

P R F F C

A REPORT OF THE MAY 1976 FLOOD IN THE PAMPANGA

RIVER BASIN AND METRO MANILA

FLOOD FORECASTING CENTER

Quezon City

Introduction:

The May 1976 flood is one of the worst floods that affected Central Luzon including Metro Manila. In the Pampanga River Basin the destructive flood waters lasted for more than a week in many areas causing heavy damage to property and a number of lives lost. In Metro Manila, the high intensity rainfall of May 19, resulted in the sudden rise of flood waters that even reached rooftops in some areas.

In its third year of operational flood forecasting, the Flood Forecasting Center had the opportunity to demonstrate once more the importance and usefulness of flood forecasting and warning system during the occurrence of Typhoon Didang.

The system operated by the Flood Forecasting Center which is a joint project of the PAGASA and the Bureau of Public Works (BPW), began its operation in September 1973 and was able to issue appropriate advisories during the major floods of October 1973, August 1974 and recently May 1976 including minor floods up to the present.

Meteorological Consideration:

Typhoon Didang was the fourth disturbance that visited the country this year. Typhoon Didang (See Fig. 1) entered the Philippine Area of Responsibility (PAR) on the 13th of May and remained quasi-stationary for sometime before it moved on a west northwesterly track at an average speed of 16 kph until the 18th. At this time, she packs maximum winds of 100 kph near the center. Didang intensified into a typhoon afterwards and slowed down consequently becoming quasi-stationary again for some time. As it moved at a very slow pace towards Central Luzon it attained maximum intensity of 140 kph then weakened slightly to 110 kph as it crossed land.

This slow and sometimes quasi-stationary movement plus the fact that the weakening was slight despite staying inland for two (2) days, dumped in heavy rains over Metro Manila on May 19th. Over the Pampanga River Basin moderate to heavy rains prevailed during the period May 20 to May 27 due to direct effects of the typhoon while crossing over Central Luzon and the intensification of the southwest monsoon as it started to recurve and move away from the country.

The passage of Typhoon Didang resulted in record breaking rainfall amounts. In Metro Manila alone the stations at Science Garden and Port

Area recorded 410.1 mm. and 371.4 mm. of rainfall respectively during the 24-hour period beginning 0800H 19 May.

As to the Pampanga River Basin a comparison of rainfall amounts of this flood and the major floods of October 1973 and August 1974 is shown in Table 1.

TABLE 1 - Meteorological Data Comparison of Three Major Floods

	: MAY 1976	: AUGUST 1974	: OCTOBER 1973
Maximum Daily Basin Rainfall	: *211.5 mm.	: 183.7 mm.	: 208.4 mm.
Total Storm Rainfall	: *836 mm	: 457 mm.	: 254 mm.
Duration of Storm Rainfall	: 9 Days	: 5 Days	: 54 Hours

* As computed from available data during the flood.

Operational Flood Forecasting:

In the evening of May 19, when Typhoon Didang was about 250 km. east of Central Luzon, the Flood Forecasting Center issued the initial flood outlook for the Pampanga River Basin. Included in this outlook was the information on the immediate swelling of rivers and creeks in Metro Manila and an advise to take precautionary measures. The issuance of this information was reached based on the extra heavy rainfall intensities gathered from four stations, namely: Manila International Airport, Port Area, Science Garden and Ipo, during the past 8 hours. Rainfall at MIA and Ipo telemetering station were 199.7 mm. and 175.0 mm. respectively.

Before the rains brought in by Didang, the Pampanga River Basin was very dry evidenced by low water levels of gaging stations. After the rains came, the basin was considered nearly saturated in the evening of May 22. Although there was a lull in rainfall during the preceding 12-hour period, the possibility of moderate to heavy rains that would lead to critical levels in the basin was forecast.

Outlooks and advisories are normally issued every 12 hours but the need for an intermediate advisory was felt in the afternoon of May 23. High risk of widespread flooding and critical levels being exceeded were forecast for the following day.

Seven (7) Outlooks and fifteen (15) Advisories were issued during the flood in review. These were promptly relayed to the National Disaster Control Center for dissemination to the public, most particularly the residents of the affected areas. The warnings were also broadcast over

DZCA, a radio station jointly operated by the PAGASA and the Office of Civil Defense. These information were also transmitted to the Bureau of Public Works, Cabanatuan Station and BPW River Control Office at Apalit. Media and private inquiries were also attended to upon request. A sample outlook and a sample advisory are attached.

Actual flooding condition reports received from the BPW River Control Office at Apalit, NDCC, media and private individuals were of valuable aid to the Flood Forecasting Center.

Discussion:

Unlike the Pampanga River Basin which is a big basin, Metro Manila is a relatively small area where the effect of rainfall on runoff is quite short. So short a time it is that warning time is also shortened. However, with the use of the four stations earlier mentioned coupled with the experiences gained in the flood forecasting activities in the Pampanga River Basin, the center was able to issue a warning for Metro Manila (See Attachment 1).

With the 24-hour rainfall amounts of the four stations on May 19 alone, one could expect a big flood in Metro Manila. What aggravated the situation more was the fact that 90% of the rainfall fell during a 12-hour period (2 pm 19 May - 2 am 20 May). These 12-hour rainfall amounts at Science Garden and Port Area exceeded the 12-hour maximum record (1950 - 1975) of 284.0 mm. at Port Area on August 24, 1952. Considering that above 7.5 mm/hr. rainfall intensity is heavy, the 24-30 mm/hr. intensities at the two stations can be termed as super heavy. From isohyetal analysis (Fig. 2) the area with maximum rainfall was small, however it was concentrated over Metro Manila.

Over the Pampanga River Basin, daily isohyetal analysis showed that rainfall maximum started southeast of the basin and moved up north. On the 23rd, a double maxima was observed, one at the northern part and the other at the central part of the basin. On the 25th and thereafter rainfall maxima lied outside, north and south of the basin. Storm rainfall isohyetal analysis is shown in Fig. 3. It can be seen that more rains fell on the mountain ranges north and east of the basin while less rainfall was observed over flat areas.

During this flood, runoff calculations for Sulipan station were made using the operational tank model. Parallel computations were made using an experimental "Isochrone Method". The computed values together with the corrected observed readings and six hourly basin rainfall are shown

in Fig. 4.

The computed values of runoff using the two methods were moderately good, however, the isochrone method produced a slightly closer peak stage. Had there been no malfunctioning in some rainfall stations, more accurate basin rainfall estimates could have been obtained, so with computed runoff values. These computations enabled the Center with confidence to forecast the surpassing of the 4-meter critical level at Sulipan with a 24-hour advantage.

A measure of the magnitude of this flood can be seen in Table 2. The peak stages at Sulipan and Candaba telemetering stations serve as a guide in flood magnitude estimate.

TABLE 2 - Peak Stages at Sulipan and Candaba Telemetering Stations

	: MAY 1976	: AUGUST 1974	: OCTOBER 1973
Peak Stage at Sulipan	: 6.13 m	: 5.54 m	: 4.57 m
Peak Stage at Candaba	: 8.24 m	: 7.85 m	: *7.00 m

* - Estimated

For the three provinces that mainly comprise the basin alone damages amounting to more than sixty (60) million pesos were recorded. The breakdown of these damages according to province and property damage is listed in Attachment 2.

The performance of flood warning activities for this flood may be considered above par. It is believed that the information and warnings issued by the Center, to disaster related agencies, helped to a certain extent in the rescue operations, flood mitigations, relief missions, etc. in the affected areas. No less than the President of the Republic himself acknowledged the importance of the system during a briefing session at the height of Typhoon Didang. This paved the way to the crystalization of flood forecasting expansion to other river basins of the country.

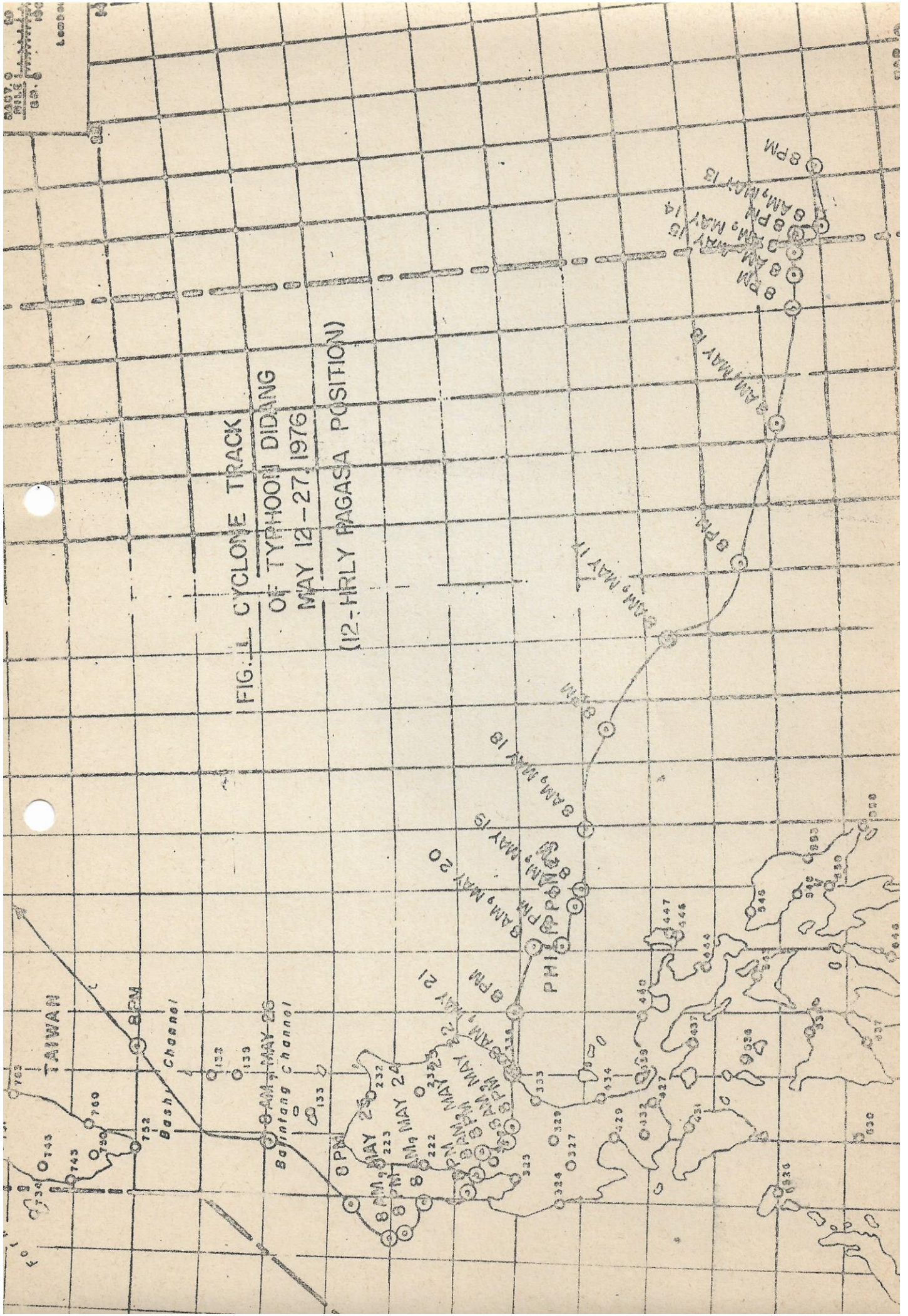


FIG. 1 CYCLONE TRACK
 OF TYPHOON DIDANG
 MAY 12 - 27, 1976
 (12-HRLY PAGASA POSITION)

500 MILE
 500 KILOMETER

TAIWAN

Bashi Channel

Bonifang Channel

PHILIPPINES

500 MILE

500 KILOMETER

8 AM, MAY 12
 8 AM, MAY 13
 8 AM, MAY 14
 8 AM, MAY 15
 8 AM, MAY 16
 8 AM, MAY 17
 8 AM, MAY 18
 8 AM, MAY 19
 8 AM, MAY 20
 8 PM, MAY 21
 8 AM, MAY 22
 8 AM, MAY 23
 8 AM, MAY 24
 8 AM, MAY 25
 8 PM, MAY 26

ATTACHMENT 1

Sample Outlook

Initial Flood Outlook
Issued at 9 PM 19 May 1976

Moderate to heavy rainfall is expected over Central and Northern Luzon during the next 24 hours which may cause localized flooding over low areas in the Pampanga River Basin.

Immediate swelling of rivers and creeks in Angat, Montalban, Novaliches, Metro Manila and its vicinity is expected resulting in floods over low areas because of very heavy rains that fell over these areas during the last 8 hours.

Take all necessary precautions and watch for the next Advisory.

FFC 191300Z

Sample Advisory

Flood Advisory No. 3
Issued at 9 PM 23 May 1976

Heavy rains were observed over the Pampanga River Basin during the past 24 hours as water levels continue to rise steadily.

High risk of widespread flooding is expected over the basin as critical levels are forecast to be reached or exceeded by tomorrow.

People living in flood prone areas particularly over the middle and lower Pampanga River Basin are advised to take necessary precautions.

Affected Areas: Cabanatuan, Sta. Rosa, Gapan, Zaragoza, San Antonio, Cabiao, San Isidro, Lapaz, Candaba, San Luis, San Simon, Apalit, San Miguel, San Ildefonso, Plaridel, Malolos, Calumpit, Paombong, Hagonoy.

MAY 19

3.1

PAMPANGA RIVER BASIN



SCALE 1:720,000

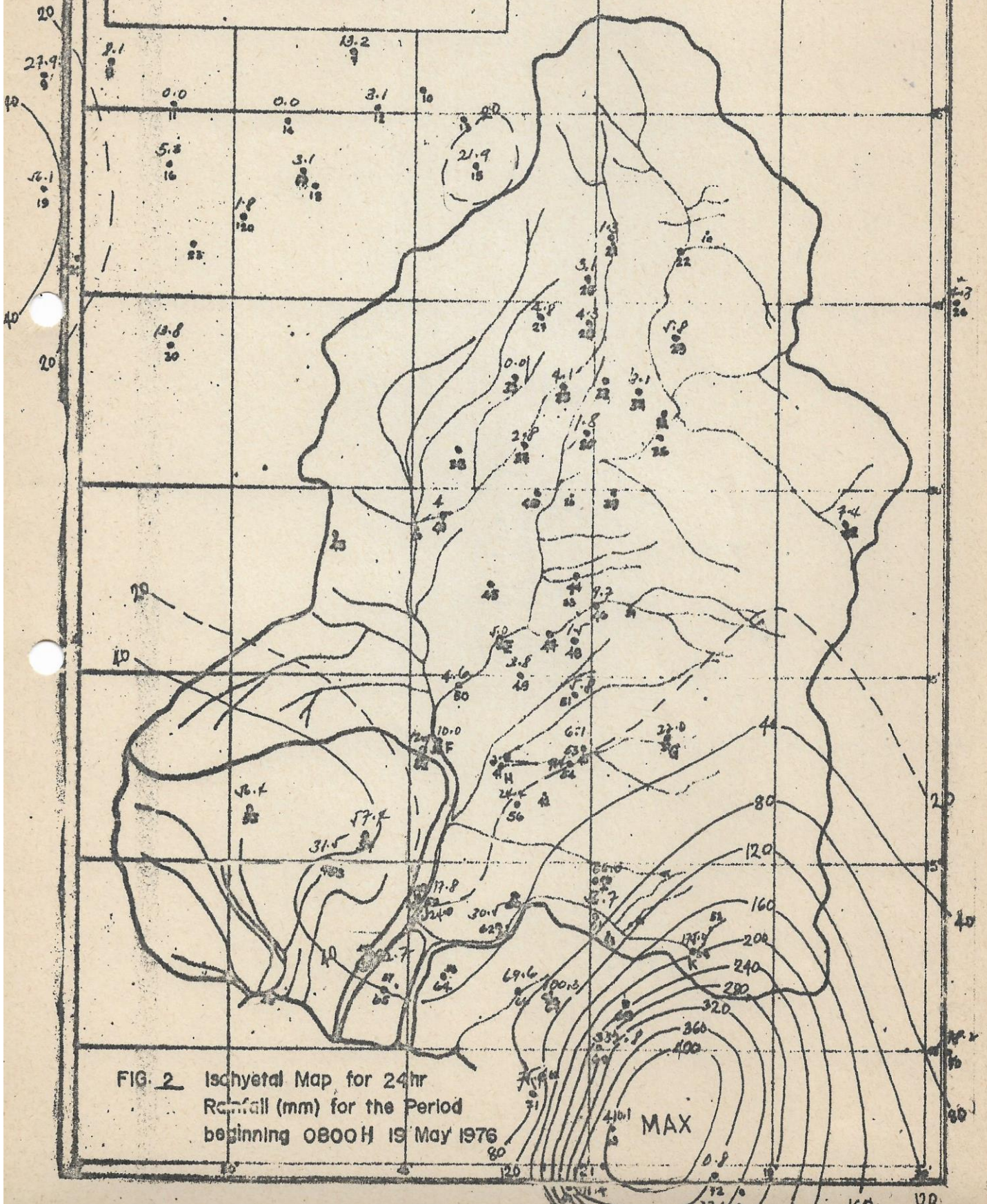


FIG. 2 Ischyetal Map for 24hr
Rainfall (mm) for the Period
beginning 0800H 19 May 1976

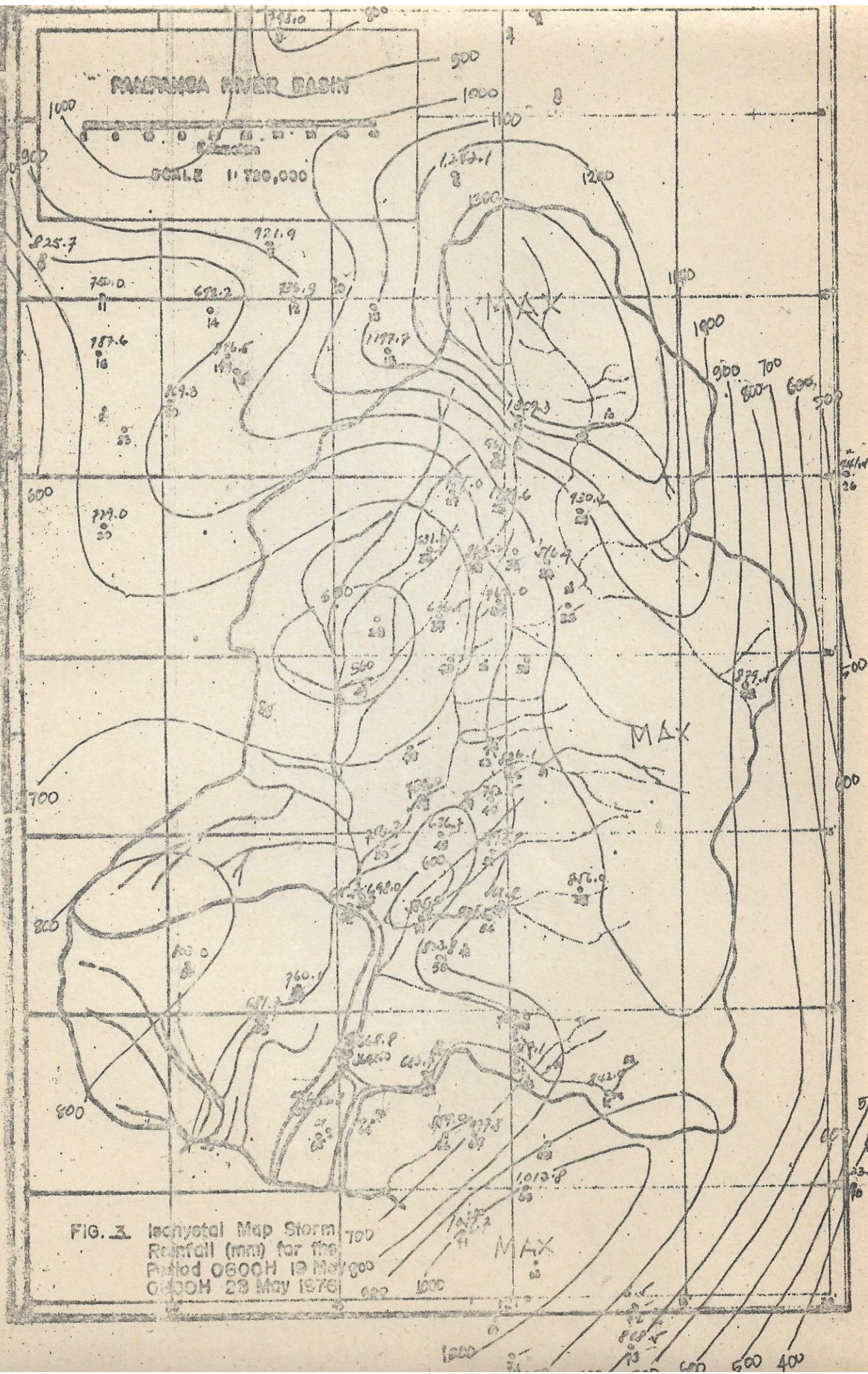
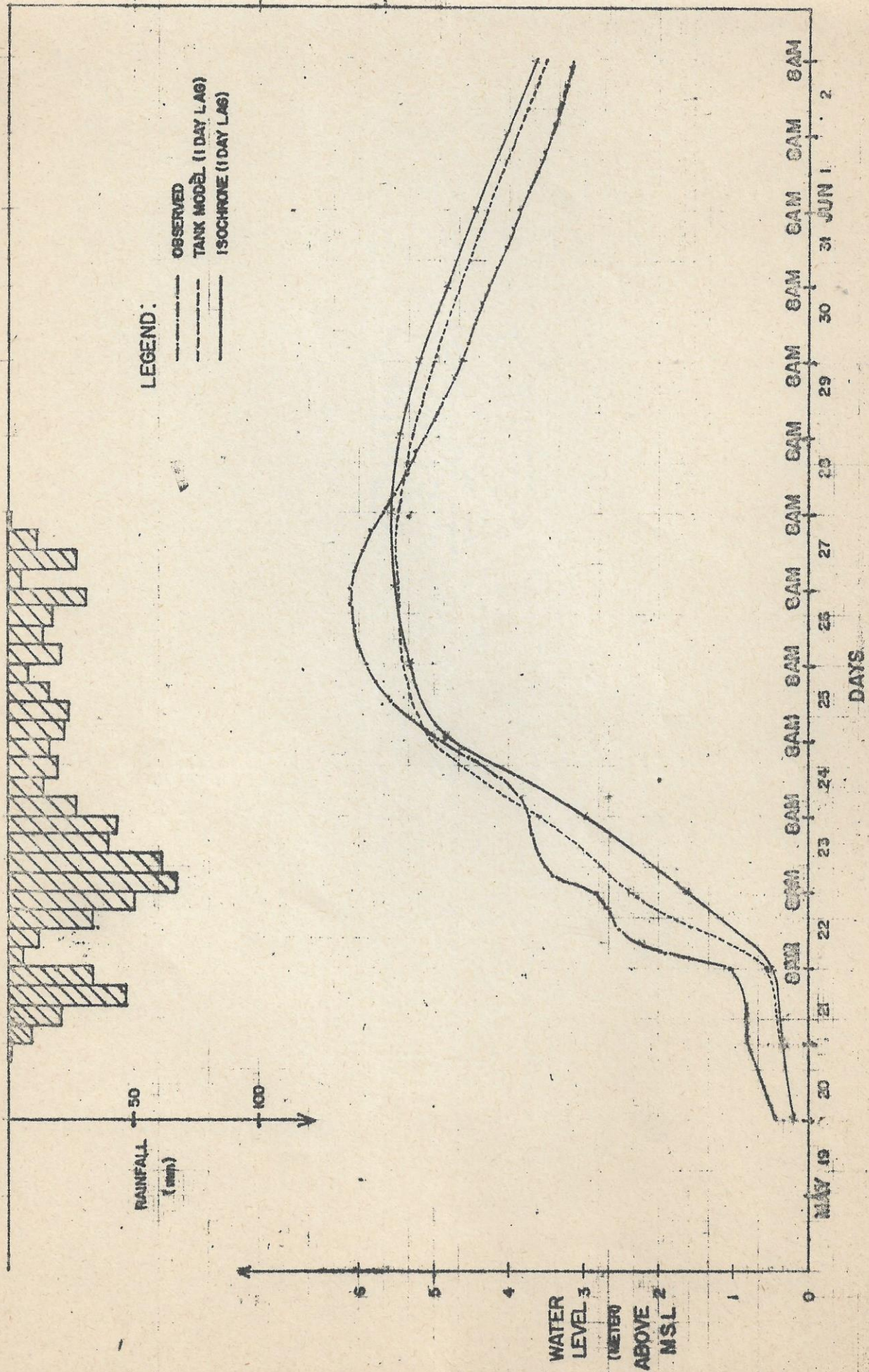


FIG. 4. Observed and Calculated Stage Hyetographs at Sulipan with 6 Hourly Basin Rainfall



MAY 1976 FLOOD

ATTACHMENT 2

D A M A G E S

P L A C E	PAMPANGA	BULACAN	NUEVA ECIJA	RIZAL	GREATER MANILA					
Public Roads and: Bridges	:	4,500,000	:	14,294,000	:	799,000	:	2,295,600		
Public Works	:	2,255,250	:	60,000	:	250,000	:			
C r o p s	:	1,992,000	:	7,500,000	:	25,691,000	:	5,734,000		
Fishpond/ Livestock	:	3,128,000	:	1,000,000	:	3,230,000	:	99,000		
Private Blgs.	:		:	500,000	:		:	648,000		
O t h e r s	:		:		:	571,800	:	6,000		
<u>T O T A L</u>	:	7,375,250	:	13,500,000	:	43,846,800	:	7,536,000	:	2,295,600

The incomplete data above were compiled from the National Disaster Control Center's records.