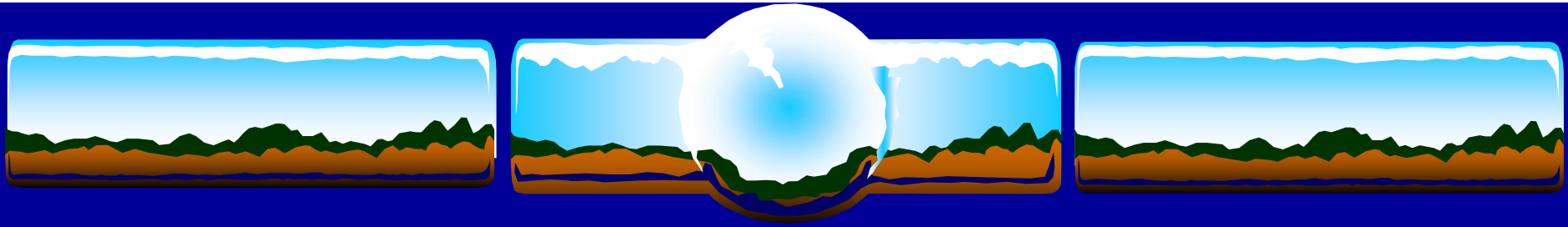


Community-Based Flood Early Warning System (CBFEWS)

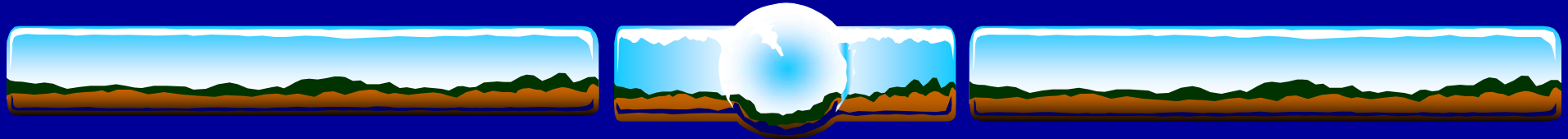


Prepared by:
Eng'r. Hilario G. Esperanza
Eng'r. Socrates F. Paat, Jr.
Flood Forecasting Branch
PAGASA Weather Bureau
Department of Science and Technology
Philippines









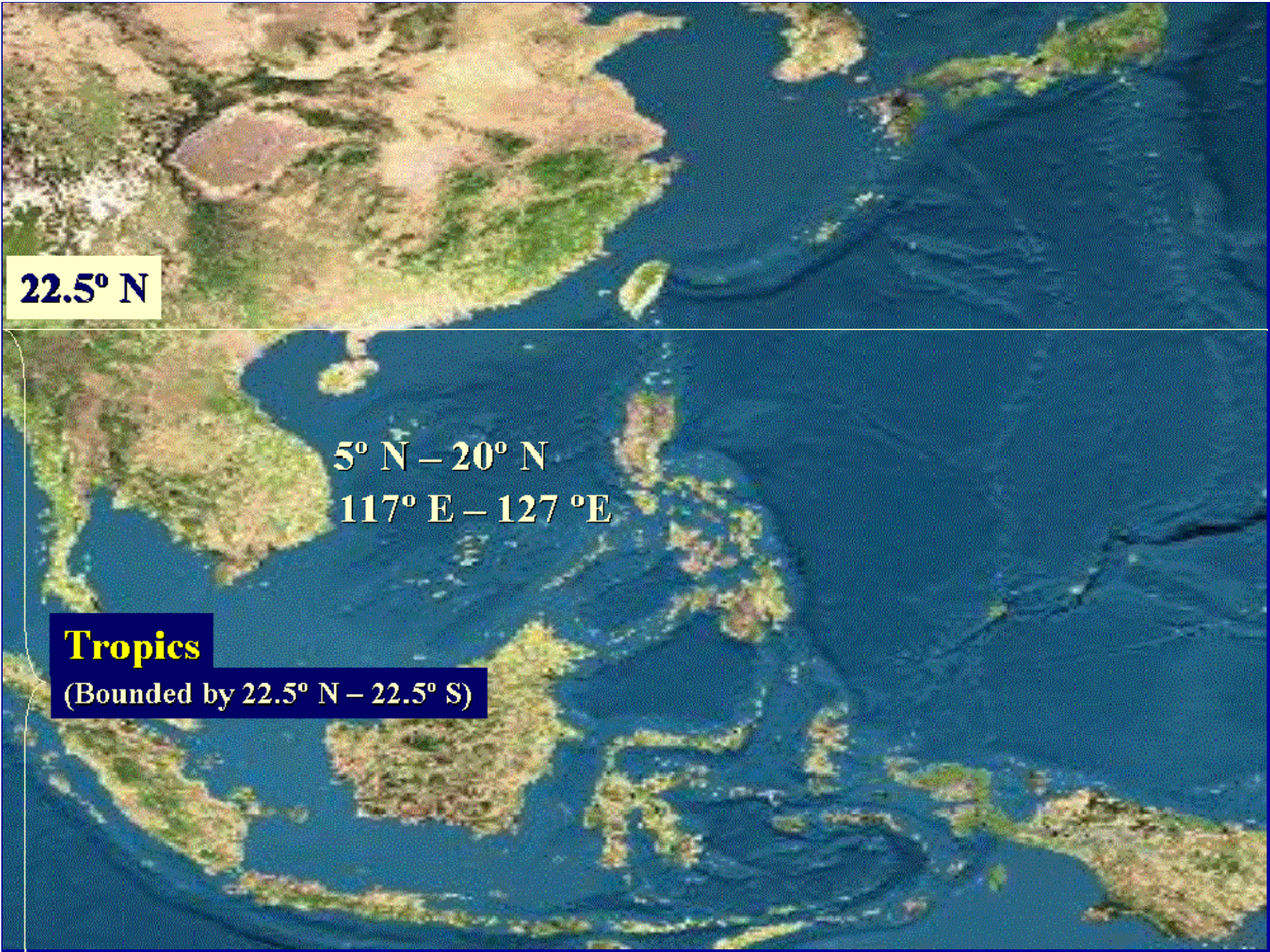
Outline of Presentation

- Weather-causing phenomena
- Climate of the Philippines
- Rationale of CBFEWS
- Activities
- Progress of implementation



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

-  Geographic location and topography
-  Ocean currents
-  Semi-permanent cyclones and anti-cyclones
-  Principal Air Streams
-  Linear systems
-  Tropical Cyclones



22.5° N

5° N – 20° N
117° E – 127° E

Tropics

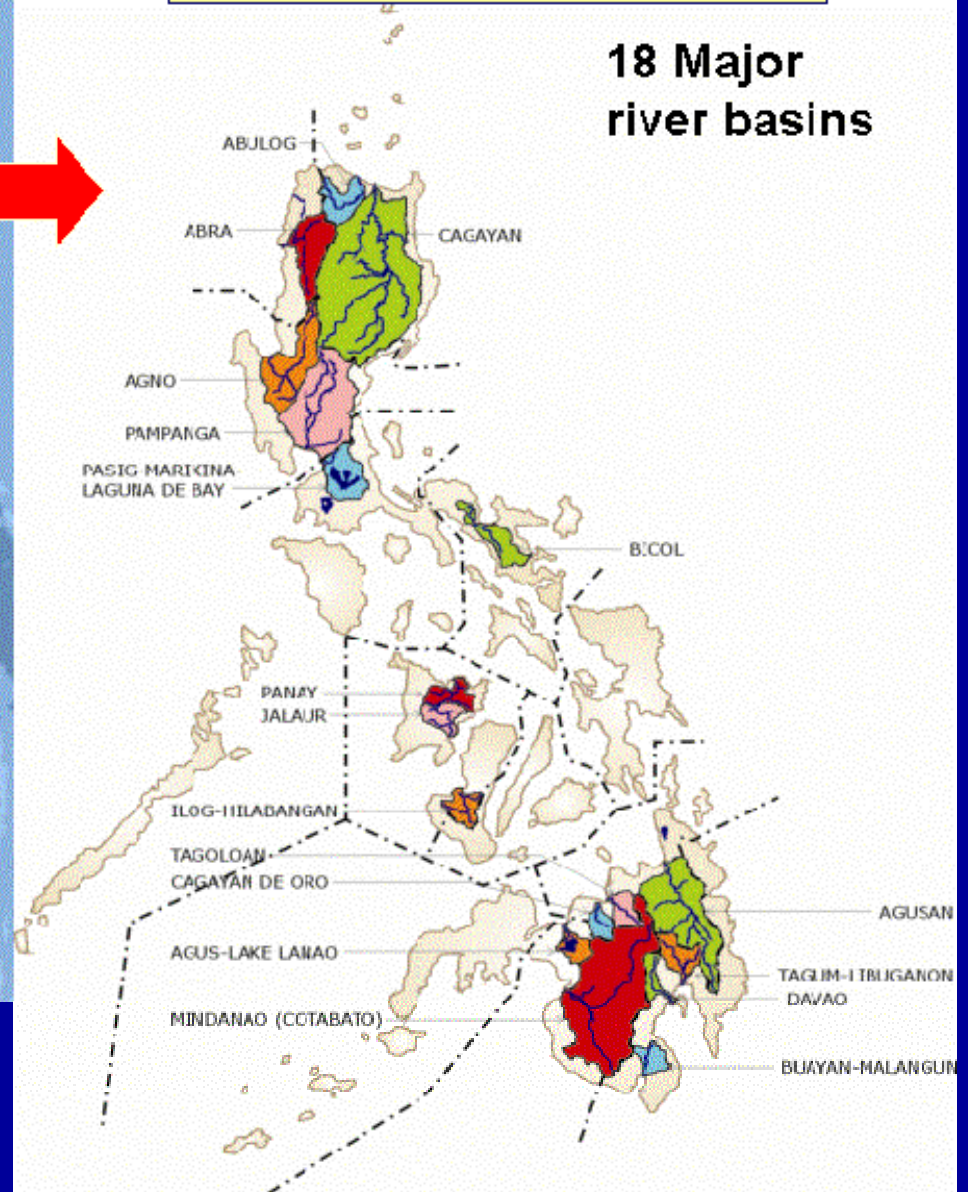
(Bounded by 22.5° N – 22.5° S)

Major River Basins

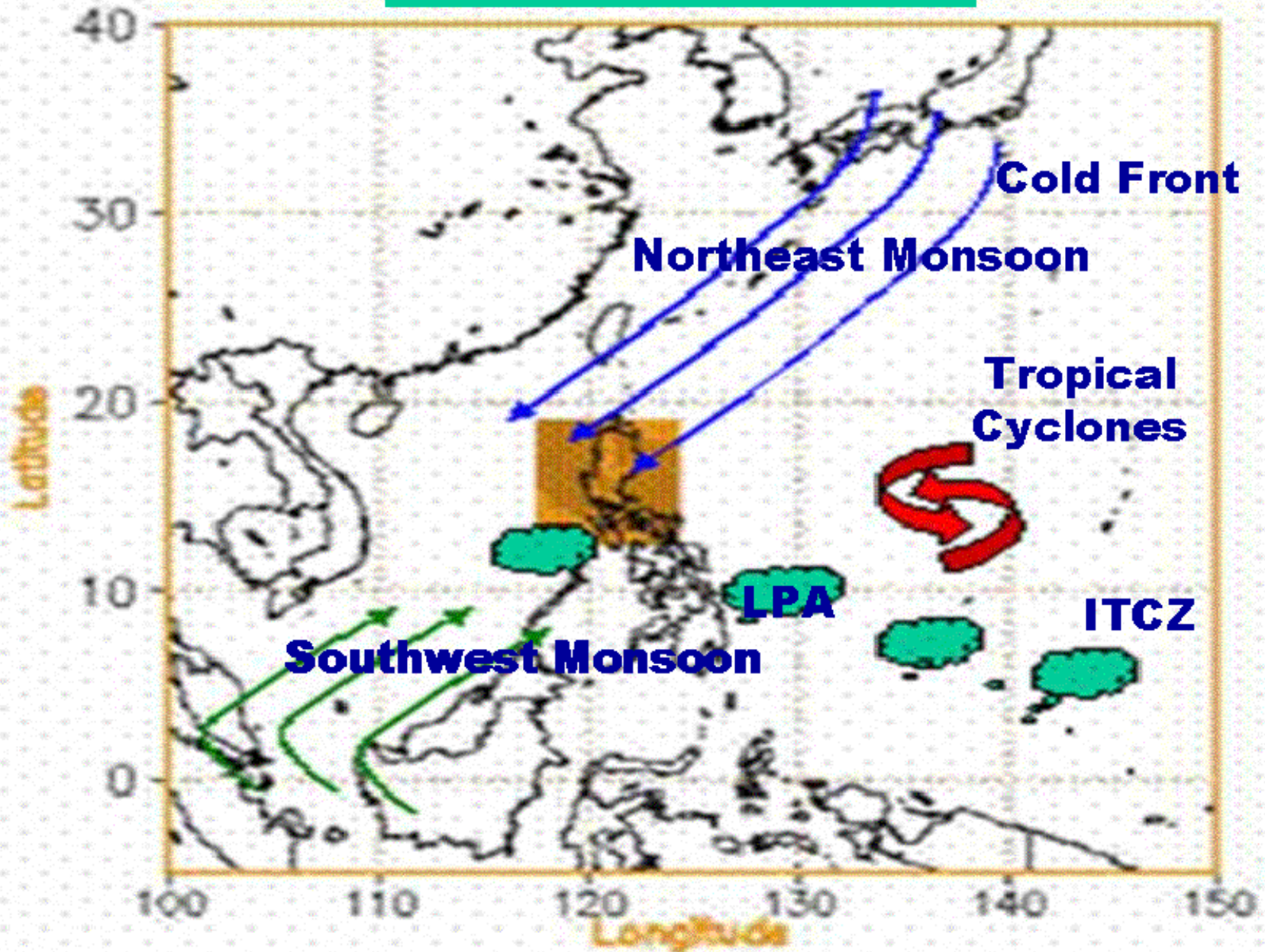
18 Major river basins



Topographic Map



Weather Systems





CLASSIFICATION OF TROPICAL CYCLONES



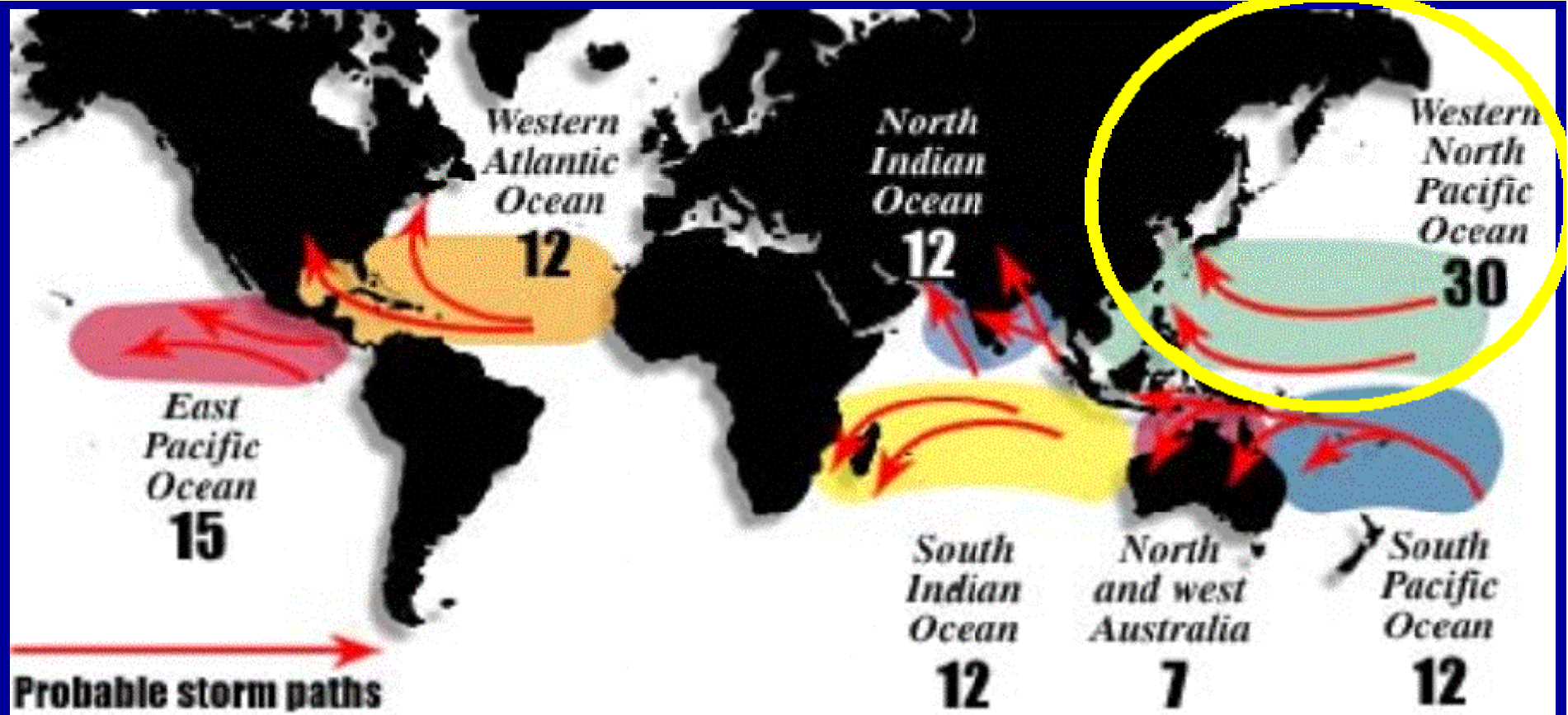
- **TROPICAL DEPRESSION** - maximum sustained winds is from 45 to 63 kph.
- **TROPICAL STORM** - maximum sustained winds is from 64 to 117 kph.
- **TYPHOON** – maximum sustained winds is 118 kph and higher.

(Super Typhoon- used by Joint Tropical Warning Center when max. winds is greater than 215 kph).

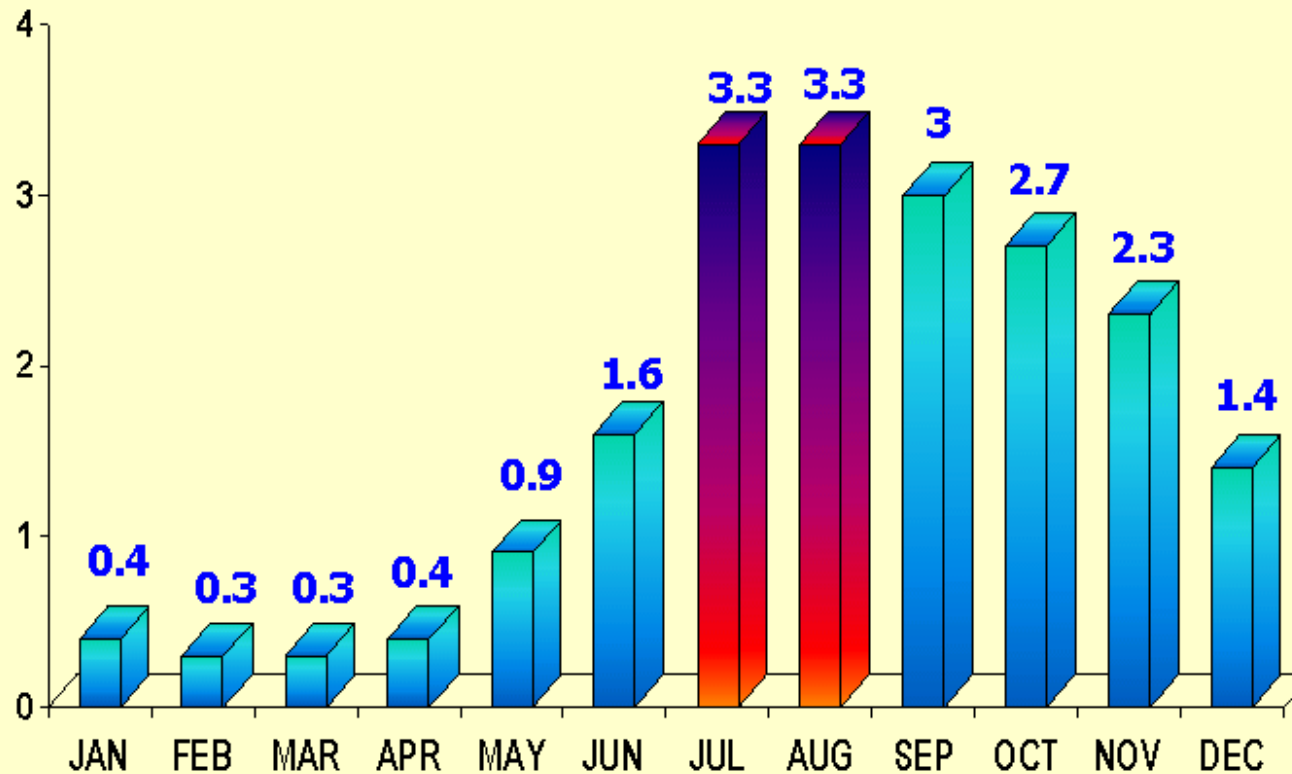
Public Storm Warning Signals

- #1- Wind speed 30-60 kph in 36 hours
- #2- Wind speed 61-100 kph in 24 hours
- #3- Wind speed 101-185 kph in 18 hours
- #4- Wind speed greater than 185 kph in 12 hours

AREAS OF FORMATION OF TROPICAL CYCLONES AND ANNUAL AVERAGE NUMBER WORLDWIDE

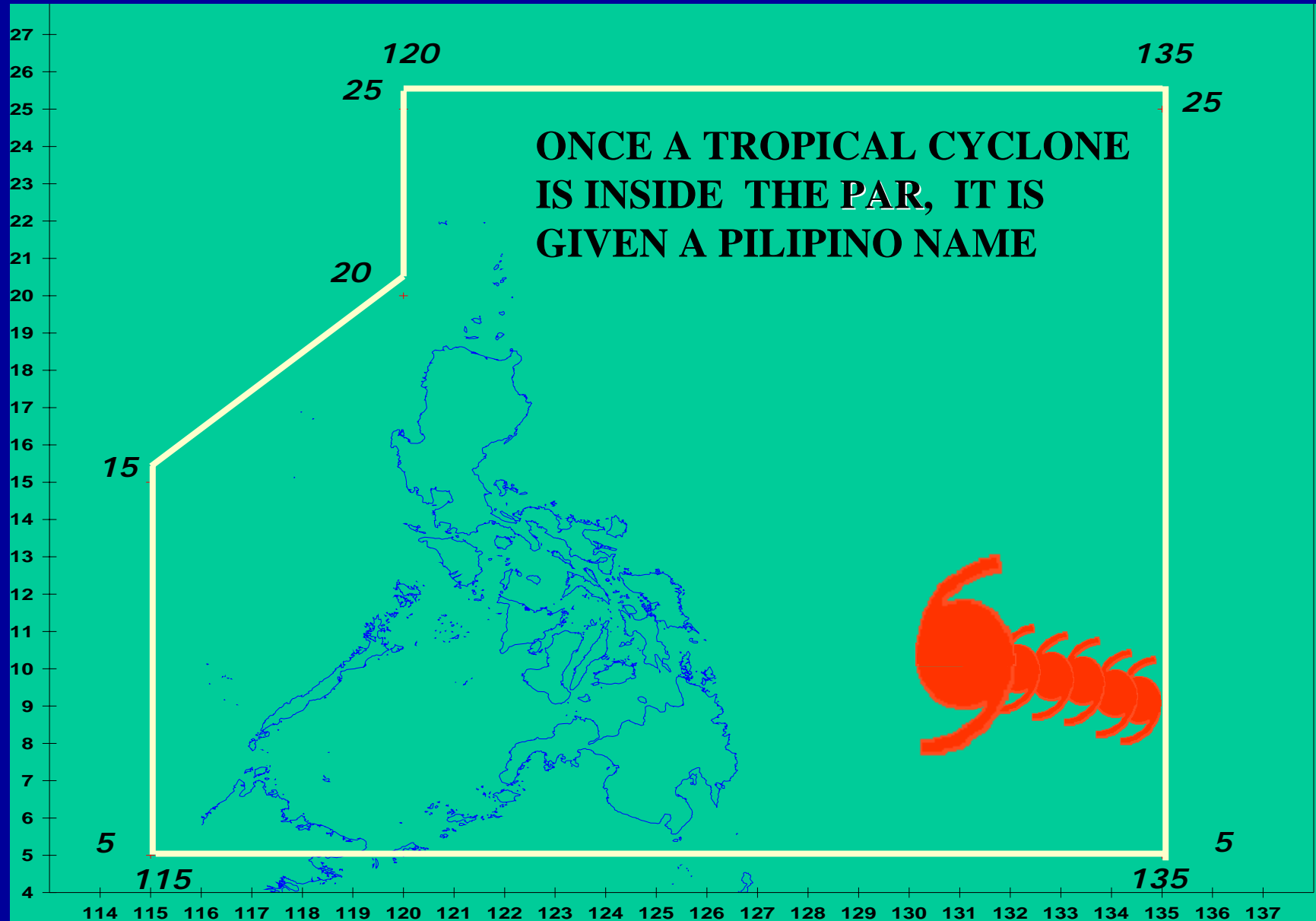


Frequency of Tropical Cyclone Occurrence



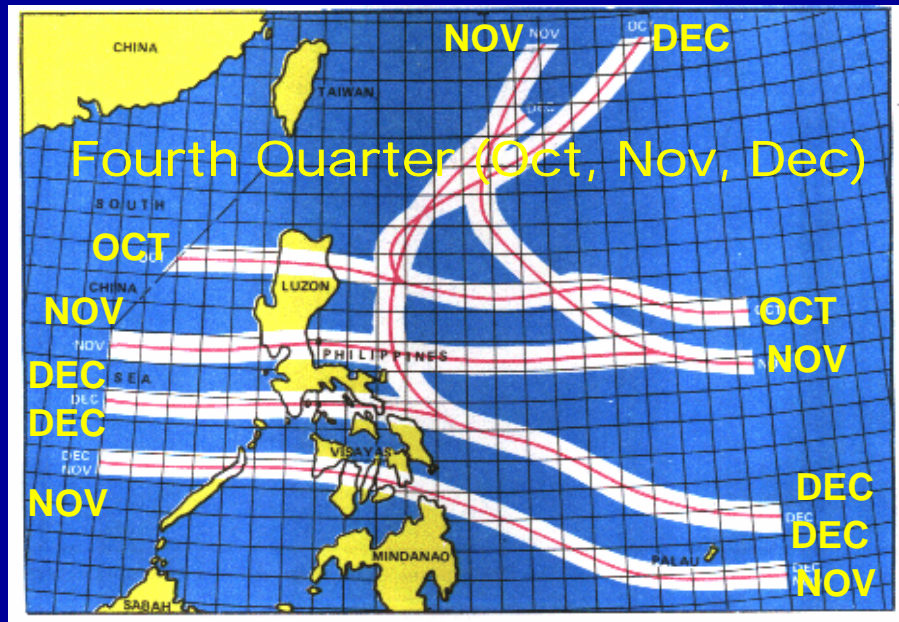
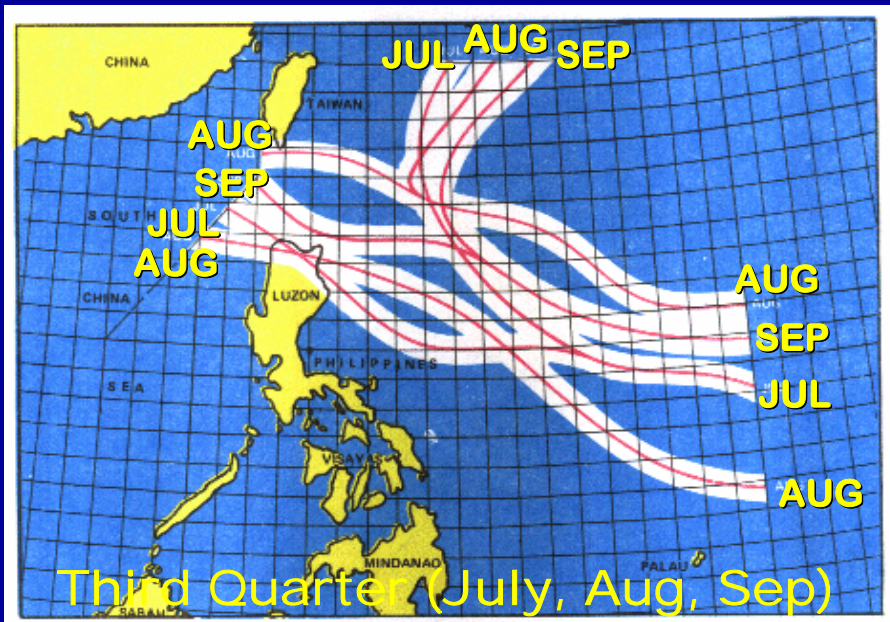
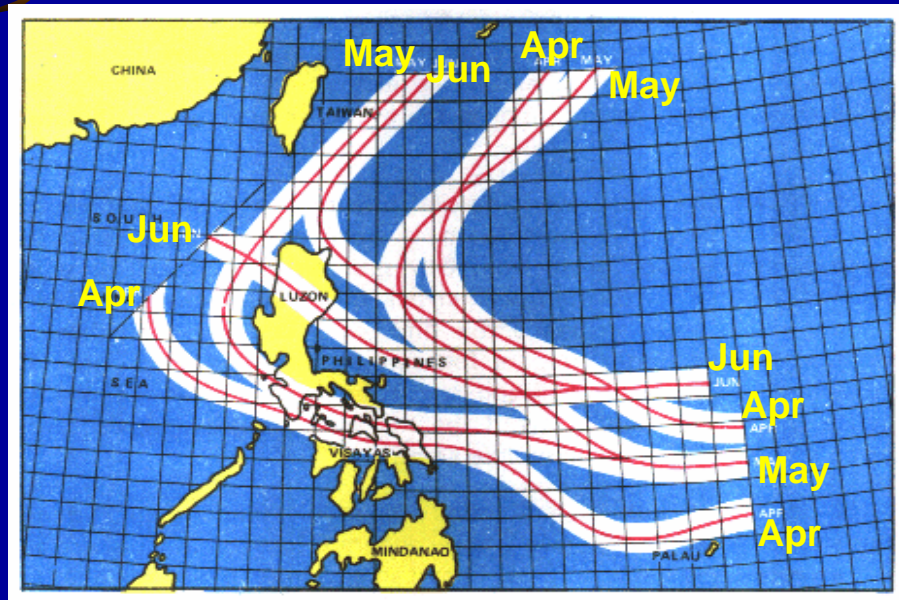
- Typhoon season is from June to December although no month is typhoon free
- Peak months are July, August and September

THE PHILIPPINE AREA OF RESPONSIBILITY [PAR]



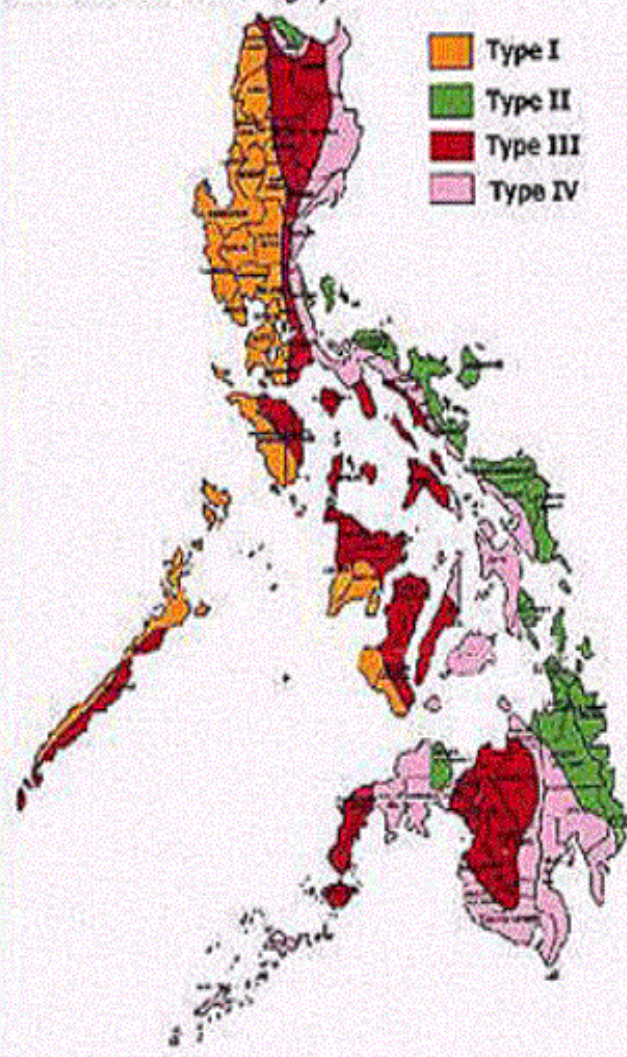
Average Tropical Cyclone Tracks

Second Quarter (April, May, June)



Philippine Climate Classification

Climate Map of the Philippines based on the Modified Coronas Classification



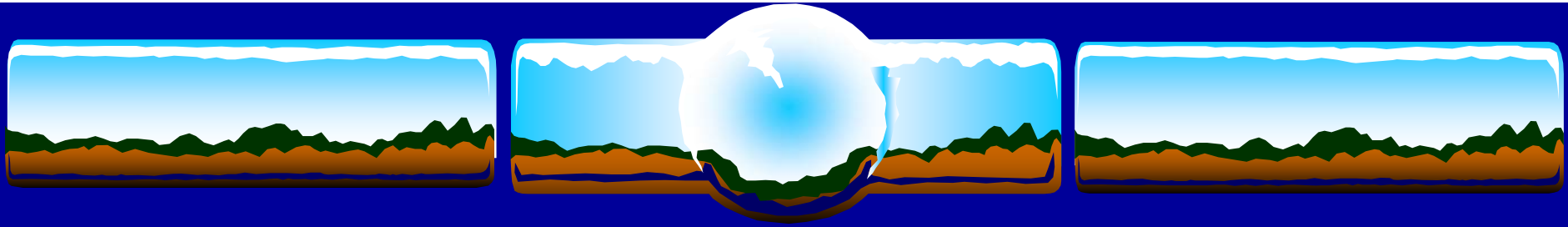
Description

Type I- Two pronounced seasons: dry from November to April wet during the rest of the year.

Type II- No dry season with a very pronounced rainfall from November to January.

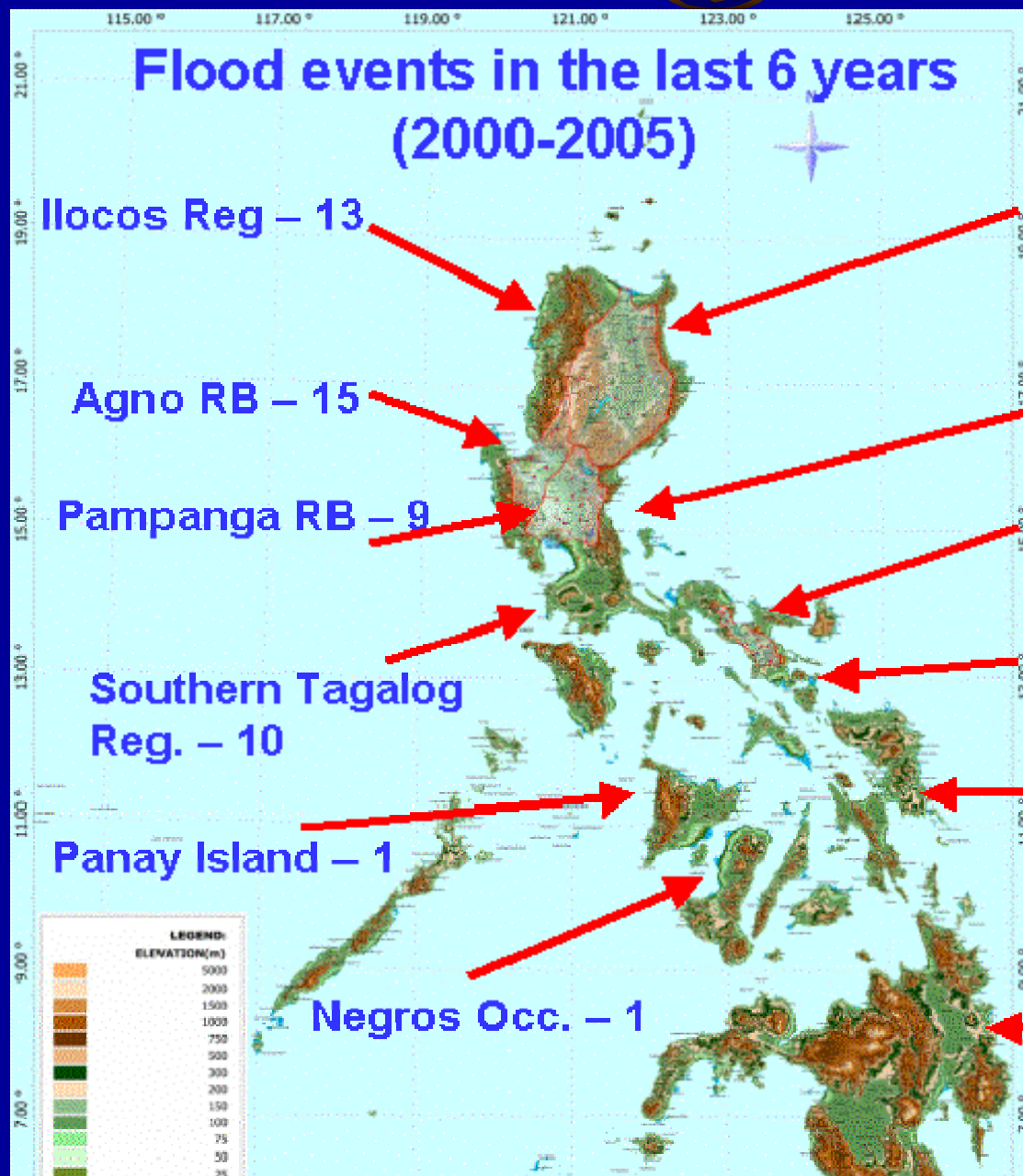
Type III- Seasons are not very pronounced relatively dry from November to April and wet during the rest of the year.

Type IV – Rainfall is more or less evenly distributed through the year.



- **Every year ~ 20 tropical cyclones enter the Philippine Area of Responsibility (PAR)**
- **~ 9 make landfall**
- **Affected by monsoons & other weather systems**
- **Casualties and damages due to hydro-meteorological hazards are high**

the flood situation in our country...



Cagayan RB – 14

Aurora-Quezon Area – 3

Bicol RB – 22

Bicol Reg – 10

Eastern Visayas Area – 20

Mindanao Area – 16

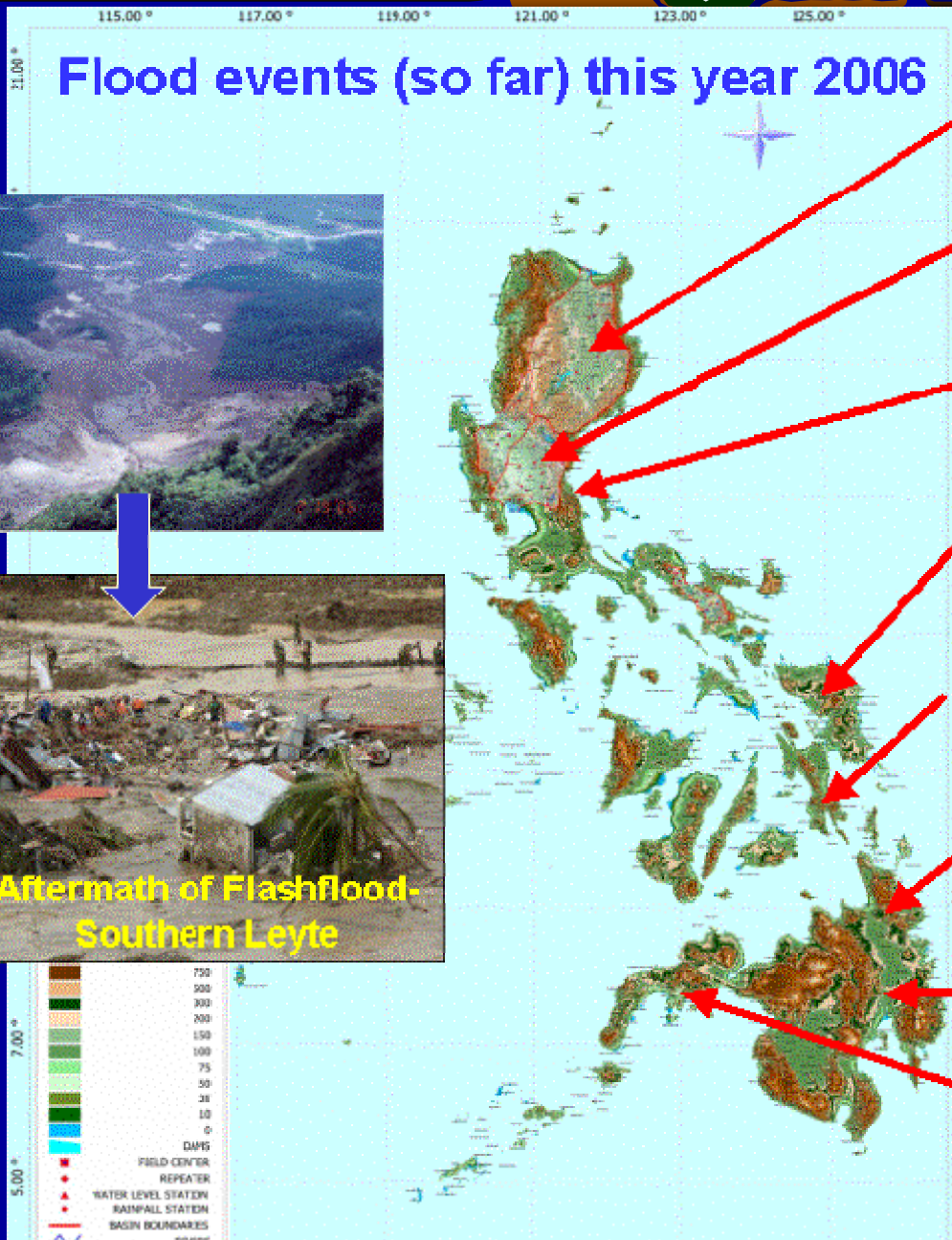
134 events

the flood situation in our country...

Flood events (so far) this year 2006



Aftermath of Flashflood-
Southern Leyte



1. Flooding in Isabel-Cagayan Area Jan. 26-28

2. Flooding in Bongabon-Gabaldon Jan. 25-27

3. Flooding in Aurora-Quezon Area Jan. 25-26

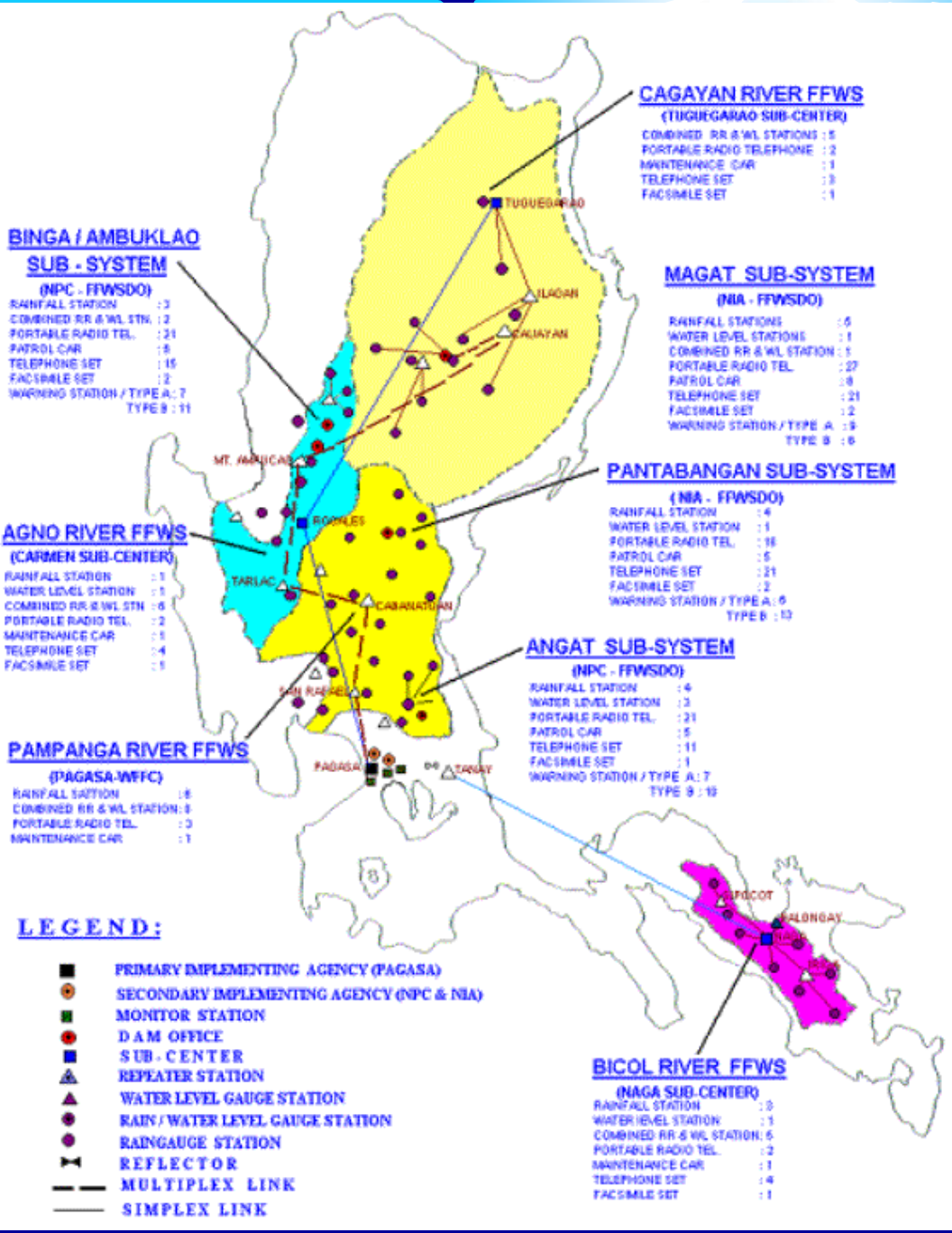
4. Flooding & Landslides in Samar – Leyte Area Feb. 10-12

5. Flashflood & Landslides in Southern Leyte Feb. 17, Flood – May 11-12

6. Flooding in CARAGA Reg. Feb. 10-12

7. Landslide in Taragona, Davao Oriental Feb. 12

8. Landslide in Bayog, Zambo del Sur (Feb. 18, 2006)

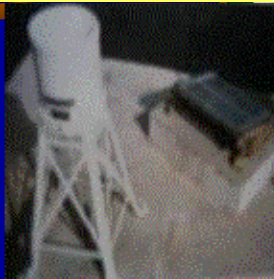


Monitored Basins and Dams

Existing Facilities for Flood Forecasting and Warning System (FFWS)



Water Level Station



Rainfall Station



Warning Station



Water Level supervisory equipment



Rainfall Supervisory equipment



Flood Forecasting and Warning Center



Relay Station



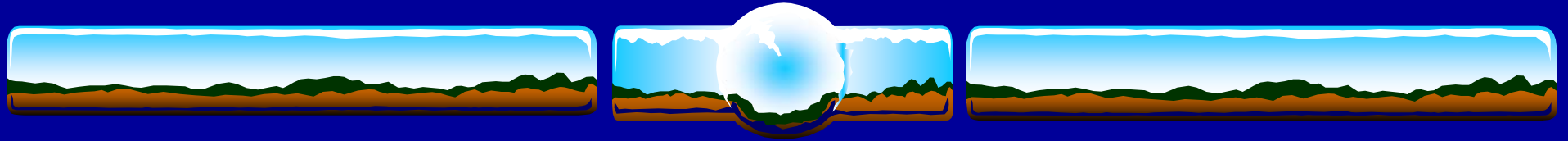
Field Center



Control Station

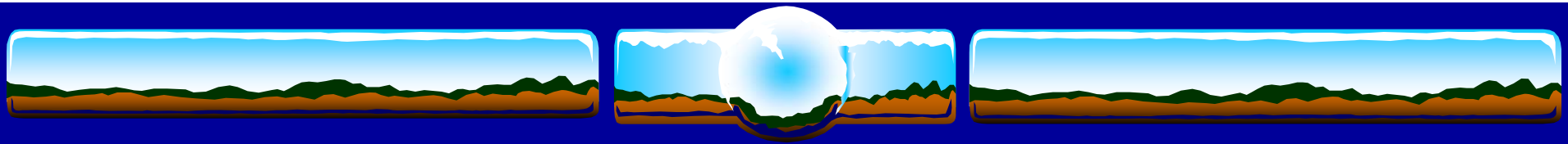


Patrol Car



Community Based Flood Early Warning System (CBEWS)

**Hazard Mapping and Assessment for
Effective Community Based Disaster
Risk Management
(READY Project – funded by UNDP)**



The Community-based Concept

BAYANIHAN

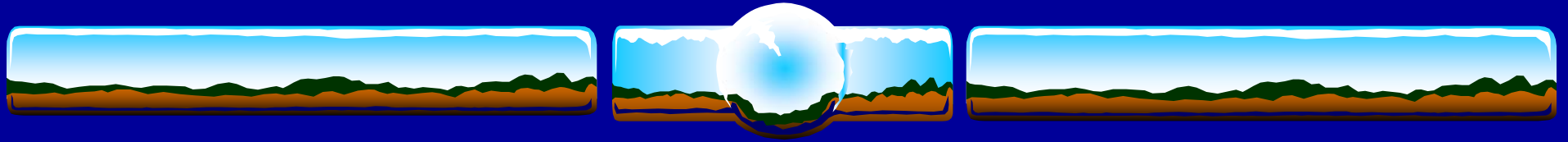
community

People-centered

institutions

instrumentations





Why pursue a CBFEWS?

- It empowers local government units (LGU's) and the communities to protect themselves against floods.
- They are in the best position to undertake preparedness measures against floods.
- It is sustainable.

Activities in CBFEWS

1. Coordination with LGUs & other institutions (consultation meetings)



Activities in CBFEWS

2. Survey (tabletop) and design of network





Activities in CBFEWS

3. Site survey (ocular inspection)

(Verification of identified sites for accessibility, communication, etc.
get coordinates)

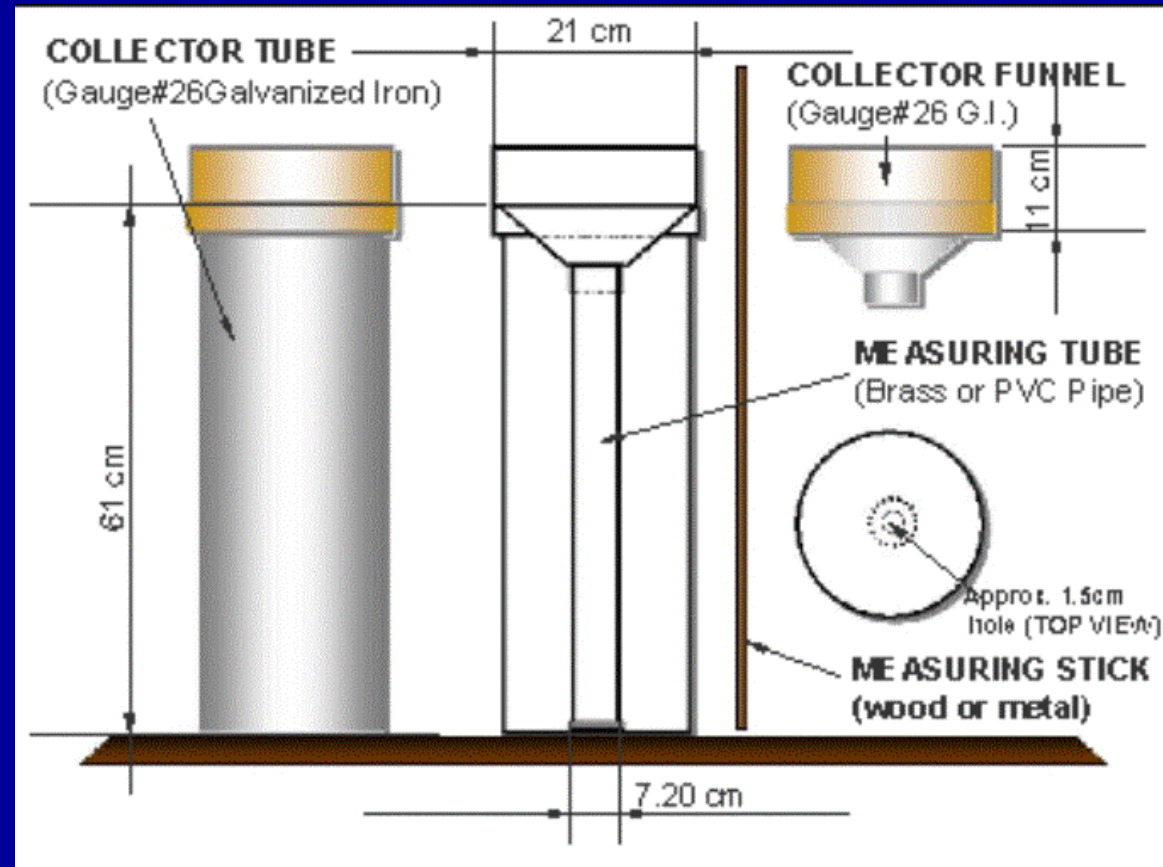


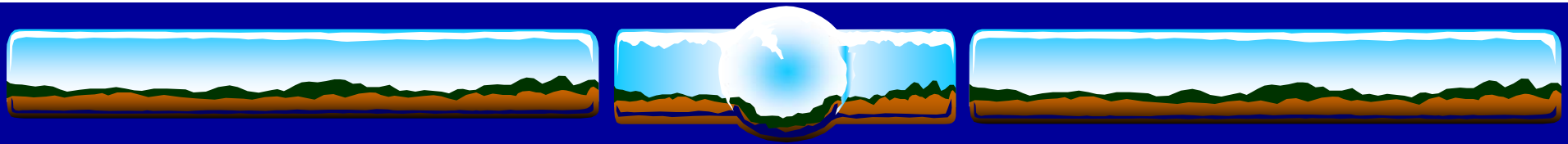
Activities in CBFEWS

4. Procurement / fabrication of equipment



Standard 8" rain gauge





Activities in CBFEWS

5. Procurement / fabrication of equipment



**AUTOMATIC
RAIN GAUGE**



Battery-operated
LCD Monitor
(inside the building)

Activities in CBFEWS

6. Procurement / fabrication of equipment



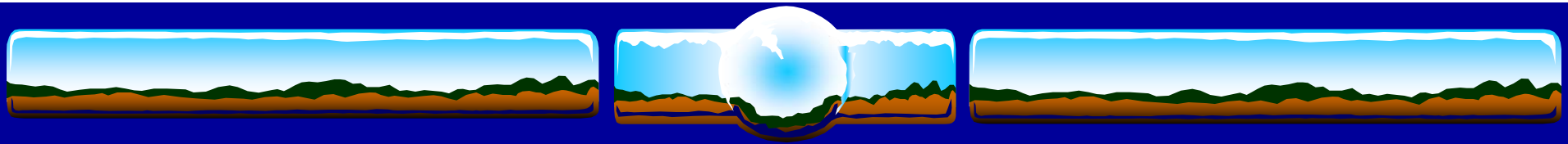
Water level gauge template

Activities in CBFEWS

7. Installation of equipment (raingauge)



Standard Raingauge



Activities in CBFEWS

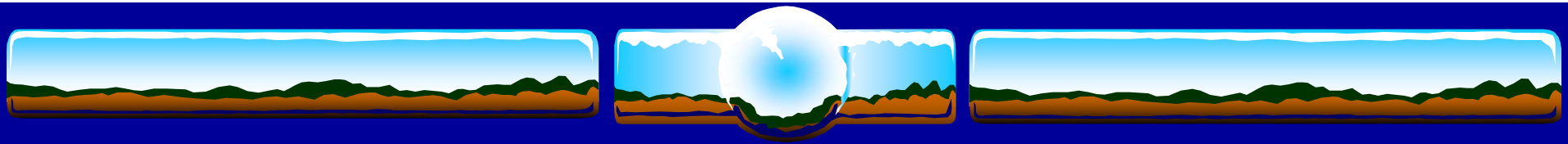
8. Installation of equipment (automatic rain gauge)

Rain Gauge



Province of Surigao del Sur
Municipality of Barobo
BARANGAY TAMBIS
NAME OF PROJECT: *Smart Agriculture Center*
AMOUNT: ₱ 115,000.00
IMPLEMENTING AGENCY: *By Administration*
SOURCE OF FUND: *ECCD*
THROUGH THE EFFORT OF *GEN VICENTE DE AMANTEL*
AND THE LOCAL GOVERNMENT UNIT OF BAROBO,
SUPPORTED BY THE PEOPLE OF MUNICIPALITY OF
ANTONIO O. ROMANILLO WITH FINANCIAL ASSISTANCE OF:
BARANGAY TAMBIS

Province of Surigao del Sur
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ANTONIO O. ROMANILLO WITH FINANCIAL ASSISTANCE OF:
BARANGAY TAMBIS



Activities in CBFEWS

9. Installation of equipment (water level gauge)

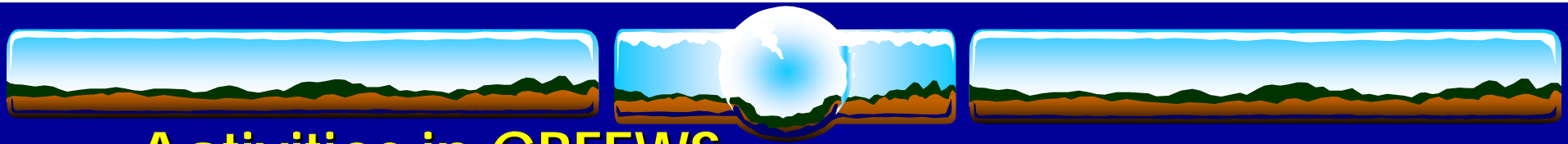
LADDER

CUT-OUT PATTERN (MADE OF CARDBOARD)



SPRAY PAINT



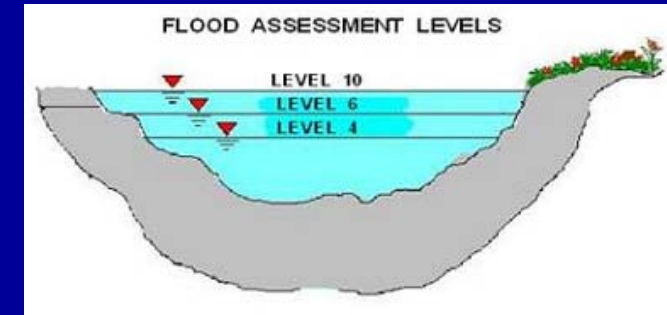


Activities in CBFEWS

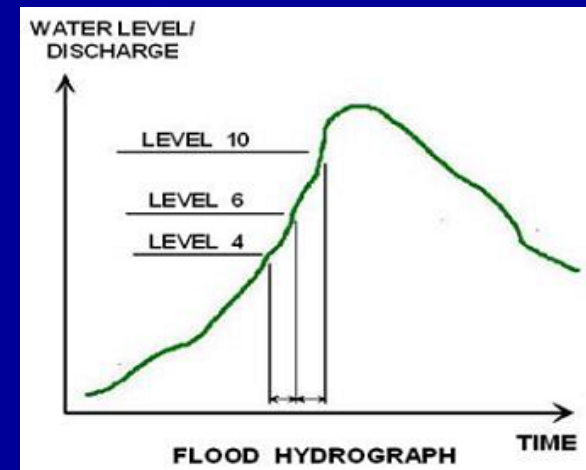
10. Discharge Measurement & Cross-sectioning (hydrographic survey measurement)



River cross-sectioning activities are undertaken to establish assessment levels for flood warning.



Discharge or river flow measurement



Activities in CBFEWS

11. Training of LGU personnel & members of community

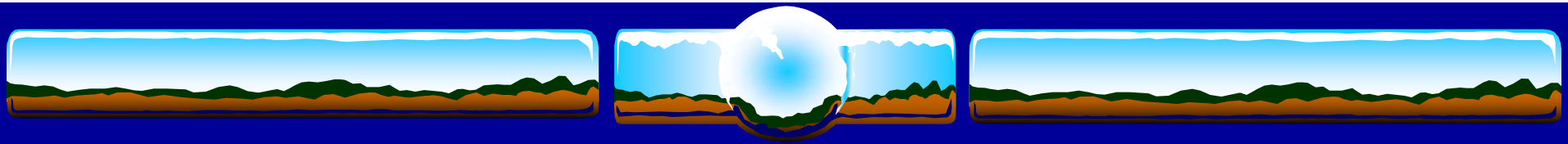


Formal training (lecture)



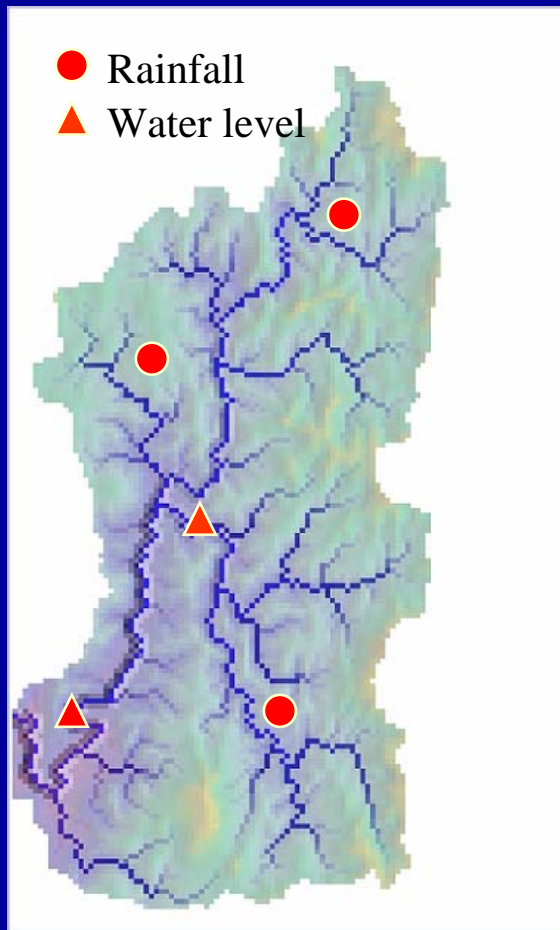
On-the-job training



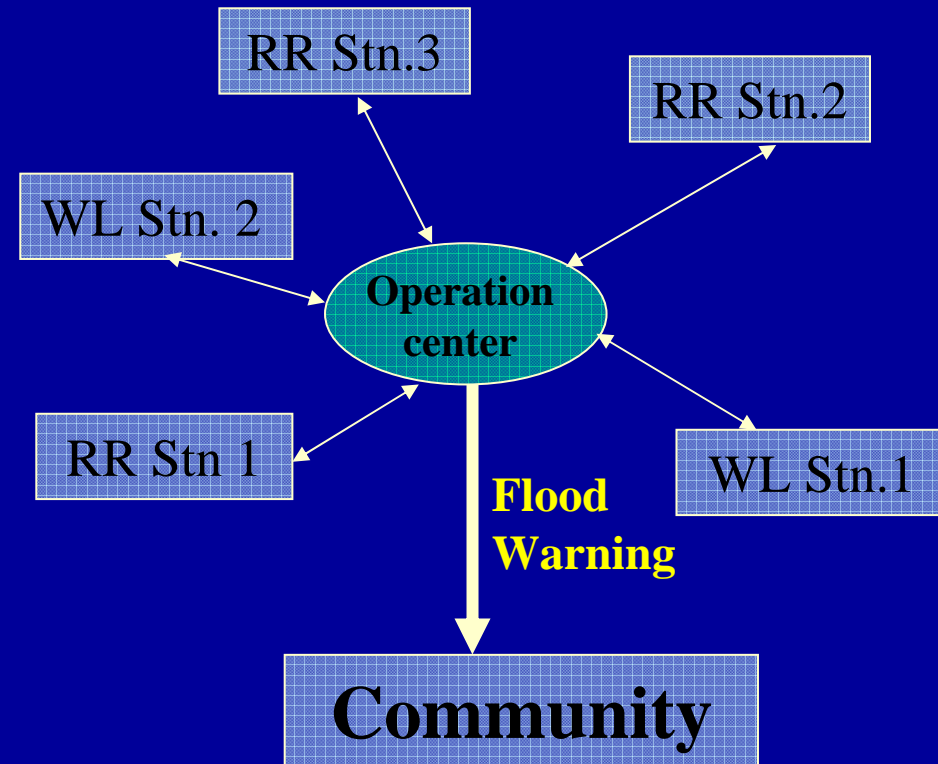


Activities in CBFEWS

12. Dry run / IEC / Operationalization



Flow of Data / Information System



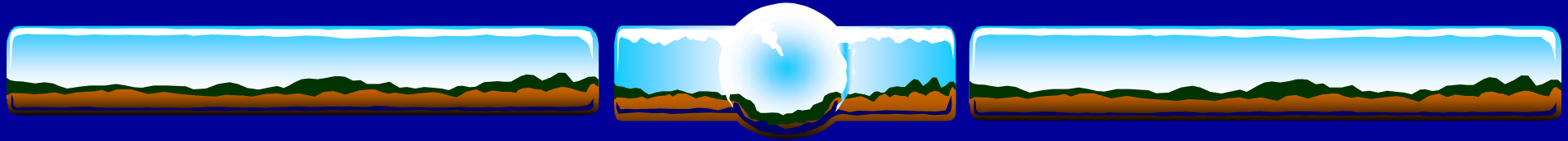
Activities in CBEWS

13. MOA signing, passage of local ordinance in support of the CBEWS



LEGISLATIVE SUPPORT (Dumangas, Iloilo)

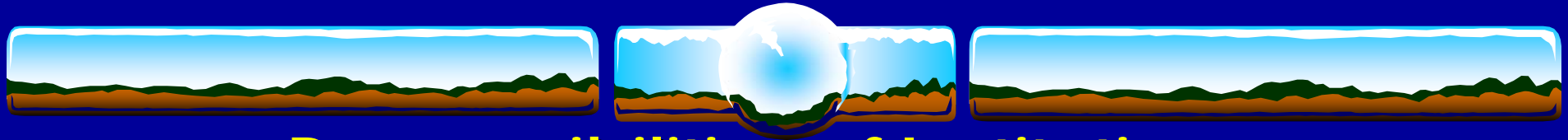
- **ORDINANCE NO 2005-01** entitled, "AN ORDINANCE PROVIDING AN ANNUAL APPROPRIATION FOR THE MAINTENANCE AND OTHER OPERATIONAL EXPENSES OF THE COMMUNITY-BASED FLOOD AND DROUGHT FORECASTING AND WARNING SYSTEM IN DUMANGAS, ILOILO".



Responsibilities of Institutions

Provincial Government

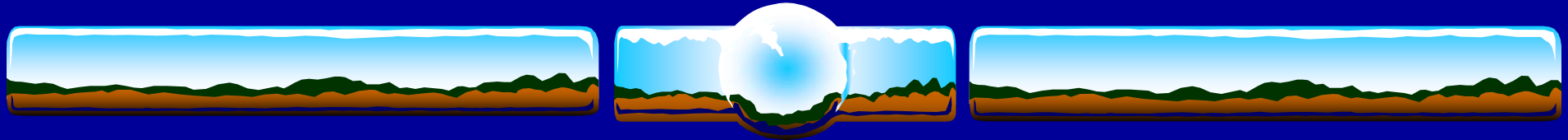
1. Coordinate with municipalities in the establishment of CBEWS;
2. Assist PAGASA in identifying the suitable communication facilities/network for the CBEWS;
3. Organize trainings/meetings for CBEWS;
4. Facilitate the signing of the MOA among stakeholders;
5. Monitor and ensure the smooth implementation of the project and the smooth operation of the CBEWS;
6. Assist the municipalities in the allocation of funds for operation & maintenance of the CBEWS through the enactment of a municipal ordinance; and
7. Provide all observed data and information to PAGASA on a monthly basis.



Responsibilities of Institutions

Municipalities

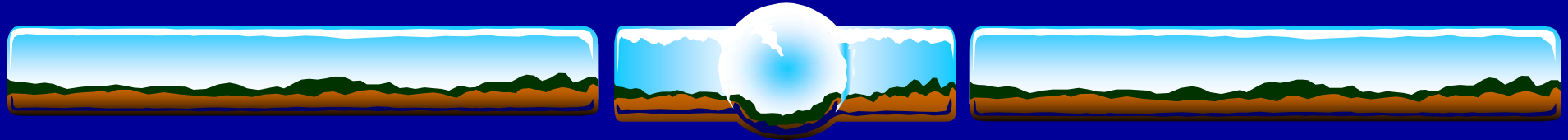
1. Assist PAGASA in the site survey, fabrication & installation of rainfall, water level and tide gauges & flood markers & hydrographic surveys;
2. Ensure the implementation of the project by signing the Memorandum of agreement;
3. Provide two observers per station to be trained by PAGASA;
4. Operate, maintain and secure the installed equipment;
5. Ensure the sustainability of the system through the passage of an ordinance in support of the CBEWS
6. Prepare and issue flood advisories/warnings to threatened communities; and
7. Provide real-time data and warnings to the Provincial Government and the designated operation center.



Responsibilities of Institutions

PAGASA

1. Coordinate with the LGUs and concerned institutions in the establishment of the CBEWS.
2. Conduct survey and design monitoring network in coordination with LGUs.
3. Install monitoring equipment in collaboration with LGUs.
4. Train LGUs in the fabrication and installation of monitoring instruments.
5. Train LGUs on observation, recording and transmission of data.
6. Train Municipal Planning and Development Officer & other key municipal personnel in the analysis of data & preparation of warnings/advisories.
7. Conduct monitoring and evaluation of CBEWS.



Responsibilities of Institutions

OCD Regional Office

1. Assist PAGASA in the coordination of the project with LGUs and other agencies.
2. Assist in information & warning dissemination.
3. Assist in monitoring & evaluation of CBEWS and provide data on casualties and damages.

DOST Regional Office

1. Assist PAGASA in the coordination of the project with LGUs and other agencies.
2. Assist in information & warning dissemination.
3. Assist in monitoring & evaluation of CBEWS.

1. Lower Pampanga River Basin (Bulacan)

- Initiative and funded by the Provincial Government of Bulacan
- Operational in June 2005
- Transmission of data & warnings: SMS/voice
- Memorandum of Agreement (MOA) & Local ordinance enacted
- Project cost ~PhP1.0M



Installation of Rain gauge Gauge



Installation of Water Level Gauge



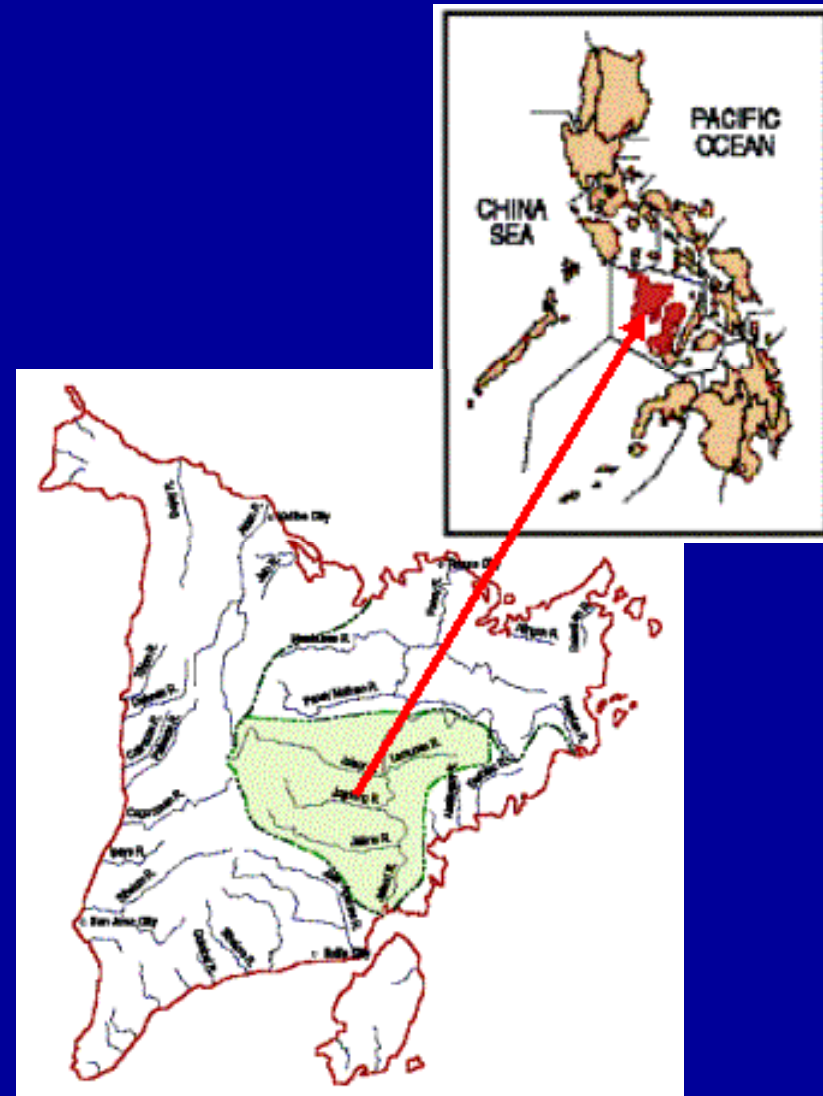
Citation was given to PAGASA by the Prov'l. Gov't. of Bulacan



PID on flood disaster mitigation to members of DCCs

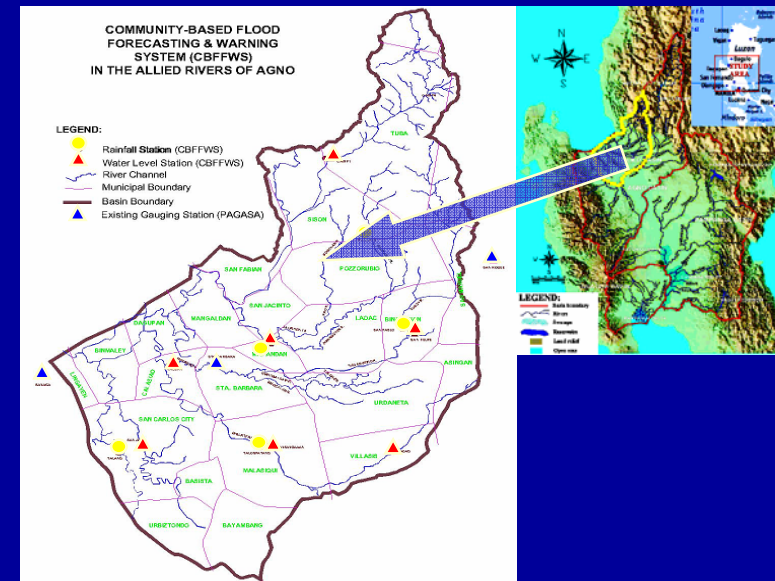
2. Jalaur River Basin

- Initiative of Municipal Government (Dumangas, Iloilo)
- Commenced in June 2003
- Funding: National Disaster Coordinating Council (NDCC)
- Transmission of data & warnings: SMS/voice
- Project cost ~PhP1.0M
- Activities undertaken:
 - ✓ Survey and design of network
 - ✓ Fabrication and installation of rainfall and water level gauges
 - ✓ MOA signed and local ordinance enacted
 - ✓ Preparation of operations manual



3. Agno-allied River Basins (Province of Pangasinan)

- Initiative of Provincial Government
- Commenced in September 2004
- Funded by JICA
- Transmission of data & warnings: radio
- Project cost ~ PhP1.9M
- Activities undertaken:
 - ✓ Survey and design network
 - ✓ Installation of rainfall and water level gauges and relay stations
 - ✓ Operations manual
 - ✓ Training/Seminar/Dry-Run
 - ✓ MOA signed and local ordinance enacted
 - ✓ Dry-run of CBFWS



4. Surigao del Sur River Basins

- Commenced April 01, 2006
- Funded by UNDP (AusAID) with counterpart from LGUs
- Coordination meetings with LGU's & other institutions – conducted
- Draft Memorandum of Agreement – under review by LGUs & gov't. institutions (OCD & DOST CARAGA)
- Survey and design of network
- Procurement & fabrication of equipment.
- Installation of the equipment
- IEC/Dry-run

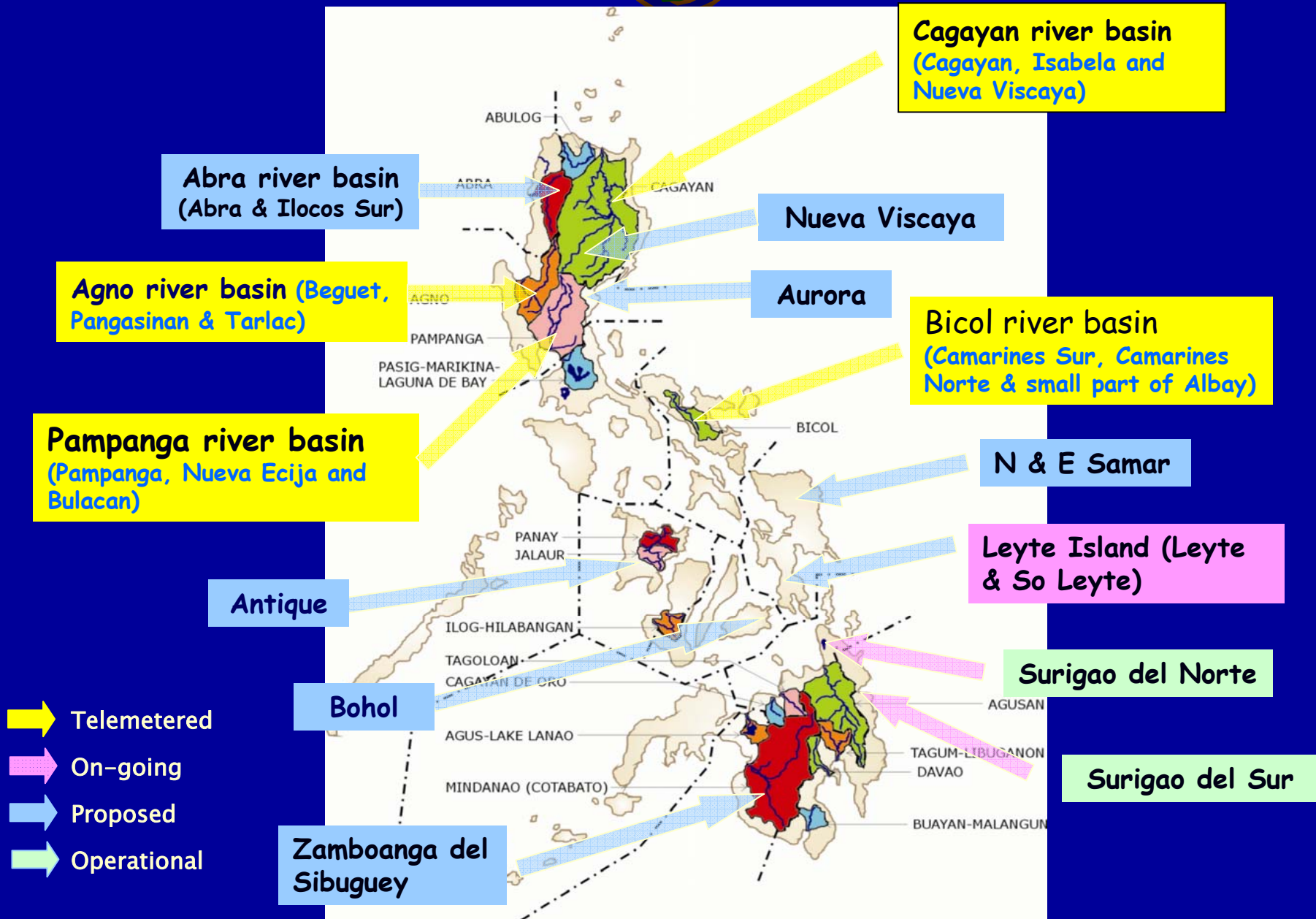


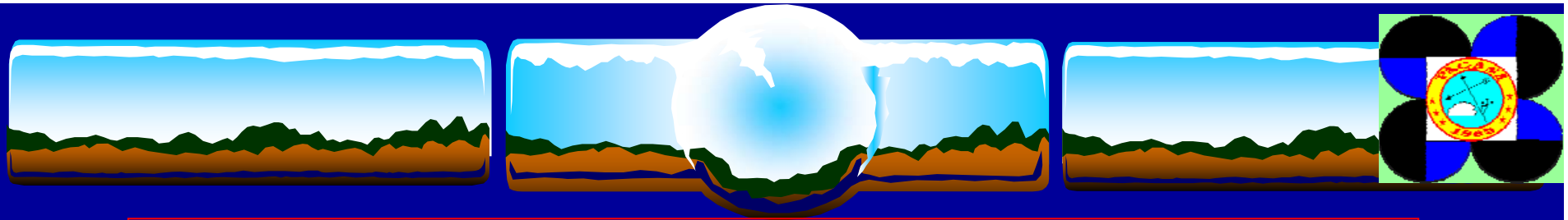
5. Surigao del Norte River Basins

- Commenced June 2006
- Funded by UNDP (AusAID) with counterpart from LGUs
- Coordination meetings with LGU's & other institutions – June 15, 2006
- Draft Memorandum of Agreement – under review by LGUs & gov't. institutions (OCD & DOST CARAGA)
- Survey and design of network –completed
- Procurement & fabrication of equipment
- Installation of equipment
- IEC / Dry-Run



Target areas of CBFEWS





For additional information, VISIT us at
<http://www.pagasa.dost.gov.ph>

THANK YOU

“tracking the sky . . . helping the country”