

Pampanga River Basin Floods (August 06 to 17)

Event 1: Southwest Monsoon (Habagat)

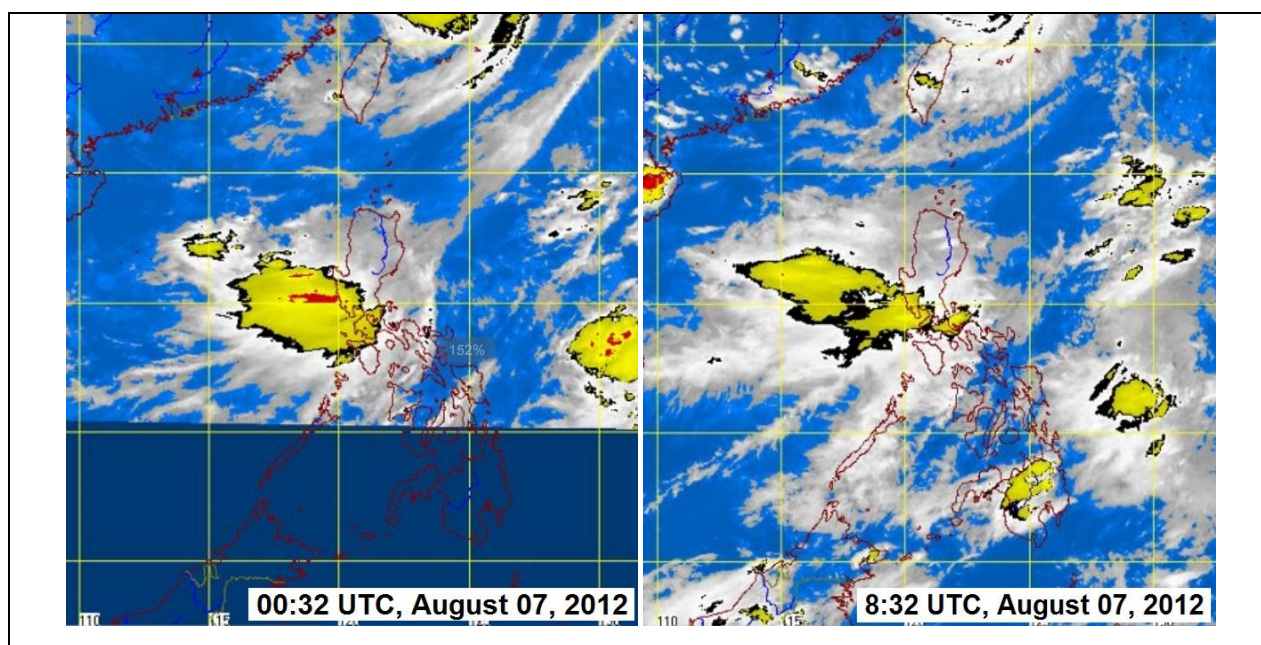


Figure 1.0 Satellite Images (above) showing the monsoons rains affecting the western parts of Luzon.

Monsoon rains brought about by the Southwest wind flow generally started affecting the Pampanga River Basin (PRB) around afternoon of 05 August, mainly at the south southwest portion of the basin. Hourly average basin rainfall (RR) of moderate to heavy intensities were generally observed over the basin on the morning of 07 August until the morning of the following day with a maximum hourly average basin RR (12.2 mm) recorded on 0900H of 07 August.

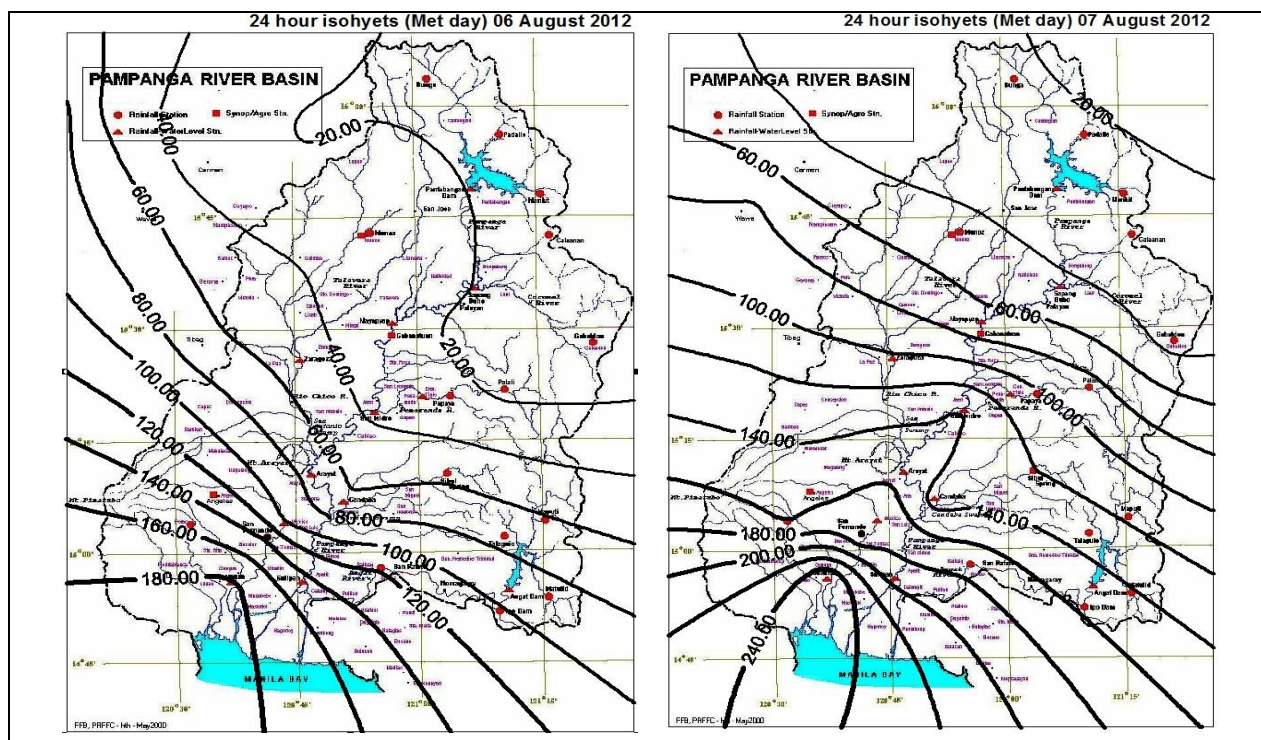


Figure 2.0 24-hour Isohyetal maps for PRB (August 06 and 07) showing partly heavy rainfall intensity at the South southwest (SSW) part of the basin,

The 24-hr rainfall distribution over the basin on 06 August shows just enough heavy rainfall (> 180 mm in 24 hrs) over at the South southwest end of the basin, in particular at the southwest side of Pampanga province (Figure 2.0, 06 August isohyetal map). More than half of the basin received light rainfall (< 60 mm in 24-hrs.) particularly at the upstream part of the basin. Except for areas affected by high tides that are mostly coastal riverside areas, no other areas (PRB) were reportedly flooded during that day. High tides were at relatively low during the period August 06 to 10.

August 07 rainfall distribution (Figure 2.0, 07 August isohyetal map) of heavy RR intensity had affected a fairly larger area at the southwest end of the basin; moderate intensity (between 60 - 180 mm in 24 hrs) affected about half of the basin area. Again, upstream sections, in particular the northeast corner of Nueva Ecija, received generally light intensity rainfall only.

Coming from a flood event generated by the passage of T.C. "Gener" (Saola), July 29 to August 03, the PRB had still several points along its main river channel at relatively high stage though all were already receding slowly. Candaba swamp level and Pampanga River at Arayat were still above critical and alarm levels prior to August 06, respectively. (Candaba's Critical level is 5.0 m; Arayat's Alarm level is 6.0 m)

Floods within PRB started around noontime of 07 August, particularly at southwest part of the basin covering mainly the allied river system of Pasac-Guagua. Abacan River at Mexico and Guagua River at Sasmuan were on a slow rise starting on the early morning of 07 August. Initial patch of flooded areas in Pampanga province (falling within Pasac-Guagua River system) which were mostly due to ponded rainwater included the City of San Fernando, the towns of Mexico, Sta. Ana, Sto. Tomas, Minalin, Apalit, Guagua, Sasmuan, Lubao, Sta. Rita, Apalit and Floridablanca. (The south end stretch of the North Luzon Expressway (NLEX) was already closed to vehicles on the morning of August 07 due to flooded portions of the expressway, particularly at Malinta (Valenzuela), Marilao and Bocaue points and this stretch of NLEX falls within the Sta. Maria River system and is outside the PRB).

Similarly, Candaba swamp level and the Pampanga River at Sapang Buho (Palayan), San Isidro, and Arayat (mid-stream of main Pampanga River); tributaries Rio Chico River at Zaragoza and Penaranda River were all slowly rising mainly due to the continuous light to occasionally moderate rains over the other half of the basin. By afternoon of that day, river stage at Mayapyap (Cabanatuan) had reacted as well and was registering a slow rise. By early afternoon of 07 August, a slow inundation of the central town of Candaba had already started. Main Pampanga River channel at its downstream sections at Sulipan station also registered a slow rise.

Floodwaters further inundated the towns within the Pasac-Guagua River system due to the breaching of the "San Fernando-Sto. Tomas-Minalin" tail dike in the afternoon of 08 August (as per reports). At about the same time, floodwaters started to overflow several riverside areas along the towns of Arayat, Candaba, San Luis, San Simon, Macabebe, Masantol, Apalit, Calumpit and Hagonoy. Around mid-morning of the following day, 09 August, Pampanga River spilled-over at Bgy. Calizon in Calumpit and by afternoon floodwaters had slowly inundated wide areas within Calumpit and Hagonoy Towns.

Ipo Dam released its reservoir water in the evening of 06 August with a discharge of about 60 cumecs. By morning of the following day, 07 August, it was already releasing around 350 cumecs and peaked at more than 850 cumecs before noontime. By morning of 08 August, discharge was down to a little over 200 cumecs. Similarly downstream of Ipo Dam, Bustos Dam was also releasing water at a rate of 350 cumecs on the morning of 07 August. It peaked at less than 800 cumecs in the afternoon of that same day. It maintained above 600 cumecs until noontime of the following day before cutting down to less than 400 cumecs afterwards. Floodwaters affected riverside areas along the Angat River particularly at Norzagaray, Angat, Bustos, Baliuag, Pulilan, Plaridel, partly Calumpit and Hagonoy, and Paombong in the Labangan Channel. Ipo Dam closed its gates in the morning of 10 August.

Pampanga River Basin & Allied River System of Pasac-Guagua Event: Southwest Monsoon (Habagat)							
	24-hr RR total (meteorological day)					River Level (meters)	
Stations	August 2012			Maximum 1- hour RR for the period	Time (LST) / Date of max RR	Peak Stage (m)	Time/Date of Peak River stage attained
	6	7	8				
Munoz	40	47	27	26	1800H / 06		
Sapang Buho	20	44	17	09	0900H / 07	1.63	1600H / 07
Gabaldon	7	32	10	13	1500H / 05		
Zaragoza	51	102	39	14	0900H / 07	4.64	0200H / 10
Mayapyap	23	66	34	8	1000H / 07	0.60	0800H / 08
Penaranda	30	111	23	14	1000H / 07	1.68	0300H / 08
Calaanan	12	30	16	7	1000H / 07		
Palali	16	88	18	17	2200H / 07		
San Isidro	37	141	35	20	1000H / 07	3.29	0900H / 08
Arayat	75	158	56	20	1000H / 07	9.24	1700H / 09
Candaba	62	162	28	12	1100H / 07	6.93	2300H / 09
Sibul Spring	57	121	43	12	1100H / 07		
Sasmuan	183	262	235	44	2200H / 08	3.17	0500H / 08
Sulipan	146	192	145	30	2200H / 08	3.95	0700H / 10
Mexico	97	176	44	32	0900H / 07	3.46	1300H / 07
Porac	156	159	43	33	0600H / 07		
San Rafael	118	174	109	34	2100H / 08		
San Fernando	139	166	37	37.4 *	0900H / 07	*As per available data only	
Ave. Basin RR	71.3	123.3	54.5	12.24	0900H / 07		

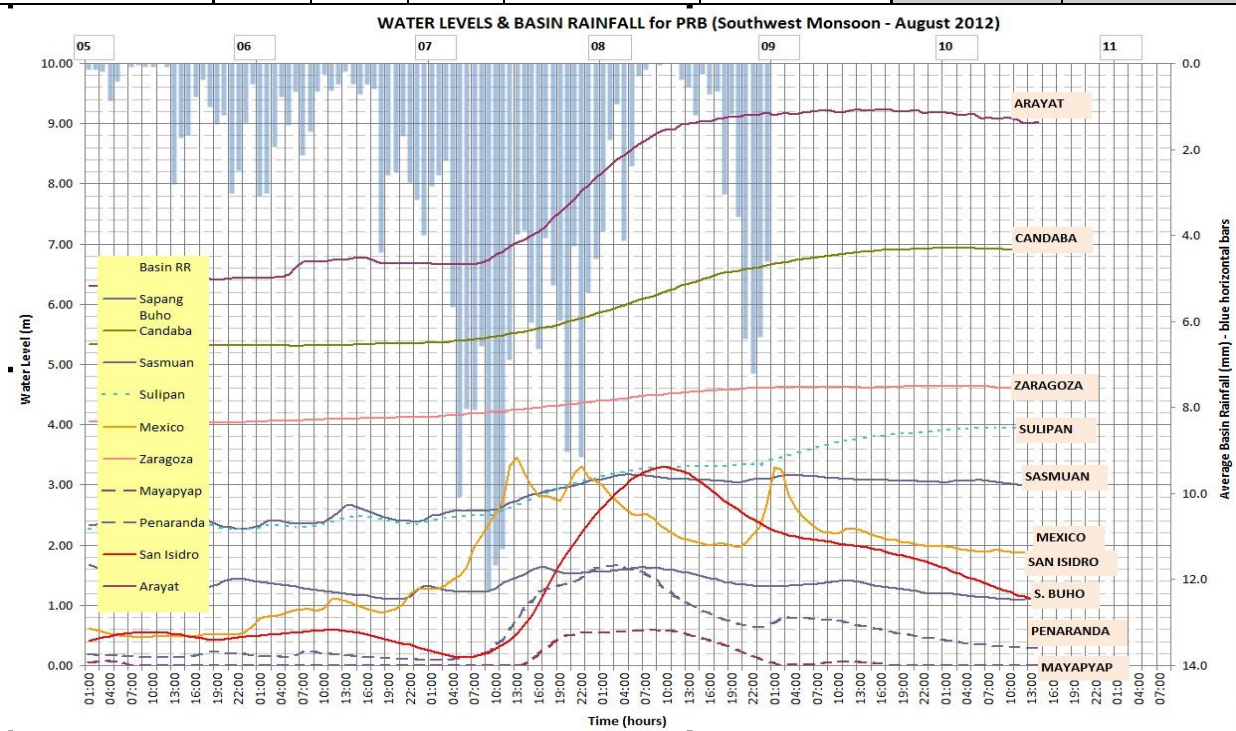


Figure 3.0 Hyetograph (Basin RR) and Hydrographs of various forecasting points within the PRB during the period August 05 to 11, 2012.

Event 2: Tropical Storm "Helen" (Kai-Tak)

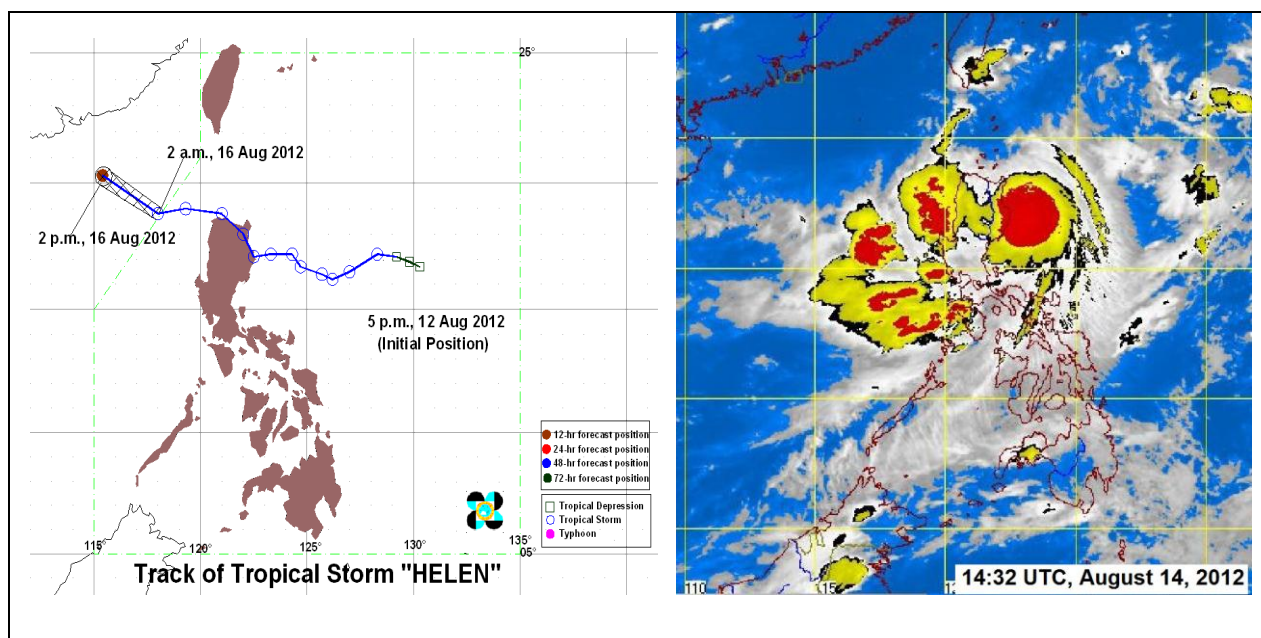


Figure 4.0 Track (top left) and Satellite Image (top right) of T.S. "Helen" (Kai-Tak)

As an ALPA east of N. Luzon, "Helen" developed into a tropical depression in the afternoon of 12 August. It became a tropical storm the following day, 13 August. It made landfall over Isabela province in the morning of 15 August, edged across Cagayan province and exited land at Aparri. By morning of the following day, "Helen" was already out of the PAR. "Helen" induced the SW wind flow further over the western sections of Luzon.

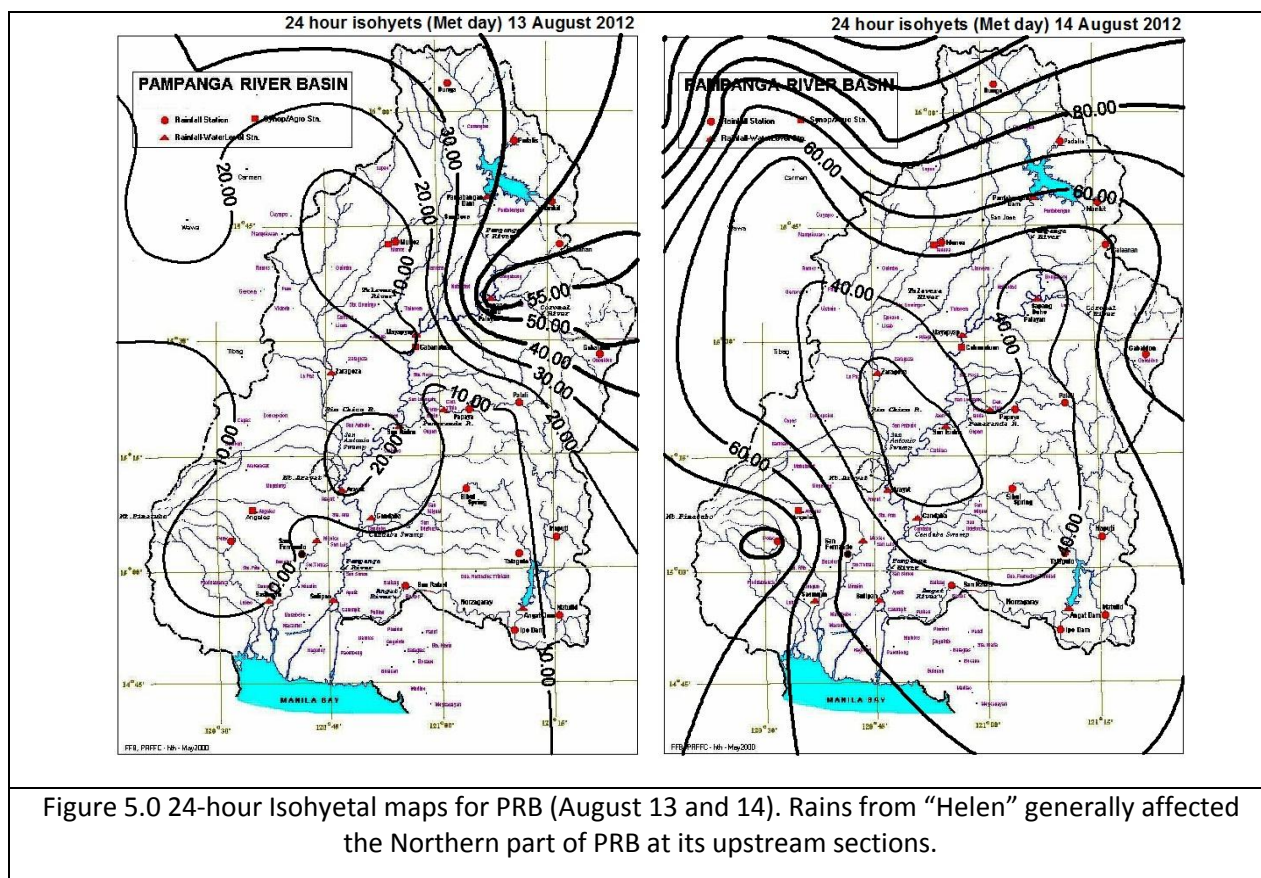


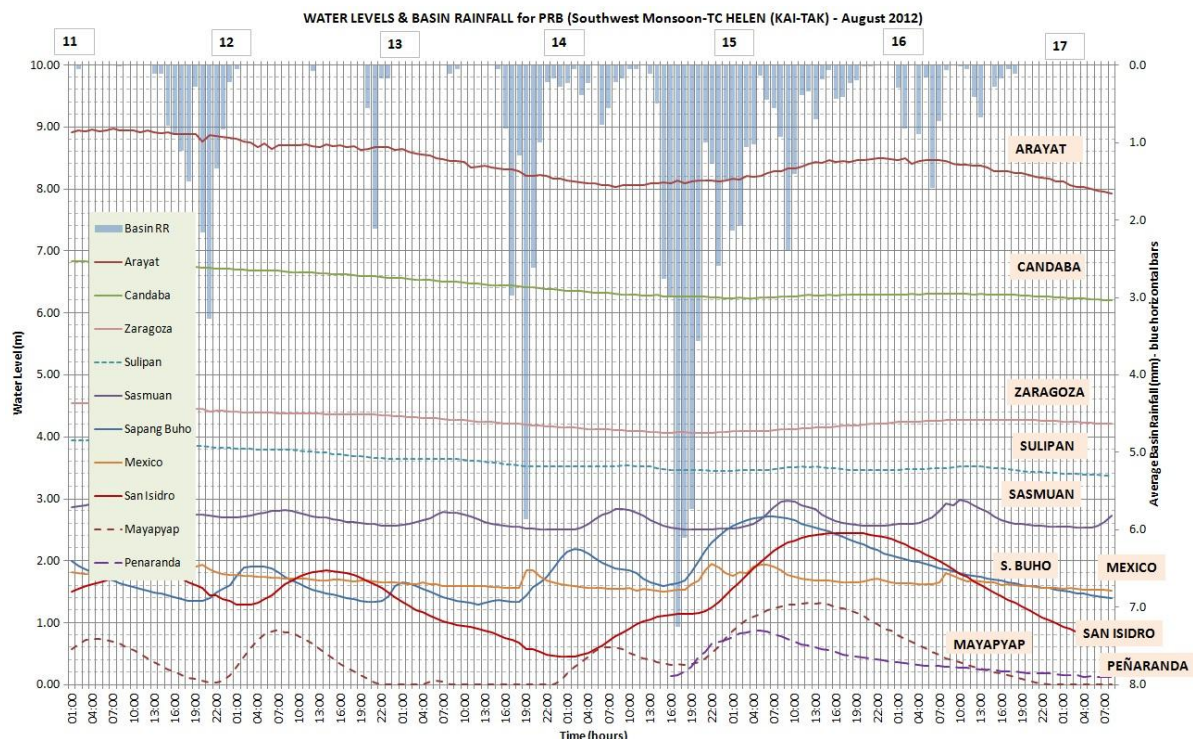
Figure 5.0 24-hour Isohyetal maps for PRB (August 13 and 14). Rains from "Helen" generally affected the Northern part of PRB at its upstream sections.

With floodwaters still persisting in many parts of the PRB as a result of the SW monsoon rains and the Pampanga River at its downstream section relatively quite high, another tropical cyclone "Helen" entered the PAR on 12 August (Figure 4.0).

The basin-wide rains from "Helen" were comparatively less than the rains spawned by the SW monsoon, which happened barely a week ago. Generally light to occasionally moderate rainfall intensity were observed over the basin as shown in the isohyetal maps from August 13-14. Mostly affected by moderate intensities are the upstream sections of PRB (Figure 5.0).

The effects of "Helen" gave another rise to river stages in the PRB upstream sections, particularly in Sapang Buho (Palayan) and in Mayapyap (Cabanatuan) in the morning of 14 August. Increase though did not reach their respective alert levels (Sapang Buho at 3.7 m. and Mayapyap at 3.0 m). Subsequently, similar increases at succeeding river sections at the middle main Pampanga River (San Isidro and Arayat) followed by late afternoon of that same day. Candaba swamp hardly reacted to "Helen" as it maintained a generally slow receding trend still from last week's flood, with periods of several hours of flat responses. Likewise, lower main Pampanga River at Sulipan continued its slow recession phase but at some periods levelled-off for several hours. Rio Chico River in Zaragoza had also maintained a generally slow recession tendency.

There were no reports of flooding at the upstream and at most of the middle sections of the basin. "Helen", however, did lengthen the inundation brought about by the SW monsoon along the main Pampanga River, at riverside areas of Arayat, San Luis, San Simon, Apalit, Macabebe, Masantol, Apalit, Calumpit and Hagonoy towns; Rio Chico Riverside areas at La Paz (Tarlac), Zaragoza and San Antonio; the Pasac-Guagua river system areas such as in Mexico, Sta. Ana, San Fernando, Sto. Tomas, Minalin, Sta. Rita, Guagua, Lubao, Apalit and Sasmuan.



Angat Dam, which did not open its gates during the SW monsoon the other week, released reservoir water at 4pm of 12 August. Initial discharge was less than 100 cumecs. By morning of the following day, 13 August, discharge was more than 200 cumecs. Varied discharges from the 3 dams, Angat, Ipo and Bustos, from time to time were observed during the "Helen" event period. Peak discharge of around 500 cumecs in Angat Dam started noontime of 13 August until morning of 14 August. Similarly, peak outflows from Ipo and Bustos Dams of around 470 and 500 cumecs, respectively, occurred in the afternoon of 13 August, and slowly downgraded both outflows towards the

succeeding days. Floods remained at some portions of the riverside areas along the Angat River: Norzagaray, Angat, Bustos, Baliuag, Pulilan, Plaridel and Paombong (Labangan Channel), partly affecting Calumpit and Hagonoy towns.

Pampanga River Basin & Allied River System of Pasac-Guagua Event: Tropical Storm "Helen" (August 12 to 16)							
	24-hr RR total (meteorological day)					River Level (meters)	
Stations	August 2012			Maximum 1- hour RR for the period	Time (LST) / Date of max RR	Peak Stage (m)	Time/Date of Peak River stage attained
	13	14	15				
Munoz	4	53	11	13	2300H / 14		
Sapang Buho	60	33	5	48	1900H / 13	2.72	0600H / 15
Gabaldon	49	68	2	24	1700H / 14		
Zaragoza	17	27	2	14	1700H / 13	Still high prior to the period	
Mayapyap	9	45	6	20	1700H / 14	1.32	1400H / 15
Penaranda	7	43	9	14	1800H / 14	Partly out of order	
Calaanan	54	47	5	27	1900H / 13		
Palali	11	38	3	25	2100H / 12		
San Isidro	22	26	7	11	1800H / 13	2.45	1500H / 15
Arayat	22	30	9	15	1700H / 13	Still high prior to the period	
Candaba	13	32	8	14	1900H / 14	Still high prior to the period	
Sibul Spring	6	31	2	6	1600H / 14		
Sasmuan	10	52	34	15	0900H / 15	Still high prior to the period	
Sulipan	3	47	30	12	2000H / 14	Still high prior to the period	
Mexico	2	47	30	10	1900H / 14	1.95	2200H / 14
Porac	14	84	19	17	1800H / 14		
San Rafael	5	42	21	12	2000H / 14	*as per available observation	
San Fernando	10	47	16	8.1*	1900H / 14		
Ave. Basin RR	17.7	43.9	11.3	7.26	1700H / 14		

Generally, floods subsided along the main Pampanga River at around August 17; Pasac-Guagua area around the same date and towards the weekend of August 18-19; Candaba swamp has areas still submerged as of this reporting (August 21).

The Pampanga River Flood Forecasting & Warning Center issued a total number of flood information as follows: 1 Flood Advisory (FA) and 22 Flood Bulletins (FB). FA no. 1 was issued 11 am of 06 August. FB no. 1 was issued at 9 am of the following day, 07 August. Subsequent bulletins were continuously issued at 5am and 5pm until the final FB (no. 22) which was issued at 5pm of 17 August.

PRFFWC Initial Post-Flood Report (as of August 21, 2012)