



WATER RELATED DISASTER MITIGATION IN THE PHILIPPINES

A presentation of

JORGE M. ESTIOKO

Chief Water Resources Staff Officer
National Water Resources Board, Philippines

The PHILIPPINES

GEOGRAPHY

- ◆ AREA:
total.....300,000 km²
land 298,170 km²
water 1,830 km²

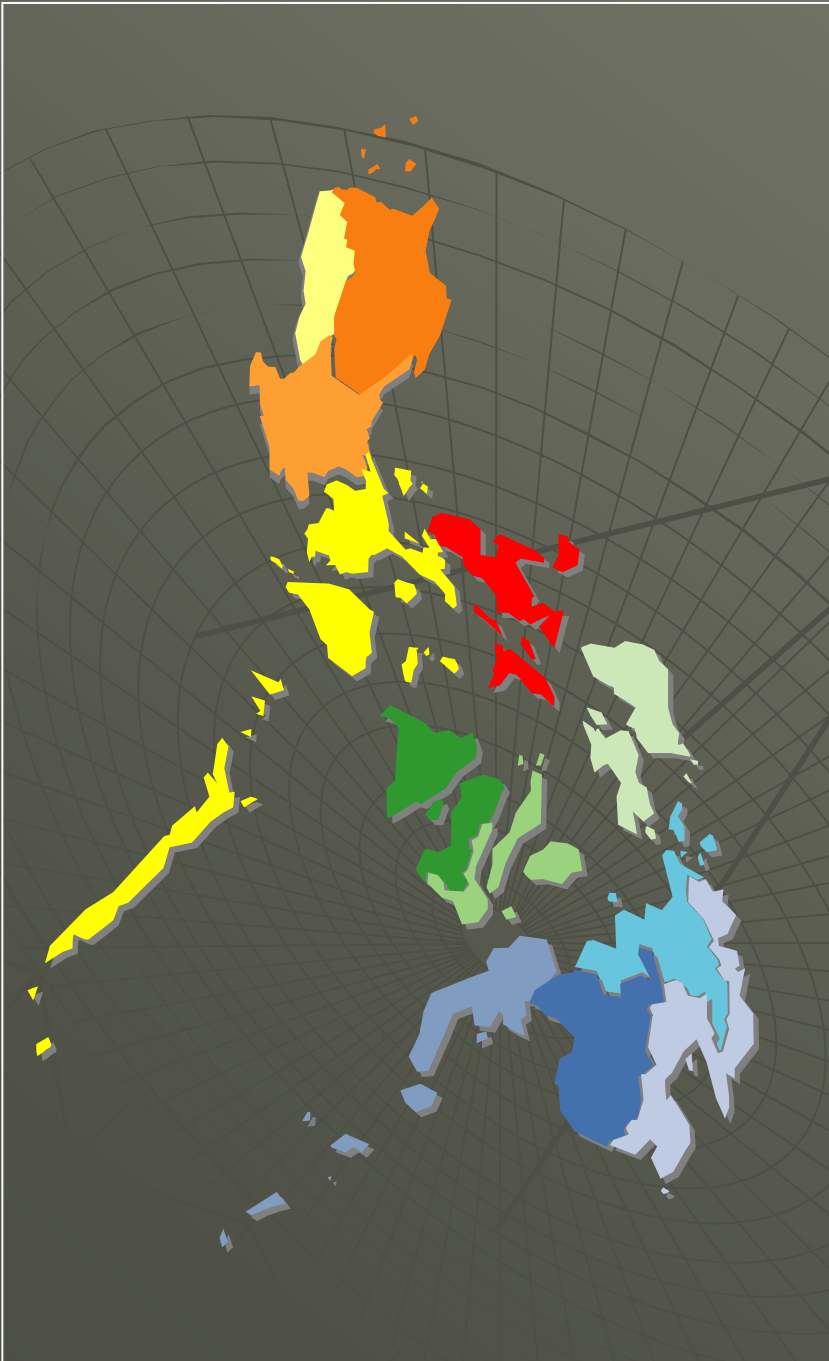
- ◆ BOUNDARIES:

North: Balintang Channel
South: Sulu and Celebes Seas
East: Philippine Sea/Pacific Ocean
West: South China Sea

- ◆ COASTLINE 36,289 km

- ◆ CLIMATE: tropical
northeast monsoon (Nov-Apr)
southwest monsoon (May-Oct)

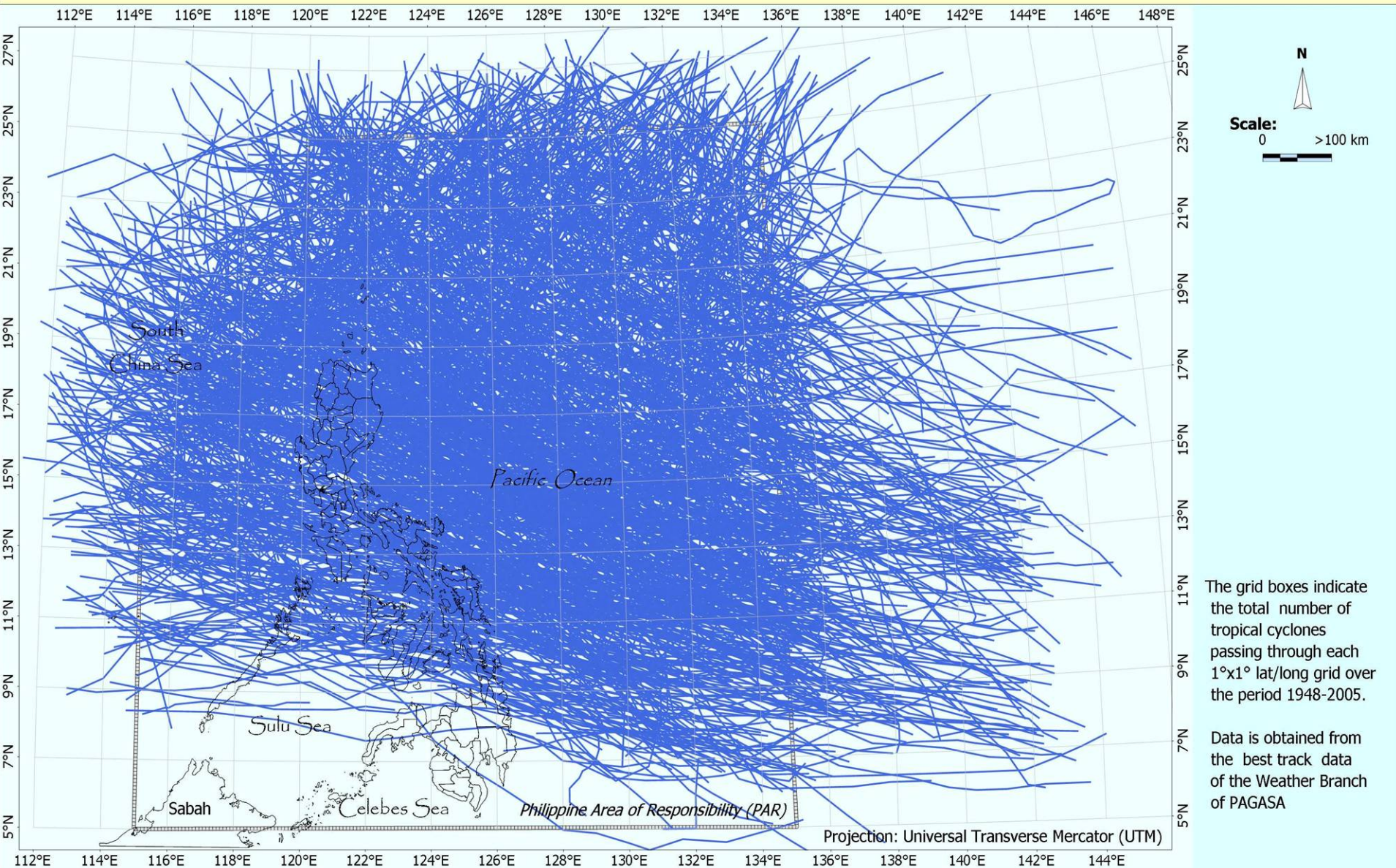
- ◆ TERRAIN: mostly mountains with
narrow to extensive coastal lowlands



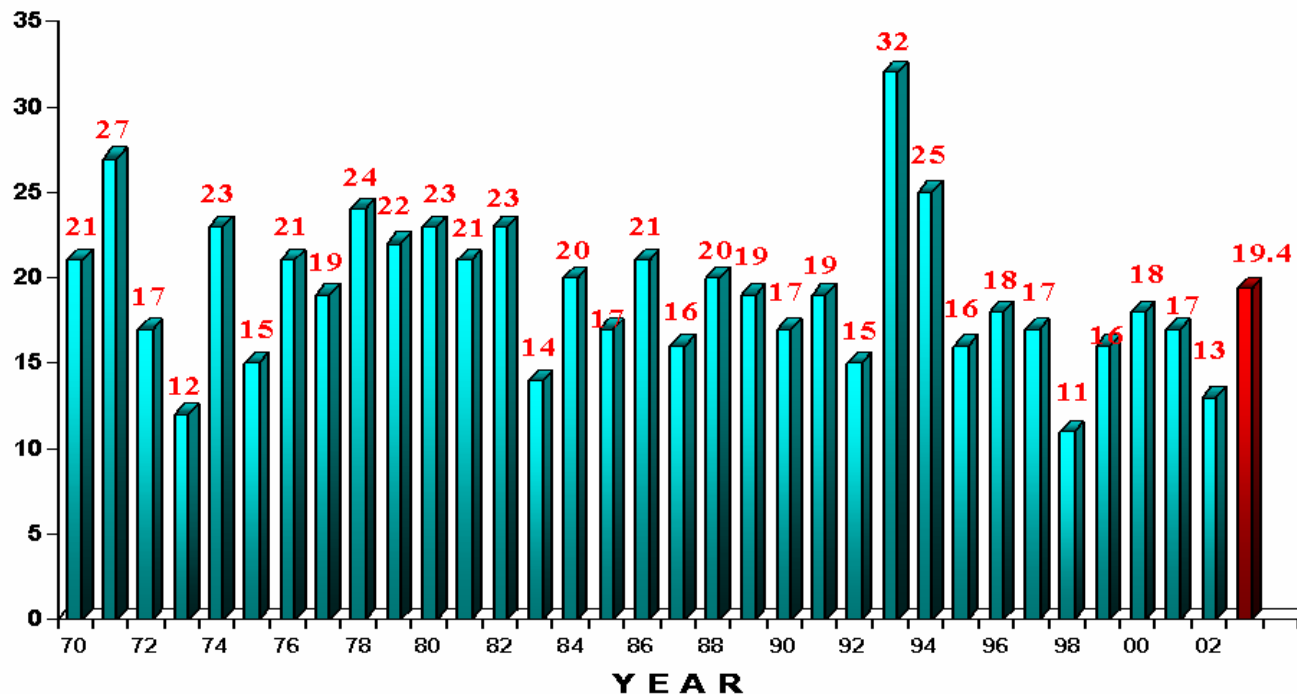
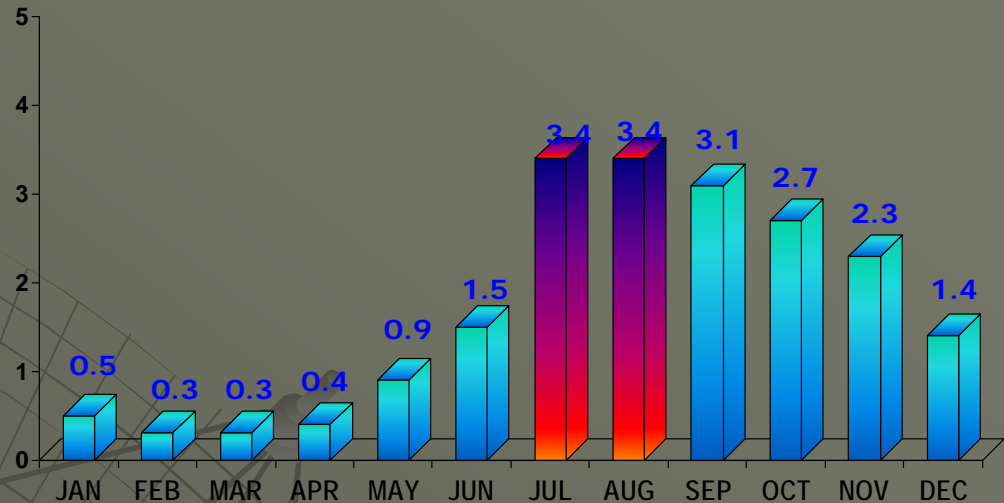
Weather Systems affecting the Philippines



Actual tropical cyclone tracks for the period 1948-2005

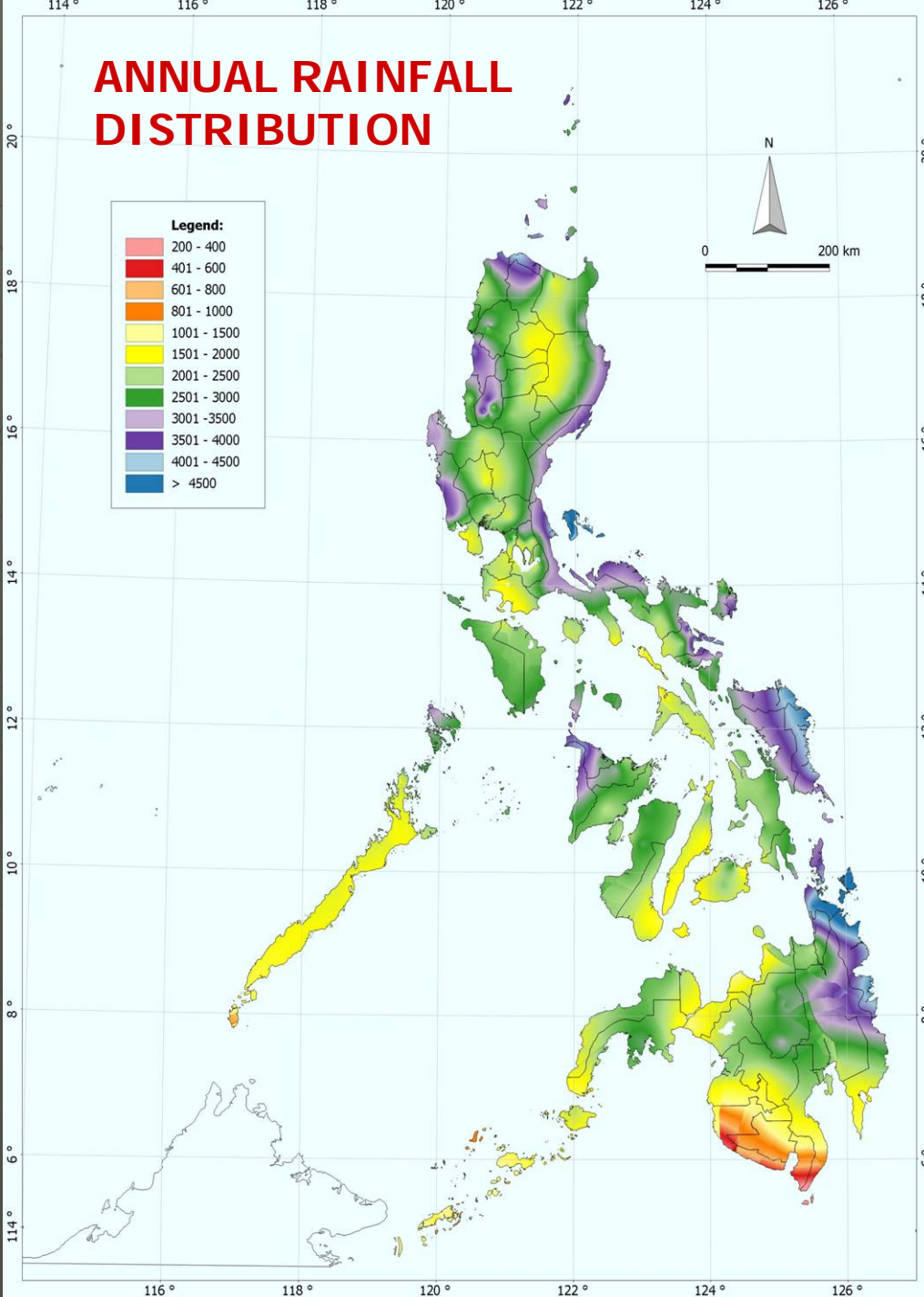
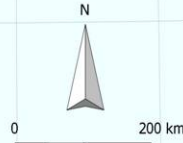
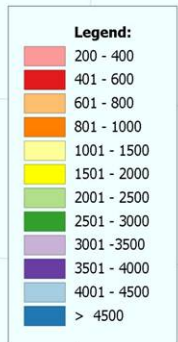


MONTHLY AVERAGE FREQUENCY OF OCCURRENCE OF TROPICAL CYCLONES IN THE PHILIPPINE AREA OF RESPONSIBILITY



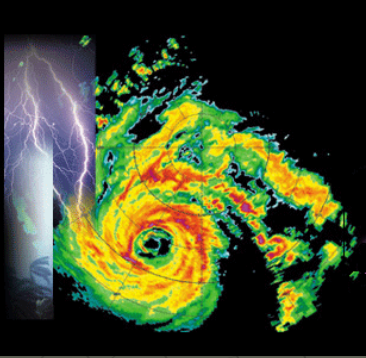
ANNUAL FREQUENCY OF OCCURRENCE OF TROPICAL CYCLONES WITHIN THE PHILIPPINE AREA OF RESPONSIBILITY (PAR)

ANNUAL RAINFALL DISTRIBUTION



Philippines is endowed with abundant water resources.

- mean annual rainfall varying from 1000 mm to 4000 mm
- 421 principal river basins
- 59 natural lakes
- estimated annual surface water supply - about 206,230 MCM
- dependable water supply - about 125,790 MCM
- groundwater potential - about 20,000 MCM



FLOOD AND WATER RELATED DISASTERS

The Philippines, being in the Circum-Pacific belt of fire and typhoon, has always been subjected to constant disasters and calamities.

An average of 30 typhoons a year with an average of 3.5 destructive typhoons that causing ...

- floods
- landslides,
- debris flows
- Other water related disasters

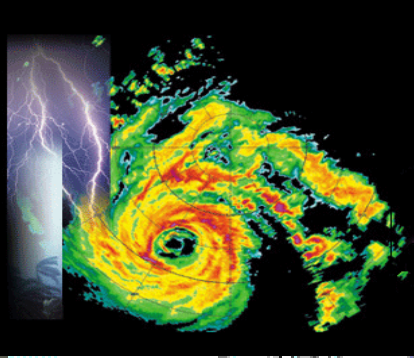
... instigate immense damage to life and property



Toto Soberano, PDI



Aftermath of Flashflood-
Southern Leyte



Damages Caused by Floods and Water Related Disasters



Toto Soberano, PDI



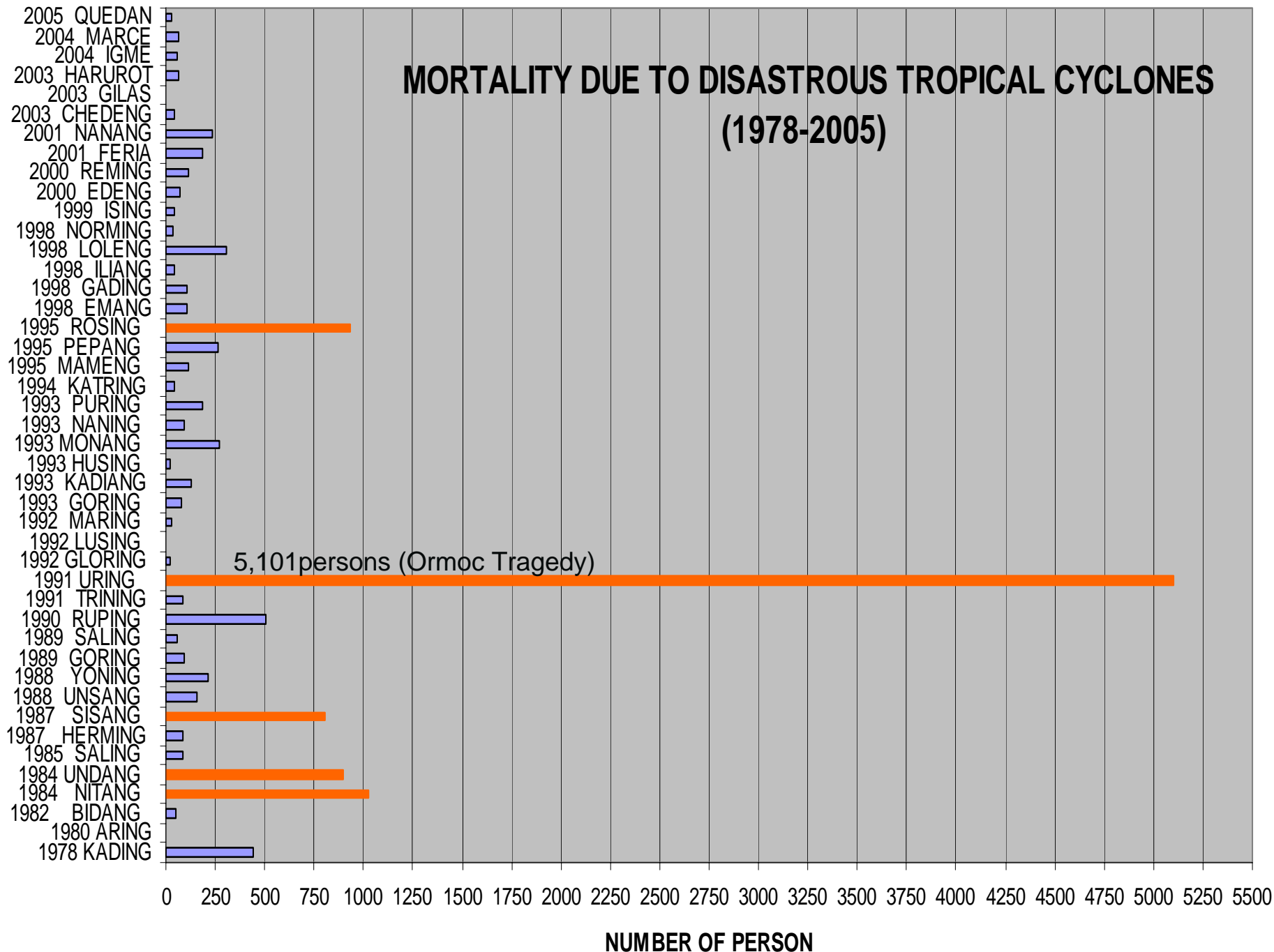
Aftermath of Flashflood-
Southern Leyte

Year	Total Damages (PhP)
2006	14.10 Billion (US\$ 282.0M)
2005	2.44 Billion (US\$ 48.8M)
2004	8.52 Billion (US\$ 17.1M)
2003	3.80 Billion (US\$ 7.6M)
2002	3.05 Billion (US\$ 6.1M)
2001	6.84 Billion (US\$ 136.8M)
2000	7.22 Billion (US\$ 144.4M)

- The billions of pesos lost annually are lethal blows to the Philippine's economy

MORTALITY DUE TO DISASTROUS TROPICAL CYCLONES (1978-2005)

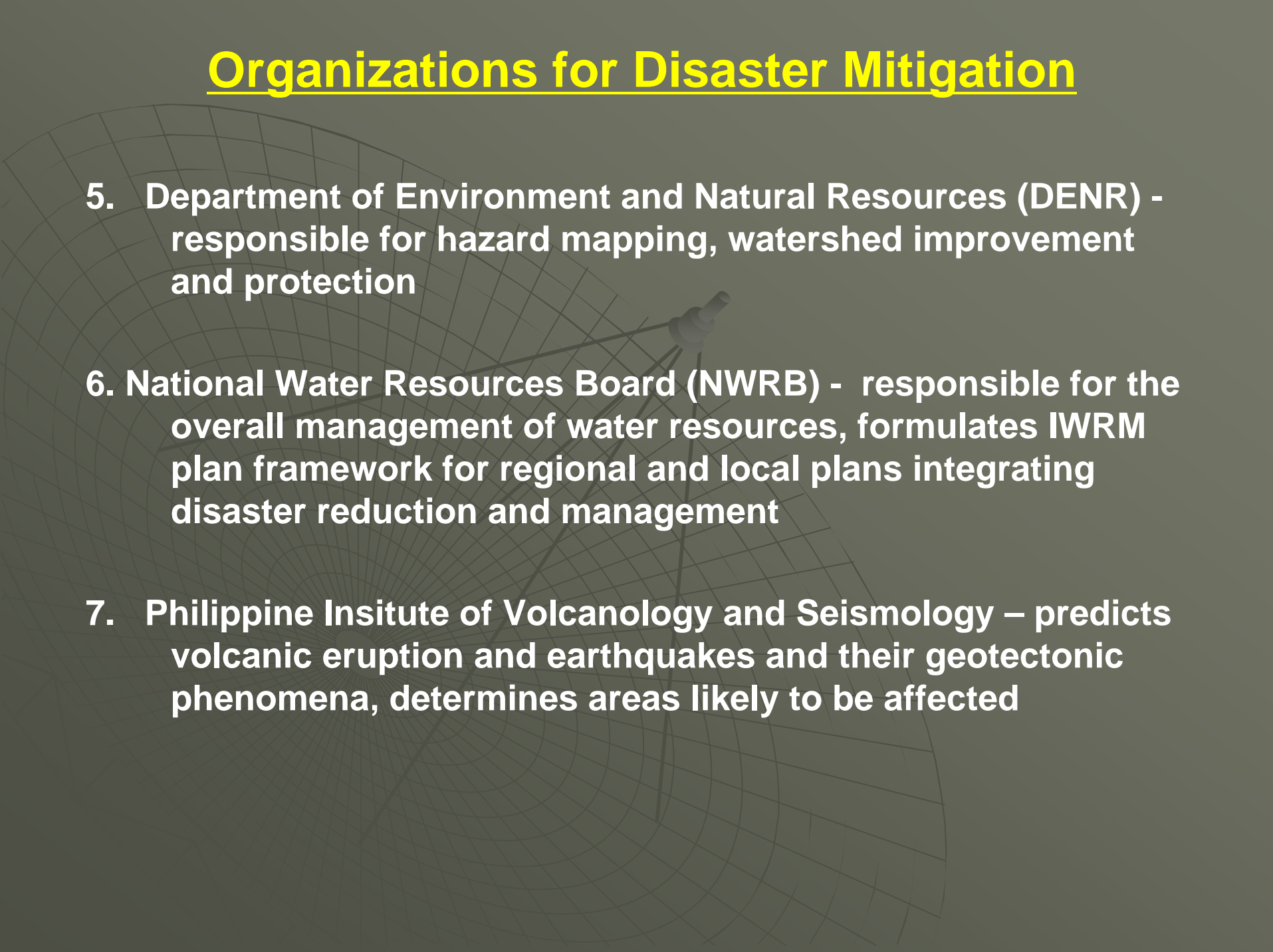
TC YEARS AND NAME



Organizations for Disaster Mitigation

- 1. National Disaster Coordinating Council (NDCC), Office of Civil Defense (OCD) – core organization for disaster reduction and mitigation composed of 19 line agencies**
- 2. Local Government Units – prepares and implements disaster risk management plans, executes preparedness, response, recover and development programs**
- 3. Department of Public Works and Highways (DPWH) – responsible for the construction and maintenance of river improvements, flood control and sabo infrastructures**
- 4. Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) – provides weather forecasting and early warning advisories**

Organizations for Disaster Mitigation

- 
5. **Department of Environment and Natural Resources (DENR) - responsible for hazard mapping, watershed improvement and protection**
 6. **National Water Resources Board (NWRB) - responsible for the overall management of water resources, formulates IWRM plan framework for regional and local plans integrating disaster reduction and management**
 7. **Philippine Insitute of Volcanology and Seismology – predicts volcanic eruption and earthquakes and their geotectonic phenomena, determines areas likely to be affected**

Efforts on Water Related Disaster Mitigation

1. NON – STRUCTURAL

- Land use management
- Flood forecasting and early warning system
- Efficient and effective dam operation and reservoir management
- Public information and education
- identification of evacuation and relocation sites
- Hazard and flood risk mapping
- Capacity building to institutions

2. STRUCTURAL

- Construction of dikes and levees, river walls and revetment
- Construction retention ponds, sedimentation basin and sabo dams
- Improvement of channel condition, drainage facilities, floodways, pumping stations, floodgates

The government has continuously developed disaster mitigation approaches including structural measures, non-structural measures, and strategies for response, recovery and development.

Shortcomings and Challenges in Mitigating Flood and Water Related Disasters

1. SHORTCOMINGS

- inadequacy of infrastructures to reduce the magnitude of flood hazard
- poor maintenance of infrastructures resulted to ineffective operations and unsustainable flood control infrastructures
- limited network of observation stations for hydro-climatologic monitoring that resulted to ineffective provision of flood forecasting and early warning dissemination
- lack of climate-based decision support tools for effective operations of dams and flood control infrastructures
- limited education and awareness outreach program to undertake preparedness measures against floods

Shortcomings and Challenges in Mitigating Flood and Water Related Disasters

1. CHALLENGES

- natural disasters have the tendency to increase in number and in severity due to climate variability/climate change
- rapid increase of urbanization and industrialization has been contributing to floods and water related disaster
- combination of different types of disasters in a particular locality
- effective and sustainable structural measures require enormous budget
- access to new technology to develop tools for preparedness, response, recovery and development
- integration of disaster management into the IWRM plan
- mainstreaming of IWRM initiatives from the National to local government level

**THANK YOU !
ARIGATO GUSAYMASU !
MARAMING SALAMAT PO !**



NATIONAL WATER RESOURCES BOARD

8th Floor, NIA Building, EDSA, Quezon City, Philippines

Telefax No. 02-9202641 / 02- 9202654

Website: www.nwrb.gov.ph