



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)
Department of Science and Technology

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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 (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 JANUARY 2020

OVERVIEW

Harvesting of early-planted dry season corn has now started in some areas of the country. Good to above normal yield is expected in Tuguegarao, Tayabas, Calapan, Romblon, Masbate, and Panay Island; while in Pto. Princesa, Mactan, Dumaguete, Zamboanga, Misamis Oriental and Bukidnon, no planting activities were done because of very low rainfall available in those areas during the November planting season. Standing newly-planted, lowland 2nd palay and dry season corn crops are in good condition in Baler, most of CALABARZON, Bicol Region, Catbalogan, Tacloban, Surigao del Sur and Surigao del Norte. In contrast, standing crops in Ilocos Sur, Ilocos Norte, Cagayan Valley, Cabanatuan, Casiguran, most parts of MIMAROPA, Panay Island, Mactan, and Zamboanga del Sur, experience moisture stress; while crops in Catarman were affected by water logging.

The weather systems that affected the country during the month were the Northeast (NE) Monsoon, Low Pressure Areas (LPAs), Tail-end of Cold Front (TECF), Easterlies, Inter-tropical convergence zone (ITCZ). No tropical cyclones had developed or entered in the Philippine Area of Responsibility (PAR).

Assessment of rainfall for the month showed that generally near to above normal rainfall conditions were experienced in most parts of Luzon, including most parts of Western and Eastern Visayas, Davao Region and SOCCSKSARGEN. The rest of Luzon, Central Visayas and most areas of Mindanao received way to below normal rainfall.

REGION I (Ilocos Region)

Lowland 2nd palay in Ilocos Sur and Ilocos Norte now in vegetative stage still suffered moisture stress due to very low moisture available during the month.

CAR (Cordillera Autonomous Region)

Any farming activities related to planting rice and corn may not be done in any part of the region because of insufficient moisture available during the month.

REGION II (Cagayan Valley)

Harvesting of early-planted dry season corn has now started in Cagayan Valley. Yield is expected to be good despite the moisture deficiency during the month. Standing, late-planted lowland 2nd palay as well as the vegetating dry season corn has suffered from moisture stress.

REGION III (Central Luzon)

Standing lowland 2nd palay planted in November suffered moisture stress in Cabanatuan and Casiguran, because of insufficient rainfall received during the month. It is also noted that December planted dry season corn in Casiguran also experienced moisture deficiency, but in Baler the standing rice and corn crops are faring well.

REGION IV-A (CALABARZON)

Harvesting of early-planted, dry season corn is ongoing in Tayabas; yield is expected to be good to normal because crops experienced good crops condition from planting to maturity. In a similar manner, outlook of dry-season corn and lowland 2nd palay is still good, although January rainfall is below normal but moisture is still sufficient for crops growth and development.

REGION IV-B (MIMAROPA)

Harvesting of early-planted, dry-season corn had just begun in Calapan and Romblon; good to normal yield is projected due to sufficient moisture experienced by the crops during its critical stage of growth. Meanwhile, the standing dry season corn crops and the late-planted lowland 2nd palay in most parts of the region are now suffering from moisture deficiency.

REGION V (Bicol Region)

Good weather and sufficient moisture available during the month favors the harvestable early-planted, dry season corn in Masbate; yield is expected to be near normal to above normal. Likewise, lowland 2nd palay as well as dry season corn in most parts of the region remain in good condition since soil moisture reserve is more than sufficient for crop growth and development.

REGION VI (Western Visayas)

Harvesting of early-planted dry season crops had just started in most parts of the region; good to near normal yield is anticipated because crops experienced positive condition throughout its growing period. On the other hand, standing rice and corn crops experienced moisture deficiency due to very minimal rainfall received during the month.

REGION VII (Central Visayas)

Moisture supply is becoming inadequate for the newly-planted, lowland 2nd palay and the vegetating dry season corn in Mactan. It is because of the minimal rainfall received during the month.

REGION VIII (Eastern Visayas)

The newly-planted, lowland 2nd palay as well as the vegetating, dry-season corn continued to experience good crops condition in most parts of the region, same is true to the vegetating lowland 2nd palay planted in Catarman last November.

REGION IX (Zamboanga Peninsula)

Crop condition of newly-planted, lowland 2nd palay as well as the vegetating dry-season corn is generally getting unfavorable. This is because of the very low rainfall received during the month.

REGION X (Northern Mindanao)

No farming activities will be undertaken in the region due to the inadequate moisture during the month.

REGION XI (Davao Region)

Good weather and ample amount of moisture available during the month favors all farming activities across the region.

REGION XII (SOCCSKSARGEN)

Adequate rainfall received during the month is beneficial for farming activities in all parts of the region.

REGION XIII (CARAGA Region)

The flowering lowland 2nd palay in most parts of the region remain in good crop condition. The sufficient rainfall received during the month favored such crops. Likewise, standing late-planted, lowland 2nd palay and the vegetating dry season corn in Surigao del Norte and Surigao del Sur are faring well.

ARMM (Autonomous Region of Muslim Mindanao)

January rainfall has been inadequate for farming activities across the region.

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TABLE 1.0 GENERALIZED NORTHEAST MONSOON INDICES
In Millimeters and Percentile Rank (October 2019 to January 2020)

STATIONS	OCTOBER		NOVEMBER		DECEMBER		JANUARY	
	GMI	%RANK	GMI	%RANK	GMI	%RANK	GMI	%RANK
CAR (Cordillera Autonomous Reg.)								
Baguio	94	24	123	29	124	29	125	29
Region I (Ilocos Reg.)								
Dagupan	41	19	67	31	67	29	67	29
Vigan	10	15	68	56	69	56	71	56
Laoag	0	7	50	49	50	49	51	49
Region II (Cagayan Valley)								
Aparri	52	22	259	78	353	81	377	83
Basco	47	25	140	37	188	44	206	36
Tuguegarao	42	19	151	32	199	42	199	42
Region III (Central Luzon)								
Iba	41	20	77	24	77	25	77	25
Cabanatuan	61	39	101	42	105	42	105	42
Baler	56	17	91	7	189	14	238	17
Casiguran	41	14	87	3	262	19	282	19
Region IV-A (CALABARZON)								
Ambulong	18	2	53	8	103	14	104	14
Infanta	52	7	106	7	176	7	217	7
Tayabas	102	42	169	31	222	34	237	34
Region IV-B (MIMAROPA)								
Calapan	104	25	144	19	213	20	233	24
Coron	101	47	155	49	207	61	212	63
Cuyo	70	24	91	22	96	19	96	19
Puerto Princesa	43	19	62	5	65	5	65	5
Romblon	68	29	104	20	153	31	169	34
San Jose	40	41	93	49	179	69	181	69
Region V (Bicol Reg.)								
Daet	136	64	227	29	327	27	361	20
Legaspi	37	22	90	5	239	19	335	29
Masbate	24	15	63	17	173	54	208	49
Virac Synop	66	37	105	5	265	32	303	34
Region VI (Western Visayas)								
Roxas	181	92	248	83	303	85	311	83
Region VII (Central Visayas)								
Mactan	94	90	109	66	158	75	168	69
Dumaguete	60	71	74	41	94	37	100	31
Tagbilaran	41	41	58	5	85	7	88	7
Region VIII (Eastern Visayas)								
Catarman	45	32	107	5	419	69	516	58
Catbalogan	54	25	79	3	180	20	232	25
Tacloban	35	51	70	24	165	20	229	29
Region IX (Western Mindanao)								
Dipolog	65	39	95	7	133	7	136	7
Zamboanga	24	8	30	3	44	7	46	7
Region X (Northern Mindanao)								
Lumbia	26	10	49	12	53	7	54	3
Malaybalay	112	44	138	31	158	34	162	22
Region XI (Davao Reg.)								
Davao	73	83	111	83	142	73	181	71
Region XII (SOCSARGEN)								
General Santos	24	41	48	53	62	54	99	64
Region XIII (CARAGA)								
Surigao	23	31	73	17	175	20	254	17
Hinatuan	22	32	75	29	210	20	350	12
ARMM (Autonomous reg. of Muslim Mindanao)								
Cotabato	100	59	113	25	118	17	121	17

**TABLE 2.0 CUMULATIVE YIELD MOISTURE INDICES FOR
LOWLAND 2ND PALAY in Millimeters and Percentile Rank.
(November 2019 to February 2020)**

STATIONS	NOVEMBER		DECEMBER		JANUARY		FEBRUARY	
	YMI	%RANK	YMI	%RANK	YMI	%RANK	YMI	%RANK
CAR (Cordillera Autonomous Reg.)								
Baguio	103	81	119	69	134	60		
Region I (Ilocos Reg.)								
Dagupan	92	86	102	76	102	70		
Laoag	177	98	182	97	191	95		
Vigan	207	98	211	98	242	98		
Region III (Central Luzon)								
Iba	125	83	132	78	132	77		
Cabanatuan	140	81	171	78	171	68		
Casiguran	162	8	733	31	885	28		
Region IV-A (CALABARZON)								
Ambulong	123	51	308	75	322	62		
Tayabas	235	29	654	36	820	38		
Infanta	192	8	583	10	850	10		
Alabat	237	10	614	15	947	22		
Region IV-B (MIMAROPA)								
Calapan	139	32	365	51	546	53		
Coron	190	85	397	95	498	97		
Cuyo	73	49	94	41	94	32		
Region V (Bicol Reg.)								
Daet	322	34	639	19	871	18		
Legaspi	186	3	643	25	1176	45		
Virac	141	5	684	42	929	45		
Region VIII (Eastern Visayas)								
Catarman	221	7	1206	76	1632	62		
Catbalogan	86	3	442	31	717	38		
Region XIII (CARAGA)								
Hinatuan	189	15	618	10	1013	10		
Surigao	179	19	616	25	870	13		

TABLE 3.0 CUMULATIVE YIELD MOISTURE INDICES FOR DRY SEASON CORN in Millimeters and Percentile Rank. (November 2019 to January 2020)

STATIONS	NOVEMBER		DECEMBER		JANUARY	
	YMI	%RANK	YMI	%RANK	YMI	%RANK
Region II (Cagayan Valley)						
Tuguegarao	295	88	607	95	616	90
Region IV-A (CALABARZON)						
Tayabas	180	29	642	47	761	46
Region IV-B (MIMAROPA)						
Calapan	106	32	356	51	485	58
Romblon	98	25	464	73	567	75
Puerto Princesa	50	14	77	10	77	7
Region V (Bicol Region)						
Masbate	106	31	518	69	651	71
Region VI (Western Visayas)						
Roxas	182	68	443	69	500	68
Region VII (Central Visayas)						
Cebu	39	34	273	71	311	58
Dumaguete	36	15	123	19	149	15
Region IX (Western Mindanao)						
Zamboanga	16	14	103	39	112	25
Region X (Northern Mindanao)						
Lumbia	63	63	81	39	85	34
Malaybalay	71	19	185	29	206	14

**TABLE 4.0 CUMULATIVE YIELD MOISTURE INDICES FOR
LOW LAND PALAY in Millimeters and Percentile Rank.
(December 2019 to March 2020)**

STATIONS	DECEMBER		JANUARY		FEBRUARY		MARCH	
	YMI	%RANK	YMI	%RANK	YMI	%RANK	YMI	%RANK
CAR (Cordillera Autonomous Reg.)								
Baguio	14	46	28	48				
Region I (Ilocos Reg.)								
Dagupan	9	61	9	45				
Vigan	5	75	13	77				
Laoag	4	66	32	90				
Region II (Cagayan Valley)								
Aparri	418	98	614	98				
Basco	178	63	285	42				
Tuguegarao	253	92	263	92				
Region III (Central Luzon)								
Iba	6	44	6	33				
Cabanatuan	28	61	28	50				
Baler	379	75	651	82				
Casiguran	511	69	648	53				
Region IV-A (CALABARZON)								
Ambulong	165	80	177	73				
Infanta	350	27	591	18				
Tayabas	374	58	525	60				
Alabat	338	29	639	43				
Region IV-B (MIMAROPA)								
Calapan	202	61	427	78				
Coron	186	93	277	93				
Cuyo	19	44	19	35				
Puerto Princesa	21	19	22	8				
Romblon	296	86	427	77				
San Jose	269	97	283	97				
Region V (Bicol Reg.)								
Daet	284	27	494	28				
Legaspi	409	49	891	68				
Masbate	334	76	503	73				
Virac	486	68	707	67				
Region VI (Western Visayas)								
Roxas	212	75	284	65				
Region VII (Central Visayas)								
Dumaguete	71	51	103	27				
Mactan, Cebu	104	53	121	20				
Tagbilaran	189	86	237	63				
Region VIII (Eastern Visayas)								
Catarman	882	90	1267	73				
Catbalogan	319	68	567	65				
Tacloban	269	46	502	37				
Region IX (Western Mindanao)								
Dipolog	129	29	148	10				
Zamboanga	71	66	82	42				
Region X (Northern Mindanao)								
Lumbia	15	37	20	30				
Malaybalay	92	46	119	12				
Region XI (Davao Reg.)								
Davao	87	58	247	60				
Region XII (SOCSARGEN)								
General Santos	59	58	212	85				
Region XIII (CARAGA)								
Surigao	391	44	620	18				
Hinatuan	384	27	742	17				
Butuan	97	42	161	37				
ARMM(Autonomous reg. of Muslim Mindanao)								
Cotabato	24	8	52	5				

TABLE 5.0 CUMULATIVE YIELD MOISTURE INDICES FOR DRY SEASON CORN in Millimeters and Percentile Rank. (December 2019 to February 2020)

STATIONS	DECEMBER		JANUARY		FEBRUARY	
	YMI	%RANK	YMI	%RANK	YMI	%RANK
CAR (Cordillera Autonomous Reg.)						
Baguio	11	46	26	47		
Region I (Ilocos Reg.)						
Dagupan	7	61	7	38		
Vigan	4	75	13	77		
Laoag	3	66	34	90		
Region II (Cagayan Valley)						
Aparri	320	98	536	100		
Basco	136	63	254	35		
Tuguegarao	193	92	205	90		
Region III (Central Luzon)						
Iba	4	44	5	32		
Cabanatuan	21	61	21	48		
Baler	290	73	591	78		
Casiguran	391	69	543	50		
Region IV-A (CALABARZON)						
Ambulong	126	78	140	70		
Infanta	267	27	534	18		
Tayabas	286	58	453	62		
Alabat	258	31	591	45		
Region IV-B (MIMAROPA)						
Calapan	154	61	336	77		
Coron	142	95	243	98		
Cuyo	14	44	14	35		
Puerto Princesa	16	17	17	8		
Romblon	226	85	371	78		
San Jose	206	97	221	95		
Region V (Bicol Reg.)						
Daet	217	25	449	27		
Legaspi	313	49	846	75		
Masbate	255	76	442	67		
Virac	371	68	616	63		
Region VI (Western Visayas)						
Roxas	162	75	242	67		
Region VII (Central Visayas)						
Dumaguete	145	86	198	55		
Mactan, Cebu	54	51	90	27		
Tagbilaran	79	53	99	15		
Region VIII (Eastern Visayas)						
Catarman	674	90	1101	70		
Catbalogan	244	66	518	65		
Tacloban	206	46	463	32		
Region IX (Western Mindanao)						
Dipolog	99	29	120	8		
Zamboanga	54	66	67	40		
Region X (Northern Mindanao)						
Lumbia	11	37	17	30		
Malaybalay	70	46	100	8		
Region XI (Davao Reg.)						
Davao	66	58	244	65		
Region XII (SOCSARGEN)						
General Santos	45	58	215	85		
Region XIII (CARAGA)						
Surigao	299	44	552	17		
Hinatuan	293	27	689	17		
Butuan	74	44	144	37		
ARMM(Autonomous reg. of Muslim Mindanao)						
Cotabato	18	8	49	5		

TABLE 6.0 DECADAL AND CUMULATIVE DECADAL RAINFALL
For the month of JANUARY 2020
[actual values (in mm) and percent of normal]

	REGION	DECADE	ACTUAL JAN	% Normal of Actual	CUMULATIVE JAN	% Normal Cumulative
R01	Ilocos Region	1	6.7	209	6.7	209
		2	2.7	67	9.4	130
		3	1.8	42	11.2	98
CAR	CAR	1	17.0	187	17.0	187
		2	12.2	100	29.2	137
		3	7.6	62	36.8	109
R02	Cagayan Valley	1	61.3	183	61.3	183
		2	32.8	81	94.2	127
		3	26.1	62	120.2	103
R03	Central Luzon	1	42.5	348	42.5	348
		2	7.2	28	49.8	130
		3	10.1	55	59.8	106
R04-A	CALABARZON	1	49.2	106	49.2	106
		2	13.8	29	63.1	66
		3	31.9	57	95.0	63
R04-B	MIMAROPA	1	9.1	101	9.1	101
		2	1.7	18	10.9	58
		3	3.8	31	14.6	48
NCR	NCR	1	9.4	104	9.4	104
		2	1.8	15	11.2	53
		3	1.4	14	12.6	41
R05	Bicol Region	1	33.8	42	33.8	42
		2	32.0	42	65.8	42
		3	61.3	64	127.1	50
R06	Western Visayas	1	16.3	68	16.3	68
		2	6.9	58	23.3	65
		3	6.5	29	29.8	51
R07	Central Visayas	1	78.0	195	78.0	195
		2	16.5	72	94.5	151
		3	20.8	54	115.3	114
R08	Eastern Visayas	1	61.9	59	61.9	59
		2	74.6	96	136.5	75
		3	114.9	95	251.4	83
R09	Zamboanga Peninsula	1	3.4	12	3.4	12
		2	4.6	26	8.0	17
		3	27.9	72	35.9	42
R10	Northern Mindanao	1	18.8	46	18.8	46
		2	49.0	150	67.8	92
		3	45.9	88	113.7	90
R11	Davao Region	1	45.7	66	45.7	66
		2	68.2	104	113.9	84
		3	141.7	168	255.6	116
R12	SOCCSKSARGEN	1	1.2	6	1.2	6
		2	5.0	29	6.2	16
		3	34.2	133	40.5	63
	CARAGA	1	132.3	87	132.3	87
		2	148.1	119	280.4	101
		3	181.3	102	461.8	102
	ARMM	1	0.1	1	0.1	1
		2	8.7	70	8.8	30
		3	26.7	117	35.5	68

FIG. 1.0 Spatial Analysis of GENERALIZED NORTHEAST MONSOON INDEX Ending JANUARY 2020 in Percentile Rank

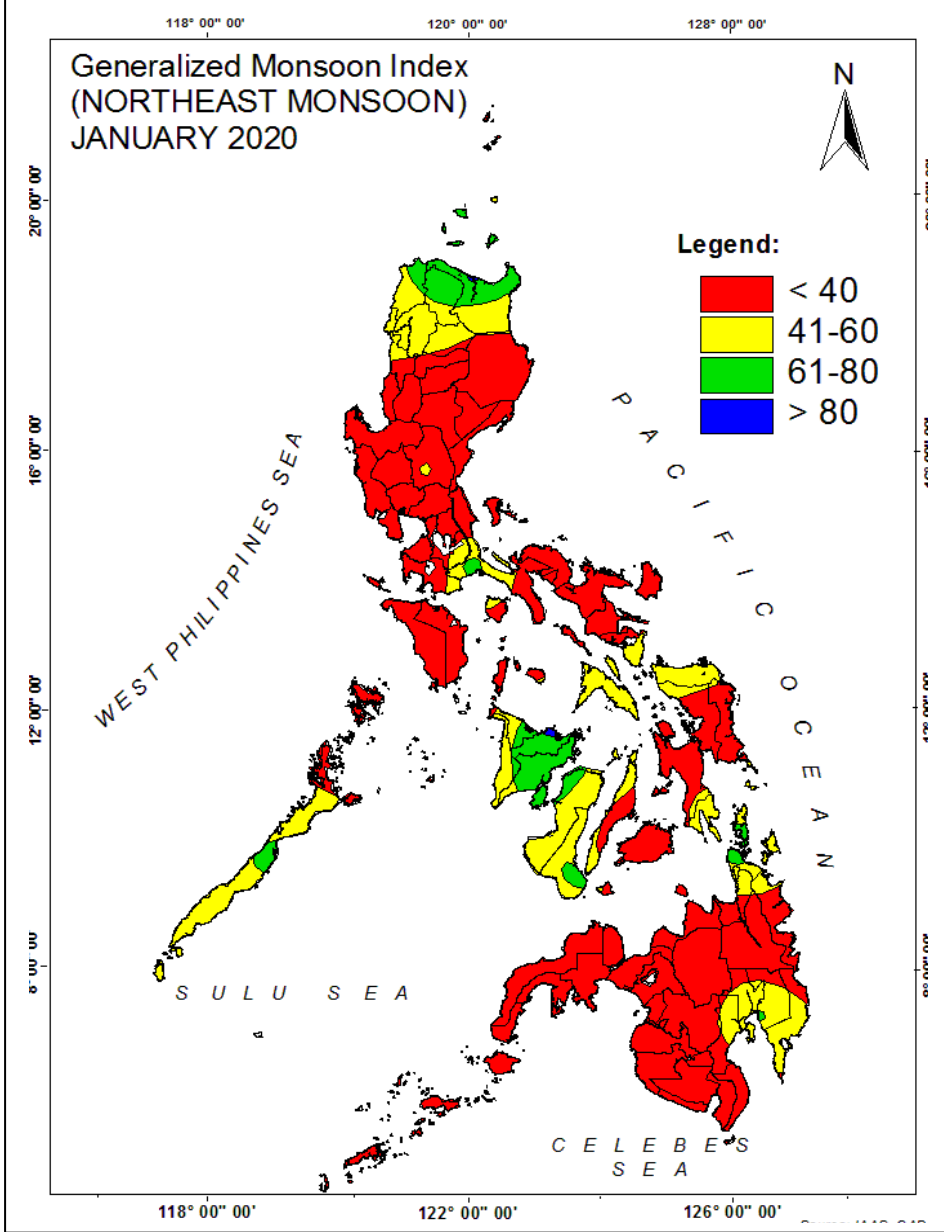


FIG 2.0 TEN DAYS ACTUAL RAINFALL DISTRIBUTION IN THE PHILIPPINES for the month of JANUARY 2020

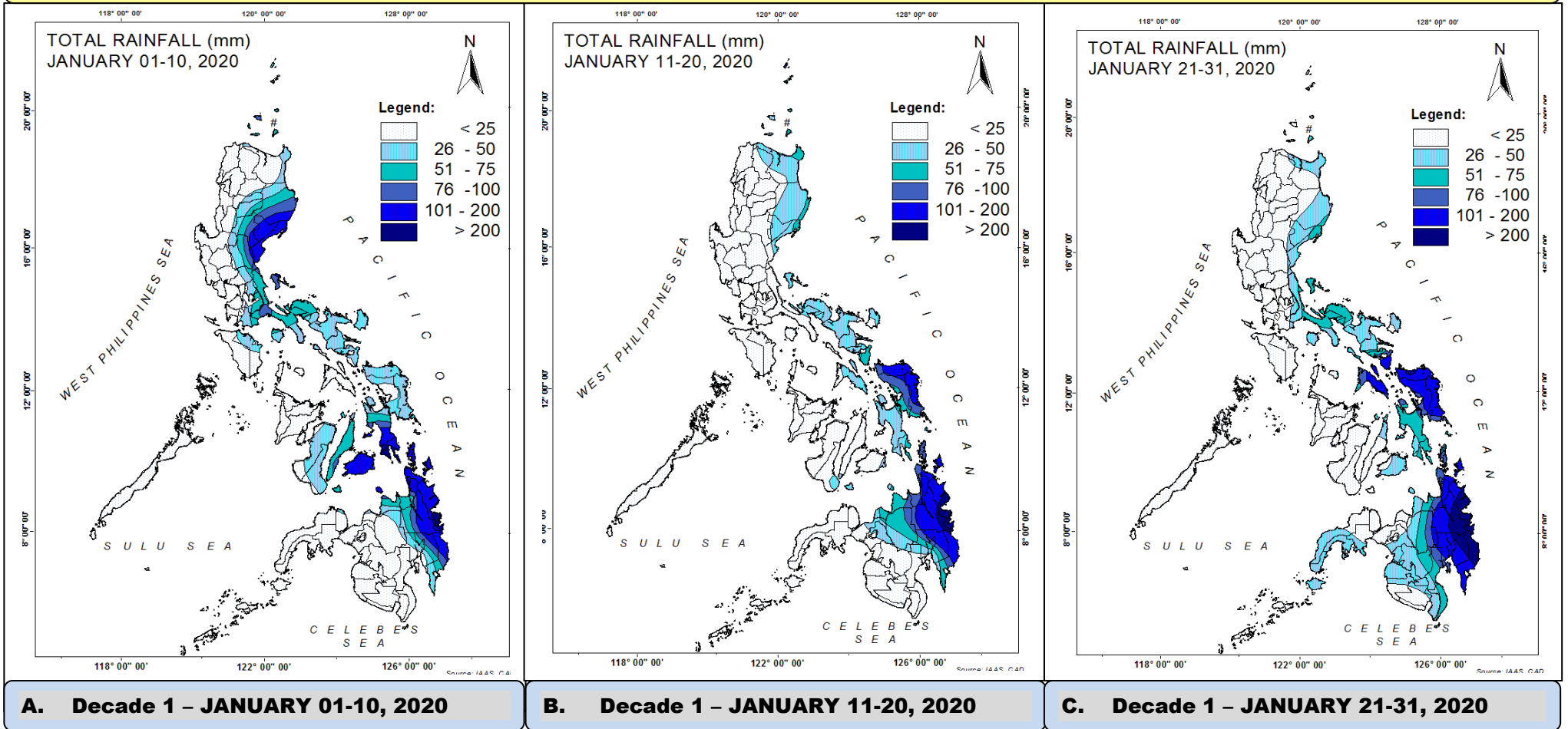
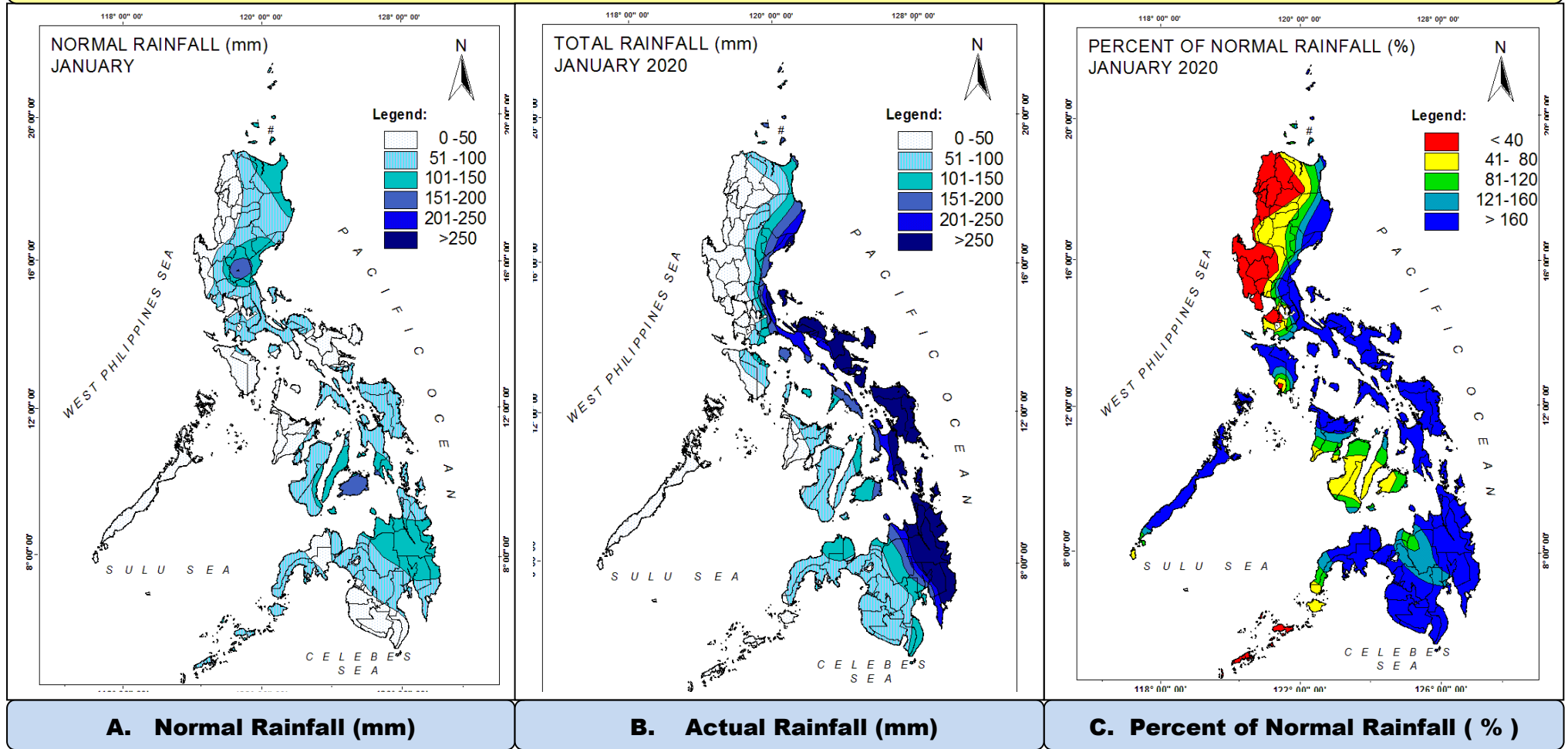


FIG. 3.0 RAINFALL IN THE PHILIPPINES for the month of JANUARY 2020



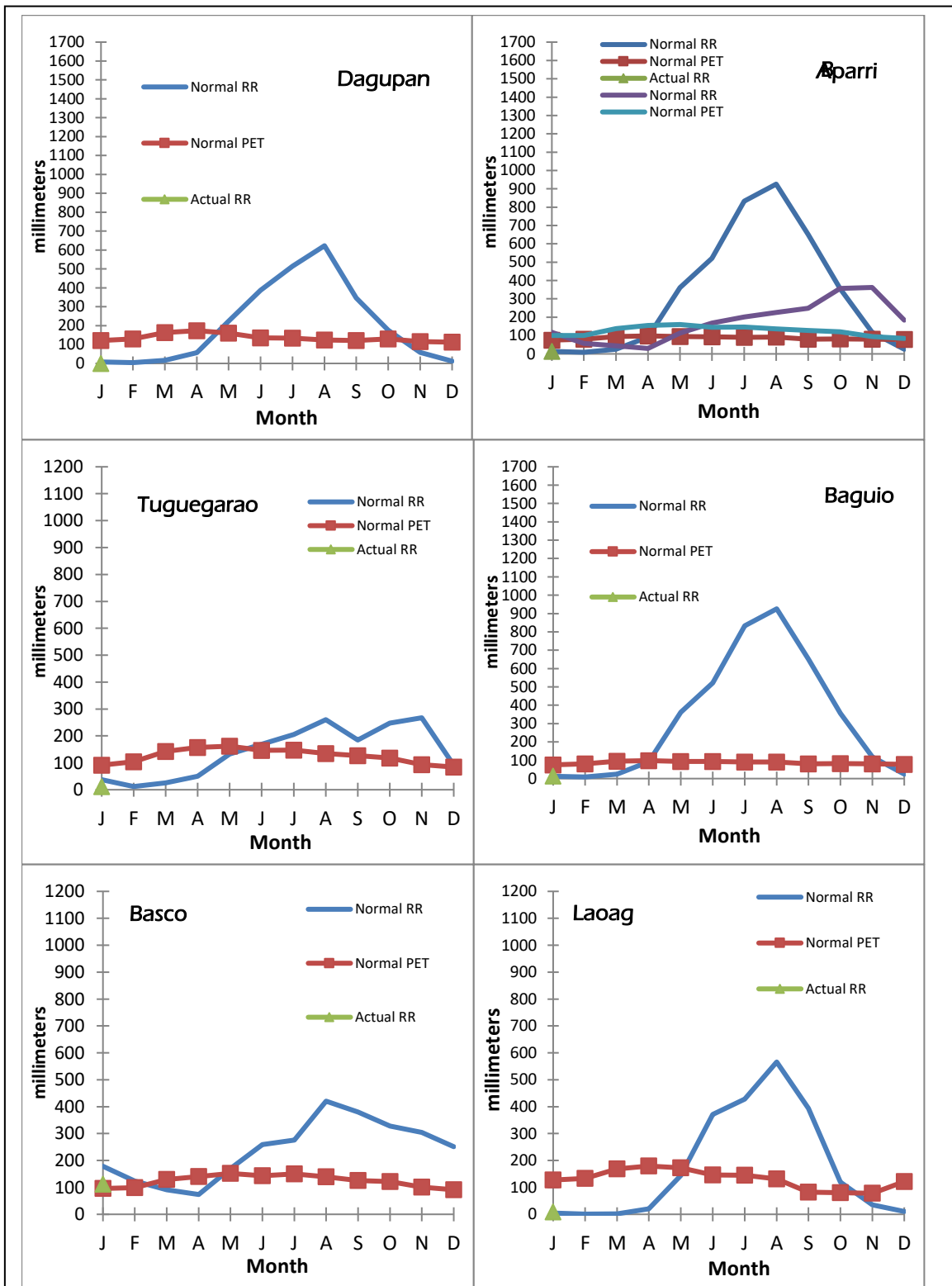


Fig. 4.0 Comparison of normal rainfall and potential evapotranspiration with the actual monthly rainfall at Laoag, Basco, Baguio, Aparri, Dagupan, and Tuguegarao.

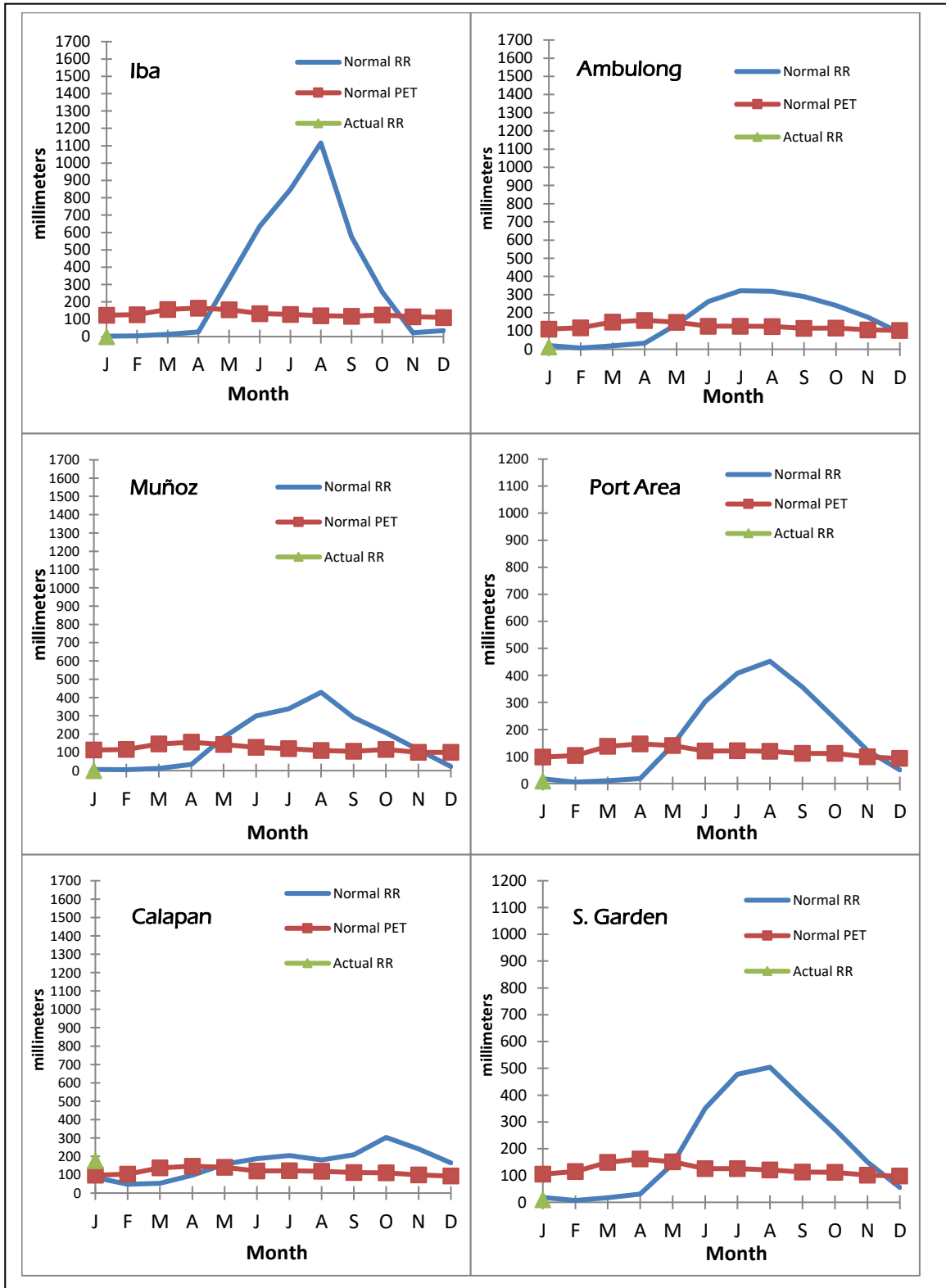


Fig 4a. Comparison of normal rainfall and potential evapotranspiration with the actual monthly rainfall at Iba, Ambulong, Muñoz, Port Area, Calapan, and Science Garden.

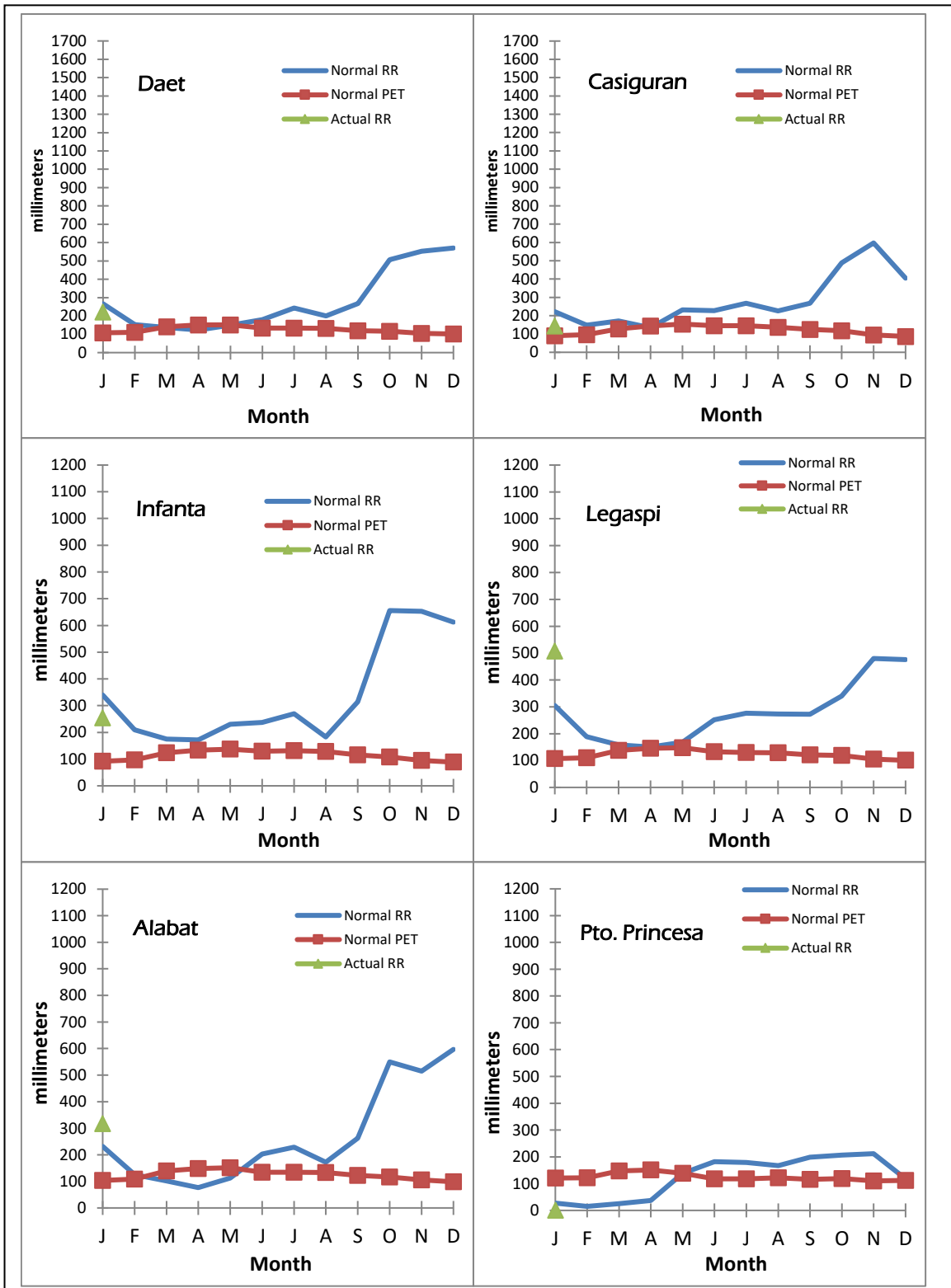


Fig. 4b. Comparison of normal rainfall and potential evapotranspiration with the actual monthly rainfall at Daet, Casiguran, Infanta, Legaspi, Alabat, and Puerto Princesa.

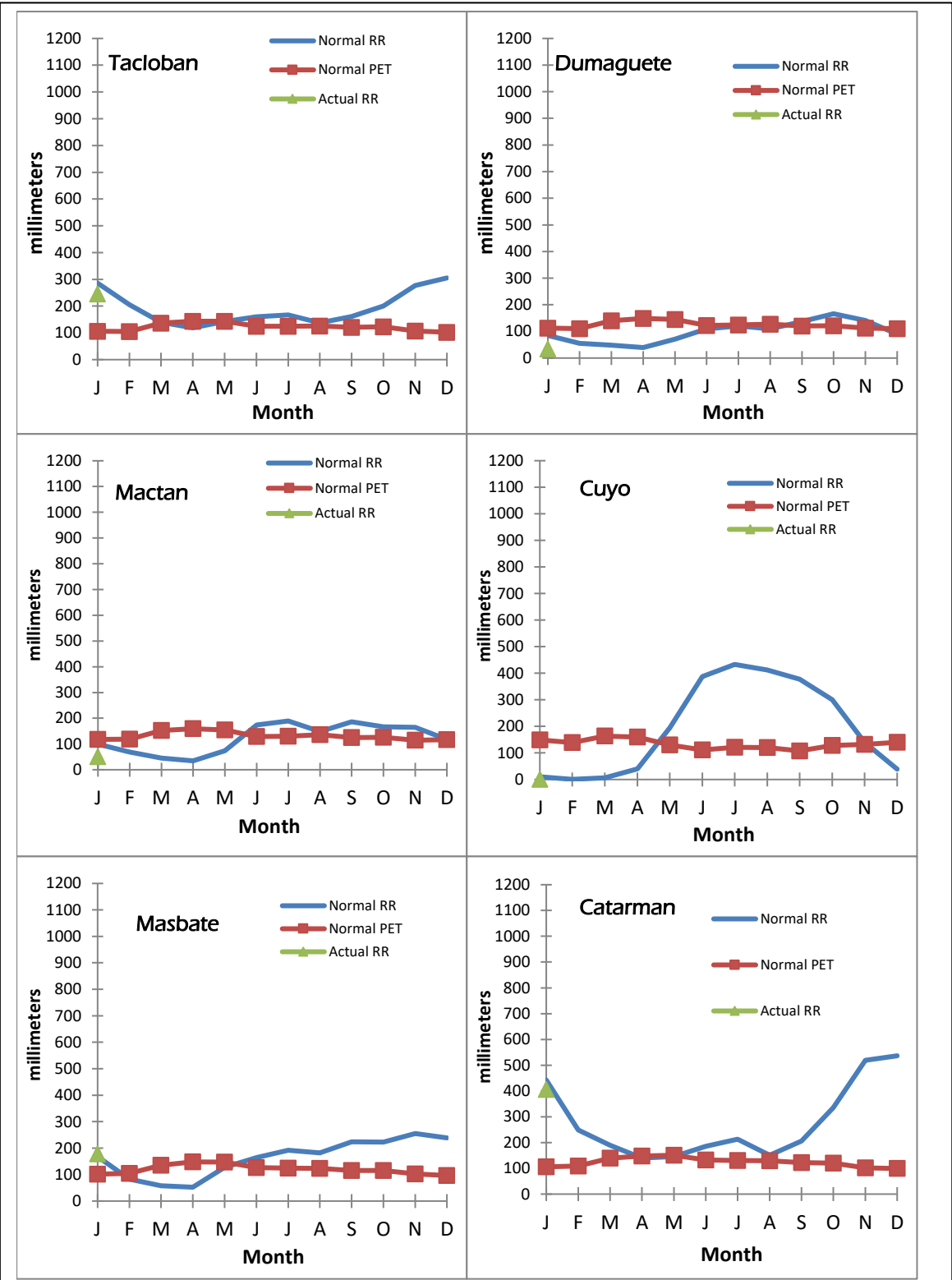


Fig 4c. Comparison of normal rainfall and potential evapotranspiration with the actual monthly rainfall at Cuyo, Masbate, Mactan, Tacloban, Catarman and Dumaguete.

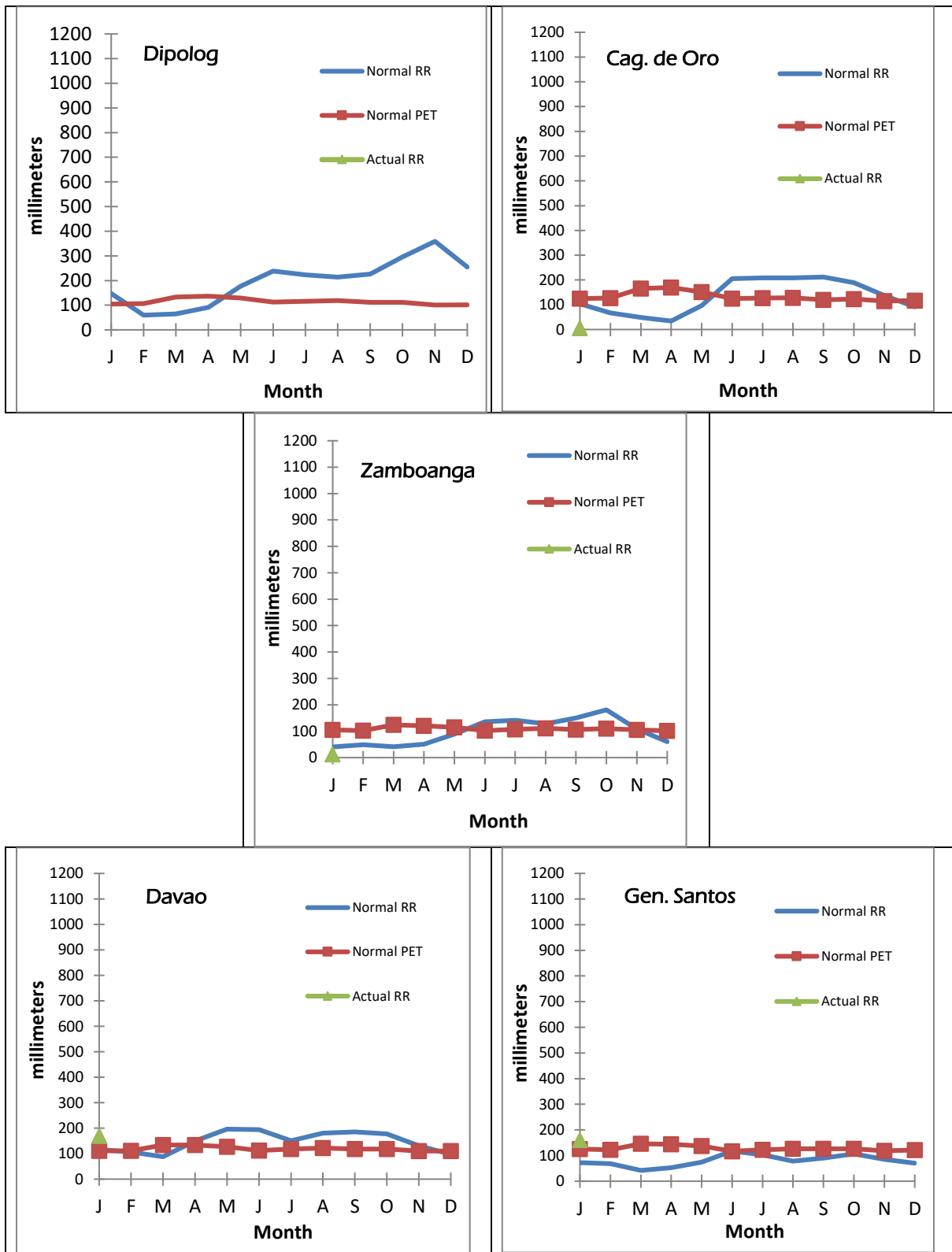


Fig 4d. Comparison of normal rainfall and potential evapotranspiration with the actual monthly rainfall at Davao, General Santos, Zamboanga, Cagayan de Oro, and Dipolog.