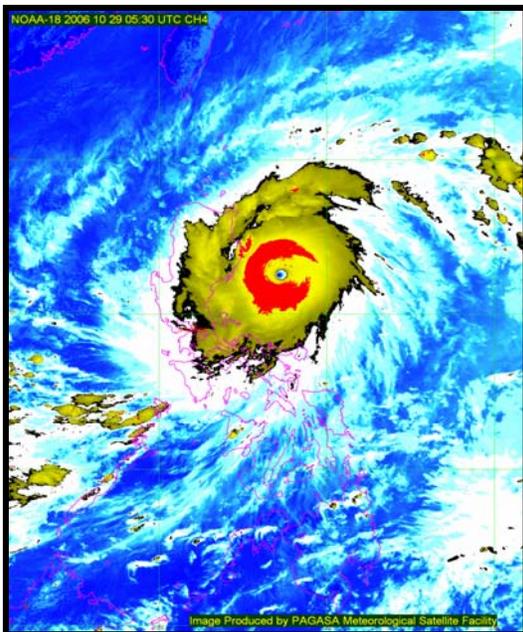


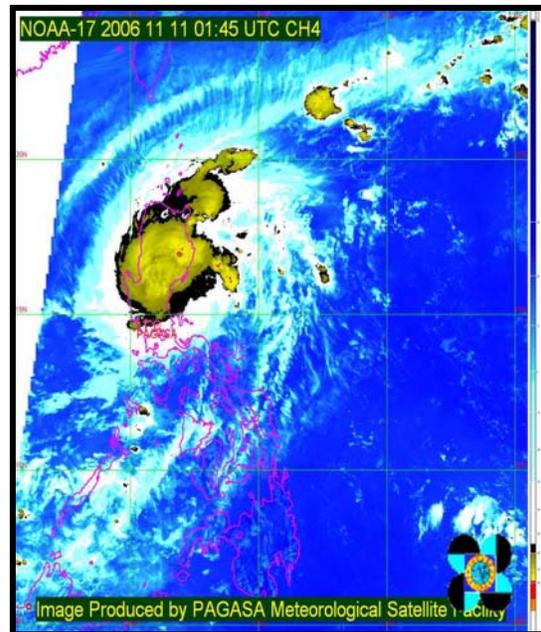
## I. Overview of Meteorological and Hydrological Conditions during the Year

In the last quarter of 2006, wide areas in the northern and central part of the Philippines were battered directly and indirectly by a series of strong typhoons. In October, CIMARON struck Luzon island and incurred damages which were compounded by the subsequent landfalls of typhoons CHEBI, DURIAN and UTOR. While the earlier XANGSANE inflicted damages which was last year's costliest, DURIAN (ref. Figs. 1,2,3 and 4), in turn, was the deadliest. The latter accounted for almost three quarters of the total tropical cyclone-related deaths in 2006.

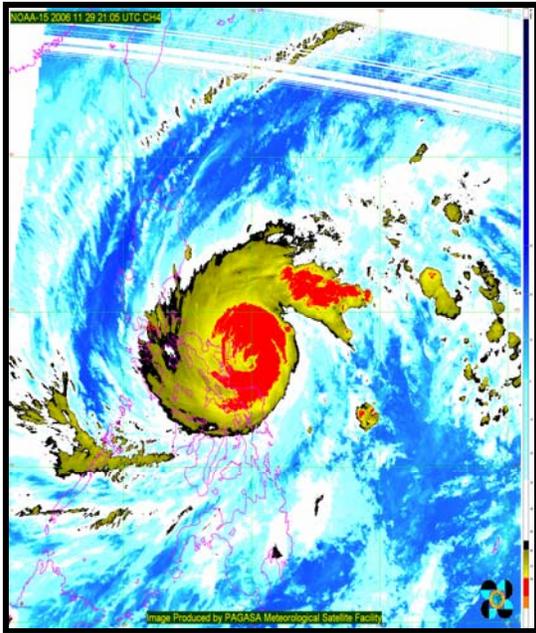
Despite these tropical cyclones, seventy percent of the country's rainfall were below normal in November. In December, just right after the passages of typhoons DURIAN and UTOR, near normal to above normal rainfall began to be observed over most parts of the country but southern Philippines, particularly Mindanao island, continued to receive below normal amounts. These trends were closely associated with a mild episode of the El Nino.



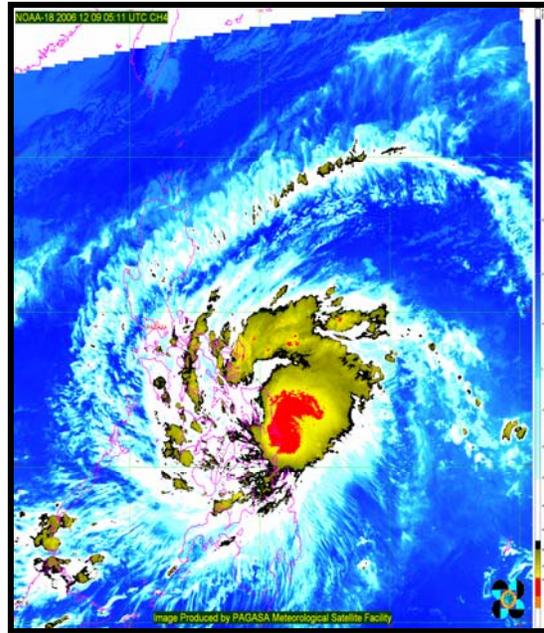
**Figure 1.** NOAA imagery (6PM of 29 October, 2006) of typhoon CIMARON (0619/22W) while on its way to Luzon island in northern Philippines (MSF-WB-PAGASA)



**Figure 2.** NOAA imagery (2AM of 11 November, 2006) of typhoon CHEBI (0620/23W) while crossing central Luzon (MSF-WB-PAGASA)



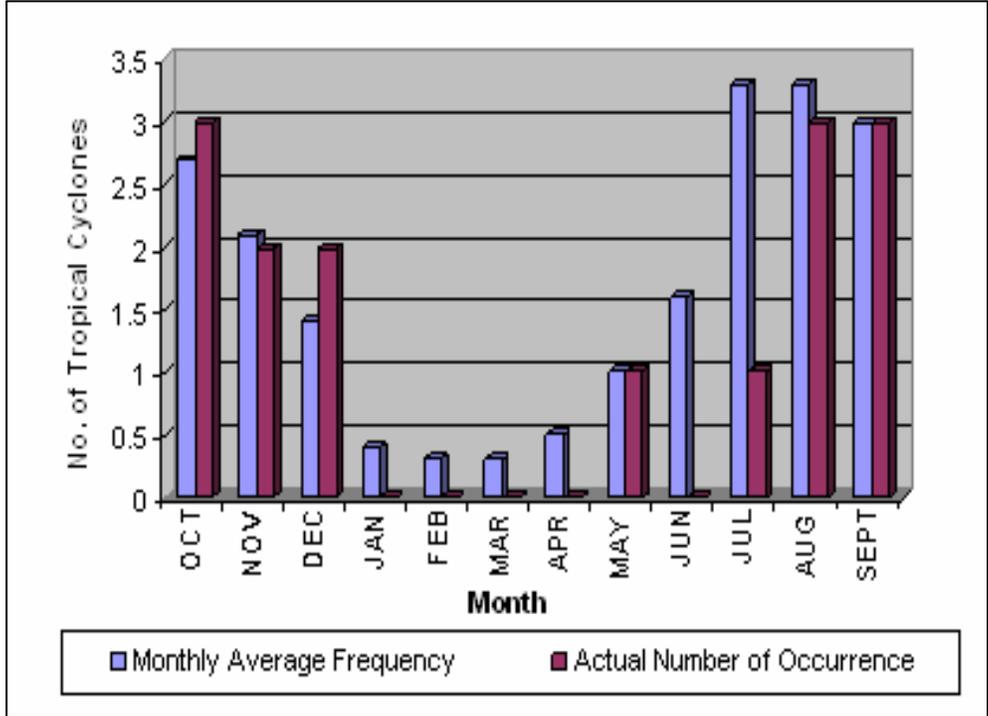
**Figure 3.** NOAA imagery (5AM 30 November, 2006) of typhoon DURIAN (0621/24W) while about to make a landfall over southern Luzon DURIAN was last year's deadliest (MSF-WB-PAGASA)



**Figure 4** NOAA imagery (6PM 09 December) showing UTOR shortly after landfall over the eastern sections of central Philippines (MSF-WB-PAGASA)

Towards May of 2007, conditions in the Pacific Ocean has returned to neutral. The country was also entering its hottest months due to strong subsidences within the easterly regime. In mid-May, YUTU entered the country's area of responsibility (PAR) and was PAGASA's first logged tropical cyclone for the 2007 season. It sparingly recurved and moved away from the Philippine land mass with no significant damages. By the end of the month, the westerlies started to displace the easterlies over the South China Sea. This led to enhanced thunderstorm activity over the western sections of northern and central Philippines. It also heralded the usual advent of the wet season.

It took almost two months before the PAR had its second tropical cyclone in typhoon MAN-YI. Starting in June, an unconventionally strong subtropical ridge has re-strengthened the easterlies and prevented the Intertropical Convergence Zone from its usual northward migration. As a result, a dry spell has affected a large swath of the country particularly in the main island of Luzon. Stronger than average easterlies has also caused moderate to strong vertical wind across sections of the western Pacific Ocean. A paradoxical consequence was MAN-YI's late incursion in mid-July which sharply deviated from the annual climatological norm of eight occurrences by end of that month (ref. Fig.5). Most meteorological centers also tie these events to a suppressed phase of the Madden-Julian Oscillation (MJO).



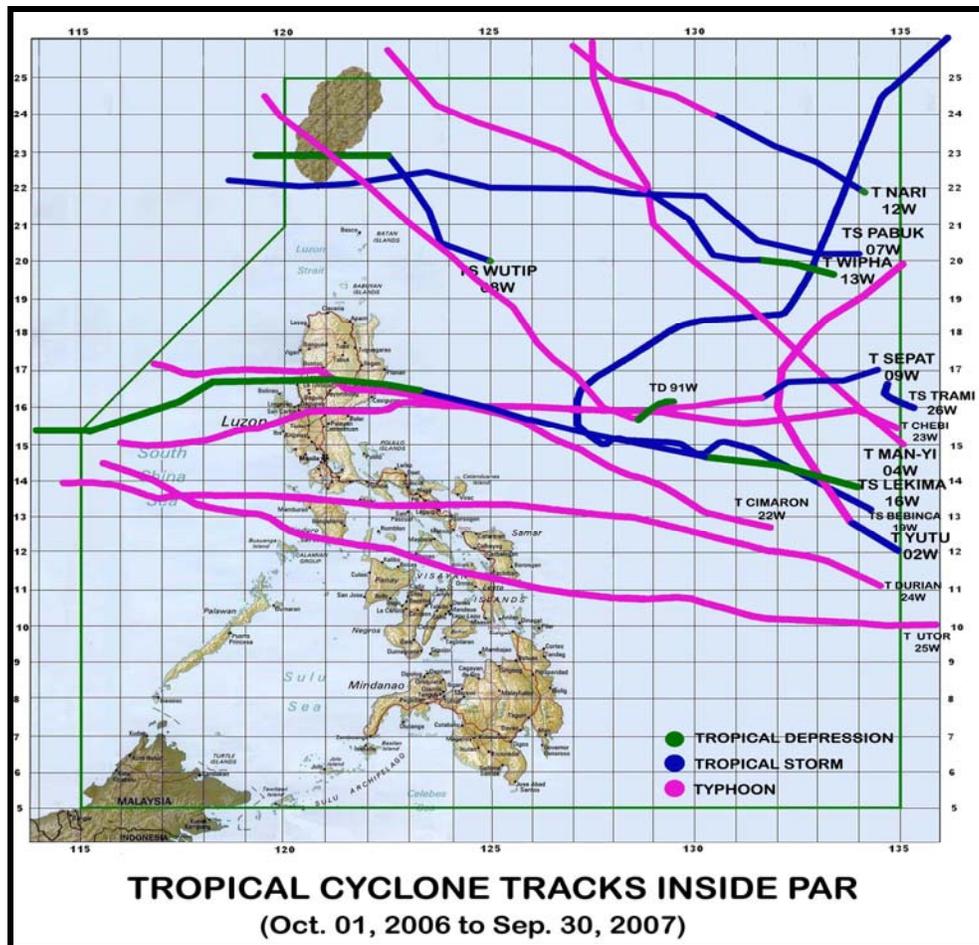
**Figure 5.** Monthly average frequency of tropical cyclones inside the Philippine Area of Responsibility (PAR) versus the actual number of occurrences in the period October 2006-September 2007. From January to April, tropical cyclone occurrence inside the PAR is nil while it fell way below short from normal in the months of June and July.

Tropical cyclogenesis east of the Philippines became favoured in the early part of August. Weakened vertical shears coupled with above average sea surface temperatures enhanced active convection over the area. In a span of just nine days in the first half of the month, three tropical cyclones (PABUK, WUTIP and SEPAT) entered the PAR and were the first for the year to inflict damages. The expected monsoon in early June also came at a later time. For the remaining half of August, no other tropical cyclone came inside the PAR. Rainfall events over most parts of the country were attributed mainly to the monsoon and periodic oscillation of the Intertropical Convergence Zone.

Three more tropical cyclones were seen inside the PAR in September. Typhoons NARI and WIPHA skirted the northeastern areas of the area of responsibility and induced monsoon rainfall over the country. Tropical storm LEKIMA, in late September, was the first landfalling tropical cyclone of the year. Its direct effects, however, pales in comparison with the indirect damages caused by PABUK and WUTIP (ref. Table 2).

## 1.1 Tropical Cyclones

Nine (9) typhoons, five (5) tropical storms and one (1) tropical depression (or a total of fifteen) had entered the PAR in the period October 2006-September 2007 (ref. Figure 6). There were five landfalls (four typhoons and one tropical depression) and four of these occurred during the last quarter of 2006. The summaries are shown in Table 1.



**Figure 6.** Tropical cyclone tracks inside the Philippine Area of Responsibility (PAR) in the period 01 October, 2006 – 30 September, 2006

There were seven (7) tropical cyclone occurrences inside the PAR in the last quarter of 2006. Tropical storm BEBINCA (1-5 Oct) and tropical depression 91W.INVEST (12-13 Oct) were hindered from further intensification by intense environmental wind shears to the east of the Philippines. In late October, typhoon CIMARON (27-31 Oct) made landfall over northern Philippines and was the first in a series of damaging typhoons during the period. Typhoons CHEBI (8-12 Nov), DURIAN (28 Nov-03 Dec) and UTOR (7-12 Dec) made subsequent landfalls and were particularly destructive over the main island of Luzon. The first

three were very strong typhoons with winds reaching up to 195 kph inside the PAR. Had it not been for the advent of the hemispheric winter, tropical storm TRAMI (18-19 Dec) could have been the fifth in the series. Cold air entrainment caused it to degenerate but a passing front turned its remnants into an amplified tropical wave which brought moderate rains over northern and central Philippines.

**Table 1.** List of tropical cyclones monitored inside the Philippine Area of Responsibility (PAR) in the period 01 October, 2006 -30 September, 2007

No.	Tropical Cyclone Status <sup>1</sup> / Int'l Code Date of Occurrence <sup>2</sup>	Warnings Issued (IW <sup>3</sup> SWB <sup>4</sup> )	Maximum Sustained Winds (kph)	Minimum Central Pressure (hPa)
1	TS BEBINCA / 19W / 0616 Oct 1-5/2006	IW-16 SWB-12	85	991
2	TD 91W.INVEST Oct 12-13	IW-5 SWB-3	55	1000
3	T CIMARON / 22W / 0619 Oct 27-31	IW-17 SWB-17	195	938
4	T CHEBI / 23W / 0620 Nov 8-12	IW-17 SWB-14	195	938
5	T DURIAN / 24W / 0621 Nov 28-Dec 03	IW-20 SWB-19	195	938
6	T UTOR / 25W / 0622 Dec 7-12	IW-20 SWB-18	130	972
7	TS TRAMI / 26W / 0623 Dec 18-19	IW-4 SWB-3	65	997
8	T YUTU / 02W / 0702 May 18-20/2007	IW-10 SWB-6	175	948
9	T MAN-YI / 04W / 0704 July 10-13	IW-9 SWB-6	210	948
10	TS PABUK / 07W / 0706 Aug 5-8	IW-11 SWB-8	110	980
11	TS WUTIP / 08W / 0707 Aug 8-9	IW-7 SWB-7	75	994
12	T SEPAT / 09W / 0708 Aug 13-18	IW-22 SWB-19	215	927
13	T NARI / 12W / 0711 Sept 13-14	IW-6 SWB-4	160	958
14	T WIPHA / 13W / 0712 Sept 15-18	IW-13 SWB-9	185	943
15	TS LEKIMA / 16W / 0714 Sept 27-30	IW-12 SWB-12	65	997

<sup>1</sup> highest TC classification inside PAR

<sup>2</sup> dates inside PAR

<sup>3</sup> International Warning for Shipping (IW)

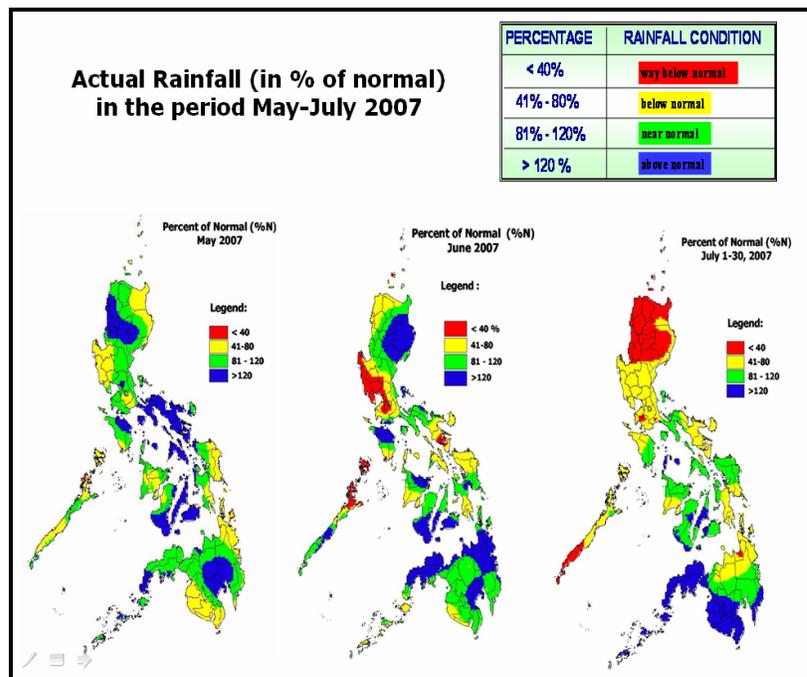
<sup>4</sup> Severe Weather Bulletins (SWB)

The start of the 2007 tropical cyclone season, in terms of occurrences inside the PAR, was relatively inactive. It took almost five months before TRAMI was succeeded by another. In addition, typhoon YUTU (18-20 May), the first for the current year, was unlike CHANCHU (0601) of May of last year. It did not impact Philippine landmass. Same goes with typhoon MAN-YI (10-13 July) which occurred almost two months later. The significant effects of tropical cyclones to the country only came in August with the entry of tropical cyclones PABUK (5-8 Aug), WUTIP (8-9 Aug) and SEPAT (8-13 Aug). This transcended into September with the occurrences of tropical cyclones WIPHA (15-18 Sept) and LEKIMA (27-30 Sept).

A total of 157 severe weather bulletins and 189 international warnings for shipping were issued during the period.

## 1.2 Rainfall

The succession of strong typhoons in the last quarter of 2006 proved catastrophic and this culminated when typhoon DURIAN brought 466.0 mm of rainfall in twenty four (24) hours in Legazpi City, Albay on 30 November. The rains triggered mudslides of volcanic ash and boulders off the previously active Mayon Volcano. A large portion of the towns in the immediate vicinity were covered with mud inflicting severe losses to life and property. The period is also marked by normal to above normal rainfall over most parts of the Philippines except for the southern part.



**Figure 7.** The actual rainfall in the period May–July 2007 shows the official hydrological effects of an unusually strong subtropical ridge in the third quarter of 2007. This is most distinct in the month of July, a month which conventionally has a high frequency of tropical cyclone occurrence and related rainfall (CB-PAGASA)

ridge continued to persist for almost two more months causing below and way below normal rainfall in most parts of the main island of Luzon. The rainfall deficit became too apparent in the month of July (ref. Figure 7). Renewed tropical cyclone activity inside the PAR, together with the monsoon-induced rainfall, came later on August.

The highest 24-hour rainfall attributed to a tropical cyclone occurrence inside the PAR in the period October 2006-September 2007 was 302.7 mm. This was recorded at Laoag, Ilocos Norte (98223) on 9 August during tropical storm WUTIP'S incidence.

**Table 2.** Damages due to tropical cyclones in the Philippines in the period 01 October, 2006- 30 September, 2007 (*NDCC media reports*)

Name of Tropical Cyclone / Date	Population Affected		Casualties			Total Damages (US\$)
	P <sup>1</sup>	F <sup>2</sup>	D <sup>3</sup>	I <sup>4</sup>	M <sup>5</sup>	
T CIMARON / 22W / 0619 Oct 27-31,2006	309,606	68,783	23	65	15	11,489,357.30
T CHEBI / 23W / 0620 Nov 8-12,2006	21,250	3,958	1	10	0	NDA
T DURIAN / 24W / 0621 Nov 28-Dec 3,2006	3,536,342	707,966	734	2,360	762	115,927,861.20
T UTOR / 25W / 0622 Dec 7-12,2006	880,663	181,344	30	44	8	15,838,106.38
TS PABUK / 07W / 0706 Aug 5-8,2007	1,198,398	249,000	15	10	1	6,827,231.46
TS WUTIP / 08W / 0707 Aug 8-9,2007						
T SEPAT / 09W / 0708 Aug 8-13,2007	716,486	148,700	5	1	0	1,550,398.51
T WIPHA / 13W / 0712 Sept 15-18,2007	62,975	12,595	1	4	0	-NDA-
TS LEKIMA / 16W / 0714 Sept 27-30,2007	12,370	2,503	9	1	1	237,333.33
<b>TOTAL</b>	<b>6,738,090</b>	<b>1,374,849</b>	<b>818</b>	<b>2,495</b>	<b>787</b>	<b>151,870,287.8</b>

P<sup>1</sup> – number of persons affected; F<sup>2</sup> – number of families affected; D<sup>3</sup> – dead; I<sup>4</sup> – injured; M<sup>5</sup> – missing; A<sup>6</sup> – agricultural damages; I<sup>7</sup> – infrastructural damages; NDA<sup>8</sup> – no data available; <sup>9</sup> Damages were summed up due to the almost simultaneous occurrence of PABUK and WUTIP inside the PAR.

### 1.3 Damages

Based on the final media reports of the National Disaster Coordinating Council (NDCC), the total estimated damage to agriculture and infrastructure due to tropical cyclones in the period 01 October 2006–30 September 2007 amounted to almost US\$ 152 million. Economic damages due to typhoon DURIAN alone accounts to slightly more than seventy five percent (75 %) of the total damages. The total casualties in the same period include 818 dead, 2,495 injured and 787 went missing. Other pertinent figures are shown in Table 2.

The cumulative effects of typhoons CIMARON, CHEBI, DURIAN, UTOR (covering a time span of just over two months) and the earlier XANGSANE in 2007 made the national government to declare a state of national calamity.