

Adaptation and Loss and Damage Associated with Climate Change in the Asia Pacific: Integrating Scientific Aspects



*International Conference on Adaptation and Loss and Damage
30-31st August, Bangkok, Thailand*

*Lessons from Philippines 2012 Typhoon Bopha: Specific
Implications For Early Warning*

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Outline of Presentation

1. Background
2. Chronology of Events
3. Damages
4. Lessons Learned
5. Best Practices
6. Challenges
7. What Needs to Be Done?
8. Conclusion



Situational Analysis: Nature of hazards in the PH

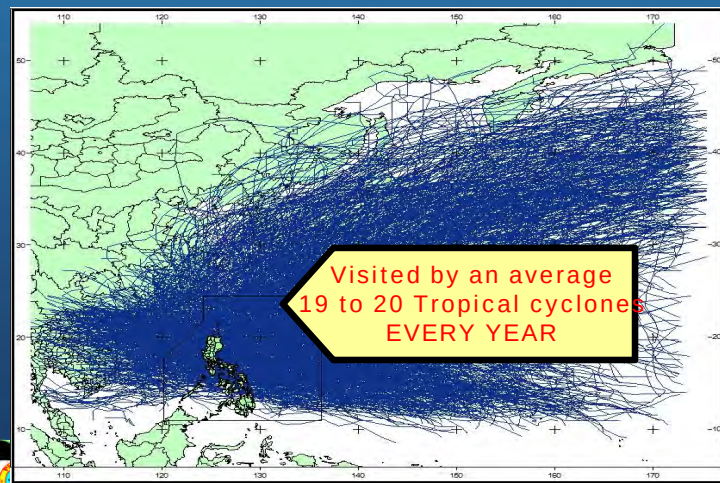
According to any criteria, the Philippines is an extremely dangerous place to inhabit.

One of the most comprehensive records on the occurrence of recent natural hazards even advised that the archipelago has experienced more disasters than any other country in the world since 1900.

- *Centre for Research on the Epidemiology of Disasters, Université Catholique de Louvain, Brussels (hereafter CRED) EM-DAT: The OFDA/CRED International Disaster Database.*

Residents of southern Luzon were likely to face a major typhoon once every 5 to 6 years in the 18th century and once every four to five years in the 19th century.

- *Rantucci, Geological Disasters in the Philippines, 27; Archive of the Manila Observatory, Manila (hereafter AMO):*



Tracks of tropical cyclones that formed in the Western North Pacific (WNP) during the period 1948-2010 (1641 TC and 1154 or 70% entered or formed in the Philippine Area of Responsibility (PAR) (Data used: JMA Data set).

Typhoon Ondoy (KETSANA) 26 September 2009 in Greater Metro Manila



Tropical Cyclones: Nov-Dec 2004

TY Unding (MUIFA) - 14-25 November
TS Violeta (MERBOK) - 22-23 November
TD Winnie - 26-30 November
TY Yoyong (NANMADOL) - 1-4 December



Typhoon Pepeng (PARMA) 9 October 2009 in CAR & Region I

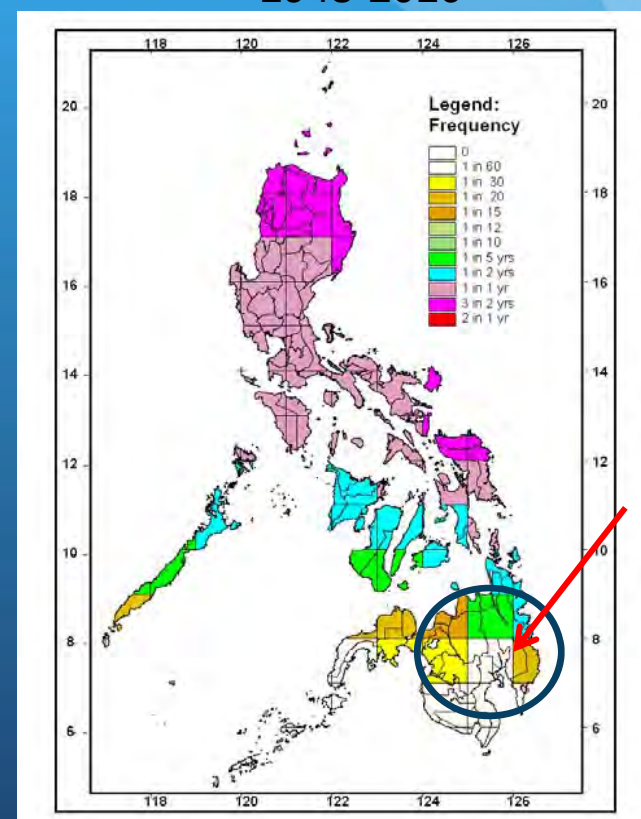


The Philippines' Risk Profile for Natural Disaster is also reflected in the 2009 Global Assessment Report prepared by the United Nations International Strategy for Disaster Reduction (UNISDR).

Human Exposure

Hazard type	Population exposed	Country ranking
<u>Cyclone</u>	16,267,090	2nd out of 89
<u>Drought</u>	2,173,490	33rd out of 184
<u>Flood</u>	788,572	8th out of 16
<u>Landslide</u>	110,704	24th out of 162
<u>Earthquake</u>	12,182,454	2nd out of 153
<u>Tsunami</u>	894,848	5th out of 76

Typhoon Frequency 1948-2010



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Chronology of Events

- November 20, 2012 : relayed to some media and the agency head for the possible formation of a tropical cyclone
- November 21, 2012 : developed Tropical Depression over the Marshal islands
- November 30, 2012 : position/location and intensity – posted at PAGASA website
- December 01, 2012 : update in position/location was included in the synopsis of the issued Public Weather Forecast 5 AM.
 - : issued the initial advisory to PABLO highlighted that it will enter PAR by morning of Monday
 - : at 7AM hourly updates started
- December 02, 2012 : at 11AM Issued the 1st Weather Bulettn as “PABLO” is expected to enter PAR
 - : Press conference was held to inform the public
 - : at 11PM PSWS #1 was issued over Eastern Visayas and Mindanao as PABLO as possible poses serious threats on these areas



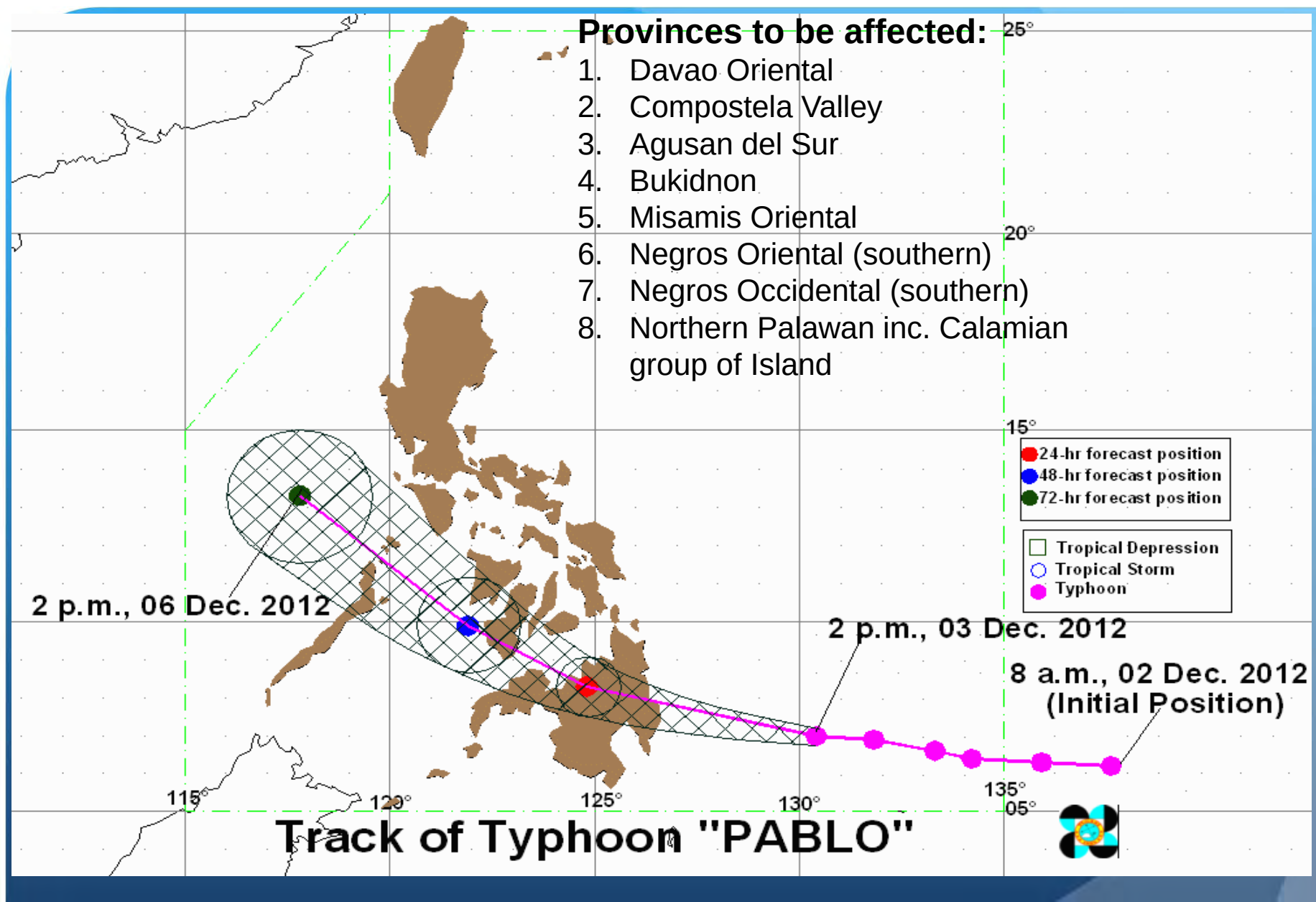
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Chronology of Events

- December 03, 2012 : at 11AM PSWS #3 was raised over Eastern Mindanao as PABLO moving towards Surigao Provinces
- December 04, 2012 : at 5PM TY Bopha will continue moving towards Eastern Mindanao (Davao – Surigao area).To make landfall over Surigao del Sur – Davao Oriental area by early tomorrow (4-6 AM), then cross the provinces of Agusan del Sur, Compostela Valley, Davao del Norte, Bukidnon, Misamis Oriental, Siquijor, Camiguin and over Bohol in the evening,crossing southern Cebu, Negros and over Panay on Wednesday.
-
- December 04, 2012 : at 4:45 AM PABLO made its initial landfall over Banganga, Davao Oriental
: at 4:30 PM PABLO's 2nd landfall over Siquijor
: at 5:30 PM PABLO's 3rd landfall over south of Dumaguete City
- December 05, 2012 : at 8:00 AM made its 4th landfall over Roxas, Palawan



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Details of “PABLO” (*BOPHA*)

Maximum Winds	185 kph
Gustiness	210 kph
Movement / speed	West @ 26 kph
FORECAST POSITIONS	
24 HR (Tuesday PM)	Vicinity of Cagayan De Oro City
48 HR (Wednesday PM)	110 km Southwest of Iloilo City
72 HR (Thursday PM)	330 km West of Calapan City
Estimated Rainfall Rate	15-30 mm/hr within Typhoon area



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PUBLIC STORM WARNING SIGNAL

PUBLIC STORM WARNING SIGNAL # 3

MINDANAO

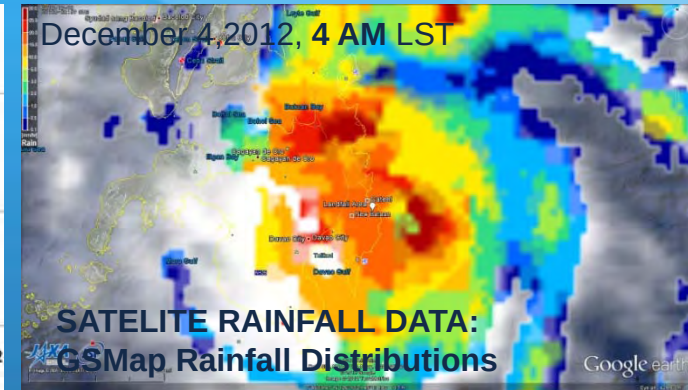
Surigao del Sur, Surigao del Norte including Siargao, Dinagat Province, Agusan del Norte, Agusan del Sur, Misamis Oriental, Bukidnon, Davao Oriental, Compostela Valley and Davao del Norte including Samal Island



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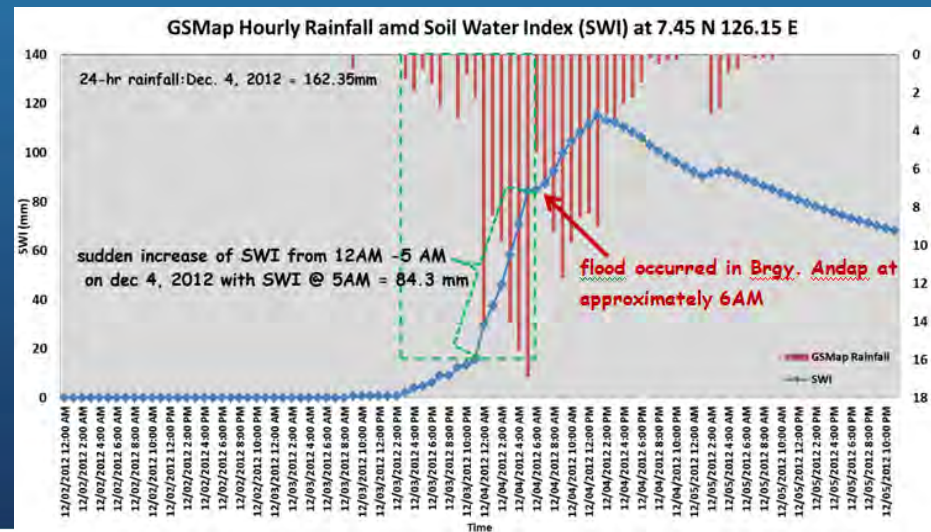
Extreme flood/flashflood events in the PH

Impacts of TY Pablo (Bopha) in Compostela Valley and Davao Oriental – Dec 2012



Typhoon Bopha deadliest catastrophe in the world in 2012:

By Ronnel W. Domingo in Manila/Philippine Daily Inquirer | Asia News Network – Fri, Jan 11, 2013



216,000 homes were destroyed in 318 municipalities of 34 provinces. Almost 1500 casualties (mostly in ComVal & Davao Oriental provinces).



CATEEL BEFORE TYPHOON BOPHA



AFTERMATH OF TYPHOON PABLO

Before



After



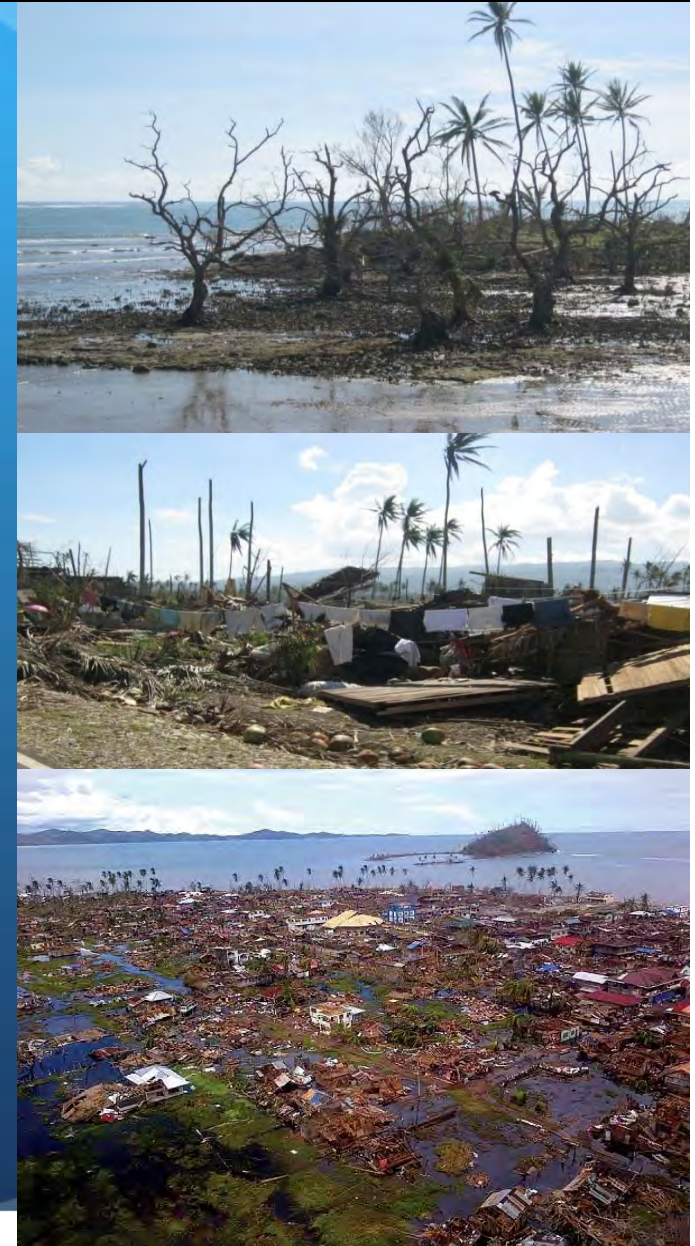
Debris flow field in New Bataan, Compostela Valley



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AFTERMATH OF TYPHOON BOPHA

- The strongest typhoon to hit Mindanao in the last several decades.
- The first time a typhoon has hit Southern Mindanao with winds of 185 kph and 220 kph gustiness);
- Landfall first occurred in Bagangga, Davao Oriental on December 4, 2012;
- Most stricken provinces were Davao Oriental and Compostela Valley including some parts of Davao del Norte.



ESTIMATED DAMAGES

- **984,346 FAMILIES** equivalent to nearly **4.27M PEOPLE** were affected.
- The estimated cost of damages to infrastructure is **PhP 812M largely from irrigation system** and **PhP 602.7M for roads and bridges**;
- **Damage to crops and livestock amounted to PhP 26.96B** for Davao del Norte, Compostela Valley and Davao Oriental (*RDRRMC XI, December 26, 2012*).

COMVAL PROVINCE



**BAGANGA,
DAVAO ORIENTAL**



**CATEEL, DAVAO
ORIENTAL**



COST OF RECOVERY / RECONSTRUCTION

- A truck passes among dead coconut trees destroyed by Typhoon Bopha. The typhoon, which hit on December 4, has caused major damage to infrastructure and agriculture in the southern Philippines. <http://www.aljazeera.com/Pat> Roque
- A wrecked school in Cateel, a town that was devastated by the typhoon's strong winds. The storm destroyed thousands of homes, and many families are now living in cramped, temporary accommodations.



US\$ 617,121,312.8 -PDNA Report Davao Oriental
& Compostela Valley as of April 2013

AFTERMATH OF TYPHOON BOPHA (PABLO)

	ComVal	Davao Oriental	TOTAL
Affected Population	520,152	225,408	745,560
Affected families	130,038	56,352	186,390
Affected Farmers	53,127	53,179	106,306

Damaged to Crops/ Grains Sector	Pre-Pablo (Ha.)	Post-Pablo (Ha. damaged)	%
Rice	18,097	10,077	55.7%
Corn	11,427	7,611	66.6%
Coconut	105,527	70,096	66.4%
Banana	29,824	24,701	82.8%
Abaca	6,074	5,188	85.4%



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AFTERMATH OF TYPHOON PABLO

- For Compostela Valley and Davao Oriental alone
 - 2,759 injured
 - 479 missing
- Strongest typhoon to cross Mindanao since Typhoon IKE in 1984, and strongest to cross Davao Provinces since Typhoon KATE in 1970.

-PDNA for Typhoon Pablo

1,248

Fatalities

-NDRRMC Final Situational
Report on Typhon Pablo

***“Pablo was
the deadliest
catastrophe
in the world
in 2012.”***

- ‘2012 Global Catastrophe
Recap’ by Aon Benfield of
Impact Forecasting



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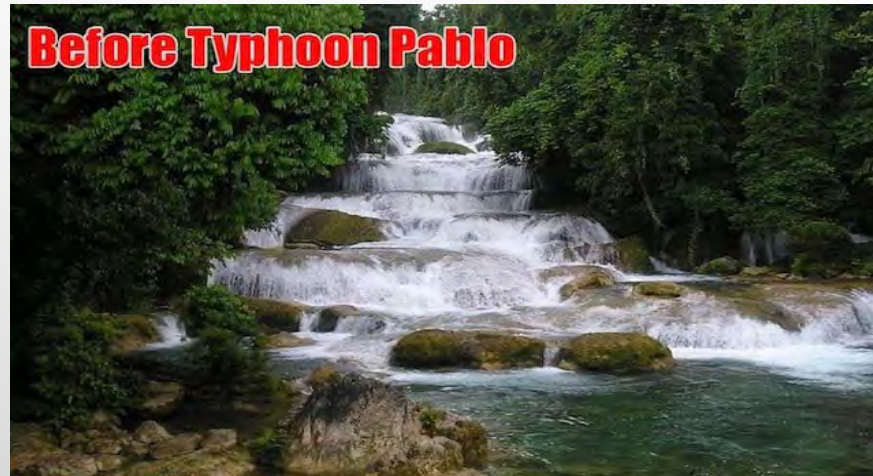
AFTERMATH OF TYPHOON PABLO

- A truck passes among dead coconut trees destroyed by Typhoon Bopha. The typhoon, which hit on December 4, has caused major damage to infrastructure and agriculture in the southern Philippines. [http://www.aljazeera.com/Pat Roque](http://www.aljazeera.com/Pat_Roque)
- A wrecked school in Cateel, a town that was devastated by the typhoon's strong winds. The storm destroyed thousands of homes, and many families are now living in cramped, temporary accommodations.



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AFTERMATH OF TYPHOON PABLO



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What are the CHALLENGES ahead?

(FEEDBACK FROM LGUS AND COMMUNITIES : EARLY WARNING)

- Uncertainty – lessons' learned - Tropical cyclone forecasts can continue to improve; however, societal benefits associated with them depend upon using them effectively. Achieving benefits from improved forecasts will remain a challenging task.
- Short-term thinking – multi-hazard approach and hazard assessment and contingency plan be done every after a calamity
- Complexity – data base and information readiness
- Institutional Structure – need to promote and sustain better institution of LGUs
- Financing frameworks – need to integrate DRR budget to the regular appropriations

Bopha AAR-LLR Report 2013



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What are the CHALLENGES ahead?

(FEEDBACK FROM LGUS AND COMMUNITIES : EARLY WARNING)

- Some of the communities did not respond well to the EW messages due to lack of awareness and understanding of typhoon signals and possible typhoon damage.
- No EW messages and evacuation calls because messages did not reach remote barangays; there was no previous history of typhoons and lack of awareness of associated hazards or messages did not provide details of the typhoon movement.

Bopha AAR-LLR Report 2013



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What are the CHALLENGES ahead?

(FEEDBACK FROM LGUS AND COMMUNITIES : EARLY WARNING)

- Some communities did not respond to EW messages because they were not in local dialect and others lacked awareness of typhoon preparedness.
- Number of people refused to evacuate because they did not understand storm signals or language; there was limited access to TV and radio; and some barangays did not have an alarm system.

Bopha AAR-LLR Report 2013



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What are the CHALLENGES ahead?

(FEEDBACK FROM LGUS AND COMMUNITIES : EARLY WARNING)

- The communities did not respond well to the EW messages because they were unaware of typhoon warning signals and weather terminology; messages did not reach the remote barangays and the area was never previously hit by a typhoon of Bopha's magnitude.

Bopha AAR-LLR Report 2013



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What are the CHALLENGES ahead?

Government Response and Preparedness

- DRRM Plan at municipal level was not updated to include preparedness for a disaster of Bopha's magnitude, or the role of specific government agencies in emergency response.
- There were less trained personnel with technical skills in the municipalities and LGUs.
- Damaged public infrastructure and telecommunications; and limited logistics slowed and limited service deliveries to disaster-affected areas.

Bopha AAR-LLR Report 2013



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LESSONS LEARNED

- The climate varies on all measurable time scales. Typhoon have occurred with different frequencies over time. A typhoon like BOPHA hitting southern part of Mindanao is indeed a rare event. But a typhoon with magnitude and intensity like Bopha can – and will – occur again. The only question is where and when.
- Existing level of societal preparedness. TY Bopha, like every storm, provides a real test of the existing level of preparedness. Without exception, each storm reveals areas where society could have been better prepared or, less vulnerable
- LGU as the first line of defense
- Warning Equipment is vital in saving life
- Without communication support warning and evacuation fails



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LESSONS LEARNED

- Early warning and evacuation system is better than rescue
- Pre-positioned organic resource capability=quick response
- Disaster Risk Reduction Plan must be considered basic input in the Regional Development Master Plan
- DRR measures = Economic Investments
- Disaster Risk Reduction Plan must be considered basic input in the Regional Development Master Plan
- Rehabilitation should be pursued in the context of development strategy



WHAT WENT WELL

- Cluster system was activated at the regional, provincial, municipal and barangay levels and regular coordination meetings were held.
- The government disseminated EW messages through a number of channels. The Department of Education issued warnings to schools prompting class suspension. School suspension became a clear indicator of impending disaster.
- The government conducted consultations for humanitarian response with NGOs and other humanitarian partners
- Joint rapid needs assessment conducted in a timely manner.
- Partnership between National Government, Local Government Units, UN International Organizations, NGOs and Private Sector
- The DRRMCs were organized and functional at the national and provincial level and municipal level, providing support for humanitarian response.

WHAT Needs To Be Done TO Address The Issue?

- Contingency plan should be amended to incorporate a multi-hazard approach including typhoons with a standard operating procedure for drills and simulation exercises including community participation. Multi-stakeholder approach .
- Community education for weather systems and improved communications were strongly recommended.
- Recommendations include that sisterhood partnerships be established with other municipalities
- Established implementing guidelines in integrating DRR to the CLUP
- Technical assistance to the Local Government Units
- DRR must be an integral part in planning and programming of the local authorities.



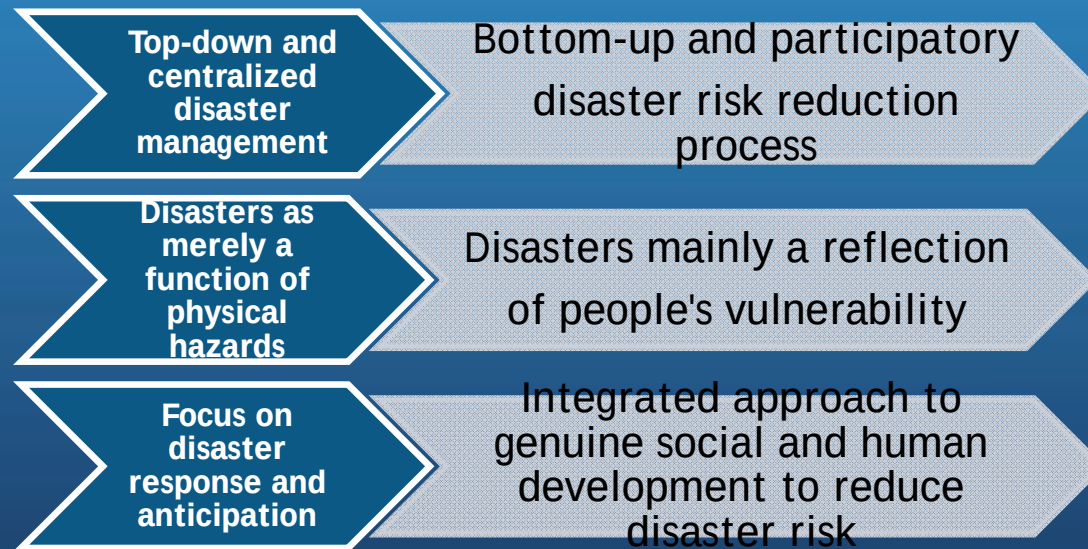
WHAT Needs To Be Done TO Address The Issue?

- Institutionalized Provincial Disaster Management Office and the Provincial Disaster Operation Center
- Established Early Warning System, Communication Protocol and Evacuation Procedures at the community level.
- Organized Local DCCs and redefined the functional roles and responsibilities of the DCC members and task units
- Strengthen disaster preparedness at community level with DRRM Fund utilization. Hazard awareness through Community-based trainings and seminars
- DRR integration to the Comprehensive Land Use Plan



PHILIPPINE DRRM SYSTEM

- Basis: Republic Act No. 10121 or The Philippine Disaster Risk Reduction and Management Act of 2010
(An Act Strengthening The Philippine Disaster Risk Reduction And Management System, Providing For The National Disaster Risk Reduction And Management Framework And Institutionalizing The National Disaster Risk Reduction And Management Plan, Appropriating Funds Therefore And For Other Purposes)
- This law provided for the *Paradigm Shift* from Disaster Relief and Response towards Disaster Risk Reduction and Management



CORE FUNCTIONS IN FOUR PILLARS OF DRRM

A. DISASTER MITIGATION AND PREVENTION

1. Multi-Hazard risk assessment and mapping;
2. Manage the hazards, vulnerabilities and risks;
3. Enforce DRR-related laws/orders/regulations such as the Building and Structural Codes of the Philippines, Fire Code, Mining Law, etc.

B. DISASTER PREPAREDNESS

1. Capacity building thru' training, orientation, drills and exercises;
2. Establish and operate an end-to-end early warning system;
3. Conduct of IEC /Advocacy campaign;
4. Maintain a database of DRRM resources, location of critical infrastructures and their capacities such as hospitals and evacuation centers;
5. Strengthen PPP;
6. Organize, train, equip and supervise local emergency response teams and Accredited Community Volunteers, and
7. Promote and raise public awareness of compliance with RA 10121.

C. DISASTER RESPONSE

1. Continuous disaster monitoring and mobilize instrumentalities and entities of the LGUs, CSOs, private groups and organized volunteers for response;
2. Respond to and manage the adverse impacts of emergencies;
3. Provision of emergency relief (food and non-food items, shelter, medical supplies, evacuation camp management; CISD);
5. Declaration of state of calamity; suspension of classes and work;
6. Allocation of the Local QRF
7. Conduct of Rapid Damage Needs Assessment and Incident Command System

D. DISASTER REHABILITATION AND RECOVERY

1. Food/cash-for-work program;
2. Permanent housing
3. Livelihood
4. Health care and wellness programs



CONCLUSION

For any early warning system to succeed, several components are necessary:

- Technology to detect and monitor the hazard;
- Communication systems to alert the public;
- Local leaders trained to make the right decisions;
- A public that is educated to react appropriately to warnings; and
- Response protocols — such as evacuation plans — prepared and rehearsed well in advance of the threat.

All these elements must work well, both individually and in harmony.

Failure in any **one** of these elements or coordination across them can mean to **failure of the whole early warning system.**

