

Disaster Response, Recovery, and Resilience: Flooding in the Philippines

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Outline of Presentation

Background

Major floods over the last 15 years

Disaster Risk Reduction and Management

- Early warning system

Challenges in Disaster Response and Rescue

Building Resilience to Flood Disasters

Background on the Philippines

- **Population (2024):** 119.1 million, a 1.51% inc. from 2023.
- **Population density (2024):** 397.02/ km²
- **Density of Metro Manila:** 42,857 people/km²
- Located in the **Pacific Ring of fire** and as such is prone to earthquakes and volcanic activities which take place around the Ring
- It is also located on the **Pacific Typhoon Belt**. As such, it is estimated that about 20 typhoons enter the Philippines area each year, of which six to nine make "landfall". Of the islands that make up the Philippines, northern Luzon and eastern Visayas are most commonly affected



Background on the Philippines

According to the Asian Centre for Flood Control (ACFC), 8 of the world's 10 most disaster-prone cities are in the Philippines. These are as listed below with their corresponding ranks:

- Tuguegarao in Cagayan (2nd)
- Lucena in Quezon Province (3rd)
- Metro Manila (4th)
- City of San Fernando in Pampanga (5th)
- Cabanatuan in Nueva Ecija (6th)
- Batangas (7th)
- San Carlos – (no province specified in the report but most likely Pangasinan) (9th)
- Naga in Camarines Sur (10th)

Major Floods in the last 15 years

- September 26, 2009: Typhoon Ondoy (international name 'Ketsana')** hit the most the areas of Metro Manila and the Rizal Province, particularly: cities of Marikina, Malabon, Muntinlupa, Pasig, Quezon, San Juan, Taguig, Valenzuela, Makati and Antipolo
- Ondoy poured an equivalent of one (1) month of rain in one (1) day;
 - Casualty remains at 1,030 broken down as follows: 464 Dead, 529 Injured and 37 Missing
 - Estimated cost of damage to infrastructure and agriculture amounted to PhP 11.106 Billion (PhP4.437 Billion - Infrastructure; PhP6.669 Billion - Agriculture).
 - **Oct. 1 Typhoon Pepeng ('Parma)** hitting Northern Luzon; Ondoy and Pepeng affected 9.3 million people ad total of total of US \$4.38 billion in damage and losses, equivalent to about 2.7 percent of GDP
 - **Oct. 28 Typhoon Santi ('Mirinae')**



Major Floods in the last 15 years

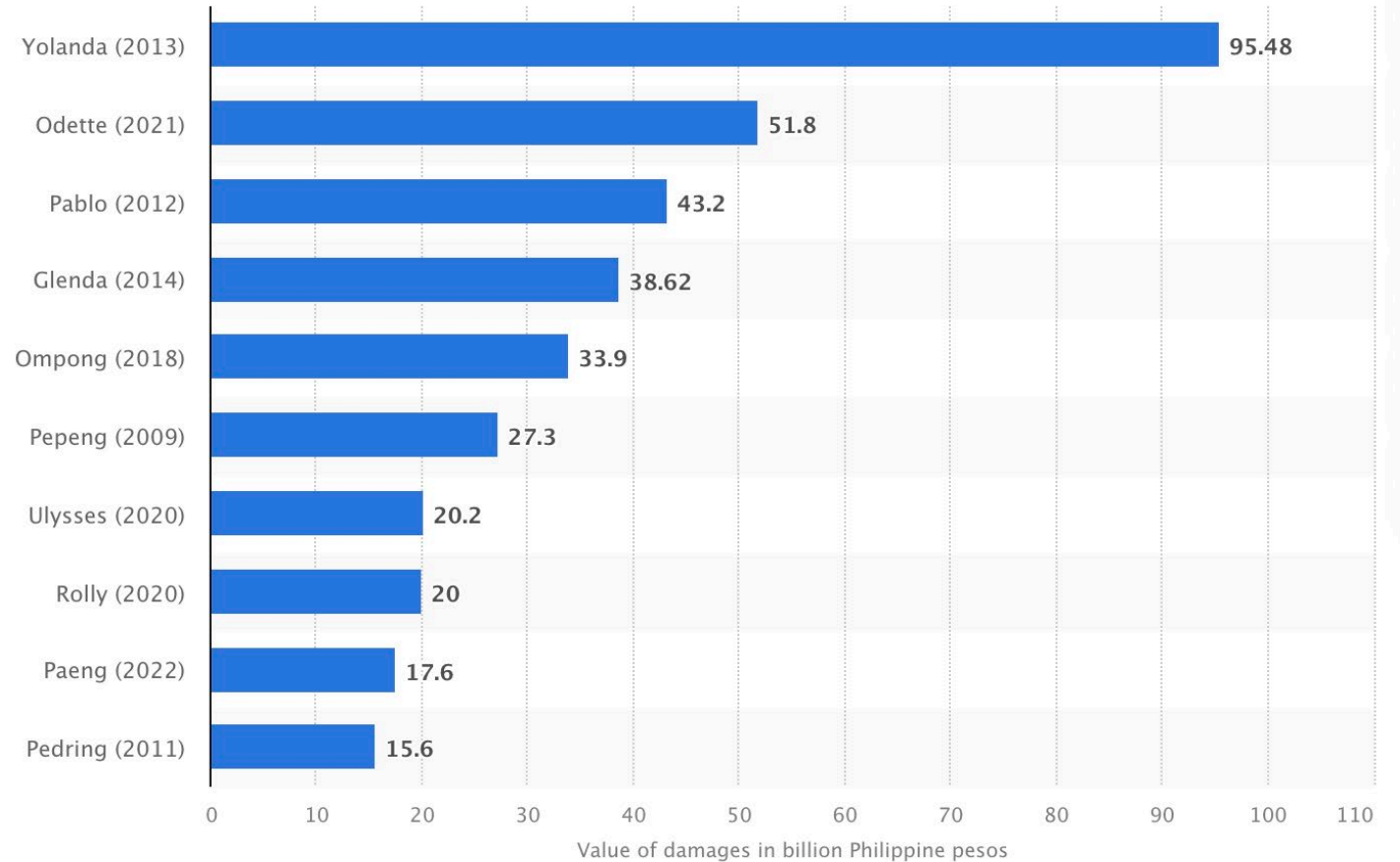
November 8, 2013: Typhoon Yolanda ('Haiyan') as a Category 5 storm

- Storm surges devastated many places such as Tacloban City. Waves measuring up to 19 feet destroyed buildings, knocked over trees, and carried cars away.
- More than 14 million people across 44 provinces were affected, claiming the lives of over 8,000 people
- The typhoon damaged 1.1 million houses, destroyed 33 million coconut trees (a major source of livelihoods), and pushed approximately 2.3 million people into poverty. Overall damage is estimated at \$13 billion

(Source: <https://www.worldvision.org/disaster-relief-news-stories/2013-typhoon-haiyan-facts>)



Most
devastating
typhoons in the
Philippines from
2011 to 2022 by
value of
damages



Source: <https://www.statista.com/statistics/1278568/philippines-most-devastating-typhoon-by-value-of-damages>

Major Floods in the last 15 years

October 24, 2024 Typhoon Kristine

(International name: Trami) affecting the northeast coast of Luzon, the country's most populous island, and caused widespread flooding and landslides

- Bicol peninsula was worst-hit where one month's worth of rain were dumped over 24 hours
- Rains also triggered volcanic mudslides or lahar in villages surrounding Mount Mayon, an active volcano in Bicol



Major Floods in the last 15 years

October 30, 2024 Typhoon Leon (Kong-Rey)

- The damage to agriculture due to tropical cyclones Kristine and Leon increased to nearly P6 billion
 - P5,913,505,507 worth of damage was reported to agriculture after the weather disturbances affected 111,411 farmers and fisherfolks with a total of 92,892 hectares of crops.
 - For infrastructures, damage worth P7,450,162,651 was also reported
- Reported death toll due to Kristine and Leon is at 150

Source: <https://www.gmanetwork.com/news/topstories/nation/925903/>





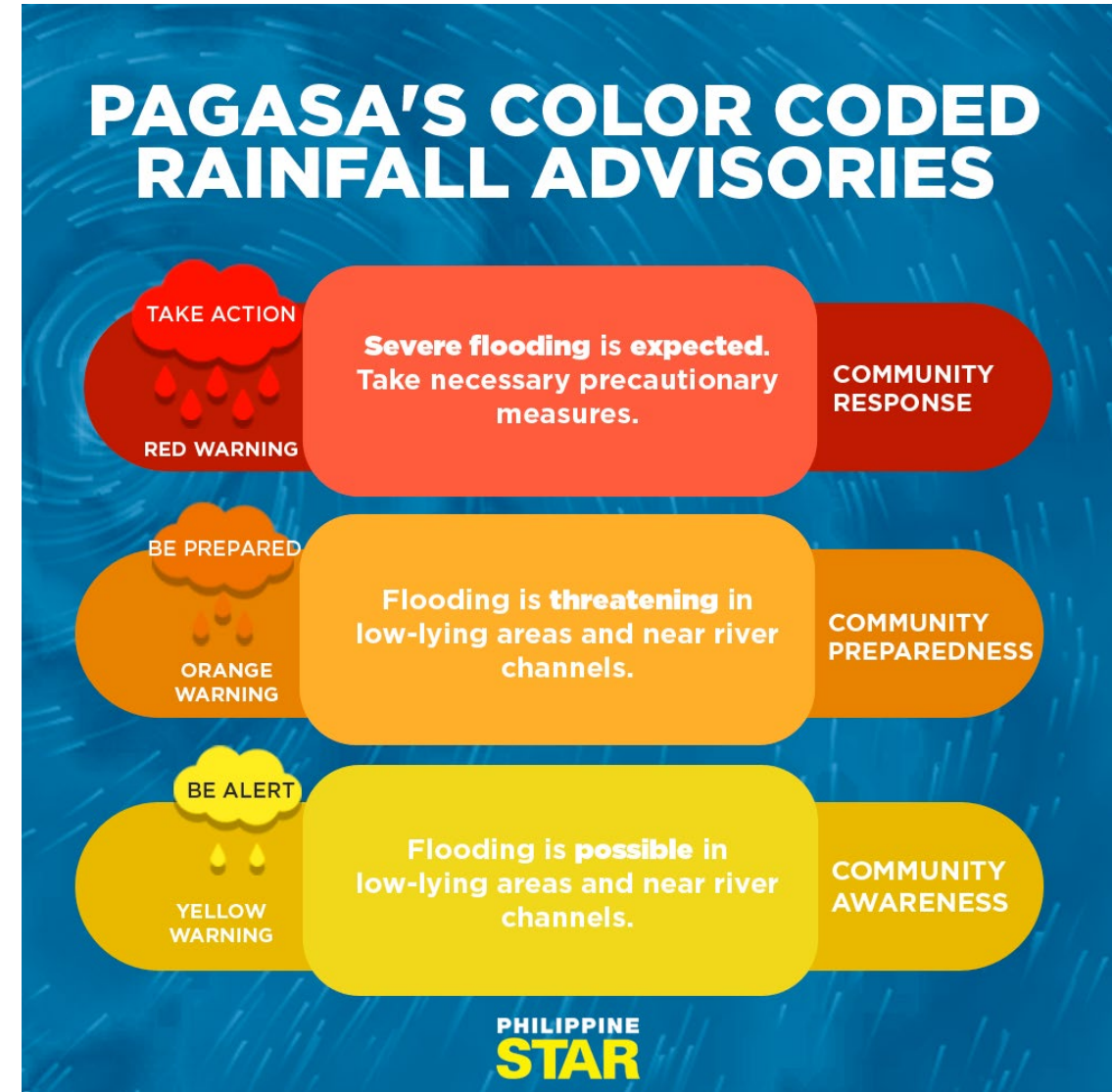
Disaster Risk Reduction and Management

- The country has been actively working towards strengthening Disaster Risk Reduction and Management (DRRM) since the enactment of Republic Act 10121, also known as the Philippine DRRM Act of 2010
- Survival and Recovery (SURE) Loan Program of the Agricultural Credit Policy Council (ACPC) with up to P5,000 loanable amount, payable in three years at zero interest
- Support of private entities like the World Food Programme, Habitat for Humanity, development partners like the ADB and WB.

Disaster Preparedness

Importance of Early warning system

MARIKINA RIVER'S OFFICIAL WATER LEVEL MONITORING	
1ST ALARM 1 MINUTE CONTINUOUS AIRING	PREPARE TO EVACUATE 15 METERS WATER LEVEL
2ND ALARM 2 MINUTES INTERMITTENT AIRING	EVACUATE TO DESIGNATED CENTERS 16 METERS WATER LEVEL
3RD ALARM 5 MINUTE CONTINUOUS AIRING	FORCED EVACUATION 18 METERS WATER LEVEL



Challenges in Disaster Response and Rescue

Storms and flooding damage the transport infrastructure first so rescue and respond become difficult



Damage to transportation infrastructure



We can't rescue them all at once because there are so many and we need additional motorboats,"

Challenges in Disaster Response and Rescue

Storms and flooding damage the transport infrastructure first so rescue and respond become difficult



Delivery of humanitarian assistance is delayed due to heavy traffic and access constraints from flooding.



A large orange circle is positioned on the left side of the slide, partially cut off by the edge.

Building Resilience to flood disasters

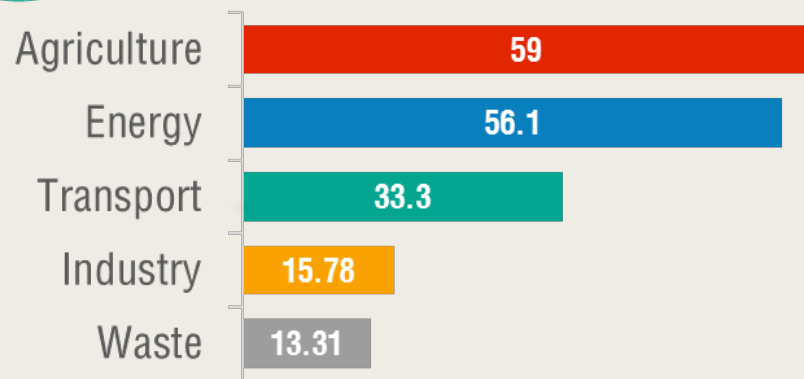
- *Moving towards low carbon societies*

Studies and scientific literatures have pointed towards climate change as a main cause for the emergence of stronger tropical cyclones. This can be attributed to existing carbon footprint and emissions (Holden, 2017)



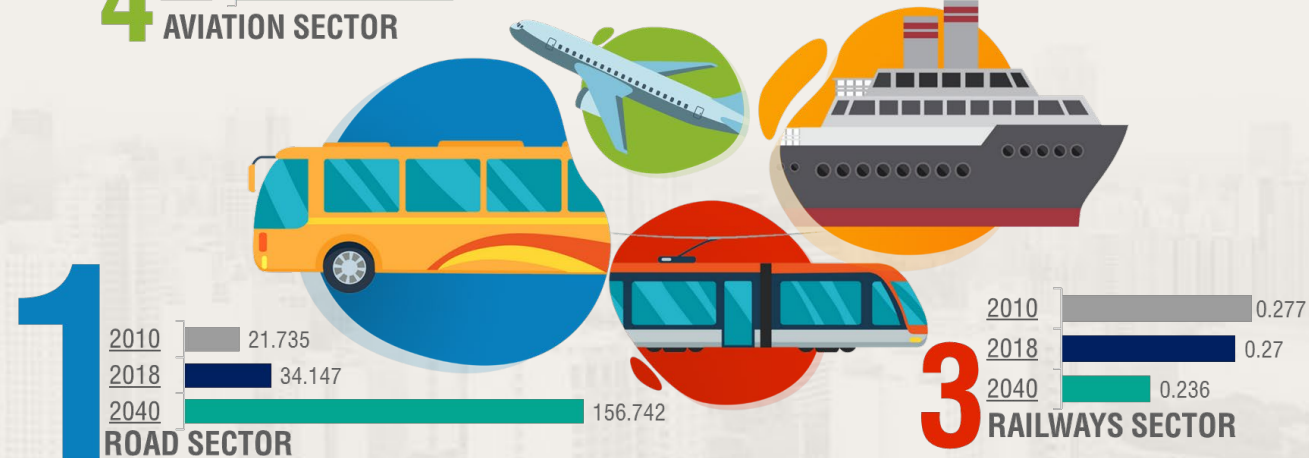
3RD

largest contributor of the Philippines' greenhouse gas emissions, next to **Agriculture Sector** and **Energy Sector**.



Greenhouse gas emissions by sector, Philippines, 2016
In million tons of carbon dioxide-equivalents (MtCO₂e).

Source: CAIT Climate Data Explorer via. Climate Watch
[OurWorldInData.org/co2-and-other-greenhouse-gas-emissions](https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions)

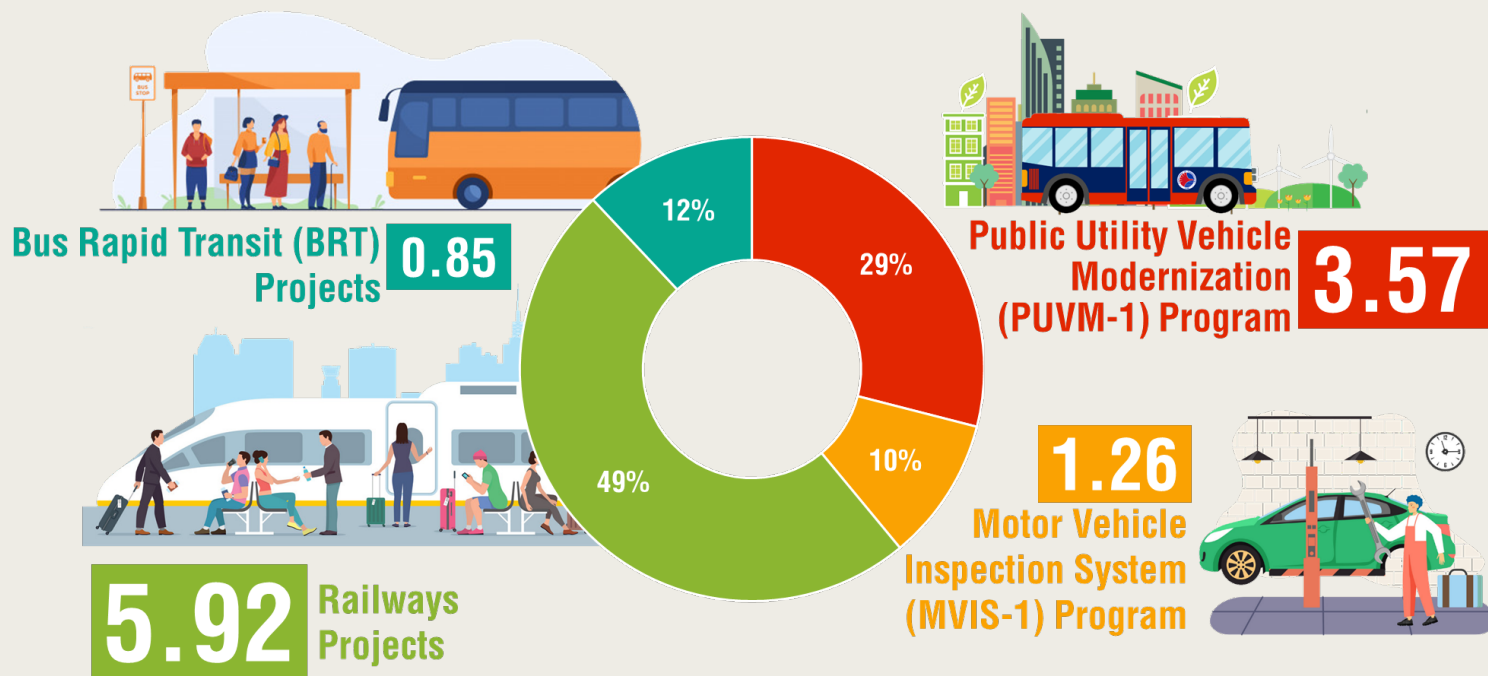


**PHILIPPINE TRANSPORT SECTOR BASELINE GHG EMISSIONS
IN MILLION TONS OF CARBON DIOXIDE-EQUIVALENTS (MTCO₂E)**

The baseline and projections were estimated considering the economic growth targeted under the **Medium-Term Philippine Development Plan – Ambisyon 2040**, and the expected growth in population.

PHILIPPINE TRANSPORT SECTOR UNCONDITIONAL MITIGATION OPTIONS

(GHG (CO₂) EMISSION REDUCTION IN MILLION TONS OF CARBON DIOXIDE-EQUIVALENTS (MTCO₂E))



Transport Programs Percent Contribution to Overall
Transport GHG Emission Reduction Targets in 2040

The Department of Transportation (DOTr) proposed Nationally Determined Contribution for the greenhouse gas emissions reduction covers the transport fleet modernization and inspection, modal shift, and infrastructure development.

The proposed NDC target will be UNCONDITIONAL.

Building Resilience to Flood Disasters

Integration of disaster resilience in settlements planning

- The increase in population has led to an increase in residential and other built-up areas. It has encroached in the previously open areas that previously absorbed the storm water (Alcazaren, 2013).
- Obstruction of waterways by informal settlers, clogging of flood ways by improper sanitation practices, encroachment and development along the flood plains (Lagmay, 2017).



Building Resilience to Flood Disasters

Adopting Nature Based Solutions:

Revitalizing our rivers


- Flood conveyance solutions increase the river's capacity to contain high discharge (heavy rainfall) events.
- Water retention and detention are solutions that smoothen the peaks of high discharge (heavy rainfall) events.

(Source:

<https://www.adb.org/sites/default/files/publication/774721/revitalizing-philippine-rivers-climate-resilience.pdf>)

Strong institutional and governance system

- Ability and willingness of government agencies to consolidate efforts and proceed towards one decision.
- Need to strengthen the role of the LGUs in creating an enabling environment for resilience and adaptation through joint cooperation and complementation.

An aerial photograph of a rural landscape where a river has flooded the surrounding green agricultural fields. A small boat is visible on the river. The text is overlaid on the image in white, bold font.

Absolute protection from flooding is neither technically feasible nor economically and environmentally viable. But we need to minimize the adverse impacts by a combination of structural and non-structural interventions.

Thank you for your attention ☺

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