Managing Disasters in the Philippines

By

Mirasol G. Domingo
Outline of Presentation

- Geographical location
- Disaster profile
- Disaster Risk Reduction and Management (DRRM) System
- Prevention and Mitigation Strategies (national)
- Local management initiatives for Hydro hazards
- Opportunities for improvement
- Conclusion
The PHILIPPINE Geography
The Philippines

- An archipelagic nation of 100.7 Filipinos (2015)
- Is generally blessed with abundant water resources:
  - Has 18 major river basins
  - Has 421 principal river basins
  - Has 72 natural lakes
  - Has coastlines stretching to 266,000 sq. km

Dependable surface water supply:
125,790 MCM/year

Groundwater potential:
around 20,200 MCM/year
18 MAJOR RIVER BASINS IN THE PHILIPPINES
Source: www.nwrb.gov.ph
has a tropical and maritime climate, characterized by relatively high temperature, high humidity and abundant rainfall

- around 20 tropical cyclones are expected to enter or develop every year, and 8 to 9 would progress to landfall

- Tropical cyclones and intense rainfall of seasonal monsoons make vulnerability to hydro-hazard a national priority concern that can be associated with the increasing number of people, industries and infrastructures that are located in hazard-prone areas
PHILIPPINES

3rd Most disaster-prone country in the world

20 average typhoon visit yearly

PACIFIC RING OF FIRE

2016 World Risk Index

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Risk (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vanuatu</td>
<td>36.28</td>
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<tr>
<td>2</td>
<td>Tonga</td>
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<td>5</td>
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<td>19.17</td>
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<tr>
<td>6</td>
<td>Solomon Islands</td>
<td>19.14</td>
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<tr>
<td>7</td>
<td>Brunei Darussalam</td>
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<tr>
<td>8</td>
<td>Costa Rica</td>
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<td>Cambodia</td>
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<tr>
<td>10</td>
<td>Papua New Guinea</td>
<td>16.89</td>
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</table>

Philippines is prone to natural calamities and disasters
### Number of Natural Disasters in the Philippines, 2000-2012

<table>
<thead>
<tr>
<th>Year</th>
<th>Drought</th>
<th>Earthquake (seismic activity)</th>
<th>Epidemic</th>
<th>Flood</th>
<th>Mass movement (dry)</th>
<th>Mass movement (wet)</th>
<th>Storm</th>
<th>Volcano</th>
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<td>0</td>
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<td>3</td>
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<td>3</td>
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<td>5</td>
<td>0</td>
<td>1</td>
<td>7</td>
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<td>17</td>
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<td>6</td>
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<td>1</td>
<td>7</td>
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</table>

Source: Emergency Events Database (EM-DAT): The Office of U.S, Foreign Disaster Assistance (OFDA)/CRED International
<table>
<thead>
<tr>
<th>Year</th>
<th>Death tolls</th>
<th>Homeless</th>
<th>Injured</th>
<th>Affected</th>
<th>Cost of Damage (US$ Million)</th>
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<td>2,703</td>
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<td>2007</td>
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<td>Total</td>
<td>12,899</td>
<td>374,908</td>
<td>138,116</td>
<td>71,073,985</td>
<td>3,367.53</td>
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</tbody>
</table>

Source: EM-DAT: The OFDA/CRED International
The impacts of Typhoon Bopha (Pablo)

<table>
<thead>
<tr>
<th>Infrastructure and Communication</th>
<th>Industries, Businesses, and Private Properties</th>
<th>Agriculture</th>
<th>Environmental Integrity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>Health and Safety</td>
<td>Livelihood</td>
<td>Lives</td>
</tr>
</tbody>
</table>
Typhoon Bopha (Pablo) 2012

Total Estimate Cost of Damage: PHP36,949,230,987.07 (agriculture, infrastructure, properties)
Total Individuals Affected: 711,682 families
Total Casualties: 1,607 Filipinos
Reported Missing: 834 Filipinos

Other immediate problems: WASH, Food Security, Health and Safety, Shelter, Logistics and Communication, Education
Baranggay Andap and New Bataan, Compostela Valley Province

- 16 affected barangays
- 46,309 affected individuals
- 126 casualties
How do we manage disasters?
Republic Act 10121:
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 Plan, appropriating funds therefore and for other purposes”
Republic Act 10121: The Philippine Disaster Risk Reduction and Management Act of 2010

Prevention, mitigation, and preparedness activities are given more priority over quick response operations.
Paradigm Shift

Disaster Relief & Response  \rightarrow  Disaster Risk Reduction & Management

Top-down & centralized disaster management  \rightarrow  Bottom-up & participatory disaster risk reduction process

Disasters as merely a function of physical hazards  \rightarrow  Disasters mainly a reflection of people's vulnerability

Focus on disaster response & anticipation  \rightarrow  Integrated approach to social & human development to reduce disaster risks

REACTIVE  \rightarrow  PROACTIVE

NDRRM Framework, June 2011

Safer, adaptive and disaster-resilient Filipino communities toward sustainable development

Risk Factors
HAZARDS
EXPOSURES
VULNERABILITIES
CAPACITIES

DRR and CCA in Planning & Implementation

Safer, Adaptive and Disaster Resilient Filipino communities towards sustainable development

- Disaster Preparedness
- Disaster Prevention and Mitigation
- Disaster Rehabilitation and Recovery
- Disaster Response
GOAL:
Avoid Hazards and Mitigate their potential impacts by reducing their vulnerabilities and exposure and enhancing capacities of communities

OBJECTIVES:
1) Reduce vulnerabilities and exposure of communities to all hazards
2) Enhance capacities of communities to reduce their own risks and cope with the impacts of all hazards
<table>
<thead>
<tr>
<th>OUTCOME 1</th>
<th>OUTCOME 2</th>
<th>OUTCOME 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRRM and CCA mainstreamed in integrated in regional, sectoral and local development policies, plans and budget (OCD)</td>
<td>DRRM and CCA sensitive environmental management (DENR)</td>
<td>Increased disaster resilience of infrastructure system (DPWH)</td>
</tr>
<tr>
<td>OUTCOME 4</td>
<td>OUTCOME 5</td>
<td>OUTCOME 6</td>
</tr>
<tr>
<td>Community-based and scientific DRRM and CCA assessment, mapping, analysis and monitoring are conducted and/or improved (OCD)</td>
<td>Communities have access to effective and applicable disaster risk financing and insurance (DOF)</td>
<td>End-to-end monitoring system, forecasting and early warning systems are established and/or improved (DOST)</td>
</tr>
</tbody>
</table>
Prevention, Mitigation and Preparedness Strategies
DRRM Efforts: Prevention and Mitigation

- Dev’t of alarm & early warning systems
- Nationwide flood forecasting & monitoring
- Geo-hazard mapping
- Comprehensive land use planning, building & safety standards
- Engineering interventions
- Flood control structures

DRRM Efforts: Prevention and Mitigation

Geo-hazards Maps

Landslide Susceptibility Map
(MGB-DENR)

Rainfall Return Flood Simulation
(PAGASA)

Active Faults & Trenches
(PHIVOLCS)

Flood and Hazard Mapping
DOST Project NOAH
Nationwide Operational Assessment of Hazards

Project NOAH aims to provide:

• flood mitigation system, specifically targeting a 6-hour flood early warning system for communities along 18 major river systems;
• enhancement of geohazard maps and;
• enhancement of storm surge vulnerability maps
Project NOAH Website
noah.dost.gov.ph
In the event of a flood in Quezon City, Metro Manila, how many people might need evacuation?

Population as of May 2010 Census: 2,781,342
Annual growth rate: 0.01277

Gender Distribution as of May 2010 Census:
- Male: 1,263,226
- Female: 1,518,116

Age Dependents as of May 2010 Census:
- 0-14: 1,168,308
- 15-69: 1,612,888
- Old (60 above): 500,156

Poverty Incidence
1.4
An expansion of the DREAM Program, aims to produce 3-D flood and hazard maps for the 2/3 of the Philippine river systems.

Aside from addressing disaster risk reduction and climate change adaptation, the resource information to be generated from this project will also be useful in providing the information requirements of various sectors in the country.

Digital Elevation Model

Critical Facilities

Flood Map

http://lidar1.upmin.edu.ph/phillidar1/
Automated Rain Gauge
Water Level Monitoring Sensors
Meteorological Buoy
**DIWATA-1**

Class: 50kg Microsatellite  
Dimensions: 55 x 55 x 35 cm  
Inclination: 51.6 degree  
Altitude: ~420 km  
Launch: March 23, 2016  
Release: April 27, 2016  
Funded by: DOST-PCIEERD
PAYLOAD AND APPLICATIONS

Wide Field Camera

Target Applications
Observation of cloud patterns and weather disturbances

High Precision Telescope

Target Applications
Assessment of the changes in Vegetation
Assessment of ocean productivity

SMI with LCTF

Target Applications
Determine the extent of damages from disasters
Profiling and archiving of cultural and natural heritage sites

Middle Field Camera

Target Applications
Assists in determining the locations of images captured using the HPT and SMI

© (2017) Gonzalez
Local initiatives: Davao City
Davao City Flooding in 2011

Total Estimate Cost of Damage: PHP 11,000,000.00
(infrastructure, private properties)
Total Individuals Affected: 14,726 families
Total Casualties: 30 Individuals
Reported Missing: 1 Individual
Other immediate problems:
WASH, Food Security, Health and Safety, Shelter
Local Initiatives

- Central 911 and Public Safety Command Center
- Acquisition and upgrading of early warning facilities
- Davao River Basin Master Plan
- Ordinance on Rainwater harvesting
- Customized IWRM manual
- Waste water management system (Vertical helophyte system)
- Plan for Waste to energy projects
Local Initiatives

• Participation in the workshop prior the National Water Security Summit
• Water management Council and the Water Code
• Sewerage and septage project
• Adoption of IWRM Davao Water Partnership Action Plan
• Demonstration site for sustainability science
<table>
<thead>
<tr>
<th>Title</th>
<th>Lead Researchers/Partners</th>
<th>Key Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microclimate in Davao City</td>
<td>Van Larenstein Hall University, DOST XI, HELP Davao Network</td>
<td>Urbanization results to Davao City as Heat Island (increased temperature); Need for additional weather stations; and Need for improved data sharing and management</td>
</tr>
<tr>
<td>Tides and Floods and Davao City</td>
<td>Van Larenstein Hall University, DOST XI, HELP Davao Network</td>
<td>Need for improvement in drainage systems and flood control infrastructures; Need for improved reporting/ recording of flood incidences</td>
</tr>
<tr>
<td>Assessment of the extent of implementation of standards and procedures for water safety in the Philippines</td>
<td>DOST XI, HELP Davao Network, UIC</td>
<td>Low level of implementation of water safety plans among drinking water providers; Quality of drinking water in certain areas do not comply with the PNDSW of 2007; Need for development of a comprehensive advocacy, partnership and networking strategy to enforce PNSDW 2007</td>
</tr>
<tr>
<td>Assessment of the water situation and the safety of wastewater and sanitation in selected parts of Davao City</td>
<td>Oulo University, DOST XI, HELP Davao Network</td>
<td>Domestic and industrial waste management practices affect the level of contamination of the wastewater of the locations; There is need for reinforcement of the laws on waste management should be strengthened; Conversion from waste to energy is highly needed</td>
</tr>
</tbody>
</table>
For submission to the City Council
(after an initial presentation with the Executive Branch)

A POLICY BRIEF

ON

Enhancing Resilience to Disasters of Urban Water Systems in Davao City

By:
HELP- Davao Network
(HYDROLOGY FOR ENVIRONMENT, LIFE & POLICY)
October 2016
Furthering **Understanding thru Consultations**


Mindanao-wide consultation on priority issues and conflicts in water use and management (BIMP-EAGA Summit, October 2014) :
food, agriculture and fisheries; domestic and industrial use; energy; climate change and hydro hazards; special concerns of Indigenous communities, women and youth

Consultation with Local Government Units and key stakeholders on demonstrating disaster resilience of urban water system in Davao City (2016)
Furthering **local capacities thru** Capability Building

- **BIMP-EAGA IWRM Forum** for Peace and Development (October, 2014)
- **Localized IWRM Training for RBOs and LGUs** and distribution of the Customized IWRM Guidelines for Davao Region (June, 2015)
- **Fellowship Program on Disaster Risk Reduction** that build community resilience, safeguards agricultural livelihoods and reduces disaster recovery costs (20 fellows/water leaders from all over Mindanao, October, 2015)
UNESCO funded Amelioration of Learning Center in Barangay 10-A

- A partnership among HELP Davao Network, DOST XI, Davao City Council (City ENRO), Davao River Initiatives, and UNESCO
- Rehabilitated using Local Indigenous materials abundant in the area
- Envisioned to become adaptive to the possibility of possible future flooding. It will be open for multi-sector usage by most vulnerable families and individuals in the community, to include children, women and the elderly. It will also become the community’s disaster preparedness hub, and shall serve as the demonstration site for community resilience to water-related disasters and climate change.
UNESCO funded project on Amelioration of Learning Center in Barangay 10-A

BEFORE

AFTER

HELP Davao Network
Hydrology for Environment, Life and Policy
Challenges

- Pollution
- Population
- Groundwater extraction
- Saline intrusion
- Political boundaries
- Sustainability of projects
- Maintenance of the EWS
- Pilferage
- Conformance to the Building code
- Commitment from Local government units
- Evacuation centers
Salamat po