The GEOSS Joint Asia – Africa Water Cycle Symposium

Tokyo, Japan
25 - 27 November 2013

Current Situation & Future Challenges on Water / Disaster Risk Reduction Issues in the Philippines

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CLIMATOLOGY AND AGROMETEOTOROLOGY DIVISION
PAGASA-DOST

OUTLINE OF PRESENTATION

BACKGROUND

EXTREME FLOOD EVENTS IN THE PHILIPPINES

PAGASA IN A NUTSHELL

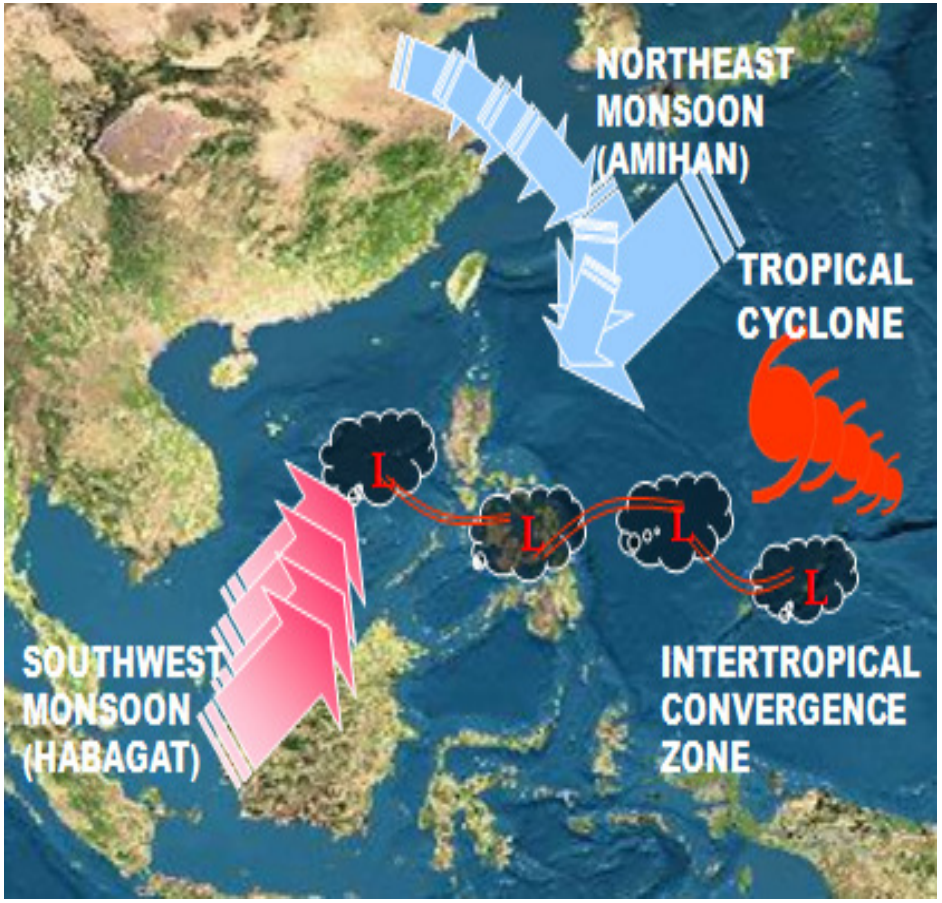
CHALLENGES, OPPORTUNITIES AND WAY FORWARD

BACKGROUND

Geographical Location of the Philippines

The Philippines climate is influenced by the complex interactions of various factors such as:

- Philippine Geography and Topography
- Ocean currents
- Semi-permanent cyclones and anti-cyclones
- Principal Air Streams
- Linear systems
- Tropical Cyclones

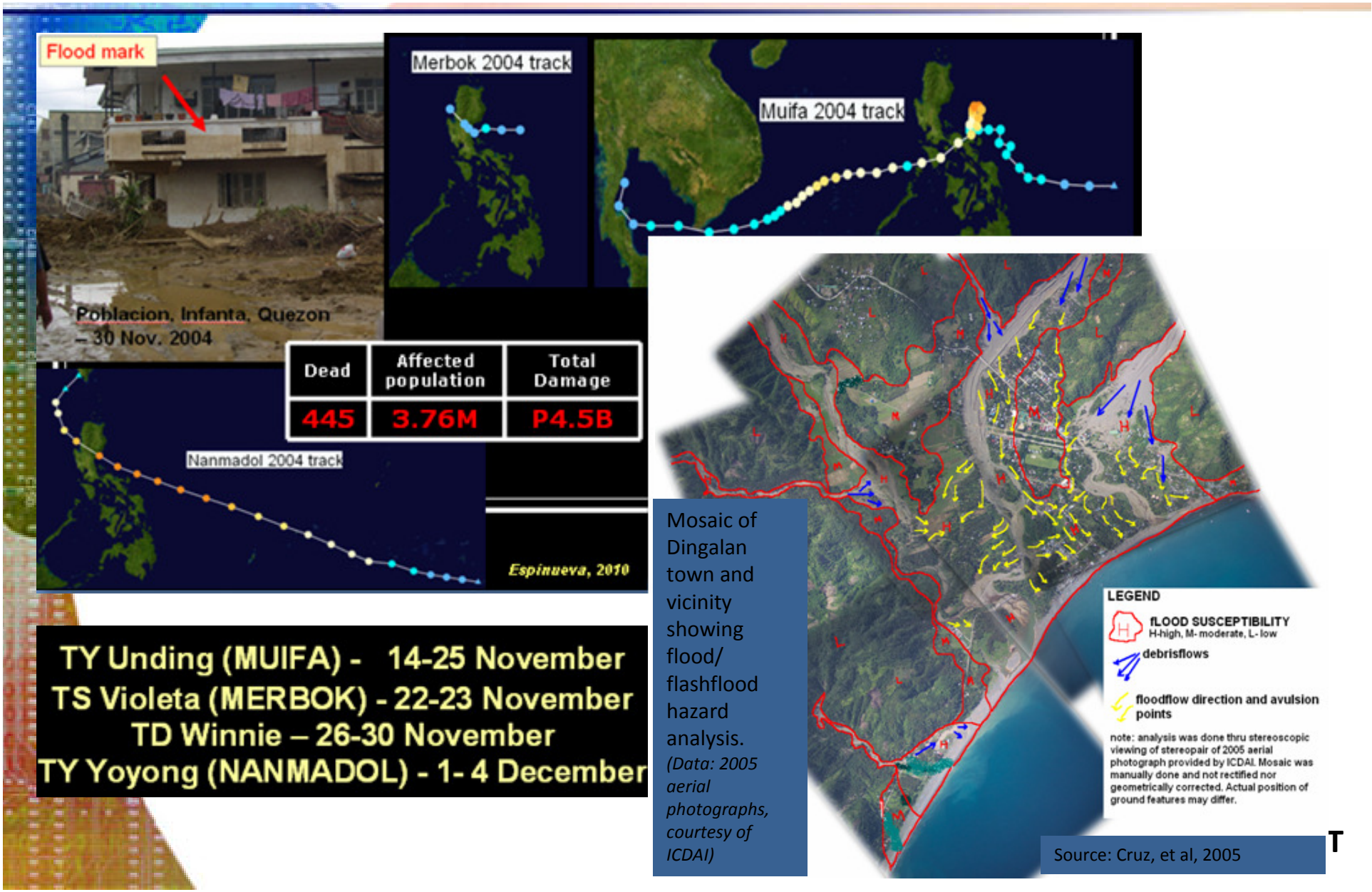


EXTREME FLOOD EVENTS IN THE PHILIPPINES

- 1972 flood in Central Luzon – due to 4 storms in July to August
- 1979 flood in Bulacan due to unprecedented spill of Angat dam
- 1991 flash flood in Ormoc City due to Typhoon Uring
- 2004 flood in Pangasinan & Pampanga and flash floods in Infanta & Quezon provinces due to passages of Typhoons Violata, Winnie and Yoyong
- 2006 floods/flashflood in Albay due to passage of Typhoon (Durian)
- 2008 floods/flashflood in Panay Island due to passage of Typhoon Frank (Fengshen)
- 2009 floods in Metro Manila & surrounding provinces & Pangasinan due to spill of San Roque dam
- 2011 floods in Central Luzon (Typhoons Pedring & Quiel) and Cagayan de Oro and Iligan cities (Tropical Storm Sendong)
- 2012 floods in Metro Manila & surrounding provinces due to the surge of the Southwest monsoon

EXTREME FLOOD EVENTS IN THE PHILIPPINES

Aug 2004 floods in Pangasinan & Pampanga and flash floods in Infanta & Quezon provinces



Mosaic of Dingalan town and vicinity showing flood/ flashflood hazard analysis. *(Data: 2005 aerial photographs, courtesy of ICDAI)*

Source: Cruz, et al, 2005

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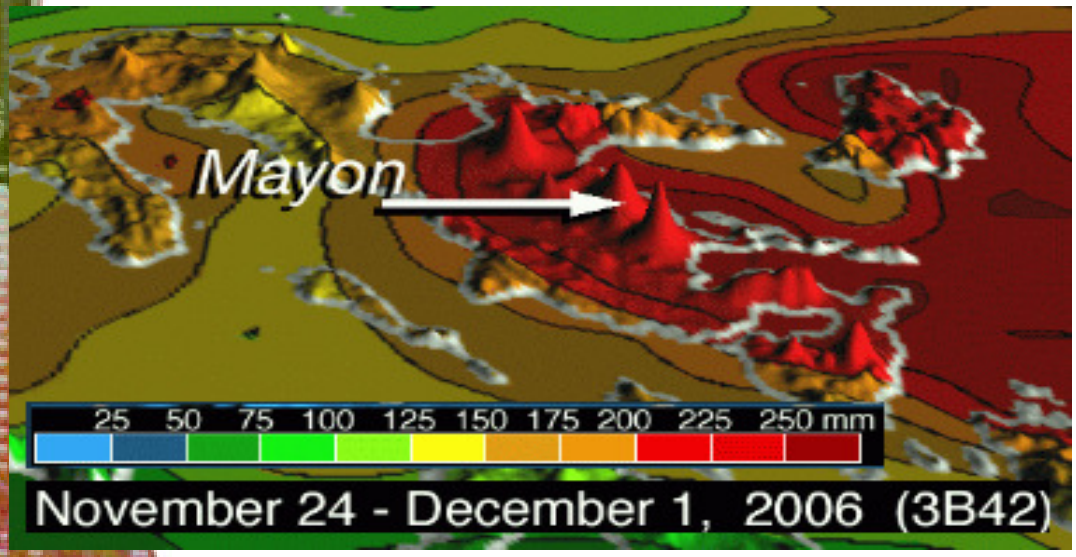
EXTREME FLOOD EVENTS IN THE PHILIPPINES

29 Nov 2006 flood/flashflood in Albay province

Dead	Affected population	Total Damage
734	2.0M	P5.5B



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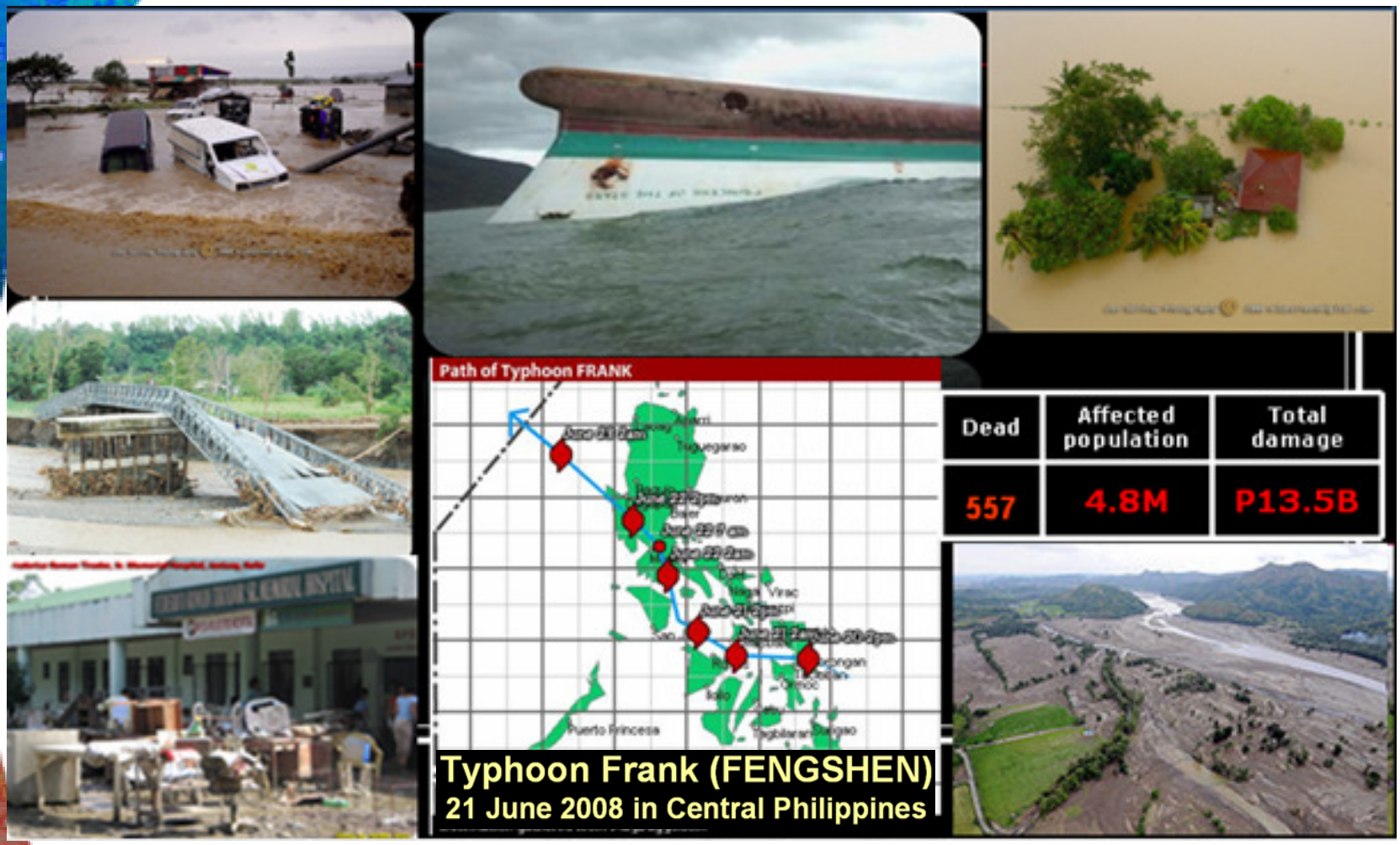
EXTREME FLOOD EVENTS IN THE PHILIPPINES

Jun 2008 flood/flash flood in the Iloilo province



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EXTREME FLOOD EVENTS IN THE PHILIPPINES

26 Sep 2009 flooding in Metro Manila & surrounding provinces (TS Ketsana)

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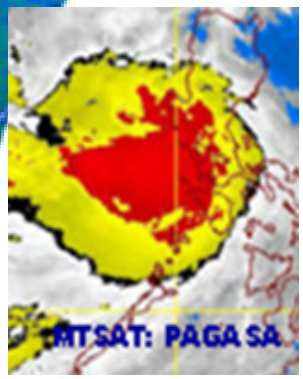
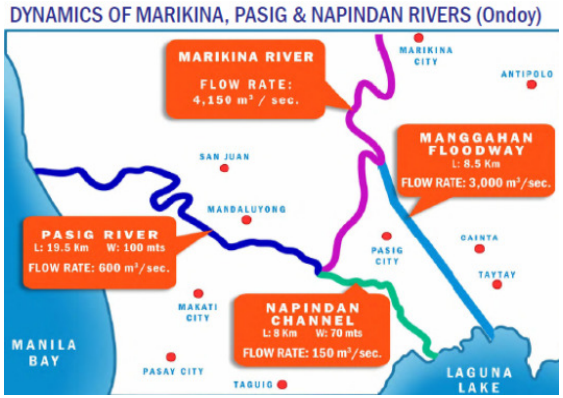
EXTREME FLOOD EVENTS IN THE PHILIPPINES

Causes of flooding in Metro Manila and surrounding areas on 26 September 2009 – due to passage of TS Ketsana

Insufficient warnings

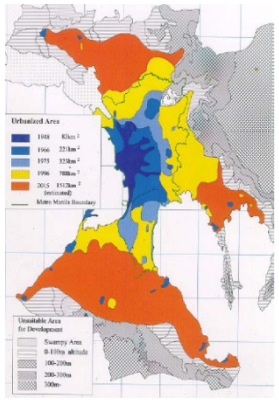


Intense rainfall



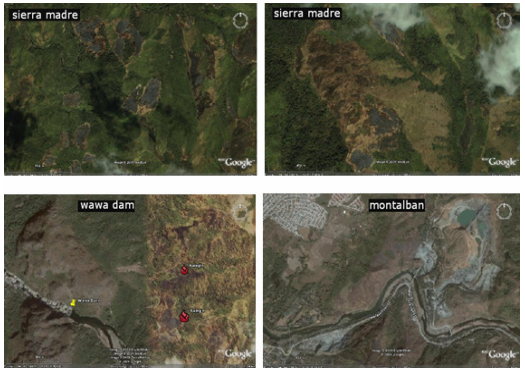
Insufficient carrying capacities

Informal settlers

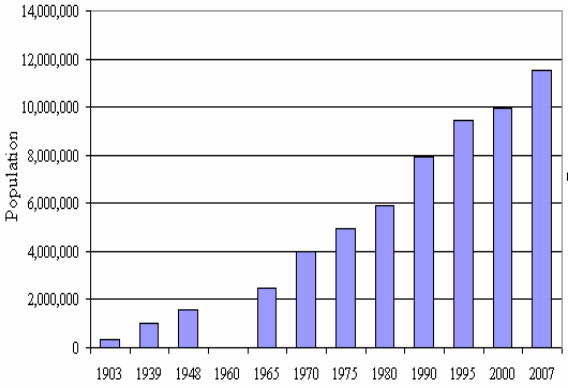


High rate of urbanization

Unabated/rampant development



Deforestation



High/dense population

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EXTREME FLOOD EVENTS IN THE PHILIPPINES

09 October 2009 floods in Pangasinan due to the spill of San Roque dam

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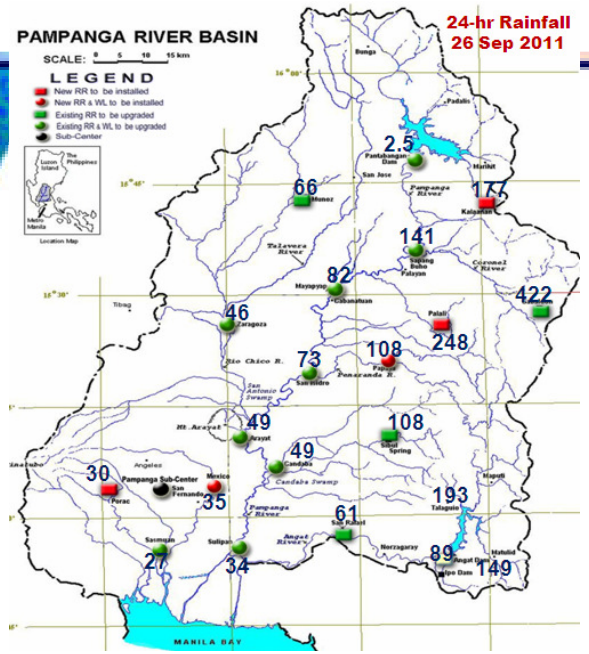
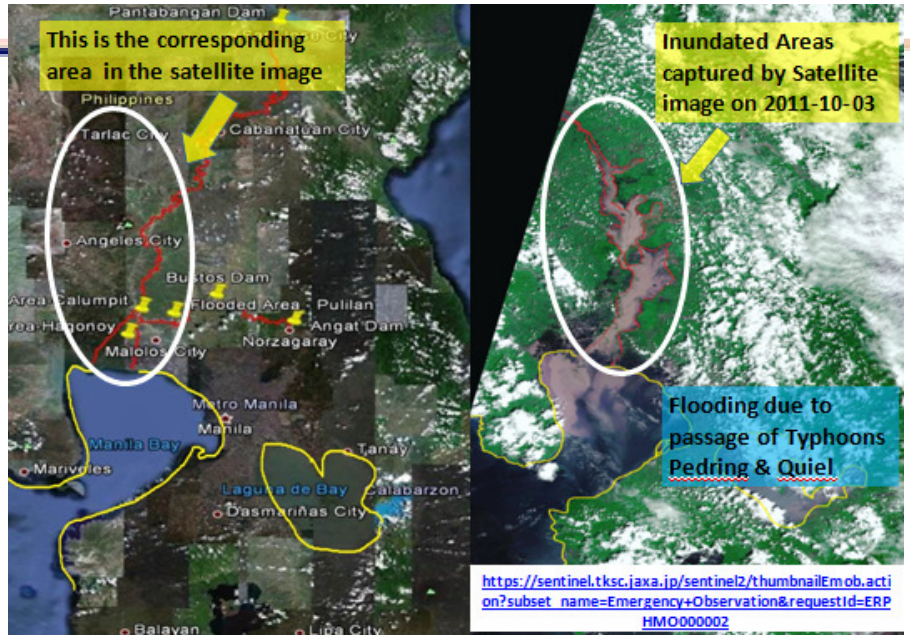
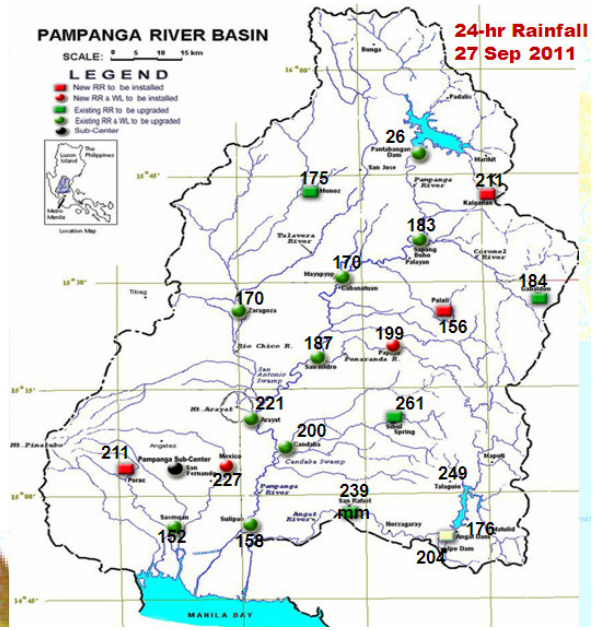
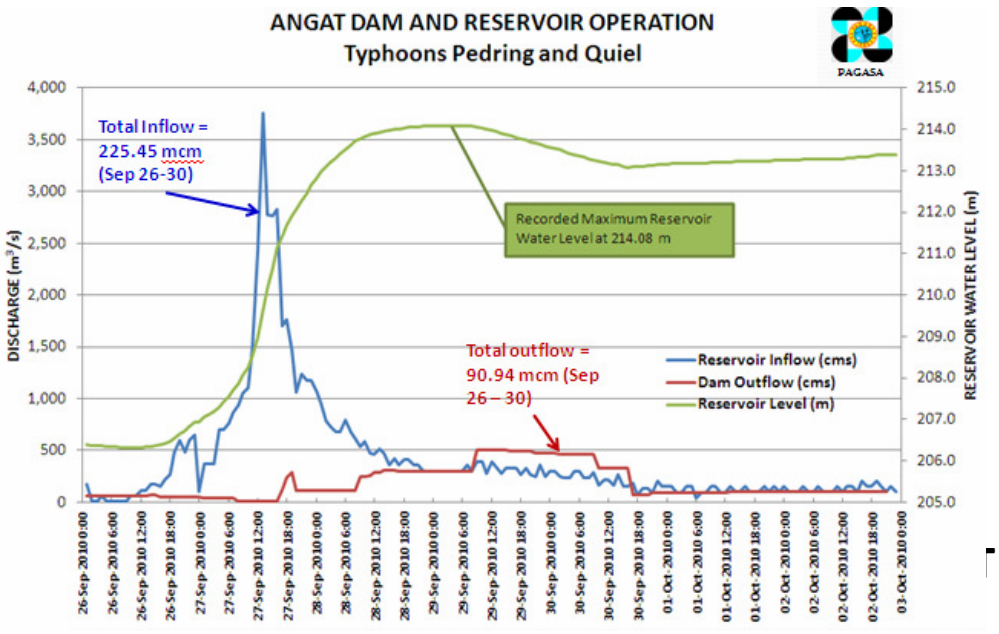
EXTREME FLOOD EVENTS IN THE PHILIPPINES

Sep - Oct 2011 floods in Central Luzon (Typhoons Pedring & Quiel)



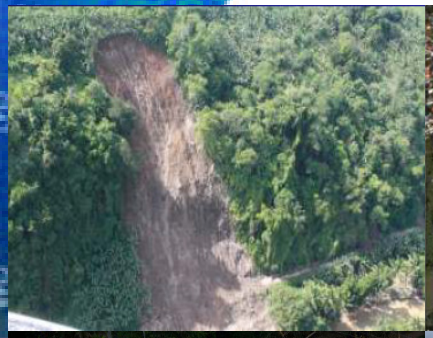


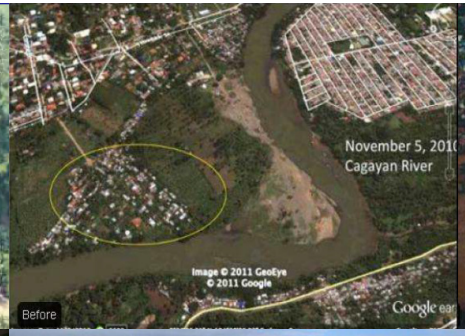


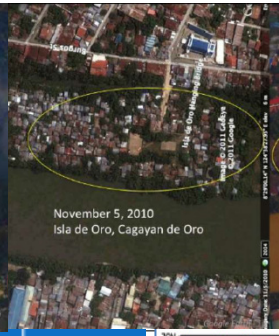


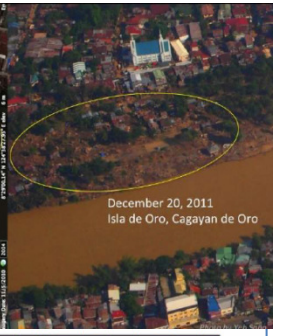
EXTREME FLOOD EVENTS IN THE PHILIPPINES

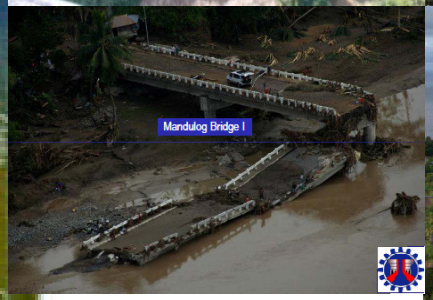
Flash flood in Cagayan de Oro & Iligan cities on 16 Dec 2011 due to passage of TS Washi



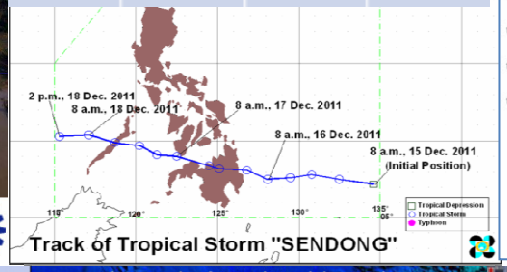




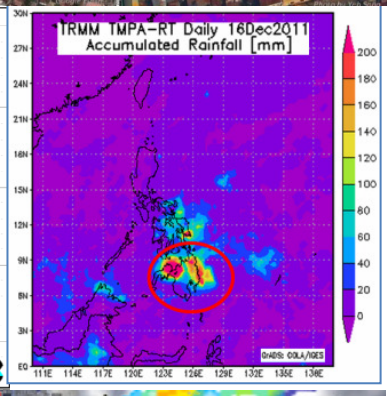




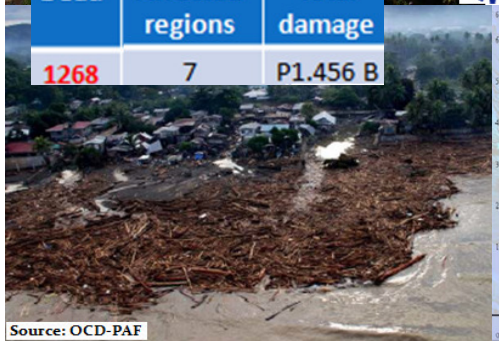
Max 1-hr RR	Max 3-hr RR	Max 6-hr RR	Max 24-hr RR
60.6	112.0	199.0	230.5

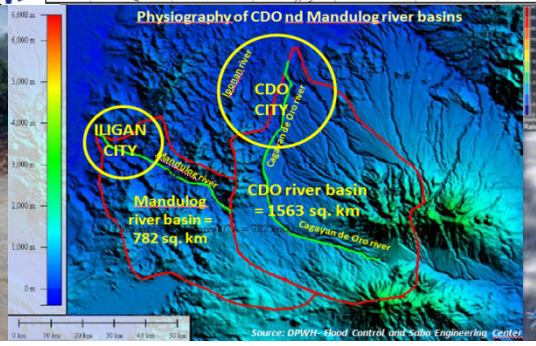


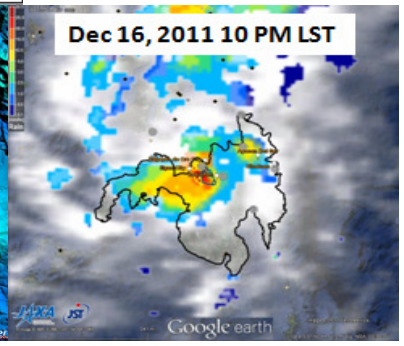
Track of Tropical Storm "SENDONG"



Dead	Affected regions	Total damage
1268	7	P1.456 B







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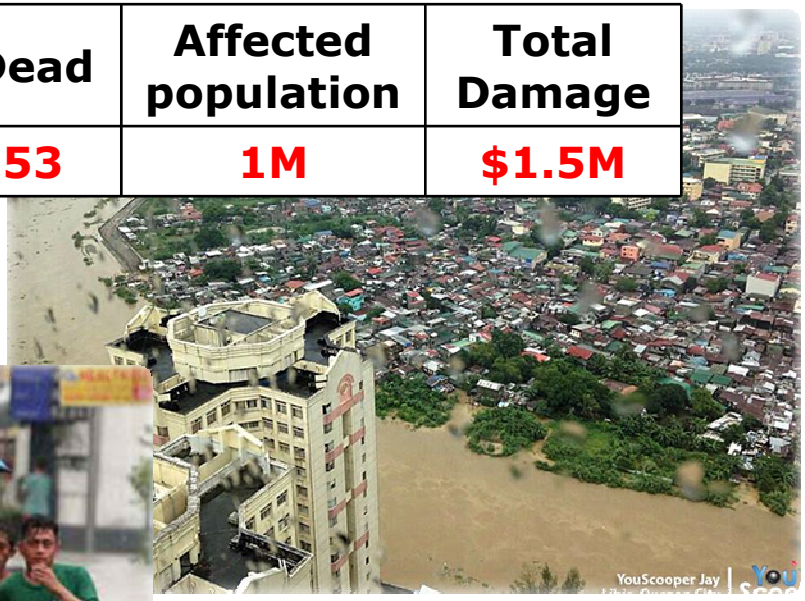
EXTREME FLOOD EVENTS IN THE PHILIPPINES

Severe Flooding occured on August 6-8, 2012 due to Southwest Monsoon (as enhanced by Typhoon Haikui)

EXTREME FLOOD EVENTS IN THE PHILIPPINES

Severe Flooding occured on August 17-21, 2013 due to Southwest Monsoon (as enhanced by Typhoon Trami)

Dead	Affected population	Total Damage
53	1M	$1.5M



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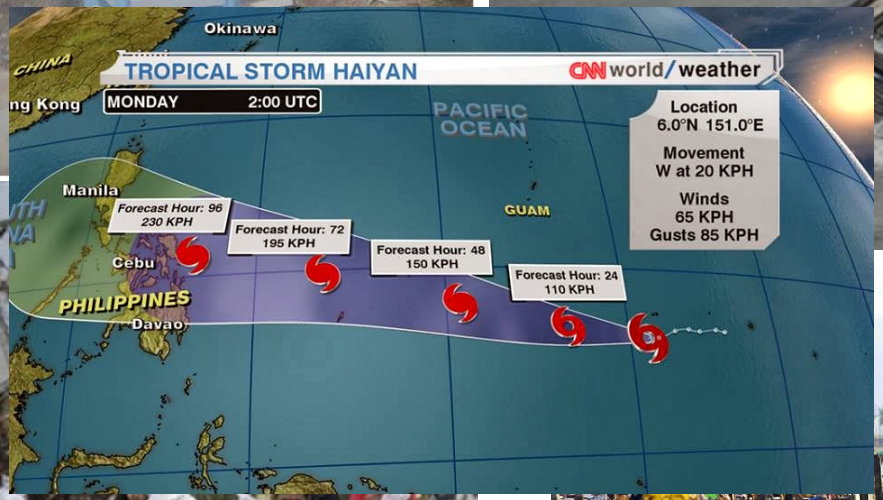
EXTREME FLOOD EVENTS IN THE PHILIPPINES

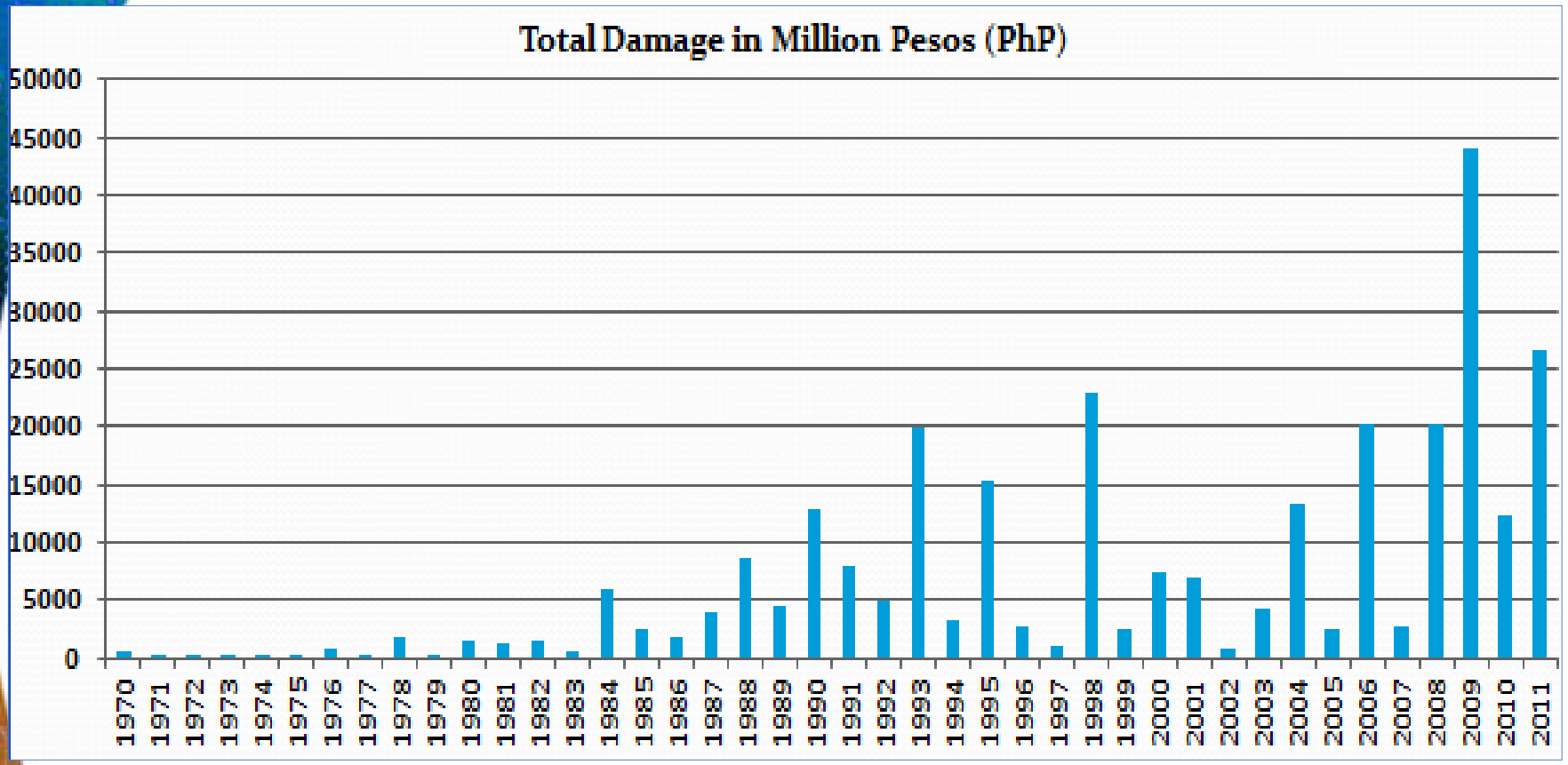
Storm surge occured at Eastern Visayas due to Typhoon Haiyan (Nov. 8, 2013)

Dead	Affected population	Total Damage
5,235	10M	$522M



EXTREME FLOOD EVENTS IN THE PHILIPPINES

Impacts of flooding



Source: Office of Civil Defense

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Philippine Atmospheric, Geophysical & Astronomical Services Administration (PAGASA) - Presidential Decree No. 78 (Dec. 1972) as amended by PD No. 1149 (June 1977)

PAGASA is an attached agency of the Department of Science and Technology (DOST)

The Philippines, through the PAGASA, is a Member of the World Meteorological Organization (WMO), a specialized body of the United Nations.

MISSION

To provide **weather, flood, climate and astronomical** products and services to promote the people's safety and well-being, and contribute to national development.

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PAGASA IN A NUTSHELL

ORGANIZATIONAL CHART

OFFICE OF THE ADMINISTRATOR

3 Deputy Administrators
- Administration & Engineering Services
- Operations & Services
- Research & Development

- Administrative Division
- Financial, Planning and Management Division
- Weather Division
- Climatology and Agrometeorology Division
- Hydro-Meteorology Division
- PAGASA Regional Services Divisions (5)
  - National Capital R
  - Northern Luzon
  - Southern Luzon
  - Visayas
  - Mindanao
- Field Stations
  - Synoptic Observation Network
  - Flood Forecasting Warning Centers
  - Agromet Observation Network
  - Radar Network
  - Upper-Air Observation Network
  - AWS Network
  - Rainfall Station Network

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NETWORK OF OBSERVING STATIONS

LEGEND:

58 Synoptic Stations

25 Agromet Stations

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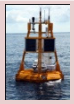
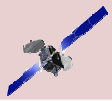
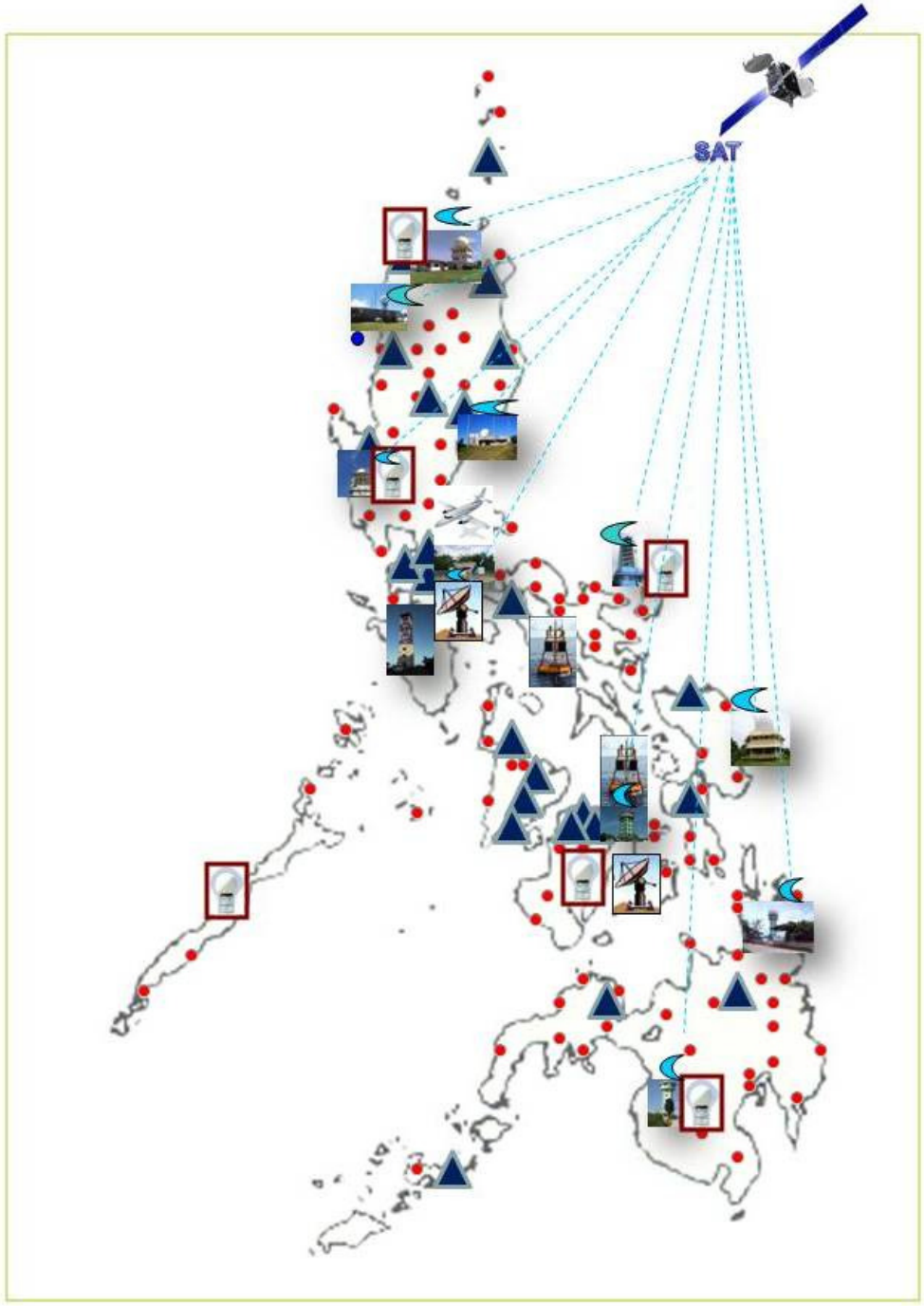
ACQUIRED TECHNOLOGIES

LEGEND:	
	AWS (155)
	ARG (87)
	Radar (10)
	Upper Air Stations (6)
	Marine Buoy (2)
	MTSAT/WAFS
	AWOS (1)
	Wind Profiler (1)
	VSAT



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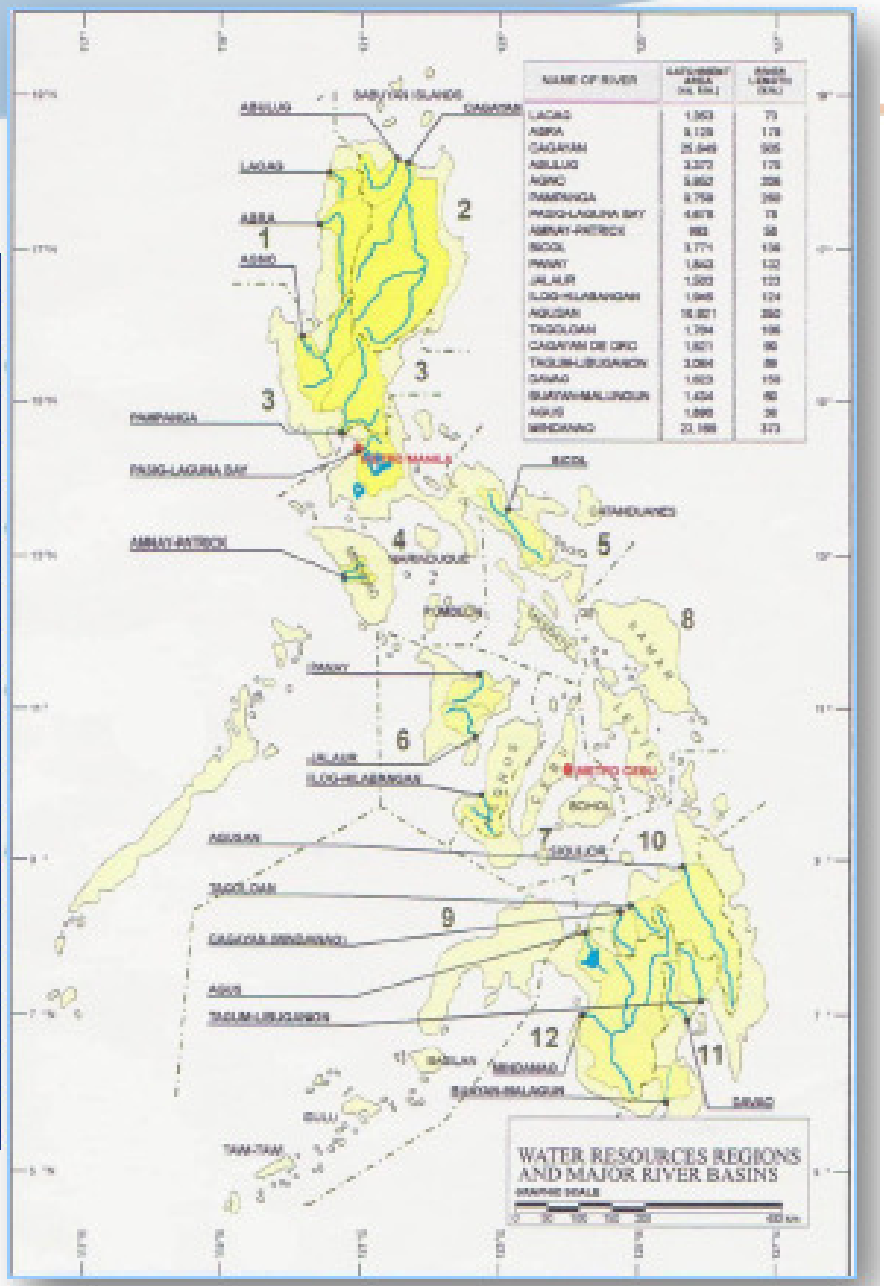
River Basins in the Philippines

Name of River Basin	Drainage Area (square kilometer)	River Length (km)
1. Cagayan	27,280	505
2. Mindanao	23,169	373
3. Agusan	10,621	350
4. Pampanga	9,759	260
5. Agno	5,952	206
6. Abra	5,125	181
7. Pasig-Marikina-Laguna Bay	4,678	78
8. Bicol	3,771	136
9. Abulog	3,372	175
10. Tagum-Libuganon	3,064	89
11. Ilog-Hilabangan	1,945	178
12. Panay	1,843	152
13. Tagoloan	1,704	106
14. Agus	1,645	36
15. Davao	1,623	150
16. Cagayan De Oro	1,521	90
17. Jalaur	1,503	123
18. Buayan-Malangun	1,434	64

Source: Rivers in the Philippines, DPWH-JICA Publication, March 1997



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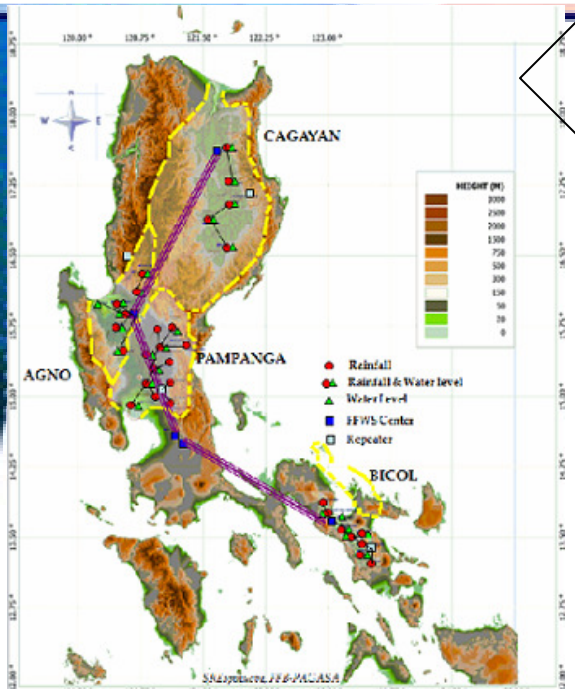
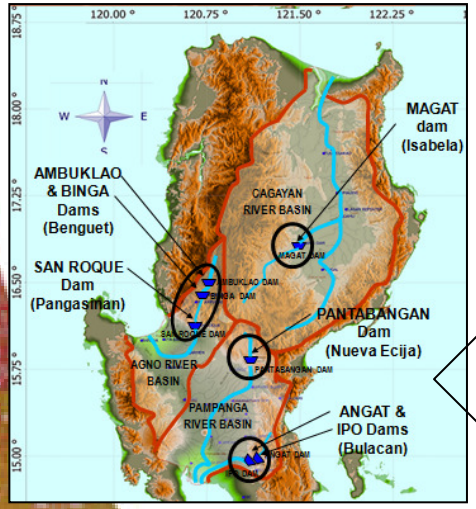
NETWORK OF HYDROLOGICAL STATIONS





Monitored telemetered major river basins

River basin / dam	RG	WL	Date
1. Pampanga river basin	17	10	1973
2. Agno river basin	12	9	1983
3. Bicol river basin	11	7	1983
4. Cagayan river basin	5	5	1983
5. Pasig-Marikina-Laguna Lake			
EFCOS (MMDA)	7	11	1993
KOICA (PAGASA)	17	16	2012
ASTI (DOST)	79	33	2012
6. Angat dam	4	2	1986
5. Pantabangan dam	5	1	1986
6. Binga/Ambuklao dam	6	2	1992
7. San Roque dam	3	2	2003
8. Magat dam	6	2	1992
9. Ipo/La Mesa dam	2	2	2011

Monitored telemetered major reservoirs

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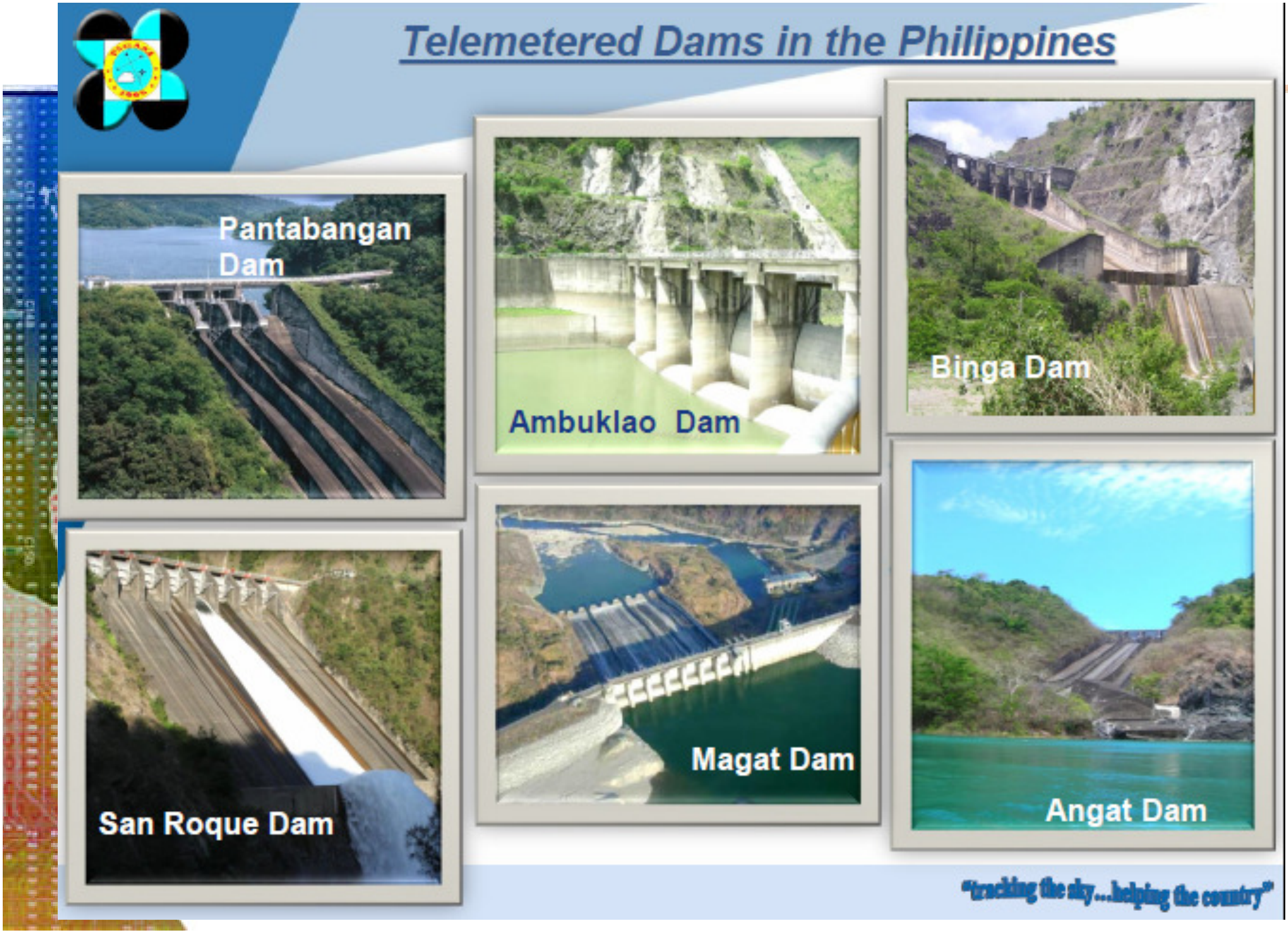


PAGASA IN A NUTSHELL

FLOOD FORECASTING AND WARNING SYSTEM FACILITIES

Rainfall station

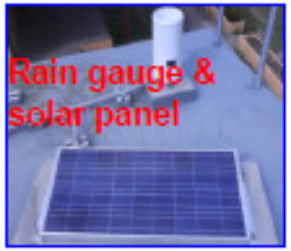
Flood Forecasting and Warning-Main Operation Center

Communication tower

Telemetry Equipment

Water level gauge

River Center & its Operation Room



Rain gauge & solar panel

Fixed and mobile warning facilities

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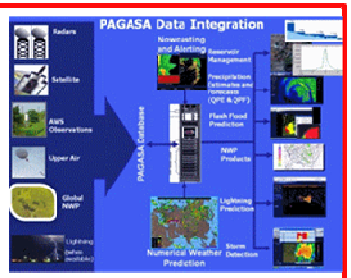
PAGASA's Technical Operation

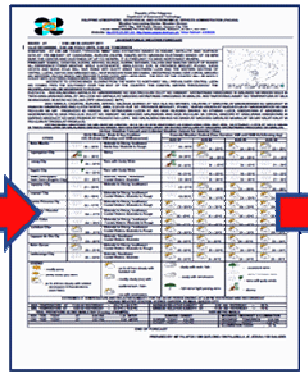
24/7 WEATHER OBSERVATION & TRANSMISSION

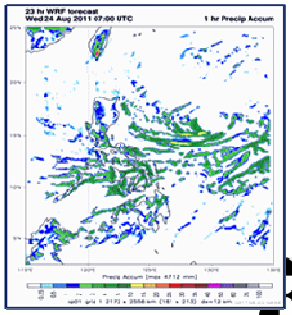
- Field Stations
- Upper-air Stations
- Doppler Radars
- Wind Profiler
- Automatic Stations
- Met. Buoys
- Airport Stations
- Met. Satellites

PROCESSING AND ANALYSES



FORECAST AND WARNING PREPARATIION





DISSEMINATION TO END-USERS

- NDRRMC
- Media
- Internet
- SMS
- AUTO FAX
- DIAL-A-WEATHER

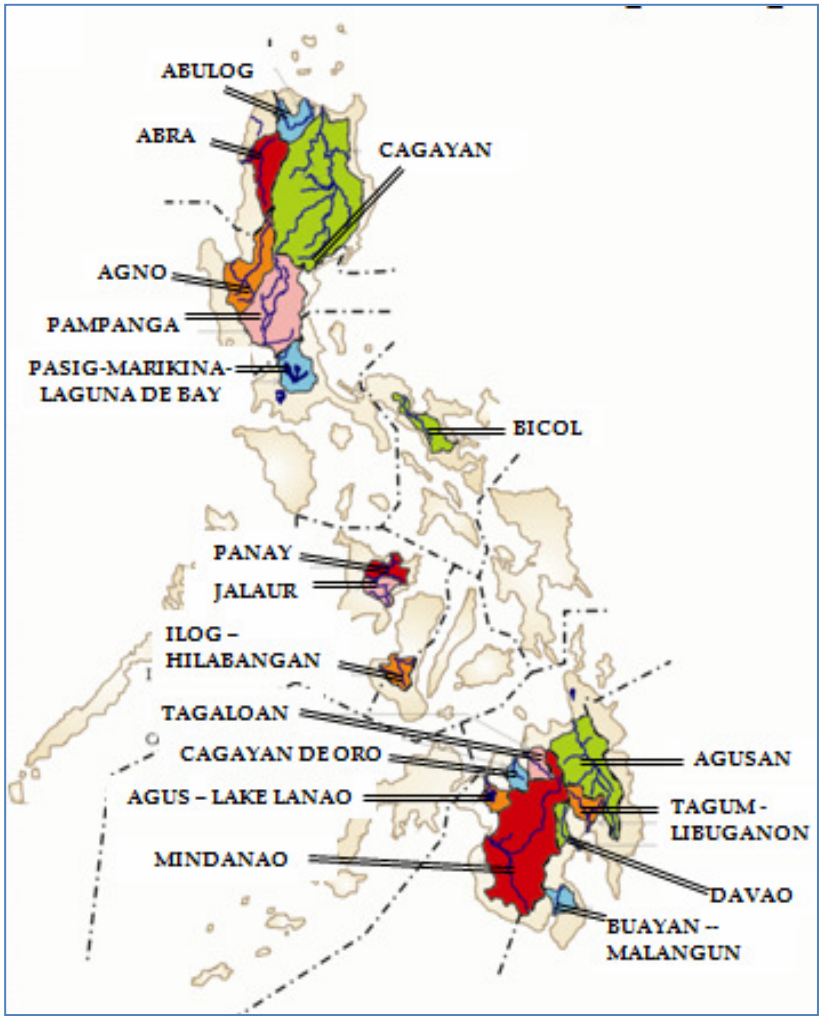
SA - DOST

CHALLENGES, OPPORTUNITIES AND WAY FORWARD

- Establishment of FFWS Centers (buildings) in the other 13 major river basins in the country

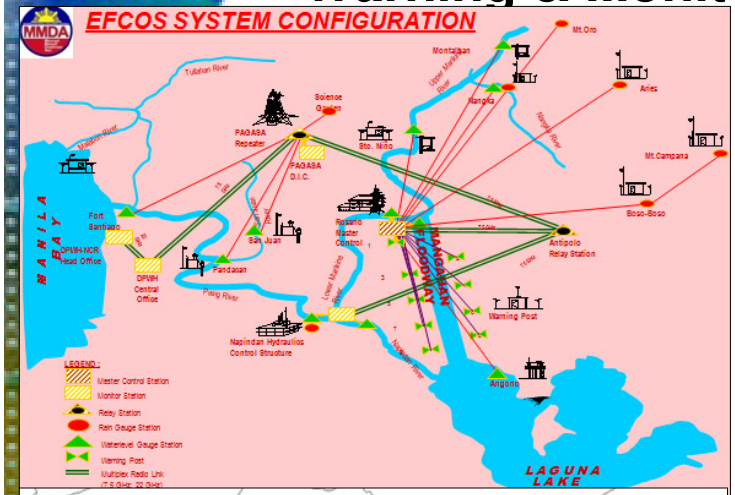
	River Basin	Location	Area, km2
1	Abulog	Luzon	3,372
2	Abra	Luzon	5,125
3	Panay	Visayas	1,843
4	Jalaur	Visayas	1,503
5	Ilog-Hilabangan	Visayas	1,945
6	Agusan	Mindanao	10,621
7	Agus-Lake Lanao	Mindanao	1,645
8	Cagayan de Oro	Mindanao	1,521
9	Tagum-Libuganon	Mindanao	3,064
10	Davao	Mindanao	1,623
11	Buayan-Malungun	Mindanao	1,434
12	Taglaoan	Mindanao	1,704
13	Mindanao	Mindanao	23,169

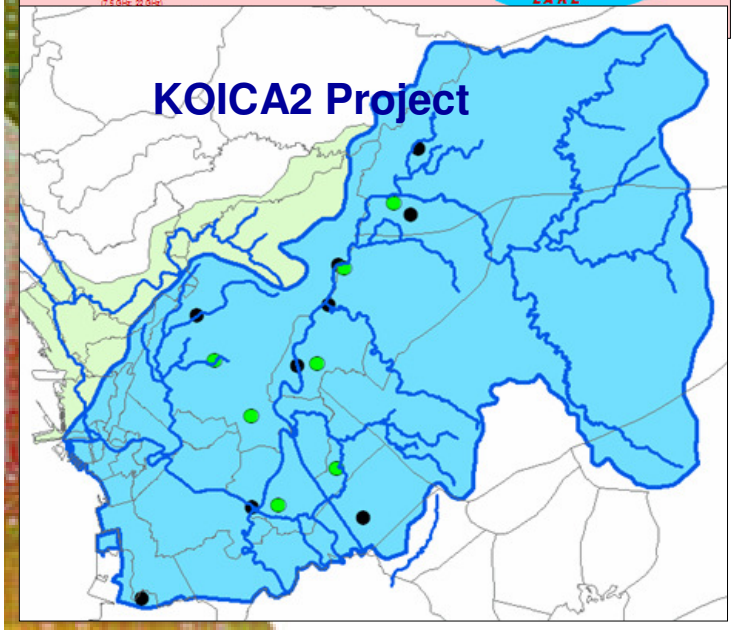
18 Major river basins



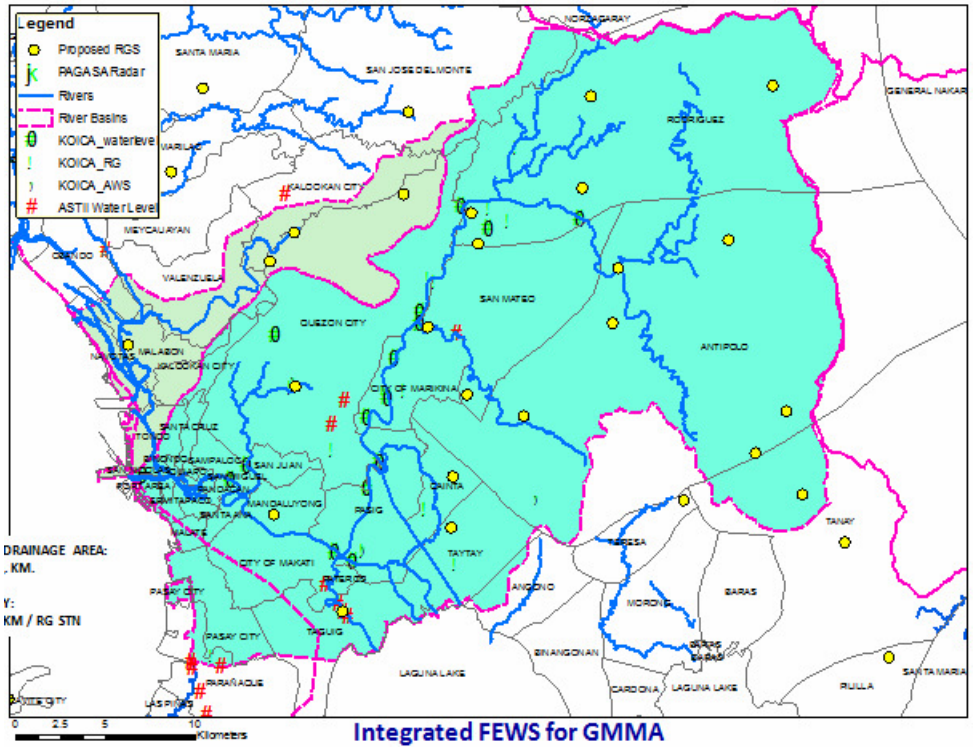
CHALLENGES, OPPORTUNITIES AND WAY FORWARD

- Operationalization of the Project "**Establishment of Early Warning & Monitoring System for Metro Manila**"





EFCOS Monitoring & Warning system



Integrated FEWS for GMMA

Integration of existing & proposed monitoring systems – Resilience project (UNDP-CIDA)

KOICA Monitoring & warning system

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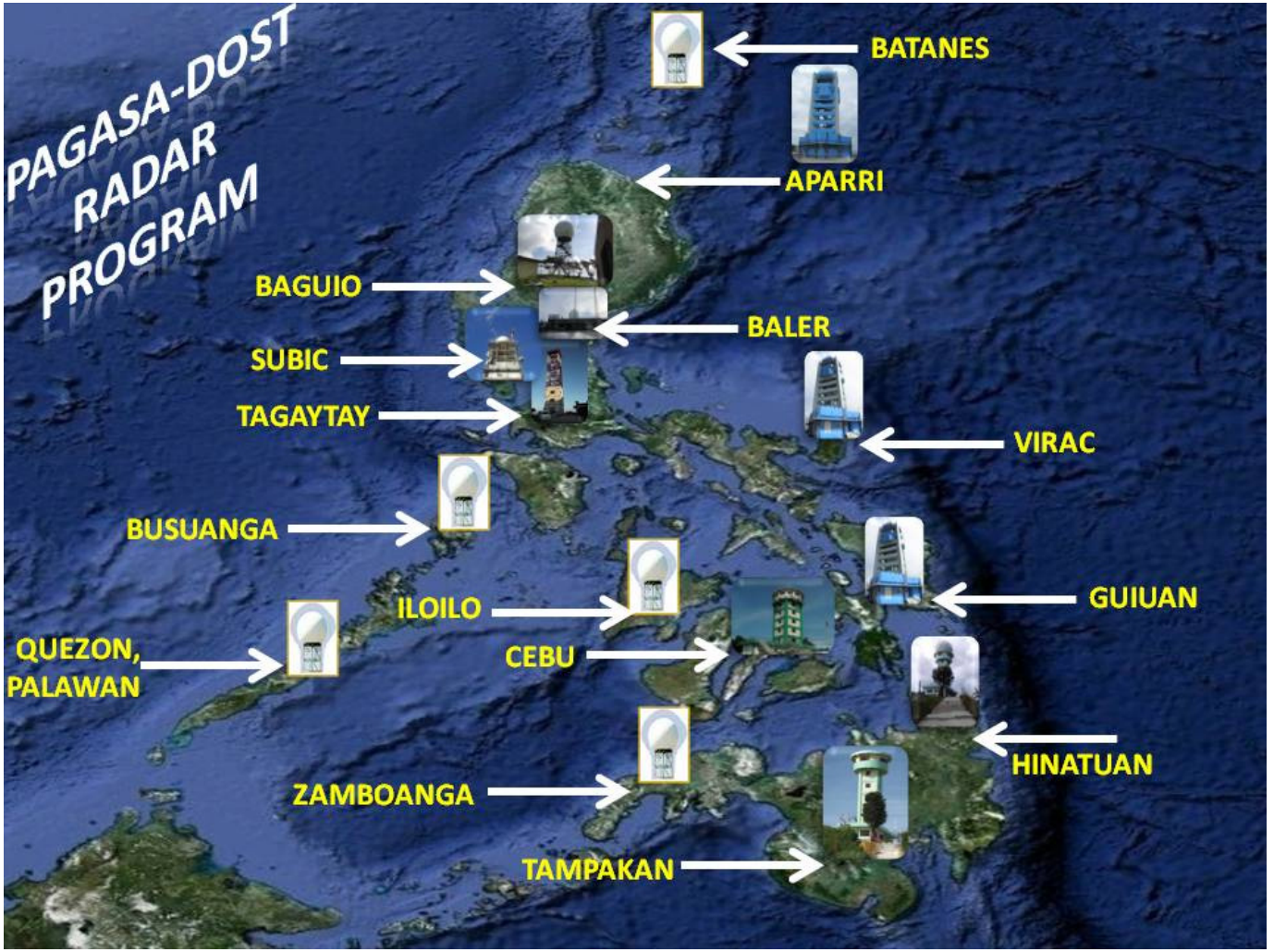
CHALLENGES, OPPORTUNITIES AND WAY FORWARD

2012
Virac
Tampakan
Aparri
2013
Guiuan
2014 onwards
Iloilo
Busuanga
Zamboanga
Quezon, Palawan
Basco, Batanes



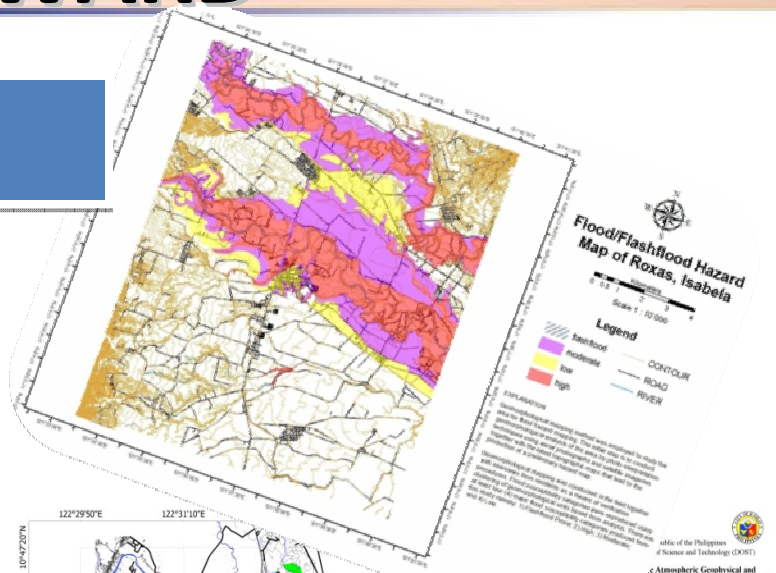
15 Doppler Weather Radars

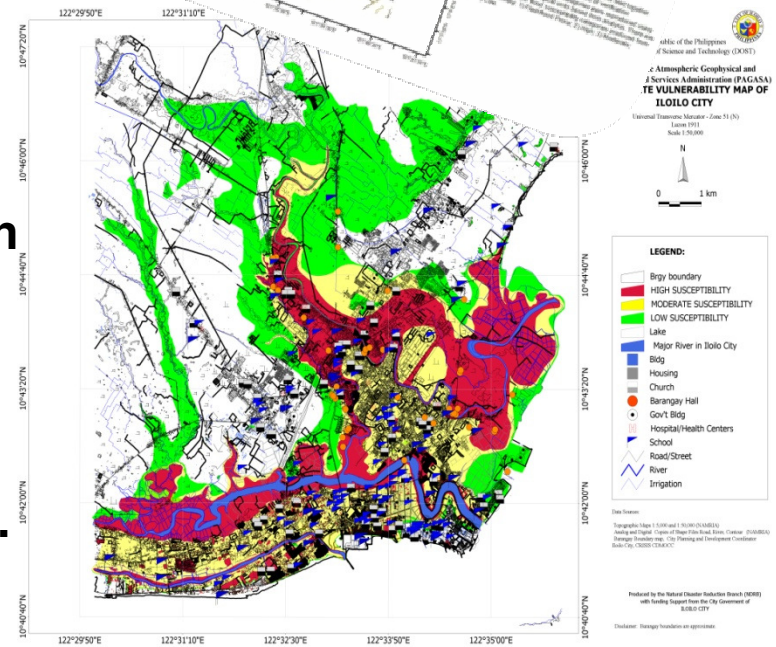
CHALLENGES, OPPORTUNITIES AND WAY FORWARD

Participation in the implementation of Nationwide Operational Assessment of Hazard s (NOAH)

Eight(8) component projects under the NOAH program

1) Hydro met Sensors Development,
2) DREAM-LIDAR 3-D Mapping Project,
3) Flood NET-Flood Modeling Project,
4) Hazards Information Media,
5) Enhancing Geo-hazards Mapping through LIDAR,
6) Doppler System Development,
7) Landslide Sensors Development Project, and;
8) Storm Surge Inundation Mapping Project.





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CHALLENGES, OPPORTUNITIES AND WAY FORWARD

- Continue flood hazard mapping activities (1:10K)
- Integration and harmonization of activities under various local & foreign- assisted project which will are on-going and to be implemented in 2014
- Adoption of the newly upgraded Dam & Flood warning protocols
- Promotion of Community Based Flood Early Warning System (CBFEWS)


Thank you....
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Saudi Arabia, Singapore, Spain,
South Korea, Sweden, Switzerland,
Taiwan, Thailand, Turkey,
UAE, UK, USA,
Vatican, Vietnam
& donor organizations.
WE WILL NEVER FORGET
From the Philippines and Filipino people


THANK YOU
We Will Never Forget
From the Filipino people.
NOVEMBER 8, 2013
TYPHOON YOLANDA (HAIYAN)

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