Response and Lessons Learned from Typhoon “HAIYAN” (YOLANDA)

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Philippine
OUTLINE

1. Meteorological Informations
2. Impacts
3. Actions Undertaken
4. Problems / Lesson Learned
5. NDRRMC Reflection Workshop (Results)
Composite Radar Image
Last image of Guiuan Radar before landfall of TY Haiyan
Tagaytay Radar
Meteorological Aspects:

- Actual movement of Typ. Haiyan (Yolanda) was predicted accurately. Issued the following warnings:
  - Issued 2 Advisory (every 11 AM Nov. 5-6, 2013)
  - Issued initial Bulletin (Nov. 6/11Pm) even though it was still outside PAR
  - Issued 12 Severe Weather Bulletins
  - disseminated through OCD-NDRRMC
  - conduct press conferences, social network, including SMS, twitter and facebook

- Issued hourly location and intensity of the typhoon through PTV 4, PAGASA’s website, twitter and facebook accounts and thru SMS.
Forecast Track vs. Actual Track

- **Actual Track**: Blue line
- **Forecast Track**: Pink line

**Track of Typhoon "YOLANDA"**

- **2 p.m. 09 Nov 2013**
- **Forecast Track as of 2 p.m. 07 Nov 2013**
- **8 p.m. 06 Nov 2013 (Initial Position)**
# METEOROLOGICAL ASPECTS

## Observed Sustained Winds and Gustiness

<table>
<thead>
<tr>
<th>Location</th>
<th>Sustained Winds:</th>
<th>Gustiness:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guiuan, Samar</td>
<td>86 knots (160 kph)(910.0 hPa)[4:00Am, Nov. 8]</td>
<td>53 m/s (195 kph)[4:10Am, Nov. 8]</td>
</tr>
<tr>
<td>Roxas, Capiz</td>
<td>70 knots (130 kph)(972.5 hPa)[2:00Pm, Nov. 8]</td>
<td>58 m/s (205 kph)[1:50Pm, Nov. 8]</td>
</tr>
<tr>
<td>Coron, Palawan</td>
<td>30 knots (55 kph) [6:00Pm, Nov. 8]</td>
<td>55 m/s (200 kph)[6:00Am, Nov. 8]</td>
</tr>
<tr>
<td>San Jose, Mindoro</td>
<td>40 knots (75 kph) (991.1 hPa)[7:35Pm, Nov.8]</td>
<td>44 m/s (160 kph)(971.0Hpa)[8:00Pm, Nov. 8]</td>
</tr>
<tr>
<td>Borongan</td>
<td>35 m/s (125 kph) [6:10Am, Nov. 8]</td>
<td>33 m/s (120 kph) [7:30Pm, Nov. 8]</td>
</tr>
<tr>
<td>Cebu City</td>
<td>35 m/s (125 kph) [9:40Am, Nov. 8]</td>
<td>35 m/s (125 kph) [9:40Am, Nov. 8]</td>
</tr>
</tbody>
</table>

**Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)**
IMPACTS OF TYPHOON “HAIYAN”
(YOLANDA)
# Impacts of TY “HAIYAN”

## Affected Population

<table>
<thead>
<tr>
<th>Families</th>
<th>Person</th>
<th>Baranggays</th>
<th>Municipalities</th>
<th>Provinces</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,434,593</td>
<td>16,078,181</td>
<td>12,139</td>
<td>591</td>
<td>44 Provinces</td>
</tr>
</tbody>
</table>

## Casualties

<table>
<thead>
<tr>
<th>Dead</th>
<th>Injured</th>
<th>Missing</th>
</tr>
</thead>
<tbody>
<tr>
<td>6,245 identified</td>
<td>28,626</td>
<td>1,039</td>
</tr>
</tbody>
</table>

## Damage (PhP)

<table>
<thead>
<tr>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>PhP 39,821,497,852.17</td>
</tr>
<tr>
<td>($ 894,865,120.27)</td>
</tr>
</tbody>
</table>

*Source: NDRRMC, as of 06 March 2014 SitRep #106*
Impacts: Damaged PAGASA Doppler radar in Guiuan, Eastern Samar

photo - credit: AFP Central Command from their Facebook page:
Impacts of Typhoon Haiyan
Impacts of Typhoon Haiyan

Tacloban Station
Impacts: Toppled Towers of National Grid Corporation of the PHILIPPINES

Toppled:
- 200 transmission towers
- 2000 poles

Estimated cost of damage:
- PhP5 billion (USD119 M)

Source: NGCP
Impacts of Typhoon Haiyan
Impacts of Typhoon Haiyan

Tacloban Airport
Impacts of Typhoon Haiyan

Malapascua Island, Northern Cebu
Impacts of Typhoon Haiyan

Tacloban City
Impacts of Typhoon Haiyan
THE AFTERMATH
Damages incurred by Typhoon Yolanda

Several coastal barangays were wiped out...
THE AFTERMATH
Damages incurred by Typhoon Yolanda

Wind, surge and wave damages are enormous ...
THE AFTERMATH
Damages incurred by Typhoon Yolanda

Economic activities were disrupted, and livelihoods were destroyed...
Impacts of Typhoon Haiyan
Impacts of Typhoon Haiyan
Actions Undertaken By PAGASA During the Approach and Passage of Typhoon “HAIYAN” (YOLANDA)
• **Nov. 5 (11Am):** Issued Weather Advisory regarding the approaching Typhoon Haiyan

• **Nov. 6 (11Pm):** Issued Regular Typhoon Bulletin even though it was still outside Philippine Area of Responsibility (PAR)

• **Nov. 6:** The Department of Science and Technology (DOST) as Vice-Chair of the National Disaster Risk Reduction and Management Council (NDRRMC), initiated NDRRMC members to convene and conducted press conference after the meeting, for the preparations and early evacuation in areas to be affected by TY Haiyan.
- **Nov. 6 - 9:** PAGASA Conducted Press Conferences and Press Briefing every 6 hours starting 5:00PM, Nov. 6

- Frequent briefing at Malacañang Palace

- The President broadcasted in tri-media about the strong Typhoon Haiyan (Yolanda) 12 hours before landfall.
• Hourly updates on the location and intensity of the typhoon (Ptv 4, posted in the website, twitter, facebook and SMS).

• Detailed Meteorologists at the OCD(NDRRMC) Operation Center.

• Deployed a team of Storm Chasers to Sorsogon who proceeded to Samar and Leyte after the typhoon passage.
• Sent meteorologists from Central Office to Visayas PAGASA Regional Center and to Iloilo, Nov. 6-11, 2013 to assist the station in the dissemination of warnings and conduct assessment after the typhoon passage.

• Issued daily weather updates for the relief, rescue and rehabilitation of the affected areas.

• **Nov. 11:** Another Response Team composed of engineers, meteorologists and technicians were sent to Samar and Leyte. They also brought food and other emergency supplies for PAGASA personnel.
Activities of the Response Teams

• Temporary transfer of Tacloban station to DOST Region 8 Office in Palo, Leyte and installed basic weather instruments.

• Three (3) solar panels were put up for temporary lighting system and radio communication (SSB) at DOST R8 in Palo, Leyte, in Catbalogan and in Guiuan stations.

• Repaired water line at Guiuan station

• Repaired the generator sets of Tacloban, Catbalogan and Catarman stations.

• Re-installed all basic instruments in all affected PAGASA stations.
Survey storm surge heights
(STORM CHASER Team)

Guiuan to Hernani
Eastern Samar 6 to 7 meters with inundation of 800 to 1000 meters.

Hernani
Tacloban to Palo
Leyte 5 to 6 meters with inundation of 600 to 800 meters.

Basey Samar 5 to 6 meters with inundation of 600 to 800 meters.

Tacloban to Palo
Leyte 5 to 6 meters with inundation of 600 to 800 meters.

Guiuan to Hernani
Eastern Samar 6 to 7 meters with inundation of 800 to 1000 meters.
• Checked/validated the reported height of the storm surge

BGY 60-C OLD RD SAGCAHAN, TACLOBAN

WaterLevel
INTERVIEWED ONE RESIDENT HERE FAR FROM THE SHORELINE

ACTUAL SURGE HEIGHT = 5.0 M

Needs confirmation from other residents nearby the coast
BGY SAPAO, GUIUAN

POSSIBLE FLOW OF THE SURGE (according to the orientation of the coconut trees)

INUNDATION REACHED ABOUT 2 KM AWAY FROM THE SHORELINE (ACCORDING TO THE WITNESS)
IEC for Teachers and LGUs in Tacloban, Leyte
History of Typhoon Passages Near Tacloban, Leyte

From records dating **1897 to 2013**, many typhoons hit Visayas area, however **5** strong typhoons landed near Tacloban with notable damages/fatalities:

<table>
<thead>
<tr>
<th>Date of Typhoon Occurrence</th>
<th>Fatalities</th>
<th>Station Pressure</th>
<th>STORM SURGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 October 1897</td>
<td>1,300</td>
<td>925.2 hPa</td>
<td>7.3 m (Hernani)</td>
</tr>
<tr>
<td>24 November 1912</td>
<td>52</td>
<td>924 hPa</td>
<td>7 m (Sta. Rita)</td>
</tr>
<tr>
<td>27 October 1952</td>
<td>444</td>
<td>930 hPa</td>
<td>No record</td>
</tr>
<tr>
<td>04 November 1984</td>
<td>1,167</td>
<td>925 hPa</td>
<td>3.5 m (coastal areas of Leyte)</td>
</tr>
<tr>
<td>08 November 2013</td>
<td>6,241 +</td>
<td>910 hPa</td>
<td>6-7 m (Leyte &amp; Samar areas)</td>
</tr>
</tbody>
</table>

Earlier events are recorded in the following documents:
- Philippine Weather Bureau Monthly Bulletins, 1901
- Hongkong Observatory, 1958, re-edited
- Shanghai Observatory, 1957, re-edited
- JMA Library, Japan

**Typhoon Yolanda is just a repeat of what happened in the past except that the damage was severe and highest because more people and infrastructure moved into harm’s way.**
Problems (Lessons Learned) During the Rescue and Relief Operations

• No communication of any sort available
• No power supply
• Heavy equipments and other vehicles were temporarily inoperational
• Impassable roads
• Relief goods stored in the provinces and regions were damaged and washaway
Problems (Lessons Learned) During the Rescue and Relief Operations

- Members of the Local Responders were also victims and cannot do their jobs
- Disaster Managers / LGUs were also victims
- Airport in the area were temporary inoperational
Lessons Learned (Problems)

- People were not aware of the destructive power of Storm Surge
- Proper implementation of contingency plan for every hazard
- Availability of Hazard Maps (implementation)
- People do not heed to the advice of the Disaster Managers / LGUs
Lessons Learned (Problems)

- Review building code and zoning (safe zones)
- Disaster drill should be done every year
- Construction of storm surge breaker/barrier or planting mangrove trees
- Evacuation centers (multi-purpose) should be disaster resilient with basic amenities
NATIONAL DISASTER RISK REDUCTION COUNCIL (NDRRMC)

REFLECTION WORSHOP ON

Typhoon “Haiyan” (Yolanda)

Participants: NDRRMC Member-Agencies Namely: DOST, DSWD, NEDA, DPWH, DILG, DOH, DENR, PIA, NHA, DOTC, DOF and DND
Objectives:

a. Gather in one place, the members of the NDRRMC-TMG and the Members of the NDRRMC

b. Conduct parallel cluster-level assessments to identify (reflect the following)
   - Good practices and lessons learned before, during and after Typhoon Haiyan
   - Gaps and recommendations

c. Present the outputs to the members of the NDRRMC-Member Agencies for adoption

Output: Key learning points and list of information to be gathered and presented.
National Disaster Risk Reduction and Management Plan

1. **Disaster Prevention and Mitigation**
   - Avoid hazards and mitigate their potential impacts by reducing vulnerabilities and exposure and enhancing capacities of communities.

2. **Disaster Preparedness**
   - Establish and strengthen capacities of communities to anticipate, cope and recover from the negative impacts of disaster.

3. **Disaster Response**
   - Provide life preservation and meet the basic subsistence needs of affected population based on acceptable standards during or immediately after a disaster.

4. **Disaster Rehabilitation and Recovery**
   - Restore and improve facilities, livelihood and living conditions and organizational capacities of affected communities, and reduced disaster risks in accordance with the “building back better” principle.

Safer, adaptive and disaster resilient Filipino communities towards sustainable development.
# Thematic Area 1: Disaster Prevention and Mitigation

Overall Responsible Agency: Department of Science and Technology (DOST)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Lead Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. DRRM and CCA mainstreamed and integrated in national, sectoral, regional and local development policies, plans and budget</td>
<td>Office of Civil Defense (OCD), NDRRMC</td>
</tr>
<tr>
<td>2. DRRM and CCA-sensitive environmental management</td>
<td>Department of Environment and Natural Resources (DENR)</td>
</tr>
<tr>
<td>3. Increased resiliency of infrastructure systems</td>
<td>Department of Public Works and Highways (DPWH)</td>
</tr>
<tr>
<td>4. Enhanced effective community-based scientific DRRM and CCA assessment, mapping, analysis and monitoring</td>
<td>OCD, NDRRMC</td>
</tr>
</tbody>
</table>
5. Communities access to effective and applicable disaster risk financing and insurance

6. End-to-end monitoring (monitoring and response), forecasting and early warning systems are established and/or improved

Department of Finance (DOF)

Department of Science and Technology (DOST)

Thematic Area 2: Disaster Preparedness
Overall Responsible Agency: Department of Interior and Local Government (DILG)

<table>
<thead>
<tr>
<th>OUTCOME</th>
<th>LEAD AGENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Increased level of awareness and enhanced capacity of the community to the threats and impacts of all hazards</td>
<td>Philippine Information Agency (PIA)</td>
</tr>
<tr>
<td>8. Communities are equipped with necessary skills and capability to cope with the impacts of disasters</td>
<td>Department of Interior and Local Government (to coordinate) and NDRRMC (to implement)</td>
</tr>
</tbody>
</table>
9. Increased DRRM and CCA capacity of Local DRRM Councils, Offices and Operation Centers at all levels
10. Developed and implement comprehensive national and local preparedness and response policies, plans, and systems
11. Strengthened partnership and coordination among all key players and stakeholders

**Thematic Area 3: Disaster Response**
Overall Responsible Agency: Department of Social Welfare and Development (DSWD)

<table>
<thead>
<tr>
<th>OUTCOME</th>
<th>LEAD AGENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. Well-established disaster response operations</td>
<td>DSWD</td>
</tr>
</tbody>
</table>
13. Adequate and prompt assessment of needs and damages at all levels
14. Integrated and coordinated Search, Rescue and Retrieval (SRR) capacity
15. Safe and timely evacuation of affected communities
16. Temporary shelter needs adequately addressed
17. Basic social services provided to affected population (whether inside or outside evacuation centers)
18. Psychosocial needs of directly and indirectly affected population addressed

OCD, DRRMC and DSWD
DND, DILG and DOH
LGUs and LDRRMO
DSWD
DOH
DSWD
<table>
<thead>
<tr>
<th>OUTCOME</th>
<th>LEAD AGENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>19. Assessed damages, losses and needs</td>
<td>OCD, NDRRMC</td>
</tr>
<tr>
<td>20. Economic activities restored, and if possible strengthened or expanded</td>
<td>Agency to be determined based on the affected sectors</td>
</tr>
<tr>
<td>21. Houses rebuilt or repaired to be more resilient to hazard events; safer sites for housing</td>
<td>National Housing Authority (NHA)</td>
</tr>
<tr>
<td>22. Disaster and climate change-resilient infrastructure constructed/reconstructed</td>
<td>DPWH</td>
</tr>
<tr>
<td>23. A psychologically sound, safe and secure citizenry that is protected from the effects of disasters is able to restore to normal functioning after each disaster</td>
<td>DOH and DSWD</td>
</tr>
</tbody>
</table>
Thank You!