Republic of the Philippines
Department of Science & Technology (DOST)
Philippine Atmospheric, Geophysical & Astronomical
Services Administration (PAGASA)

Post-Flood Investigation Report
Pampanga River Basin: Flash Flood of November 2004
(Tropical Depression Violeta, November 22-23, 2004)

Pampanga River Flood Forecasting & Warning Center
WFFC Compound., Agham Rd., Diliman, Quezon City, Philippines 1100
Webpage: http://groups.msn.com/PampangaRiverBasin/prffwc.msnw
E-mail: prffwc_ffb@yahoo.com

Table of Contents

List of Tables

List of Figures

Pampanga River Basin: Flash Flood of November 2004 (Tropical Depression Violeta)

Summary

Flash flood is the fastest moving type of flood. It happens when heavy rains of high intensity collects in a stream, turning the normally calm area into an instant rushing current. The quick change of state and the fast movement of streamflow is what catches people off-guard, with little or no warning at all, making flash floods very dangerous.

Heavy rains for several hours spawned by Tropical Depression Violeta (November 22-23, 2004) at the upper reaches of tributaries Coronel, Chico and Sumacbao rivers, on the western slopes of the Sierra Madre mountain range, which started before midnight of 23rd of November 2004, resulted in flash flooding of several barangays in 2 towns along the Peñaranda river and 4 towns along the main Coronel river in the province of Nueva Ecija (N.E.).

By morning, more than 30 houses have been washed-out in Bgy. Castellano, San Leonardo, N.E.; debris and logs littered portions of the Maharlika Highway between the towns of San Leonardo and Gapan rendering the hi-way and the Doña Josefa Bridge (Gapan) impassable for a few hours. The aftermath saw 2 lives loss, 17 missing and an estimated damage of about P31.4 million to Infra, crops, livestock and vegetables.

The Pampanga River Flood Forecasting and Warning Center (PRFFWC) survey team, composed of Messrs. Armando P. Taruc (Senior Weather Specialist), Hilton T. Hernando (Weather Facilities Specialist II) and Pablito Villablanca (Weather Observer III), offers several reasons as to the possible cause of flash flooding in the aforementioned areas:

- High Intensity rainfall for about 4 hours in the mountainous area between Gen. Tinio and Gabaldon in N.E.(Figure 4.0 and 4.1); followed by another 4 hours of heavy rains in the Gabaldon area;
- Fairly steep to gradual slope terrain of the rainfall-fed area producing strong and torrent run-off and streamflow (Figures 6.1 & 6.2, Pic 11.0);
- The rather silted and shallow channels of the Chico, Sumacbao, and Peñaranda rivers draining into the main Pampanga River (Pic 5.0 and 12.0).

1.0 Background

Pampanga River Basin is situated in the central plains of Luzon Island, the rice granary of the Philippine archipelago. By dint of geography, the country experiences at least 20 tropical cyclones, on the average, annually. On the other hand, the basin experiences at least 1 to 2 floods in a year due to this natural condition.

In 1973, a pilot Flood Forecasting and Warning System (FFWS) for Pampanga River Basin was established through technical cooperation between the Philippines and Japan Governments. The main purpose was to issue flood warnings and advisories to the concerned populace for them to take precautionary measures and avoid the disastrous effects of floods. Later, in 1983, the Flood Forecasting and Warning System for Dam Operation (FFWSDO) was established within the basin to integrate in the basin forecast the amount of water released from dams. Within the Pampanga River Basin are two large dams: the Angat Dam and the Pantabangan Dam. This FFWSDO scheme is being done in cooperation with other government agencies.

This report deals with the flash flood episode over the eastern portions of Pampanga River Basin as a result of the heavy rains brought about by Tropical Depression Violeta (November 22-23, 2004)

2.0 Physiographical Factor[1]

2.1 The Pampanga River Basin

The Pampanga River Basin (PRB) is the 4th largest basin in the Philippines. It drains an aggregate area of 8,550 km^2 (Figure 1.0) and encompasses the provinces of Nueva Ecija (almost whole province), part of Bulacan and Pampanga, and portions of Tarlac. Main Pampanga River is about 260 kilometers in length.

The basin is drained through the Pampanga River and via the Labangan Channel into the Manila Bay. Several tributaries support the main river, the principal ones of which are the Peñaranda and the Coronel-Santor Rivers on the eastern side of the basin and the Rio Chico River from the northwest side. The Angat River joins the Pampanga River at Calumpit in Bulacan via the Bagbag River. The Labangan channel, on the other hand, acts as a cut-off channel for the Angat River into Manila Bay. Somewhere between the middle and lower portion of the basin stands the Mount Arayat, standing some 1,026 meters in elevation. Adjacent just on the eastern

[1] *Major parts of this section were taken from the Pampanga River Basin Post-Flood Investigation reports of the SW Monsoon event as enhanced by Typhoon Marce, August 2004.*

side, at the left bank of the Pampanga River, is the Candaba swamp, covering an area of some 300 km^2 absorbing most of the flood flows coming from the eastern sections of the basin (western slopes of the Sierra Madre mountain range) and the overflowing of the Pampanga River via the Cabiao Floodway. This area acts as a detention basin and is submerged during the rainy season but is relatively dry during summer. At the lower sections of the basin, where the Pampanga delta lies, the Pampanga River system, crisscrossed with fish farms, form a network of sluggish, tidal flats and canals, which eventually find their way to Manila Bay. The main river has a relatively low-gradient riverbed channel particularly at the middle and lower sections, other than being below the mean sea level elevation.

2.2 Flood Prone Areas

The overall flat topography and the rapidly developing and agriculturally productive flood plain of the Pampanga River Basin make it very vulnerable to floods during intense and prolonged rainfall. On the other hand, flash flood prone areas are, obviously, situated mostly on the upper reaches of the basin particularly close to the mountainside areas or along the low-end slopes of the Sierra Madre mountain range.

3.0 Meteorological Factor

Tropical Depression Violeta *(International Codename: Merbok, 0426)*, November 22-23, 2004.

T. D. Violeta (Figures 2.0) started out immediately as a tropical depression on the morning of November 22, some 120 kms NNE of Virac, Catanduanes with strongest sustained winds of 55 kph near the center. It was moving WNW at about 11 kph before it made landfall just south of Baler, Aurora very soon after noontime of the same day, with strongest sustained winds of 45 kph near the center. Eventually it slowed down to 9 kph upon hitting land. It cut across Nueva Ecija and Pangasinan. By morning of November 23, it was already off the coast of Pangasinan, 110 kms WNW of Dagupan City. Finally, Violeta weakened into a low pressure area some 150 kms west of Pangasinan several hours after noontime (Figure 3.0-3.3).

T.D. Violeta's regional precipitation impact started around late evening of November 22, which lasted for a few hours until the early morning of the following day over the province of Nueva Ecija. High intensity rainfall was recorded over the Gabaldon - Gen. Tinio area, producing flash floods along several towns of Nueva Ecija province.

4.0 Hydrometeorological Factor

4.1 The Pampanga River Basin Flood Forecasting & Warning System

The Pampanga River Basin Flood Forecasting and Warning System has a total of 14 rainfall (RR) stations: Gabaldon, Sapang Buho, Mayapyap, Munoz, San Isidro, Arayat, Candaba, Zaragoza, Papaya, Sibul Springs, San Rafael, Ipo Dam, Sulipan and Sasmuan which is in Guagua River Basin; 7 water level (WL) stations: Sapang Buho, Mayapyap, San Isidro, Zaragoza, Arayat, Candaba and Sulipan (refer back to Figure 1.0). Within the two basin systems (Pampanga and Guagua) are 2 synoptic stations; Angeles and Cabanatuan stations. An agrometeorological station also exists in Munoz, N.E.

A standard rain gage observation in the Municipality of Guagua was set-up just recently, through a community-based flood management program of the office, and manual observation is undertaken during times of inclement weather.

4.2 Status of Stations during the Event (November 22-23, 2004)

Telemetered real-time data was practically available throughout the event except for rainfall data of Zaragoza and Arayat. There were few breaks for San Isidro telemetered rainfall as well.

On the other hand, real-time water level data for Zaragoza, San Isidro and Arayat were not coming in during the rainfall impact period. Sapang Buho stopped responding at the time the river stage started to ascend. Also, Mayapyap had several hours of data breaks in the early morning of November 23.

4.3 Rainfall Aspect

Table 1.0 Rainfall Intensity Classification Table (mm)

Category	1 hour	3 hours	6 hours	12 hours	24 hours
Light	< 2.5	< 7.5	< 15	< 30	< 60
Moderate	2.5 – 7.5	7.5 – 22.5	15 – 45	30 – 90	60 – 180
Heavy	> 7.5	> 22.5	> 45	> 90	> 180

Relatively high intensity rainfall were observed at Gabaldon and Papaya stations for around 4 hours, between 2100H, 22 Nov to 0100H, 23 Nov. (Figure 4.1). Similarly high intensity rains continued for Gabaldon from 0400H-0900H, 23 Nov. Relatively heavy rains, for 2 to 3 hours, were also recorded for Munoz, Sapang Buho, Mayapyap, San Isidro, Sibul Springs, Arayat and San Rafael. The brief but rather high intensity rainfall was concentrated, mainly, on the eastern sections of the basin, particularly at the western slopes of the Sierra Madre mountain range or the eastern boundary of the basin (Figure 4.0).

Table 1.1 The 24-hr Rainfall Totals of various stations within and around the Pampanga River Basin during passage of T.D. Violeta

	November (2004)			
Stations	20th	21st	22nd	23rd
San Roque		0	22	0
Sta. Barbara		0	17	0
Carmen		0	22	0
Wawa		0	30	0
Tibag		0	96	0
Bunga				
Padalis				
Marikit			143	17
Pantabangan Dam			106	7
CLSU, Munoz	0	0	57.2	0
Cabanatuan	0.5	T	69.4	T
Angeles	0.4	0	14.5	T
Subic	2.4	0	0.4	0.6
Maputi				
Talaguio	13	1		2
Matulid				
Angat Dam	21	15	59	1
Norzagaray				
Munoz Telemetering		0	52	0
Gabaldon	1	0	429	21
Sapang Buho	1	0	82	4
Mayapyap	1	0	58	1
Zaragoza				
Papaya	2	0	149	4
San Isidro	2	0	74	1
Arayat	4	0	48	1
Sibul Springs	5	0	80	0
Ipo Dam	16	11	46	0
San Rafael	13	0	43	0
Candaba	7	0	32	0
Sulipan	7	0	7	0
Sasmuan	5	0	3	0

Blank means no data recorded / received

Table 1.1 shows the available daily (8 AM to 8 AM - meteorological day) rainfall values observed at stations within and around the basin system. Hyetographs and hydrographs for each telemetering station are presented in Figures 5.0 to 5.13 and for the basin hyetograph in Figure 6.0.

5.0 Basin Hydrological Factor

5.1 River Heights and Basin Situation during the Event

Prior to T.D. Violeta, Typhoon Unding (Muifa, 0425), November 14-21, 2004, passed by further south of the basin. Although the latter tropical disturbance wreak havoc in the Bicol region, its effect over the PRB was insignificant.

River water level readings (based on staff gage) of reporting stations and available telemetered data before T.D. Violeta were all way below their respective alert status.

Water Level readings refer to or close to the actual river stages at the station points except for Zaragoza, which was stuck at 11.81 meters for quite a period. River stage readings for San Isidro station were taken from the DPWH gagekeeper's report for the month. Mayapyap telemetered WL data were reconciled from DPWH gagekeeper's report at the station. Although there were some doubtful data recorded for the month, specifically before the flooding event and at the start of the month, it is believed that the gagekeepers may have conscientiously recorded close to the actual river stage reading from the DPWH staff gage during the flood episode.

Table 2.0 Time/Date Station's Flood Assessment Gage Heights were attained

Station Point	(Alert Level) Time & Day attained	(Alarm Level) Time & Day attained	(Critical Level) Time & Day attained	Remarks
Sapang Buho	(3.7 m) believed not to have been attained	(4.5 m) not attained	(6.5 m) not attained	No survey made after the flood. Marks have been surpassed by the succeeding flood events.
Mayapyap	(3.0 m) attained after 1400H of the 23rd	(3.5 m) attained between 1500H-1600H of the 23rd	(4.5 m) attained between 1800H-1900H of the 23rd	Peak WL recorded was at 4.59 m (29.946 m. AMSL) attained at around 2000H, 23 November.
San Isidro	(3.2 m) estimated time attained – early morning of the 23rd	(4.5 m) may not have been attained	(6.0 m) not attained	No telemetered data. Est. peak water level of 4.30 m. (13.533 m. AMSL) attained at around 0800H of November 23.

Zaragoza	(11.0 m) attained around 2100H of the 23rd	(12.5 m) not attained	(14.5 m) not attained	Peak gage height of 11.38 m (11.715 m. AMSL) attained at about 0900H, November 24
Arayat	(5.0 m) attained early morning of the 23rd	(6.0 m) before noontime of the 23rd	(8.5m) not attained	Peak of 8.15 m (8.232 m AMSL) attained on 1500H, November 24.
Candaba		(4.5 m) 0700H, November 24	(5.0 m) 0400H of November 25	Recorded Peak of 5.05 m (4.893 m AMSL) attained at around 0700H of November 25.
Sulipan	(3.6 m) not attained	(4.2 m) not attained	(5.0 m) not attained	Peak gage height at 2.01 m (1.945 m AMSL) attained 2300H of November 24.
Sasmuan				No record of river overflowing at station site.
Norzagaray				No record of water level data during the event. No reported flooding at this section during the event.

Note: Elevation of gage heights (in MSL) were based on survey of elevation of zero "0" of gage at various streamgaging stations undertaken on November 1996.

Based on the preceding table, only Mayapyap and Candaba gaging stations were the only ones to have reached their respective critical levels. Flood flows along the main Pampanga River in Mayapyap gaging station were the result of the heavy rains recorded at Gabaldon via the Coronel River (Figure 7.0).

Overflowing of the Peñaranda River in Gapan and San Leonardo were from the runoff resulting from heavy rains at the upstream reaches of said river, namely Sumacbao and Chico rivers (Figure 7.1 and 7.2).

Peak rains over Gabaldon and Papaya occurred before midnight of the 23rd of November. Flash flooding in Bgy. San Vicente, Gapan and Bgy. Castellano, San Leonardo were reported to have happened between 0200H-0300H of the 23rd of November. By estimates, about 3 to 4 hours after the peak rains.

Time of concentration (T_C) is the time it takes for water to travel from the most distant point of the watershed to reach its outlet. Remoteness really relates to time of travel, not distance. On the other hand, Time lag (T_L) is the time difference between the centroid of the hyetograph (RR depth vs. Time) and the peak of the hydrograph (WL vs. Time). This can be simply said as something like the time of peak of rains with respect to the peak of floods.

An estimate of the T_C and T_L for Sumacbao, Chico and Coronel rivers using the SCS method is as follows:

River System	T_C (hours)	T_L (hours)
Sumacbao River	7.5	4.5
Chico River	8.2	4.9
Coronel River	9.4	5.6

$TC = (L^{1.15}) / (3084\ H^{0.38})$ where L is distance in meters and H is the difference in elevation between the watershed outlet and most distant ridge in meters. A study of many hydrographs has led to the empirical relationship for time lag, T_L, namely: $T_L = 0.6\ T_C$

Finally, there were no reported flooding from river overflowing along the main Pampanga River and from its major tributaries, Rio Chico and Angat rivers.

5.2 Areas Flooded

Physically, there was no widespread flooding during the event. Passing floodwaters that lasted for a few hours were experienced in at least 6 towns of Nueva Ecija as a result of the disturbance. Pampanga and Bulacan provinces were not significantly affected at that time except only in San Miguel, Bulacan, where the sudden and rushing increase of San Miguel River eroded several embankments along its channel. There were no reported river overflowing at the said latter two provinces. A flood flow map showing the movement and possible extent of flooding of the affected areas is presented in Figures 7.0 and 7.3.

Table 3.0 Flood affected areas (November 22-23, 2004)

Barangay	Estimated Flood Depth (m)	Remarks
1. Municipality of Gen. Tinio, N.E. – 6 Barangays		
Pias	1.5 (est.)	Overflowing of Sumacbao river
Poblacion East	0.5 – 1.0	Floodwaters from Penaranda river affecting
Poblacion Central	0.5 – 1.0	mostly the riverside areas
Rio Chico	0.5 (est.)	Overflowing of Chico river - riverside areas
Pulong Matong	1.5 (est.)	Affected by Peñaranda river - riverside areas
Padolina	1.5 (est.)	Affected by Peñaranda river - riverside areas
2. Municipality of Bongabon, N.E. - 4 Barangays		
Lusok	1.6	Bangkerohan-Lusok Rd. between km. 139-140 underwater between 3am-2pm, Nov. 23
Bantug		
Vega		Floodwaters fron Digmala river

Palomania		
3. Municipality of Laur, N.E. – 2 Barangays		
Betania	1.0 – 2.0	Affected by Coronel and Nabao rivers
San Antonio - Panganulong	1.0 – 2.0	Affected by Coronel river – riverside areas
4. Municipality of Gabaldon, N.E. – 10 Barangays		
Ligaya		
Bagong Sikat		Ponding of rainwater and from Coronel river
Tagumpay		Ponding of rainwater
Bugnan		Affected by Bugnan creek
Cuyapa	0.5	Run-off from mountains and Cuyapa creek
Malinao	0.5	Run-off from mountains
South Poblacion	0.5	Run-off coming from the mountains
Sawmill	0.5	Run-off from mountains
North Poblacion	0.5	Run-off from mountains
5. Cabanatuan City, N.E. – 3 Barangays		
Rizdelis		
Sumacab Norte	0.5 – 1.0	Affected by Pampanga River – riverside areas
San Juan Accfa	1.2	Affected by San Gregorio Creek
5. Municipality of San Leonardo, N.E. – 2 Barangays		
Castellano	0.5 – 2.0	Overflowing of Peñaranda river
Nieves	0.5 – 1.0	Affected by Peñaranda river – riverside areas
6. Gapan City, N.E. – 3 Barangays		
Pambuan	1.0 – 2.0	Overflowing of the Peñaranda river; mostly riverside areas; passing floodwaters in early morning of Nov.23, between 2am – 6am
Sto. Nino	1.0 – 2.0	
San Lorenzo	1.0 – 2.0	

- Bongabon Bridge – not passable to all types of vehicles from about 5am to 12 noon (estimated), Nov. 23, 2004 (PDCC report)
- Doña Josefa Bridge and portions of Maharlika Hi-way between San Leonardo and Gapan – not passable to all types of vehicles from 2am to 9am, Nov. 23, 2004 due to flash floods and afterwards clearing of logs and debris.

6.0 Flood Forecasting and Warning activities

Flood forecasting and warning activities during the event were practically useless. The initial bulletin, FB no. 1, was issued at 0900H of November 23. Floodwaters that have affected the eastern portions of Nueva Ecija had almost subsided at that time.

This is one of the limitations of the FFWS, that is, not suitable for flash flood forecasting and warning. At any rate, 5 more flood bulletins were issued afterwards to forewarn downstream areas, riverside areas along the Pampanga River. Final flood bulletin, FB no. 6, was issued on 0400H of November 25. No general flood advisories (GFA) were issued for the Guagua river basin area.

7.0 Flood Damages (Province of Nueva Ecija)

Summary report of affected areas and damages incurred for the Province of Nueva Ecija as prepared by the Office of Civil Defense, Region 3, as of 0800H, 28 November 2004, are as follows:

- Total number of Municipalities / Cities affected: 4 towns and 1 city (Nueva Ecija)
- Total families affected: 1,863 families
- Total persons affected: 8,542 persons
- Number of Fatalities: 2 persons (Gabaldon)
- Number of Injured persons: 58 persons (Gabaldon)
- Number of missing persons: 17 persons (Gabaldon)
- Number of houses partially damaged: 35 (San Leonardo)

Estimated cost of Damages:

- Infrastructures: ₱ 2.525 Million
- Crops: ₱ 8,354,800 (393.5 has.)
- Livestocks: ₱ 1.510 Million
- Vegetables: ₱ 19,047,245 (718.55 has.)

8.0 Recommendations

The nature of flash flooding is fast and sudden. Therefore, a flash flood alert system should be introduced and adopted at areas that are prone to such type of flooding. A network of rainfall stations at strategic points of the mountain ranges of Sierra Madre and water level observation points at the immediate low end slopes of the mountains as well as river observation points at upstream sections of primary rivers are some of the possible actions that can be adopted for a flash flood alert system.

Except, of course, if it is possible to estimate the amount of rainfall, as well as the area of its downpour, then the above network system can be shelved. Another is the establishment of rainfall radar that is oriented at that area. However, such systems are quite expensive to operate and maintain. While the previous system is less expensive, manning setup may be a bit of a problem, especially if an observer is to be stationed at a remote and physically uninhabited area.

References

A. Reports:

1. Post-Flood Investigation Report - Area: Pampanga River Basin System, Event: Southwest Monsoon of August 2004. PRFFWC, Flood Forecasting Branch, PAGASA, DOST in collaboration with PKII Engineers. October 2004.

B: Resource Persons:

1. Personnel and Staff of the Pampanga Provincial Disaster Coordinating Center, San Fernando, Pampanga.
2. Mr. Rodolfo Santos, Provincial Disaster Coordinating Officer, Bulacan Provincial Disaster Coordinating Office, Malolos, Bulacan
3. Raul Agustin, Special Operations Officer, Bulacan Provincial Disaster Coordinating Office, Bulacan
4. Lorenzo W. Burgos, Executive Officer, PDCC; Chief, Provincial Disaster Management Center, Office of Civil Defense, Province of Nueva Ecija.
5. Amado del Valle, CEO II, PDCC, Province of Nueva Ecija.
6. Personnel and Staff of PAGASA Cabanatuan Synoptic Station, Cabanatuan City, Nueva Ecija
7. Lourdes Elipane, DPWH gagekeeper, San Isidro, Nueva Ecija
8. Alberto Punzalan, DPWH gagekeeper, Mayapyap, Cabanatuan, Nueva Ecija
9. Personnel of Techniques Development Section, Weather Branch, PAGASA, DOST
10. Personnel & Staff of the Pampanga River Flood Forecasting & Warning Center, FFB, PAGASA, DOST

FIGURES

FIGURES

Figure 1.0 The Pampanga River Basin including the allied basin of Guagua River.

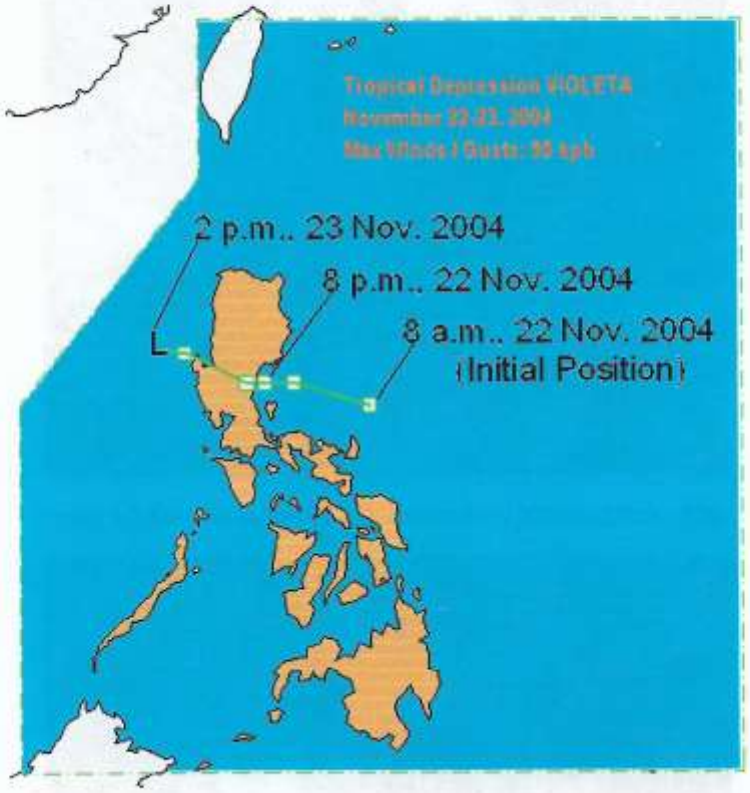


Figure 2.0 Track of Tropical Depression Violeta from Nov.22-23, 2004.

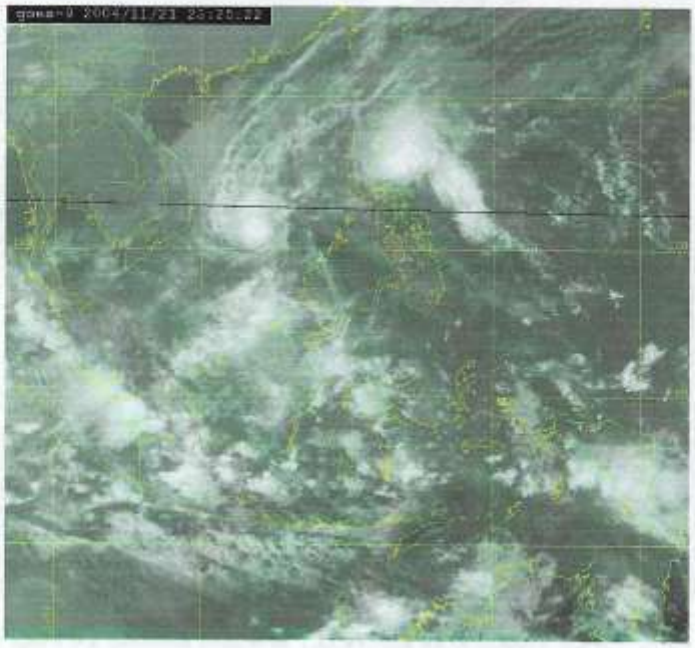


Figure 3.0 Satellite Image of T.D.Violeta as of 0000H, 22Nov. 2004.

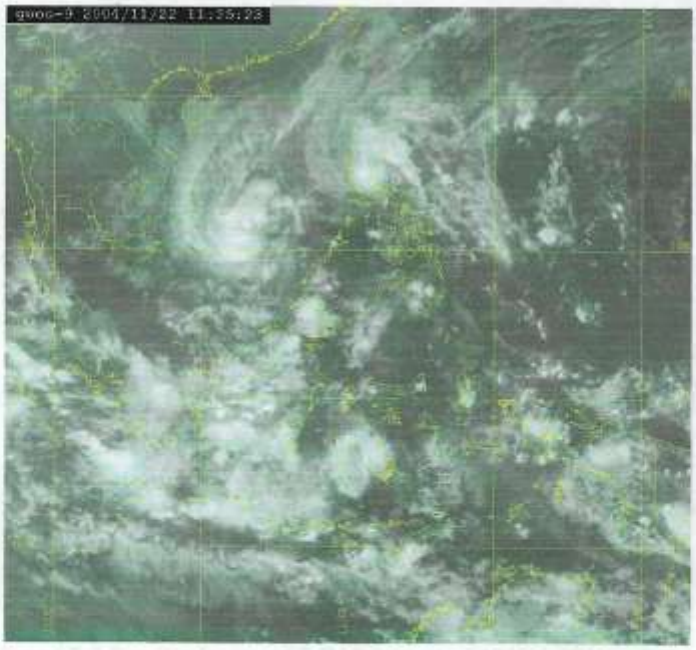


Figure 3.1 Satellite Image of T.D.Violeta as of 1200H, 22Nov. 2004.

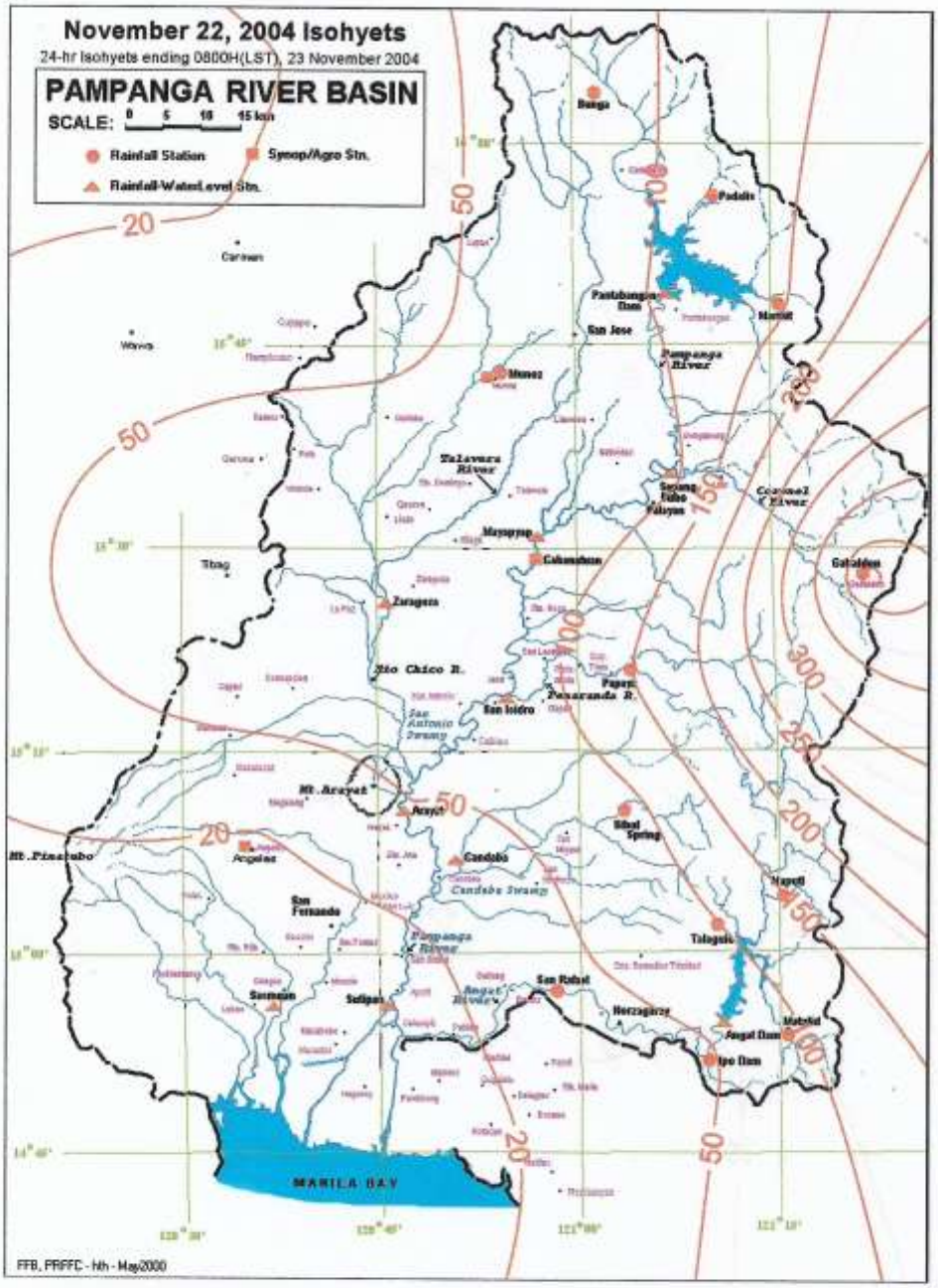


Figure 4.0 24-hour Isohyets ending at 0800H, November 23, 2004

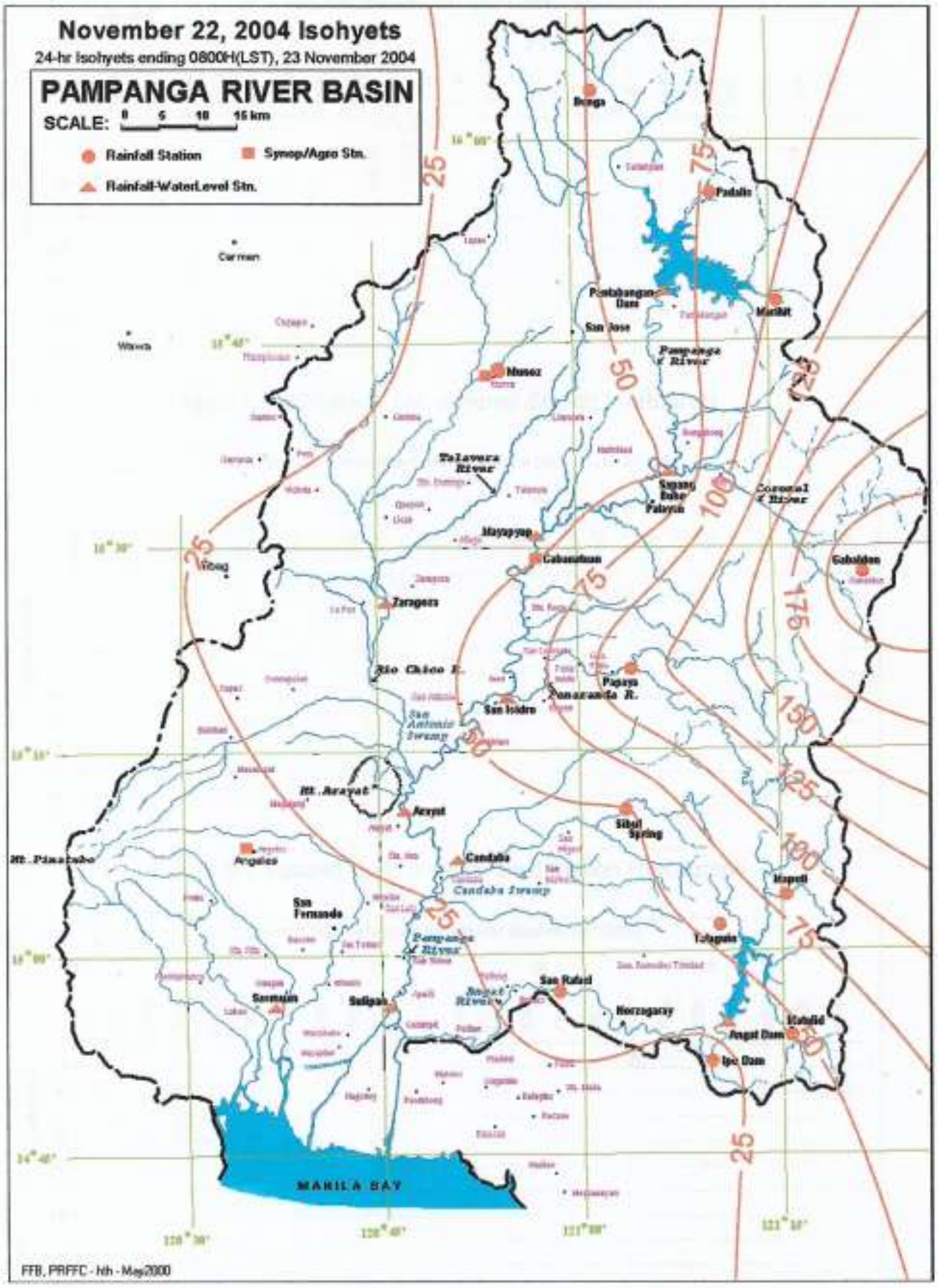


Figure 4.1 Maximum 4-hour total Isohyets from 2100H, 22 Nov 2004 to 0100H, 23 Nov 2004.

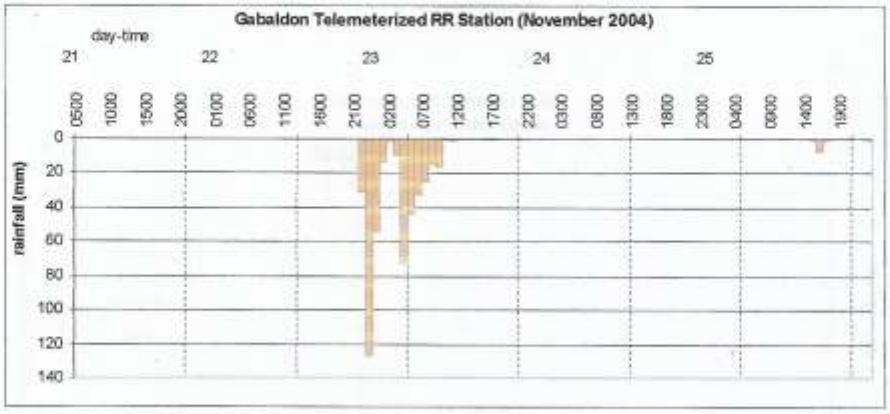


Figure 5.0 Gabaldon Telemetered Station Hyetograph

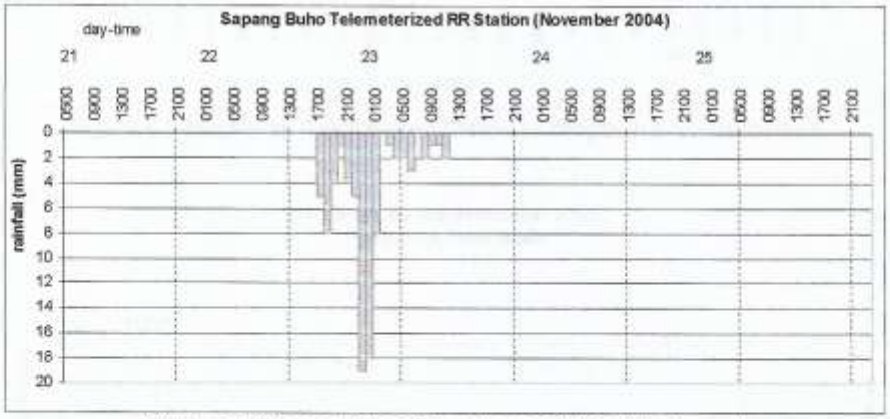


Figure 5.1 Sapang Buho Telemetered Station Hyetograph

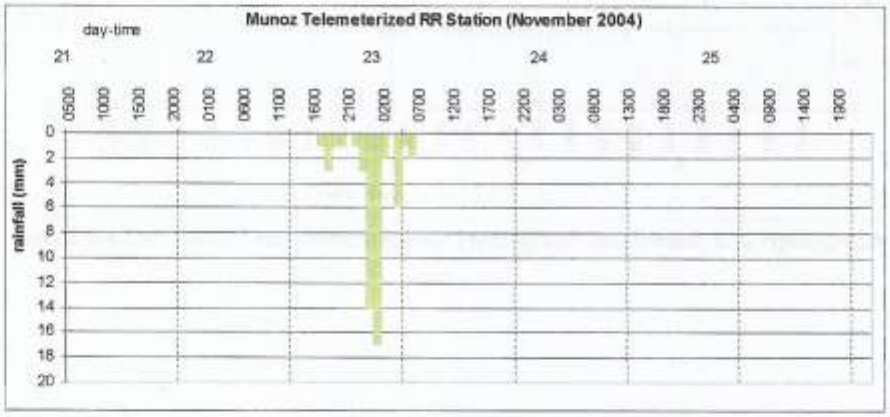


Figure 5.2 Muñoz Telemetered Station Hyetograph

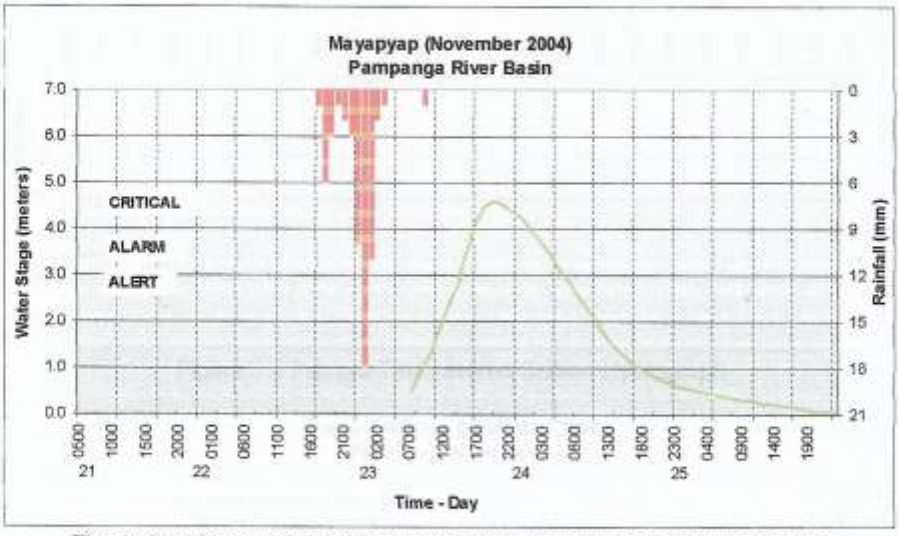


Figure 5.3 Mayapyap Telemetered Station Hydrograph and Hyetograph

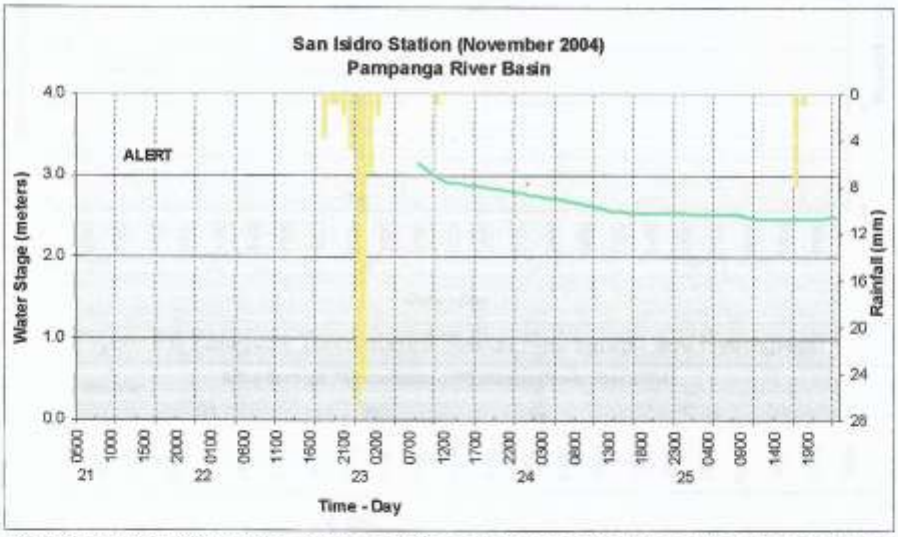


Figure 5.4 San Isidro Telemetered Station Hydrograph (estimated) and Hyetograph

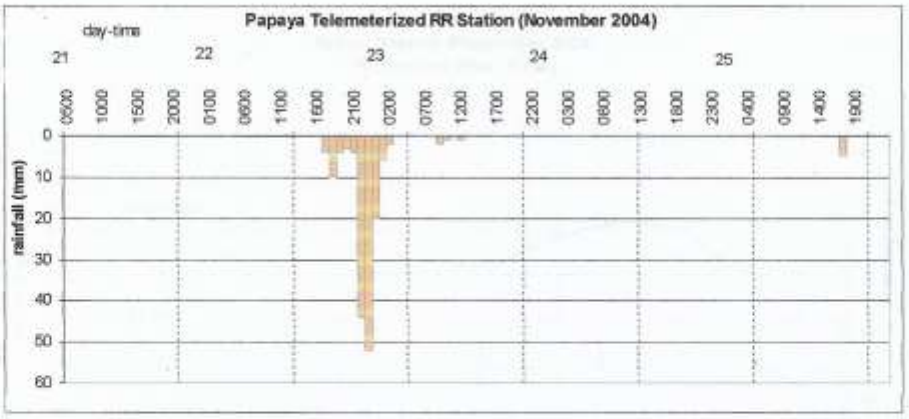


Figure 5.5 Papaya Telemetered Station Hyetograph

Figure 5.6 Zaragoza Telemetered Station Hydrograph and Hyetograph

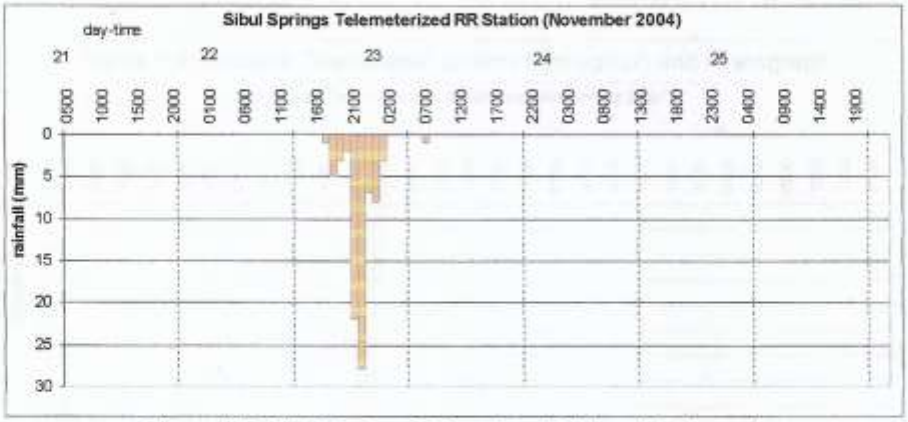


Figure 5.7 Sibul Springs Telemetered Station Hyetograph

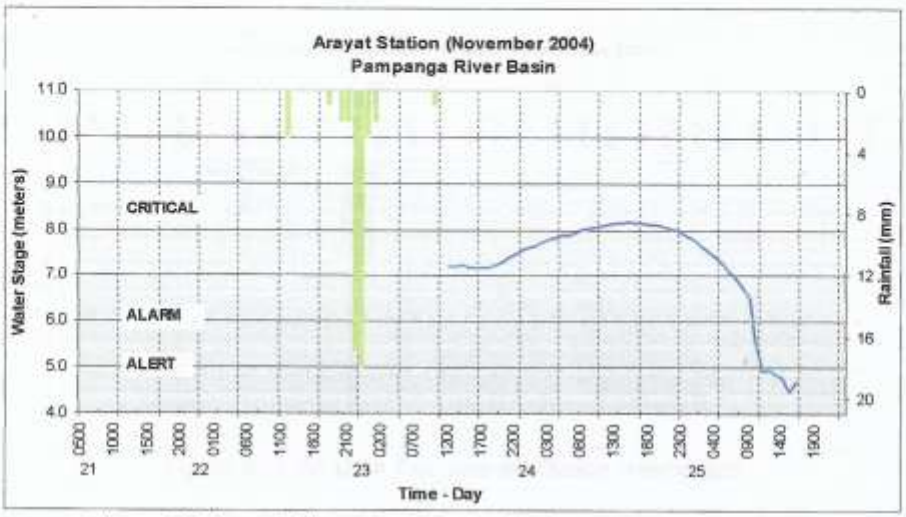


Figure 5.8 Arayat Telemetered Station Hydrograph and Hyetograph

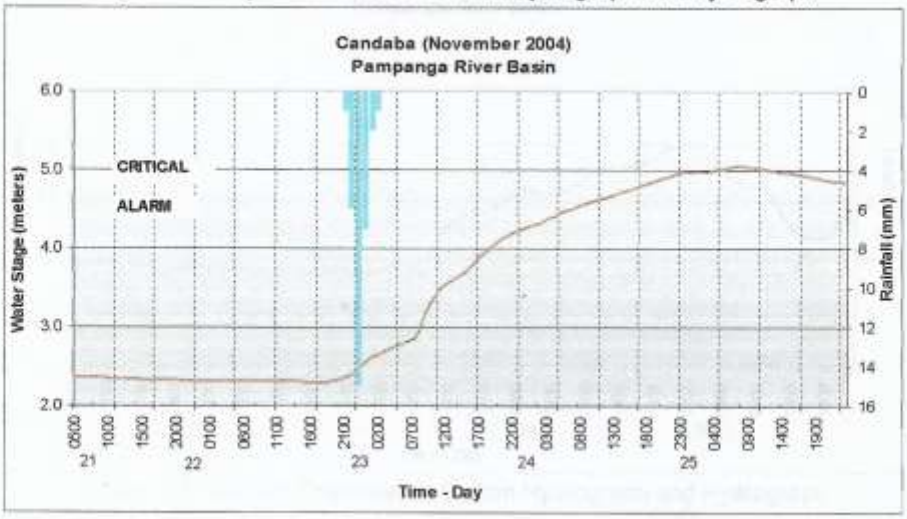


Figure 5.9 Candaba Telemetered Station Hydrograph and Hyetograph

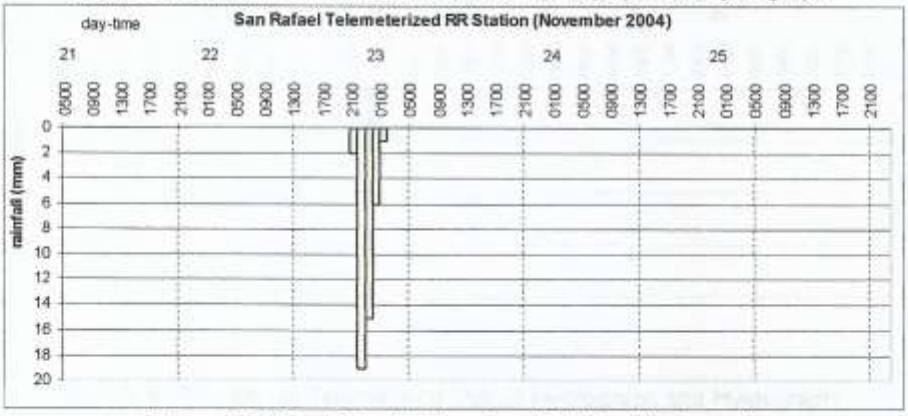


Figure 5.10 San Rafael Telemetered Station Hyetograph

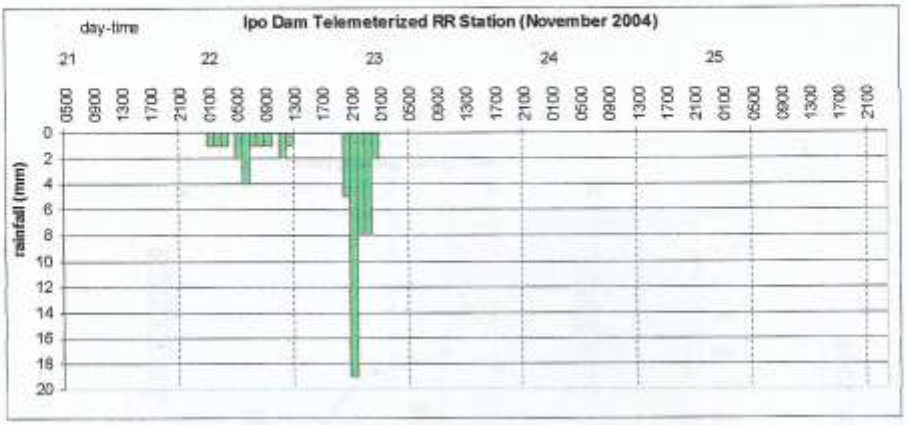


Figure 5.11 Ipo Dam Telemetered Station Hyetograph

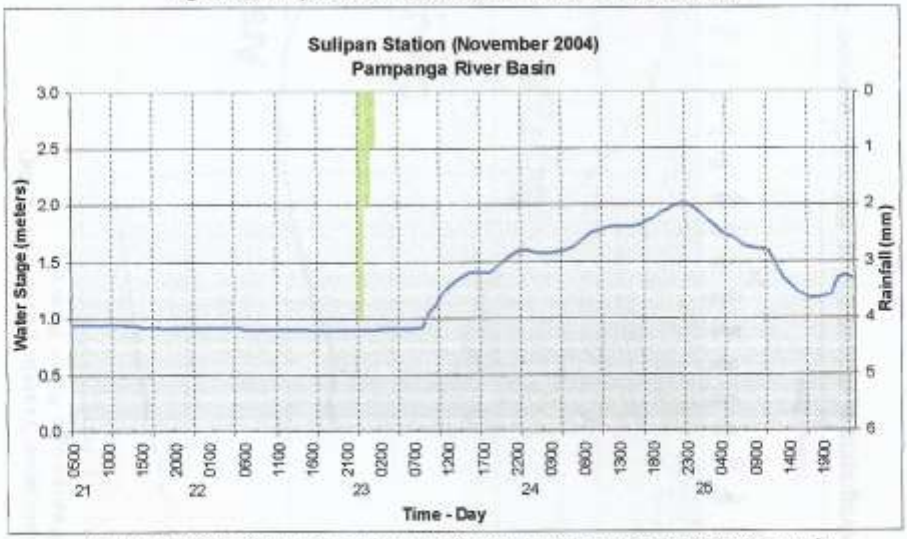


Figure 5.12 Sulipan Telemetered Station Hydrograph and Hyetograph

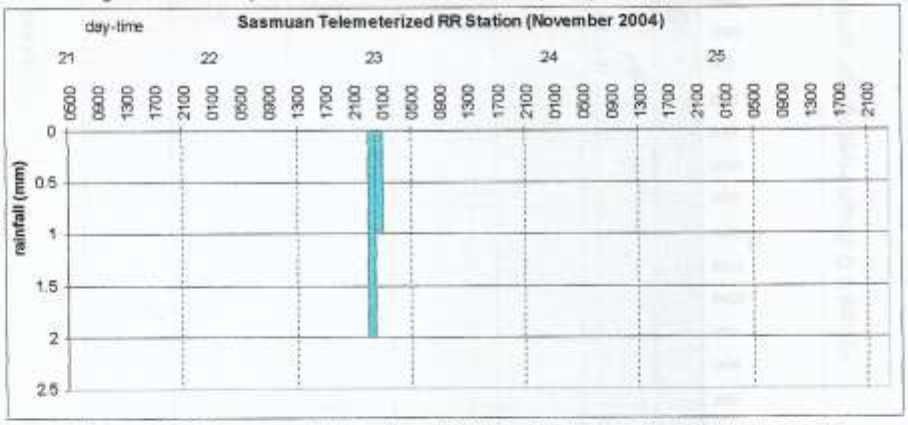


Figure 5.13 Sasmuan Telemetered Station Hydrograph and Hyetograph

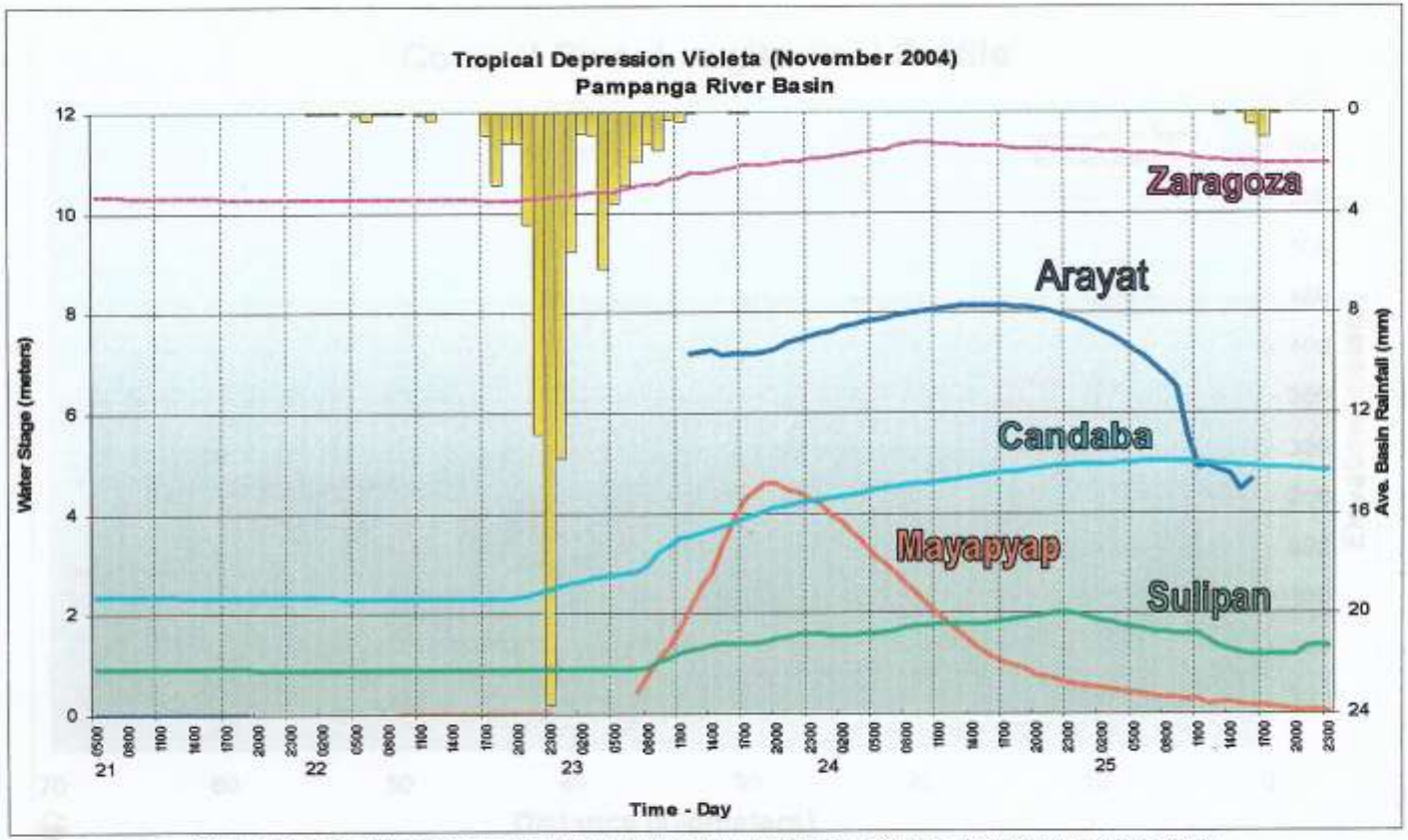


Figure 6.0 Basin Hyetograph and Hydrographs at various gaging stations (November 21-25, 2004)

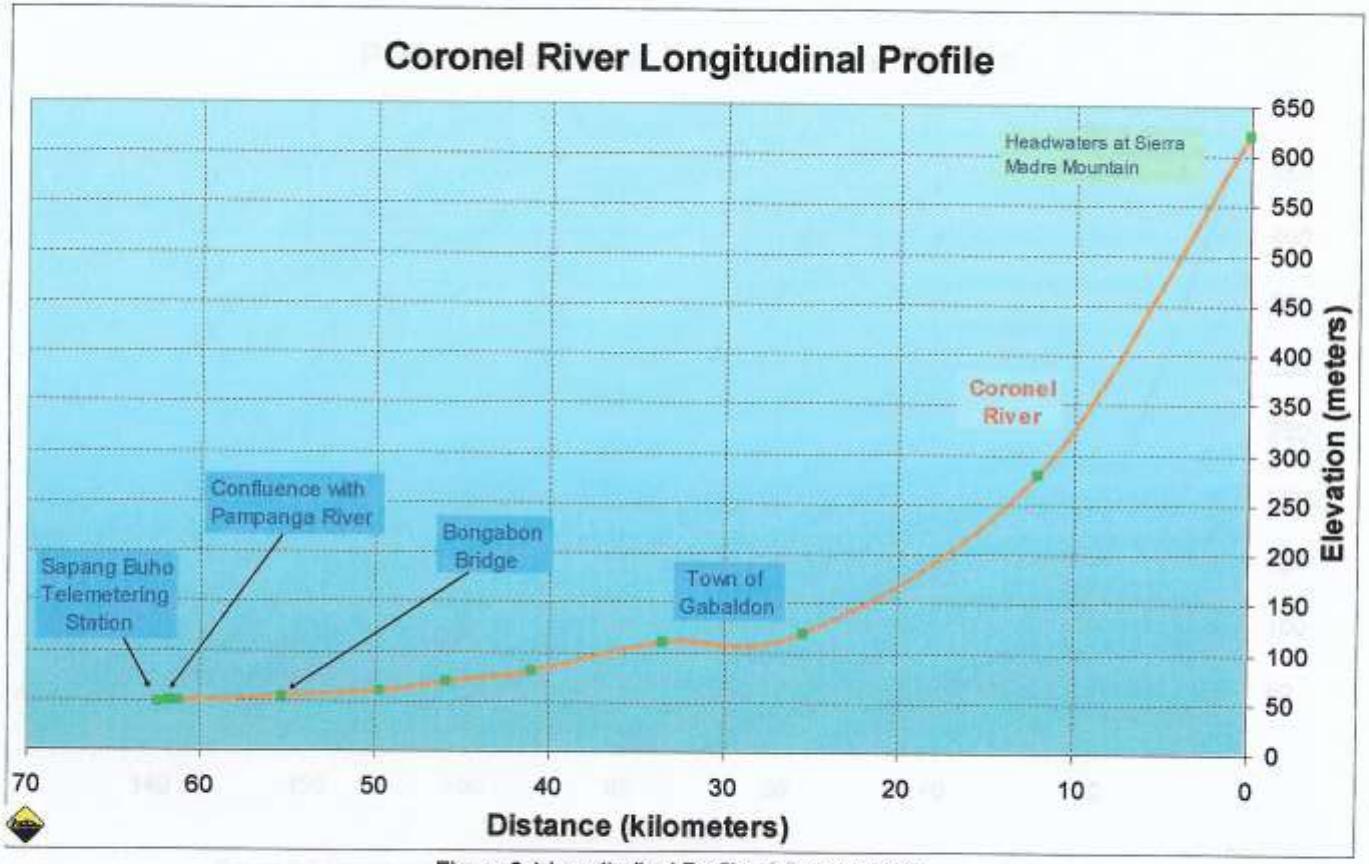


Figure 6.1 Longitudinal Profile of Coronel River

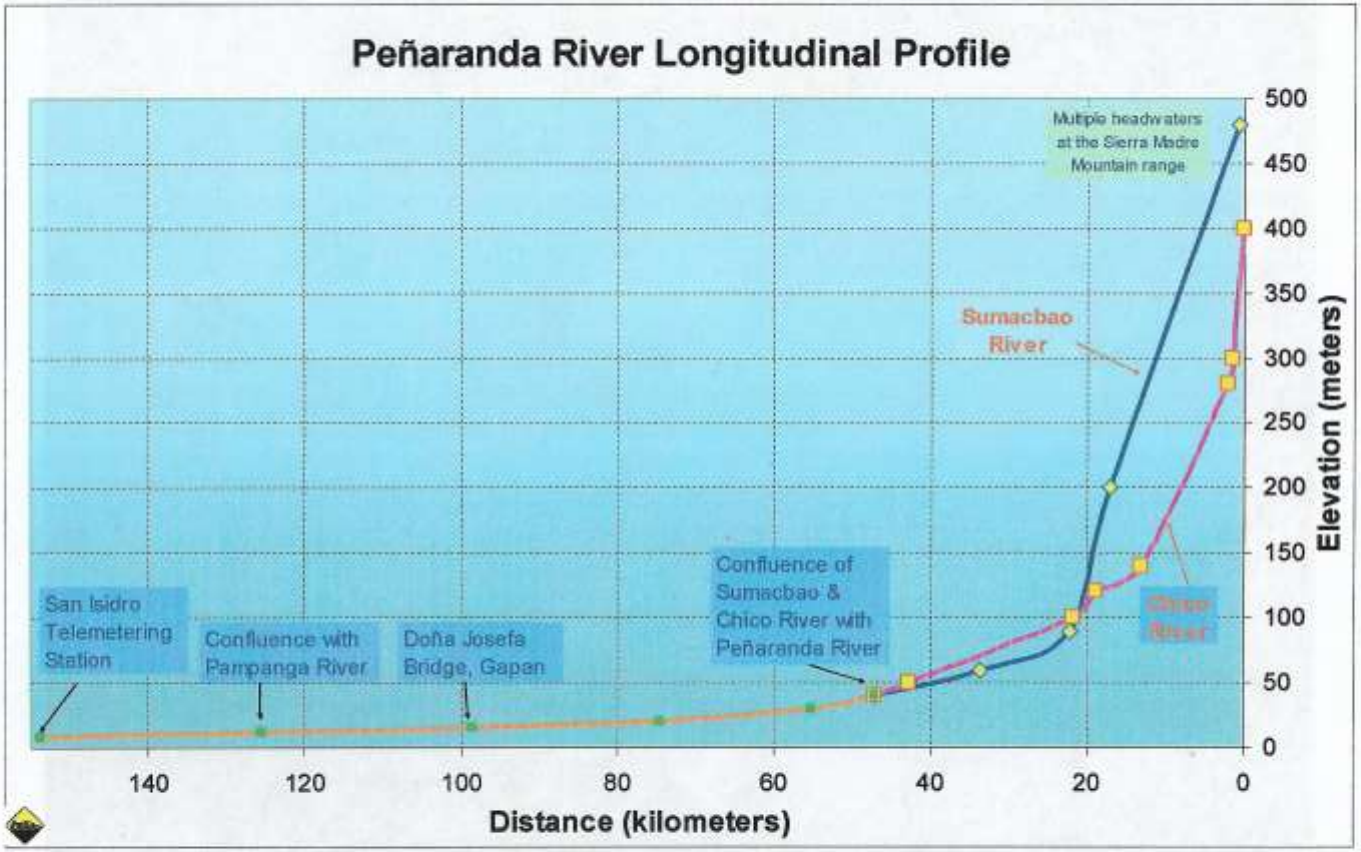


Figure 6.2 Longitudinal Profile of Peñaranda River from both Sumacbao and Chico Rivers

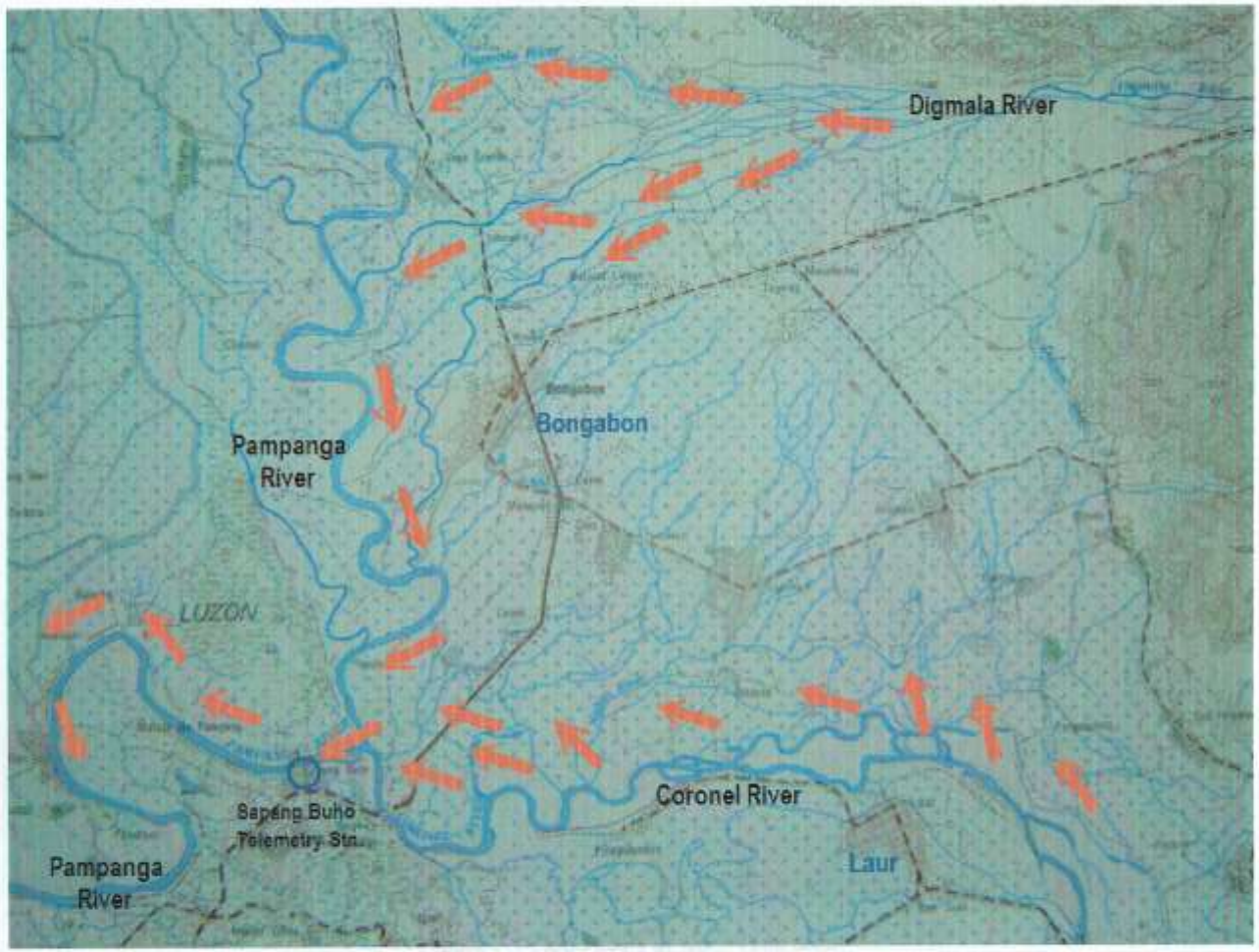


Figure 7.0 Flood flows at the Bongabon-Laur Area (Nov. 23, 2004)

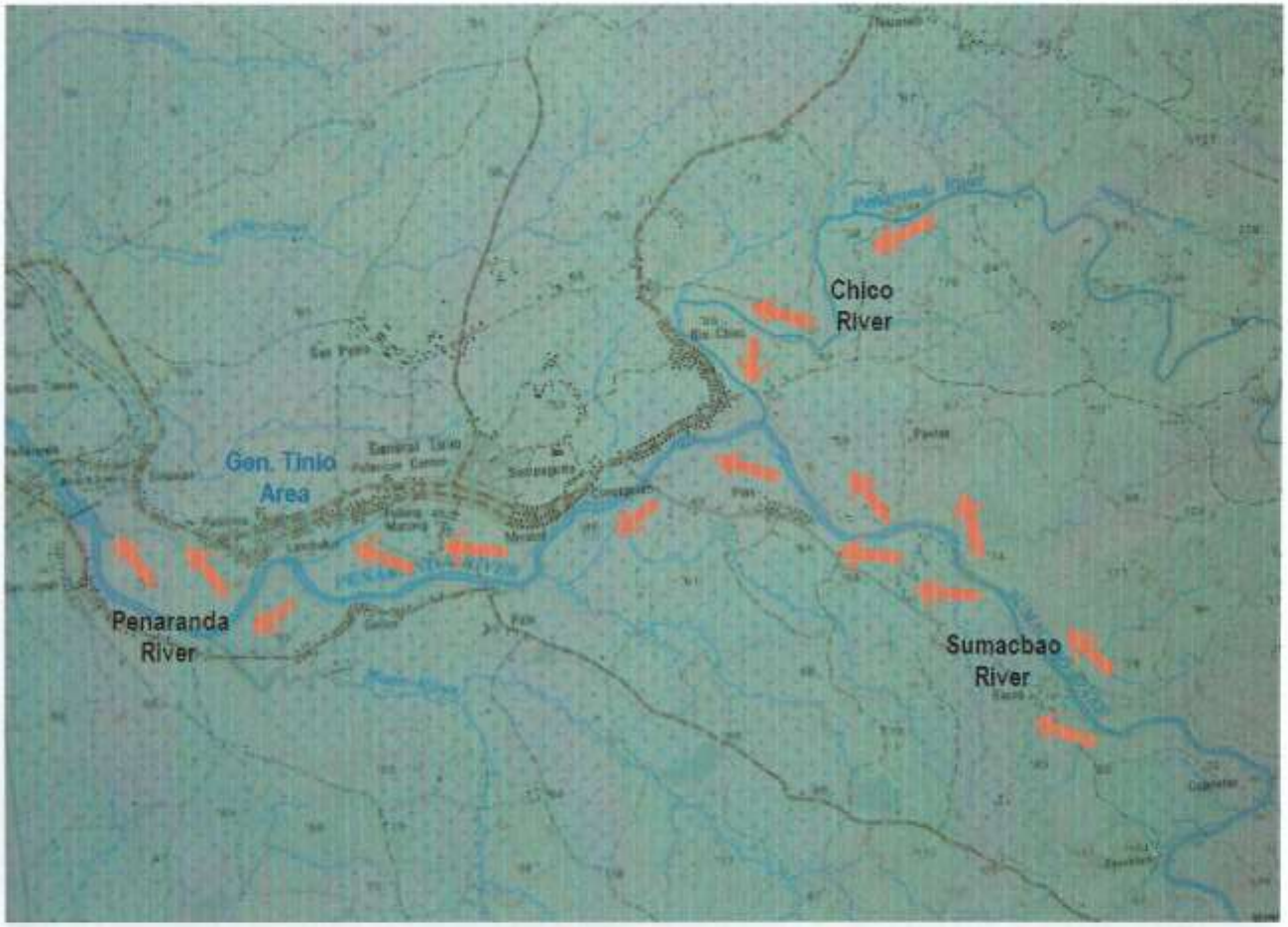


Figure 7.1 Flood flows at Gen. Tinio area.

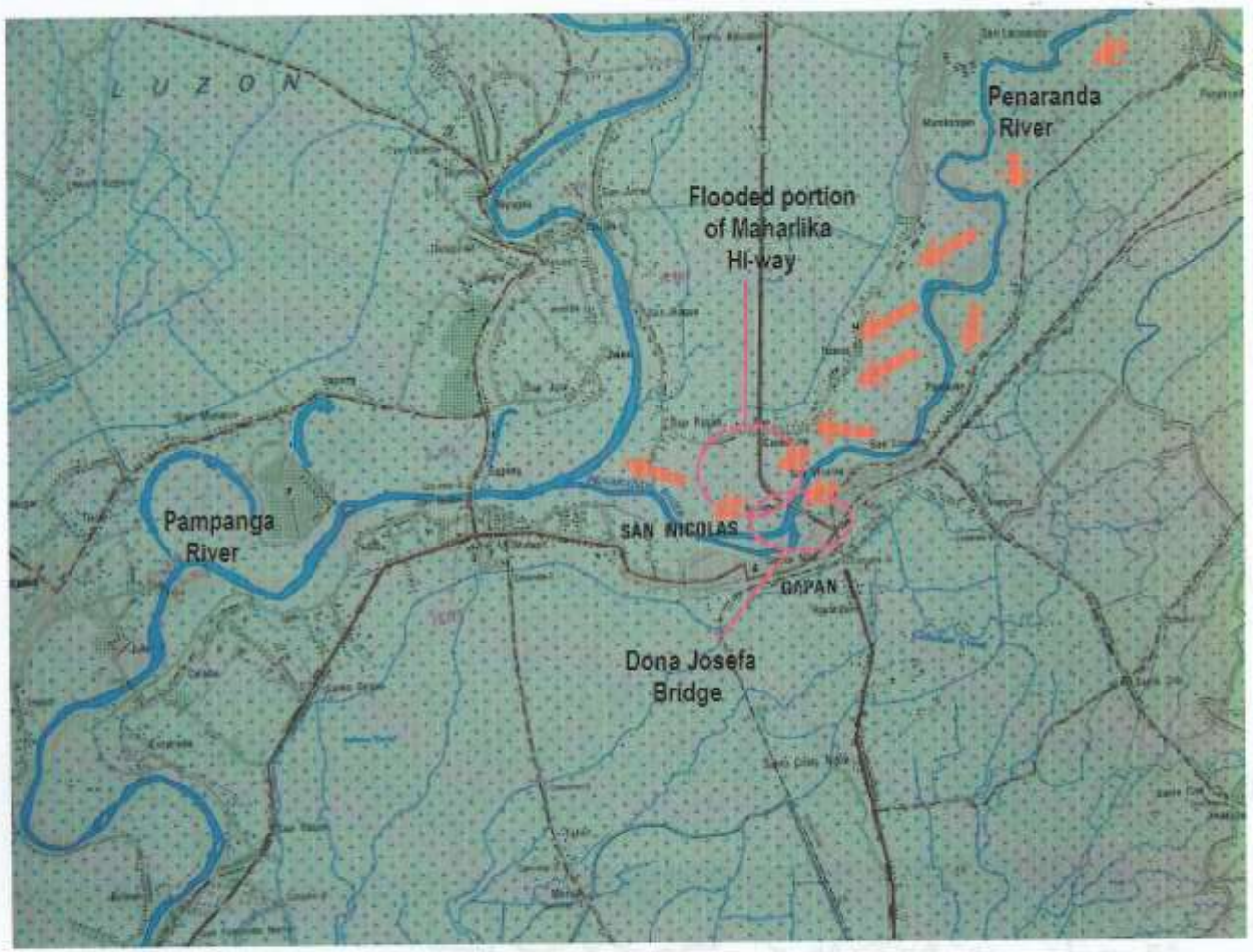


Figure 7.2 Portion where floodwaters overflowed the Maharlika Hi-way at the San Leonardo-Gapan Area.

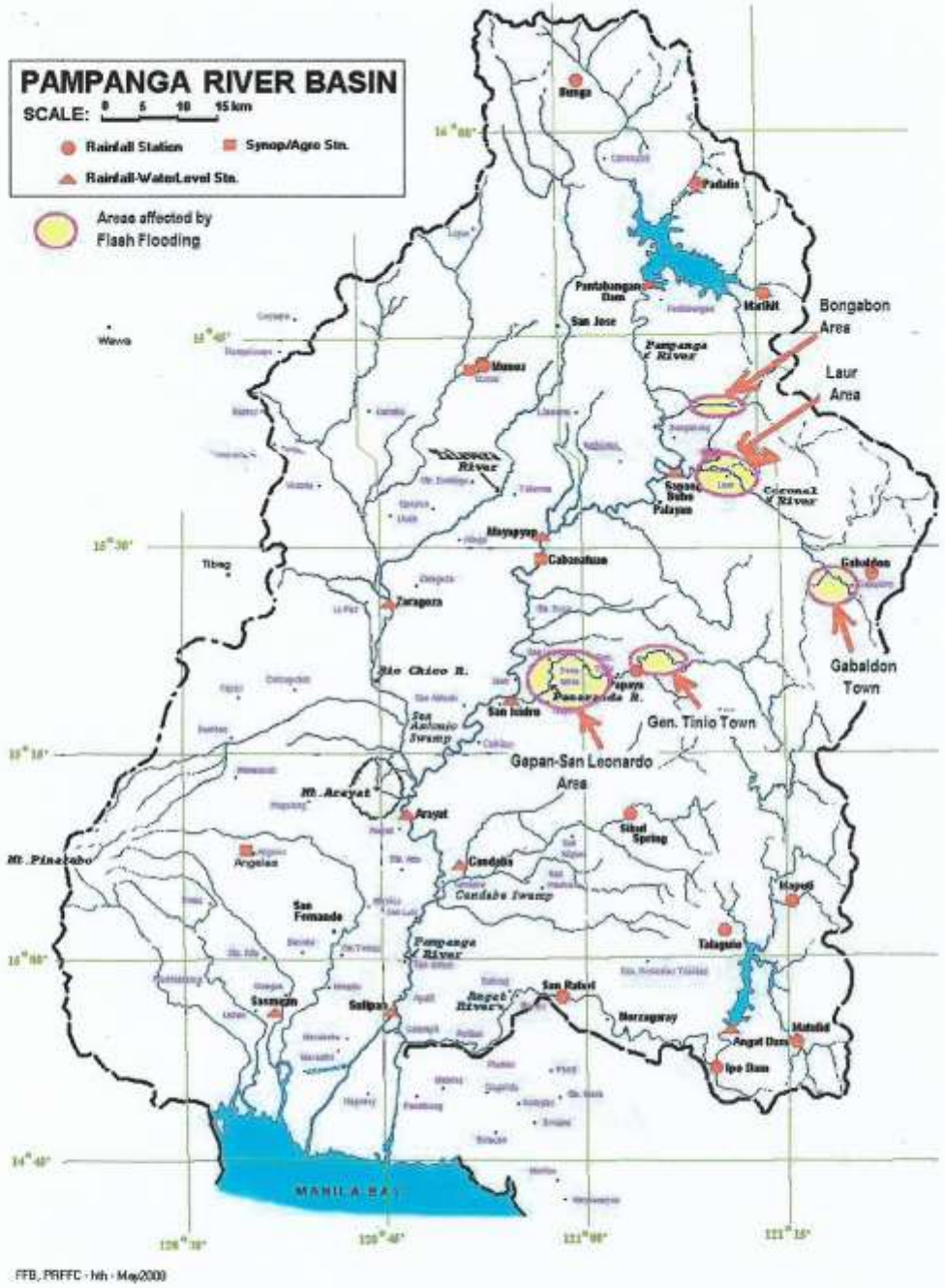


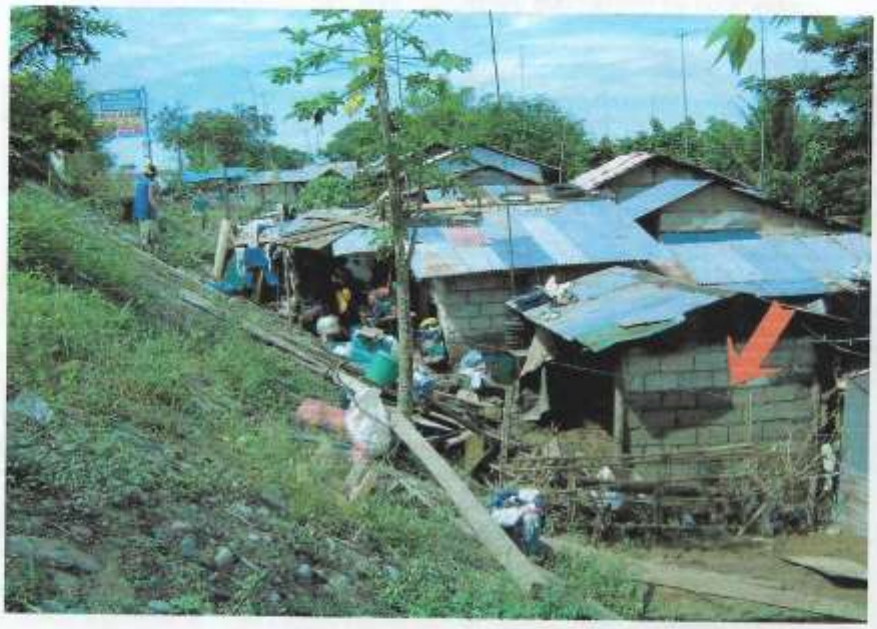
Figure 7.3 Areas affected by flash flooding (Nov. 22-23, 2004)

PHOTOGRAPHS

Pic 1.0 Debris brought by the flashflood caught under the Doña Josefa Bridge at Inang Bayan, Brgy. San Vicente, Gapan, Nueva Ecija.

Pic 2.0 Dwellings of informal settlers at the right bank of Peñaranda River were almost totally washed-out as the flashflood arrived.

Pic 3.0 Floodwaters overflowed the Maharlika Highway at San Leonardo, Nueva Ecija just after the Doña Josefa Bridge.



Pic 4.0 Maximum flood height (red arrow) attained as shown by the flood marks on the walls of houses that were left standing after the flashflood at the right bank of Peñaranda River (San Leonardo side).

Pic 5.0 The right bank plain area of the muddy-colored Peñaranda River at Bgy. Castellano, San Leonardo, was completely submerged by floodwaters.

Pic 6.0 The left bank (riverside areas) of the Peñaranda River at Bgy. San Vicente, Gapan, was totally submerged at the height of the floodwaters. Residents of the area, shown here, are trying to recover things that were washed away.

Pic 7.0 Big logs from upstream washed away by floodwaters along the Pampanga River being gathered by locals at San Isidro, Nueva Ecija.

Pic 8.0 Logs that were washed away by floodwaters along the channel of Pampanga River (left bank section) at the San Leonardo-Jaen junction.

Pic 9.0 San Isidro streamgaging station at 2.90 meters reading at around 1300H, 23 Nov. 2004, several hours after reaching its peak of more than 3.15 meters. The first sensing was totally submerged during the peak stage.

Pic 10.0 Maximum flood level attained at Arayat Gaging station reached 8.16 meters at around 1500H, 24 November 2005.

Pic 11.0 The Gabaldon valley with the mountainous area (about 800m-900m AMSL) at the background separating the said valley from the town of Gen.Tinio at the other side of the mountain. Mountains are quite steep producing fast-moving floodwaters.

Pic 12.0 The Sumacbao-Chico river confluence showing a plain and shallow channel. Downstream sections, along Peñaranda river, are rather silted and similarly shallow..

FLOOD BULLETINS

Republic of the Philippines
Department of Science and Technology
PHILIPPINE ATMOSPHERIC, GEOPHYSICAL AND
ASTRONOMICAL SERVICES ADMINISTRATION (PAGASA)

FLOOD FORECASTING BRANCH
PAMPANGA RIVER FLOOD FORECASTING AND WARNING CENTER
WFFC, BIR Road, Quezon City 1100 Tel. No. 928-27-54/926-50-60 Fax. 929-40-65
Webpage:http://www.pampangariverbasin.mainpage.net

==========

PAMPANGA RIVER BASIN
FLOOD BULLETIN No.1
Issued at 9:00 AM Tuesday November 23 2004
(Valid Until 4:00 PM Today)

ACCUMULATED STATION RAINFALL (mm):
(From 8:00AM 22 November 2004 to 8:00AM 23 November 2004)

Munoz = 52	Papaya = 149	Ipo = 46
Sapang Buho = 82	San Isidro = 74	San Rafael = 43
Mayapyap = 70	Sibul Spring = 80	Cabanatuan Synop = 69
Gabaldon = 429	Candaba = 32	Sulipan = 7

FORECAST 24-HR RAINFALL BEGINNING AT 9 AM TODAY
Light to Moderate rainfall

EXPECTED HYDROLOGICAL RESPONSE:

1. CONTINUED RISE OF UPPER AND MIDDLE PAMPANGA RIVER AND TRIBUTARY CHICO RIVER.

FLOODING IS EXPECTED TO PERSIST IN THE LOW-LYING AREAS OF GAPAN, STA. ROSA, SAN LEONARDO, LAUR, PALAYAN CITY, JAEN, CABIAO AND CABANATUAN CITY.

FLOODING IS EXPECTED IN THE LOW-LYING AREAS OF POB. ARAYAT, BO. CANDATING, SAN MATEO AND STA. CRUZ.

PUBLIC WARNING:

PEOPLE LIVING IN LOW LYING AREAS ADJACENT OR ALONG THE ABOVE MENTIONED WATERWAYS AND THE LOCAL DISASTER COORDINATING COUNCILS CONCERNED ARE ADVISED TO TAKE THE NECESSARY APPROPRIATE ACTIONS.

Prepared By:
RTP / SRE / SFPJr.
Hydrologists

Republic of the Philippines
Department of Science and Technology
PHILIPPINE ATMOSPHERIC, GEOPHYSICAL AND
ASTRONOMICAL SERVICES ADMINISTRATION (PAGASA)

FLOOD FORECASTING BRANCH
PAMPANGA RIVER FLOOD FORECASTING AND WARNING CENTER
WFFC, BIR Road, Quezon City 1100 Tel. No. 928-27-54/926-50-60 Fax. 929-40-65
Webpage:http://www.pampangariverbasin.mainpage.net

PAMPANGA RIVER BASIN
FLOOD BULLETIN No. 2
Issued at 4:00 PM Tuesday November 23 2004
(Valid Until the next issuance at 4:00 AM tomorrow)

AVERAGE BASIN RAINFALL:
PAST 31 HOURS ENDING AT 3:00PM TODAY = 97mm WITH MAXIMUM OVER NORTHEASTERN PART OF THE BASIN

FORECAST FOR THE NEXT 12 HOURS = LESS THAN 10mm

EXPECTED HYDROLOGICAL RESPONSE:

2. FURTHER RISE OF UPPER AND MIDDLE PAMPANGA RIVER AND TRIBUTARIES RIO CHICO AND PENARANDA RIVERS.
FLOODING IS EXPECTED TO PERSIST IN THE LOW-LYING AREAS OF BONGABON, LAUR, PALAYAN CITY, GAPAN, STA. ROSA, SAN LEONARDO, JAEN, CABIAO AND CABANATUAN CITY.

2. GRADUAL RISE OF LOWER PAMPANGA RIVER.
FLOODING IS THREATENING IN THE LOW-LYING AREAS SURROUNDING CANDABA SWAMP INCLUDING APALIT AND THOSE IN THE DELTA AREAS.

RESIDENTS AND THE DISASTER COORDINATING COUNCILS CONCERNED ARE ADVISED TO TAKE APPROPRIATE ACTIONS.

Prepared By:

HMB / SRE / DDF / SFPJr.
Hydrologists

Republic of the Philippines
Department of Science and Technology
PHILIPPINE ATMOSPHERIC, GEOPHYSICAL AND ASTRONOMICAL SERVICES ADMINISTRATION (PAGASA)

FLOOD FORECASTING BRANCH
PAMPANGA RIVER FLOOD FORECASTING AND WARNING CENTER
WFFC, BIR Road, Quezon City 1100 Tel. No. 928-27-54/926-50-60 Fax. 929-40-65
Webpage:http://www.pampangariverbasin.mainpage.net

PAMPANGA RIVER BASIN
FLOOD BULLETIN No. 3
Issued at 4:00 AM Wednesday November 24, 2004
(Valid Until the next issuance at 4:00 PM today)

AVERAGE BASIN RAINFALL:
PAST 43 HOURS ENDING AT 3:00AM TODAY = 97mm WITH NO RAINS RECORDED DURING THE LAST 10 HOURS.

FORECAST FOR THE NEXT 12 HOURS = LESS THAN 5mm

EXPECTED HYDROLOGICAL RESPONSE:

3. GRADUAL RECESSION OF THE UPPER MAIN PAMPANGA RIVER AND TRIBUTARIES RIO CHICO AND PENARANDA RIVERS.
FLOODING IS EXPECTED TO IMMEDIATELY SUBSIDE IN THE LOW-LYING AREAS OF BONGABON, LAUR, PALAYAN CITY, GAPAN, STA. ROSA, SAN LEONARDO, JAEN, AND CABANATUAN CITY.

2. SLOW RISE OF THE MIDDLE AND LOWER MAIN PAMPANGA RIVER.
FLOODING IS EXPECTED TO OCCUR IN THE LOW-LYING RIVERSIDE AREAS OF CABIAO, ARAYAT, SAN LUIS, SAN SIMON, APALIT, CALUMPIT, HAGONOY AND PAOMBONG.

3. SLOW FILLING-UP OF THE CANDABA SWAMP AREA.
FLOODING IS EXPECTED TO OCCUR IN THE SURROUNDING LOW-LYING AREAS OF CANDABA SWAMP.

RESIDENTS AND THE DISASTER COORDINATING COUNCILS CONCERNED ARE ADVISED TO TAKE APPROPRIATE ACTIONS.

Prepared By:

HTH / FLM

Republic of the Philippines
Department of Science and Technology
PHILIPPINE ATMOSPHERIC, GEOPHYSICAL AND
ASTRONOMICAL SERVICES ADMINISTRATION (PAGASA)

FLOOD FORECASTING BRANCH
PAMPANGA RIVER FLOOD FORECASTING AND WARNING CENTER
WFFC, BIR Road, Quezon City 1100 Tel. No. 928-27-54/926-50-60 Fax. 929-40-65
Webpage:http://www.pampangariverbasin.mainpage.net

PAMPANGA RIVER BASIN
FLOOD BULLETIN No. 4
Issued at 4:00 PM Wednesday November 24, 2004
(Valid Until the next issuance at 4:00 AM tomorrow)

AVERAGE BASIN RAINFALL:
PAST 55 HOURS ENDING AT 3:00PM TODAY = 97mm
(NO RAINS RECORDED DURING THE LAST 22 HOURS)

FORECAST FOR THE NEXT 12 HOURS = LESS THAN 10mm

EXPECTED HYDROLOGICAL RESPONSE:

4. CONTINUOUS RECESSION OF THE UPPER MAIN PAMPANGA RIVER AND TRIBUTARIES RIO CHICO AND PENARANDA RIVERS.
FLOODING IS EXPECTED TO IMMEDIATELY SUBSIDE IN THE LOW-LYING AREAS OF BONGABON, LAUR, PALAYAN CITY, GAPAN, STA. ROSA, SAN LEONARDO, JAEN, AND CABANATUAN CITY.

2. SLOW RISE OF THE MIDDLE AND LOWER MAIN PAMPANGA RIVER.
FLOODING IS EXPECTED TO OCCUR IN THE LOW-LYING RIVERSIDE AREAS OF CABIAO, ARAYAT, SAN LUIS, SAN SIMON, APALIT, CALUMPIT, HAGONOY AND PAOMBONG.

3. SLOW FILLING-UP OF THE CANDABA SWAMP AREA.
FLOODING IS EXPECTED TO OCCUR IN THE SURROUNDING LOW-LYING AREAS OF CANDABA SWAMP.

RESIDENTS AND THE DISASTER COORDINATING COUNCILS CONCERNED ARE ADVISED TO TAKE APPROPRIATE ACTIONS.

Prepared By:

SFPJr.
Hydrologist, FFWS

Noted By:

Rosa T. Perez, Ph. D.
OIC, FFB

Republic of the Philippines
Department of Science and Technology
PHILIPPINE ATMOSPHERIC, GEOPHYSICAL AND ASTRONOMICAL SERVICES ADMINISTRATION (PAGASA)

FLOOD FORECASTING BRANCH
PAMPANGA RIVER FLOOD FORECASTING AND WARNING CENTER
WFFC, BIR Road, Quezon City 1100 Tel. No. 928-27-54/926-50-60 Fax. 929-40-65
Webpage:http://www.pampangariverbasin.mainpage.net

PAMPANGA RIVER BASIN
FLOOD BULLETIN No. 5 (FINAL)
Issued at 4:00 AM Thursday November 25, 2004
(Valid for the next 24-hour period)

AVERAGE BASIN RAINFALL:
PAST 67 HOURS ENDING AT 3:00 AM TODAY = 97mm
(NO RAINS RECORDED DURING THE PAST 34 HOURS)

FORECAST FOR THE NEXT 24 HOURS = LESS THAN 5mm

EXPECTED HYDROLOGICAL RESPONSE:

5. MIDDLE AND LOWER MAIN PAMPANGA RIVER REACHED ITS PEAKS AND A SLOW RECESSION IS NOW IN EFFECT.
RIVER FLOODING IS NO LONGER POSSIBLE IN THE NEXT 24 HOURS IN THE LOW-LYING AREAS OF ARAYAT, SAN LUIS, SAN SIMON, APALIT, CALUMPIT, HAGONOY AND PAOMBONG.

2. WATER LEVEL OF CANDABA SWAMP TO LEVEL OFF AND TO RECEDE VERY SLOWLY.
FLOODING IS EXPECTED TO REMAIN FOR SEVERAL DAYS WITHIN AND IN THE SURROUNDING LOW-LYING AREAS OF CANDABA SWAMP.

RESIDENTS AND THE DISASTER COORDINATING COUNCILS CONCERNED ARE STILL ADVISED TO CONTINUE TO TAKE APPROPRIATE ACTIONS.

Prepared By:

HTH / FLM
PRFFWC

Noted By:

Rosa T. Perez, Ph. D.
OIC, FFB

Telemetered Rainfall and Water Level Data for Pampanga River Basin November 22 - 25, 2004

Telemetered Rainfall and Water Level Data for Pampanga River Basin

November 22 - 25, 2004

Year:	PAMPANGA RIVER BASIN																						
2004	Telemeterized Rainfall and Water Level Data																						
Mo.: Nov	Rainfall Stations															Water Level Stations							
Day	Time (0000)	Munoz	Sapang Buho	Mayapyap	Gabaldon	Zaragoza	Papaya	San Isidro	Arayat	Candaba	Sibul Spring	Sasmuan	Sulipan	Ipo Dam	San Rafael	Sapang Buho	Mayapyap	Zaragoza	San Isidro	Arayat	Candaba	Sexmoan	Sulipan
21	15																						
21	16																						
21	17																						
21	18																						
21	19																						
21	20																						
21	21																						
21	22																						
21	23																						
22	**00**																						
22	01																						
22	02																						
22	03																						
22	04																						
22	05																						
22	06																						
22	07																						
22	08																						
22	09	0	0	0	0		0	0	0	0	0	0	0	1	0	0.00	0.00	10.28			2.31		0.90
22	10	0	0	0	0		0	0	0	0	0	0	0	0	0	0.00	0.00	10.28			2.31		0.90
22	11	0	0	0	0		0	0	0	0	0	0	0	2	0	0.00	0.00	10.28			2.31		0.90
22	12	0	0	0	0		0	0	3	0	0	0	0	1	0	0.00	0.00	10.27			2.31		0.90
22	13	0	0	0	0		0	0	0	0	0	0	0	0	0	0.00	0.00	10.27			2.31		0.90
22	14	0	0	0	0		0	0	0	0	0	0	0	0	0	0.00	0.00	10.27			2.31		0.90
22	15	0	0	0	0		0	0	0	0	0	0	0	0	0	0.00	0.00	10.27			2.30		0.90
22	16	0	0	0	0		0	0	0	0	0	0	0	0	0	0.00	0.00	10.27			2.30		0.89
22	17	1	5	1	0		4	0	0	0	1	0	0	0	0	0.00	0.00	10.26			2.30		0.89

Year:	PAMPANGA RIVER BASIN																					
2004	Telemeterized Rainfall and Water Level Data																					
Mo.: Nov	Rainfall Stations														Water Level Stations							
Day	Time (0000)	Munoz	Sapang Buho	Mayapyap	Gabaldon	Zaragoza	Papaya	San Isidro	Arayat	Candaba	Sibul Spring	Sasmuan	Sulipan	Ipo Dam	San Rafael	Sapang Buho	Mayapyap	Zaragoza	San Isidro	Arayat	Candaba	Sexmoan	Sulipan
22	18	3	8	6	0		10	4	1	0	5	0	0	0	0	0.00	0.00	10.26			2.30		0.89
22	19	1	4	3	0		4	1	0	0	3	0	0	0	0	0.00	0.00	10.26			2.31		0.89
22	20	1	1	1	0		3	1	2	0	2	0	0	5	0	0.00	0.00	10.26			2.32		0.89
22	21	0	4	2	0		4	2	2	1	22	0	0	19	2	0.00	0.00	10.27			2.37		0.89
22	22	1	5	3	31		44	5	17	6	28	0	0	8	19	0.11	0.00	10.29			2.42		0.89
22	23	3	19	10	127		52	27	18	15	7	2	4	8	15	0.17	0.00	10.31			2.49		0.89
23	00	14	18	18	55		20	25	3	7	8	1	2	2	6	0.23		10.33			2.56		0.89
23	01	17	8	11	14		6	7	2	2	3	0	1	0	1			10.35			2.62		0.89
23	02	2	0	2	2		2	2	0	1	0	0	0	0	0			10.37			2.66		0.90
23	03	0	1	1	10		0	0	0	0	0	0	0	0	0			10.39			2.71		0.90
23	04	6	2	0	73		0	0	0	0	0	0	0	0	0			10.41			2.74		0.90
23	05	1	2	0	44		0	0	0	0	0	0	0	0	0			10.42			2.77		0.90
23	06	2	3	0	33		0	0	0	0	0	0	0	0	0			10.48			2.81		0.90
23	07	0	0	0	25		0	0	0	0	1	0	0	0	0		0.45	10.53			2.84		0.90
23	08	0	2	0	15		0	0	0	0	0	0	0	0	0		0.79	10.56	3.14		2.97		0.91
23	09	0	1	1	16		2	0	0	0	0	0	0	0	0		1.09	10.56	3.08		3.21		1.05
23	10	0	1	0	1		1	0	1	0	0	0	0	0	0		1.35	10.66	3.02		3.36		1.11
23	11	0	2	0	2		0	1	0	0	0	0	0	0	0		1.70	10.70	2.96		3.50		1.21
23	12	0	0	0	0		1	0	0	0	0	0	0	0	0		2.11	10.78	2.91	7.18	3.55		1.27
23	13	0	0	0	0		0	0	0	0	0	0	0	0	0		2.51	10.78	**2.90**	7.20	3.60		1.32
23	14	0	0	0	0		0	0	0	0	0	0	0	0	0		2.80	10.80	2.89	7.23	3.66		1.36
23	15	0	0	0	0		0	0	0	0	0	0	0	0	0		3.35	10.84	2.88	7.15	3.73		1.40
23	16	0	0	0	1		0	0	0	0	0	0	0	0	0		3.83	10.88	2.87	7.17	3.81		1.40
23	17	0	0	0	1		0	0	0	0	0	0	0	0	0		4.24	10.94	2.86	7.17	3.90		1.39
23	18	0	0	0	0		0	0	0	0	0	0	0	0	0		4.44	10.94	2.85	7.17	3.97		1.39
23	19	0	0	0	0		0	0	0	0	0	0	0	0	0		4.58	10.96	2.83	7.22	4.05		1.44
23	20	0	0	0	0		0	0	0	0	0	0	0	0	0		4.59	10.98	2.82	7.29	4.12		1.49

Year:	PAMPANGA RIVER BASIN																					
2004	Telemeterized Rainfall and Water Level Data																					
Mo.: Nov	Rainfall Stations														Water Level Stations							
Day	Time (0000)	Munoz	Sapang Buho	Mayapyap	Gabaldon	Zaragoza	Papaya	San Isidro	Arayat	Candaba	Sibul Spring	Sasmuan	Sulipan	Ipo Dam	San Rafael	Sapang Buho	Mayapyap	Zaragoza	San Isidro	Arayat	Candaba	Sexmoan	Sulipan
23	21	0	0	0	0		0	0	0	0	0	0	0	0	0		4.48	11.00	2.81	7.41	4.16		1.54
23	22	0	0	0	0		0	0	0	0	0	0	0	0	0		4.39	11.02	2.79	7.46	4.21		1.58
23	23	0	0	0	0		0	0	0	0	0	0	0	0	0		4.29	11.06	2.78	7.53	4.24		1.59
24	**00**	0	0	0	0		0	0	0	0	0	0	0	0	0		4.17	11.08	2.77	7.61	4.27		1.58
24	01	0	0	0	0		0	0	0	0	0	0	0	0	0		3.96	11.10	2.76	7.63	4.30		1.57
24	02	0	0	0	0		0	0	0	0	0	0	0	0	0		3.82	11.14	2.74	7.71	4.33		1.57
24	03	0	0	0	0		0	0	0	0	0	0	0	0	0		3.62	11.18	2.73	7.77	4.38		1.57
24	04	0	0	0	0		0	0	0	0	0	0	0	0	0		3.41	11.20	2.71	7.81	4.42		1.58
24	05	0	0	0	0		0	0	0	0	0	0	0	0	0		3.17	11.24	2.70	7.86	4.46		1.59
24	06	0	0	0	0		0	0	0	0	0	0	0	0	0		2.96	11.24	2.69	7.87	4.49		1.62
24	07	0	0	0	0		0	0	0	0	0	0	0	0	0		2.81	11.34	2.68	7.94	4.52		1.66
24	08	0	0	0	0		0	0	0	0	0	0	0	0	0		2.60	11.36	2.66	7.98	4.55		1.71
24	09	0	0	0	0		0	0	0	0	0	0	0	0	0		2.39	11.38	2.64	8.02	4.58		1.75
24	10	0	0	0	0		0	0	0	0	0	0	0	0	0		2.18	11.38	2.62	8.05	4.61		1.77
24	11	0	0	0	0		0	0	0	0	0	0	0	0	0		1.98	11.36	2.60	8.08	4.63		1.79
24	12	0	0	0	0		0	0	0	0	0	0	0	0	0		1.77	11.36	2.58	8.11	4.66		1.80
24	13	0	0	0	0		0	0	0	0	0	0	0	0	0		1.58	11.34	2.56	8.14	4.69		1.80
24	14	0	0	0	0		0	0	0	0	0	0	0	0	0		1.40	11.34	2.55	8.13	4.72		1.80
24	15	0	0	0	0		0	0	0	0	0	0	0	0	0		1.26	11.33	2.55	8.15	4.75		1.80
24	16	0	0	0	0		0	0	0	0	0	0	0	0	0		1.13	11.32	2.54	8.14	4.78		1.82
24	17	0	0	0	0		0	0	0	0	0	0	0	0	0		1.03	11.30	2.54	8.13	4.81		1.85
24	18	0	0	0	0		0	0	0	0	0	0	0	0	0		0.96	11.28	2.54	8.12	4.84		1.88
24	19	0	0	0	0		0	0	0	0	0	0	0	0	0		0.88	11.26	2.54	8.10	4.86		1.93
24	20	0	0	0	0		0	0	0	0	0	0	0	0	0		0.78	11.26	2.53	8.09	4.89		1.96
24	21	0	0	0	0		0	0	0	0	0	0	0	0	0		0.73	11.26	2.53	8.03	4.92		1.99
24	22	0	0	0	0		0	0	0	0	0	0	0	0	0		0.68	11.25	2.53	7.98	4.94		2.00
24	23	0	0	0	0		0	0	0	0	0	0	0	0	0		0.62	11.24	2.53	7.92	4.96		2.01

Year:	PAMPANGA RIVER BASIN																					
2004	Telemeterized Rainfall and Water Level Data																					
Mo.: Nov	Rainfall Stations														Water Level Stations							
Day	Time (0000)	Munoz	Sapang Buho	Mayapyap	Gabaldon	Zaragoza	Papaya	San Isidro	Arayat	Candaba	Sibul Spring	Sasmuan	Sulipan	Ipo Dam	San Rafael	Sapang Buho	Mayapyap	Zaragoza	San Isidro	Arayat	Candaba	Sexmoan	Sulipan
25	00	0	0	0	0		0	0	0	0	0	0	0	0	0		0.58	11.23	2.53	7.84	4.98		1.97
25	01	0	0	0	0		0	0	0	0	0	0	0	0	0		0.54	11.22	2.52	7.74	4.99		1.92
25	02	0	0	0	0		0	0	0	0	0	0	0	0	0		0.51	11.21	2.52	7.64	4.99		1.86
25	03	0	0	0	0		0	0	0	0	0	0	0	0	0		0.47	11.20	2.52	7.52	4.99		1.81
25	04	0	0	0	0		0	0	0	0	0	0	0	0	0		0.44	11.19	2.52	7.39	5.00		1.76
25	05	0	0	0	0		0	0	0	0	0	0	0	0	0		0.41	11.18	2.52	7.25	5.02		1.72
25	06	0	0	0	0		0	0	0	0	0	0	0	0	0		0.38	11.17	2.51	7.11	5.04		1.69
25	07	0	0	0	0		0	0	0	0	0	0	0	0	0		0.36	11.16	2.51	6.94	5.05		1.64
25	08	0	0	0	0		0	0	0	0	0	0	0	0	0		0.33	11.15	2.51	6.75	5.05		1.62
25	09	0	0	0	0		0	0	0	0	0	0	0	0	0		0.31	11.13	2.50	6.51	5.04		1.60
25	10																						
25	11																						
25	12																						
25	13																						
25	14																						
25	15																						
25	16																						
25	17																						
25	18																						
25	19																						
25	20																						
25	21																						
25	22																						
25	23																						
26	00																						
26	01																						
26	02																						