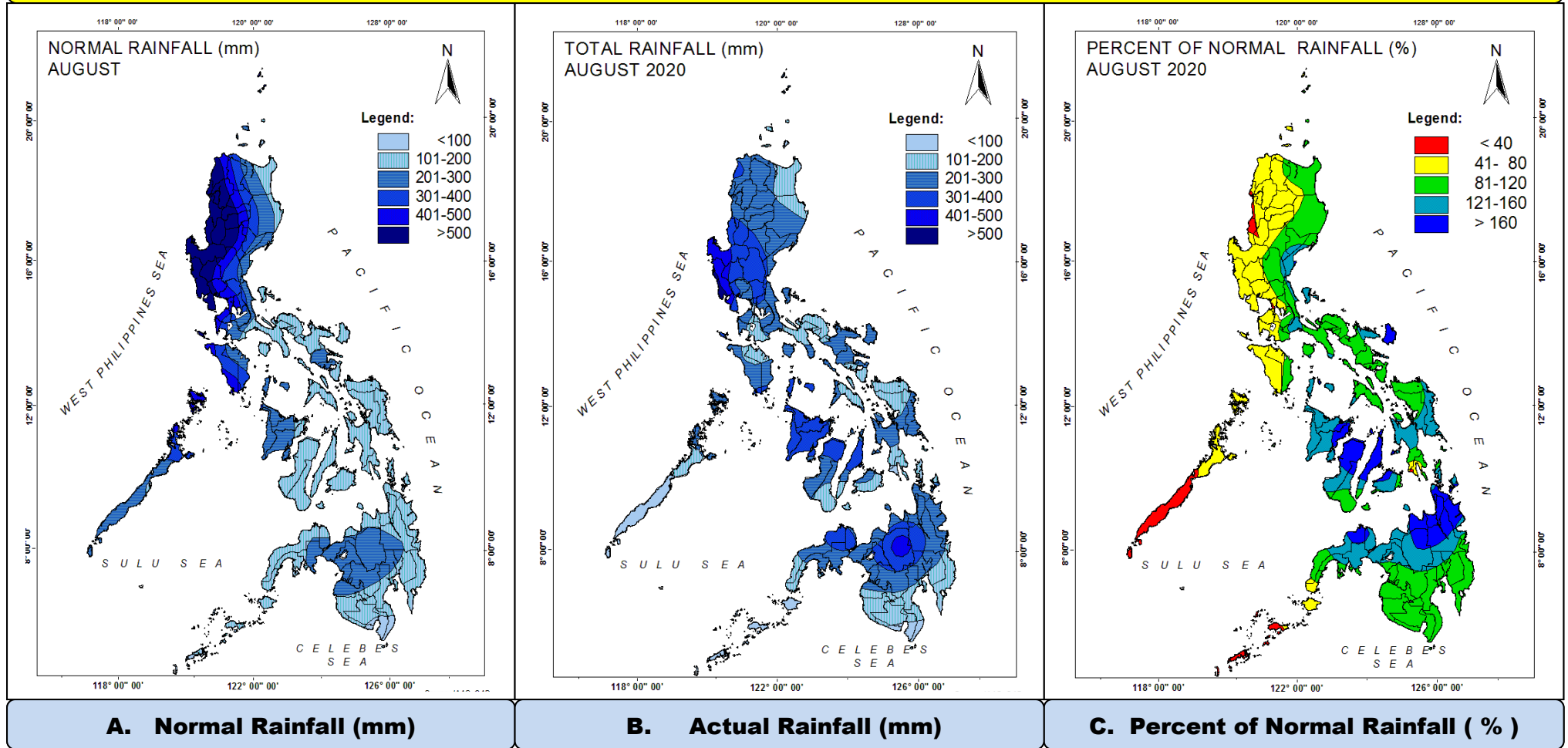


FIG. 4.0 RAINFALL IN THE PHILIPPINES for the month of AUGUST 2020



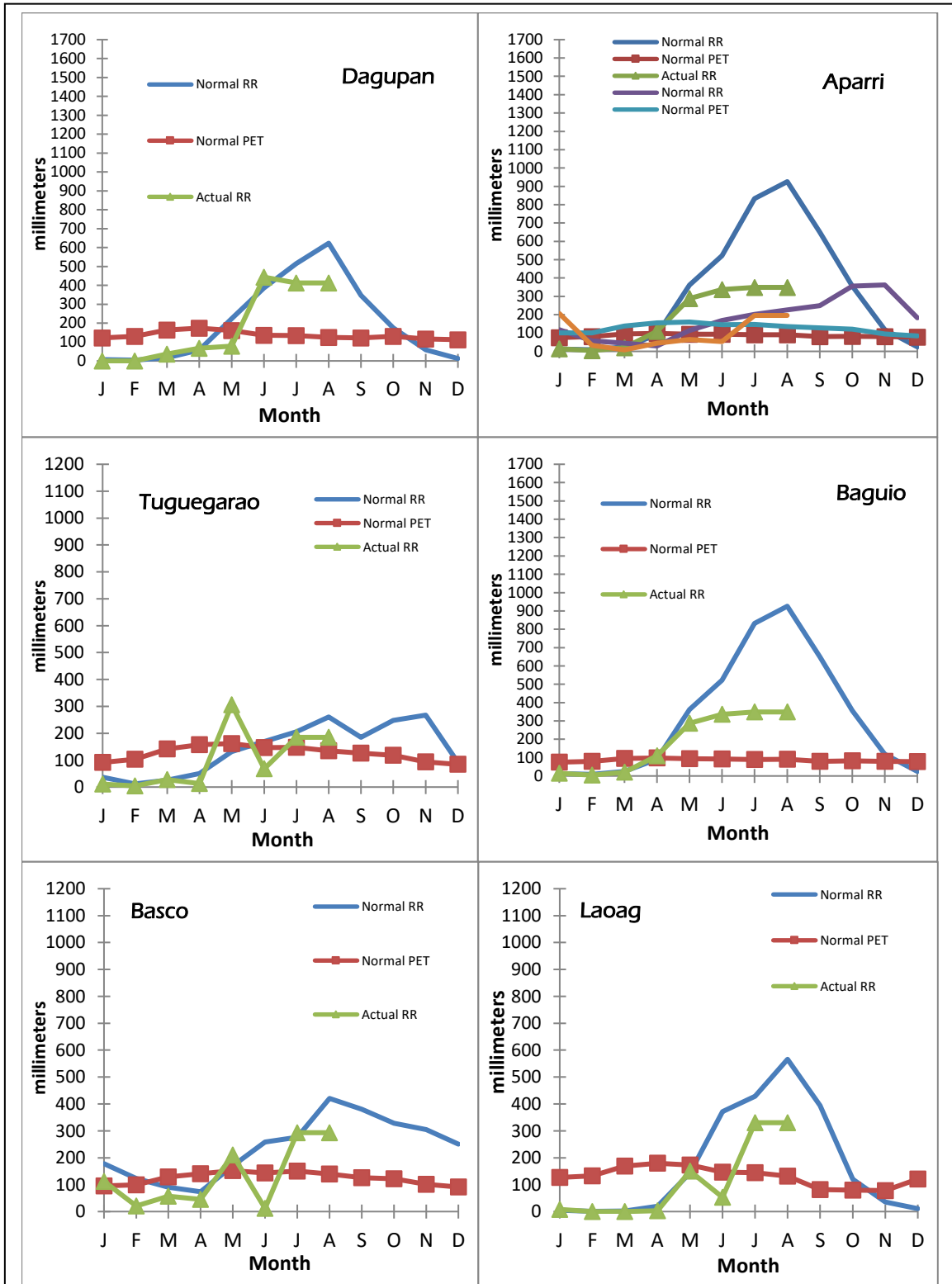


Fig. 5.0 Comparison of normal rainfall and potential evapotranspiration with the actual monthly rainfall at Laoag, Basco, Baguio, Aparri, Dagupan, and Tuguegarao.

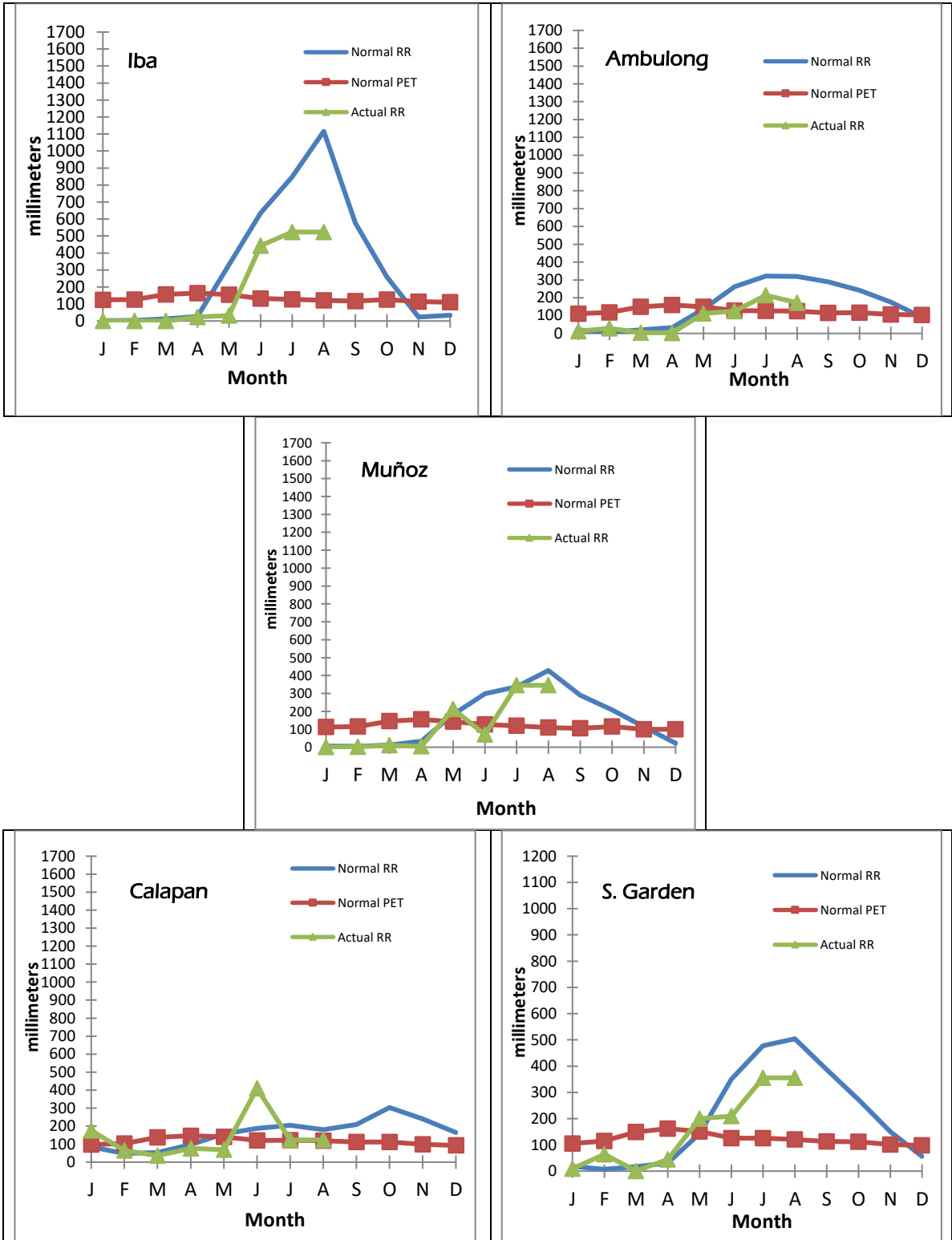


Fig 5a. Comparison of normal rainfall and potential evapotranspiration with the actual monthly rainfall at Iba, Ambulong, Muñoz, Port Area, Calapan, and Science Garden.

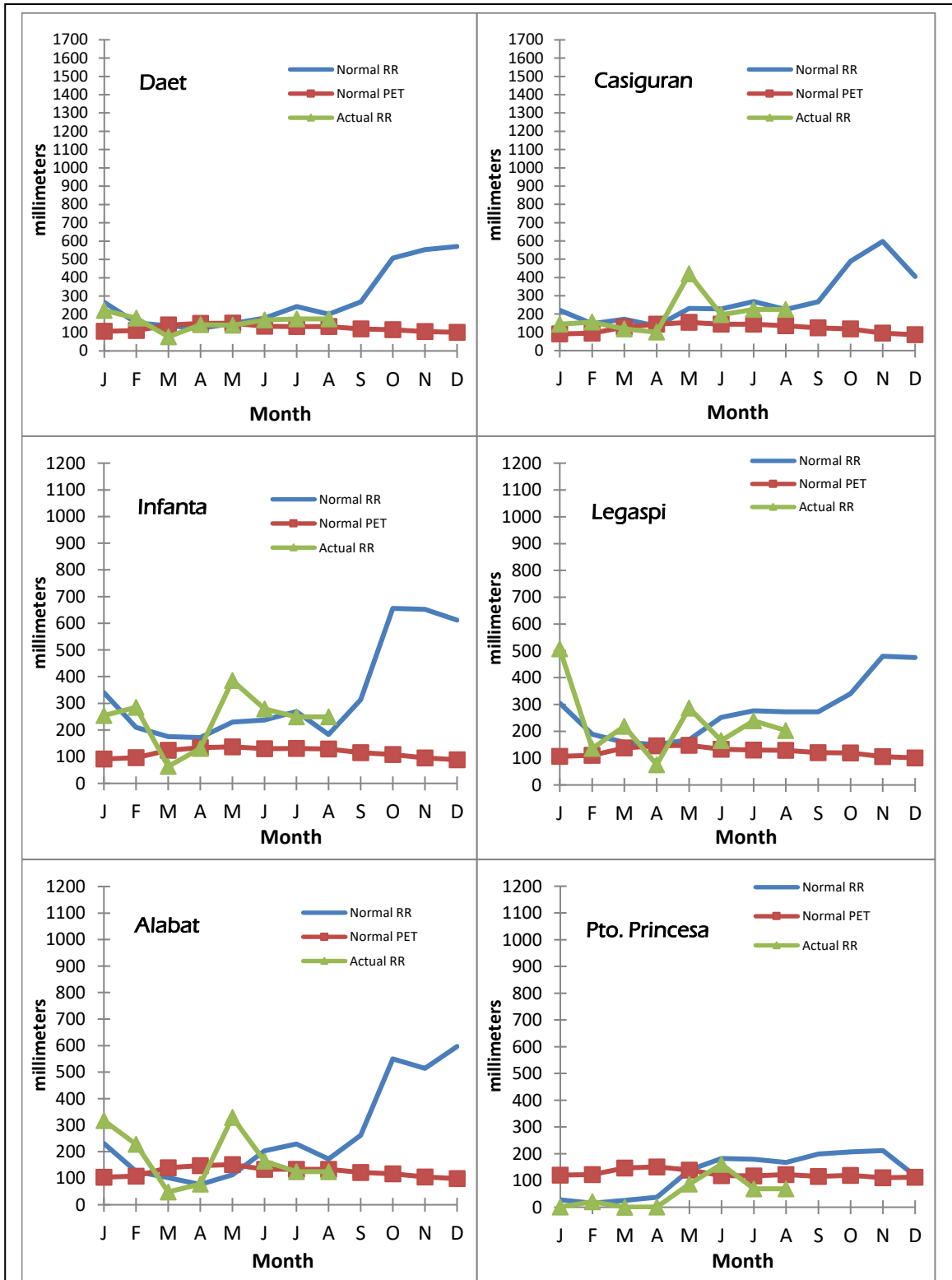


Fig. 5b. Comparison of normal rainfall and potential evapotranspiration with the actual monthly rainfall at Daet, Casiguran, Infanta, Legaspi, Alabat, and Puerto Princesa.

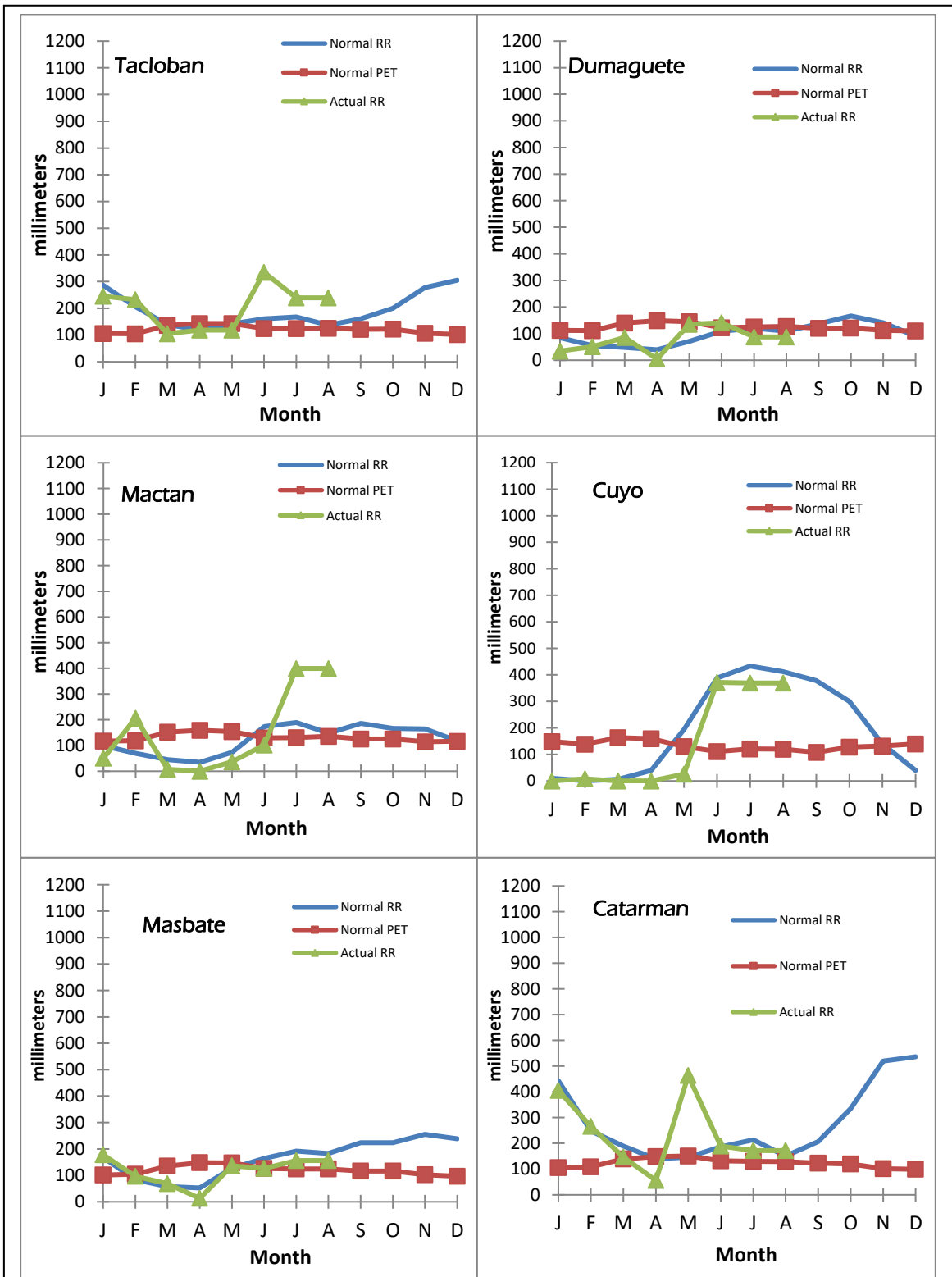


Fig. 5c. Comparison of normal rainfall and potential evapotranspiration with the actual monthly rainfall at Cuyo, Masbate, Mactan, Tacloban, Catarman and Dumaguete.

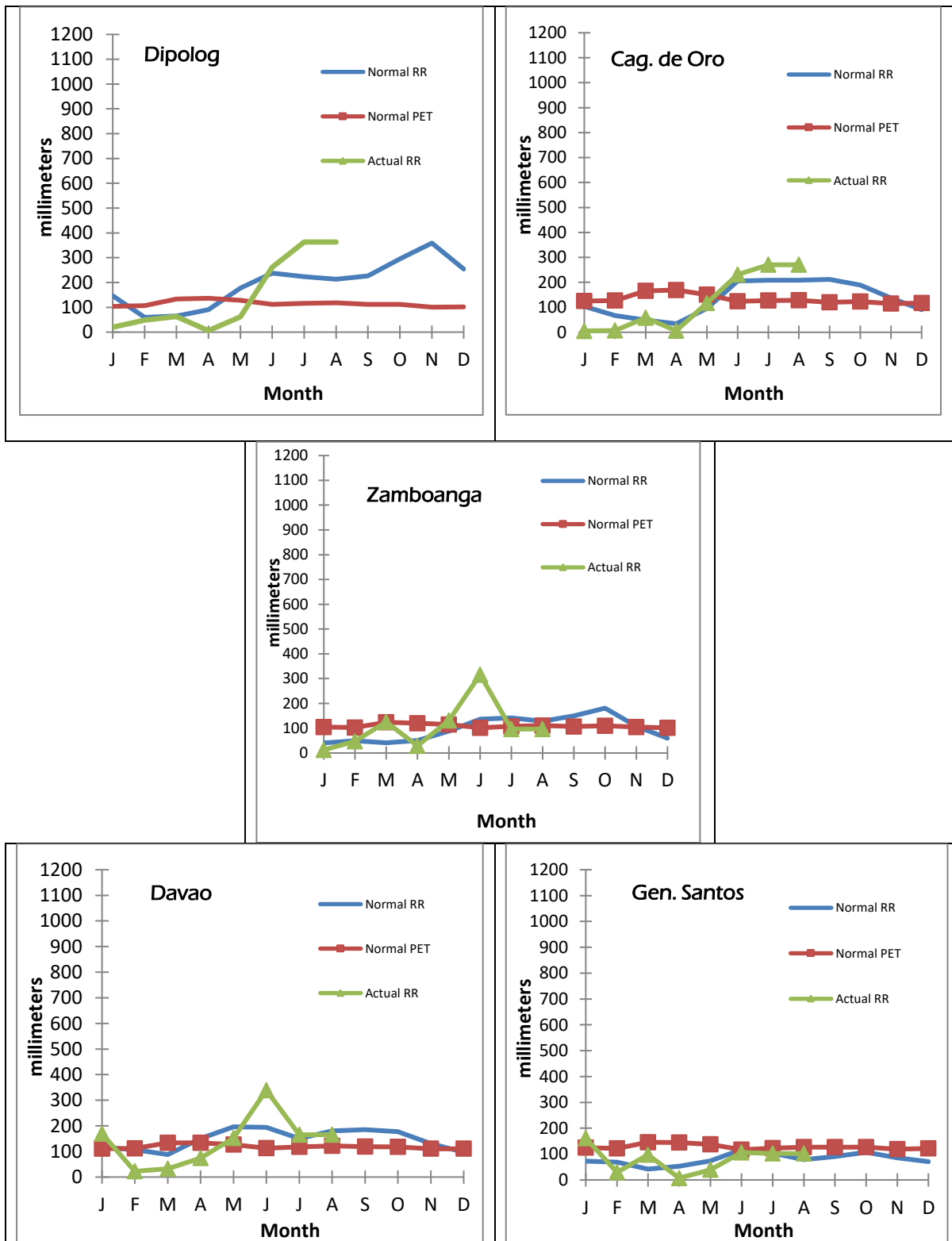


Fig 5d. Comparison of normal rainfall and potential evapotranspiration with the actual monthly rainfall at Davao, General Santos, Zamboanga, Cagayan de Oro, and Dipolog.