

# Governance and Disaster Risk Management tools

- a Philippine insight

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4. Holistic Measures
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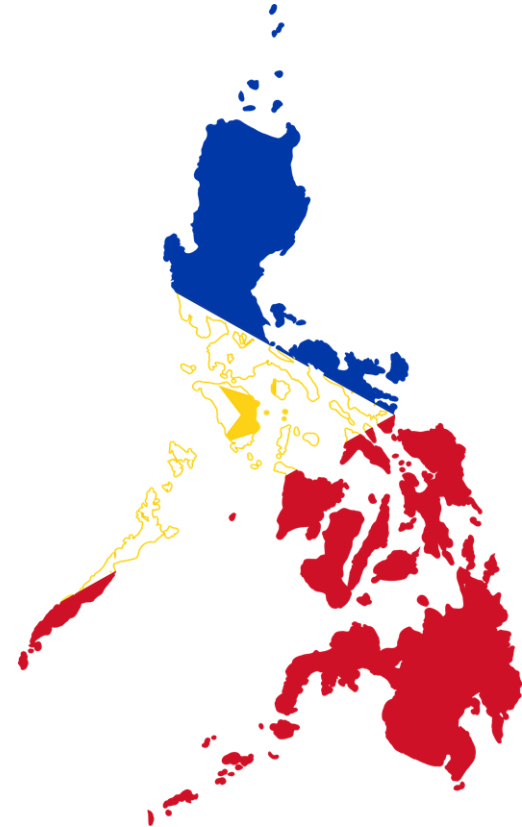


Figure 1: Philippines with the color of its flag



Figure 2: Integrated approach to Disaster Risk Management



# Disaster Risk Management- DRM

- DRM seeks to reduce a society's vulnerability to extreme natural events so that even if such events occur, they do not result in a disaster.
- Effective DRM has to take into account extreme weather conditions.
- It must always aim to analyse, take into account, and - where possible- tackle underlying risk factors.



# Ex-ante scheme of DRM

## Preparation

Data

Awareness

Planning

Prevention

## Risk Mitigation

Indemnity cover

Parametric insurance

Mutual schemes

Alternative-risk transfers

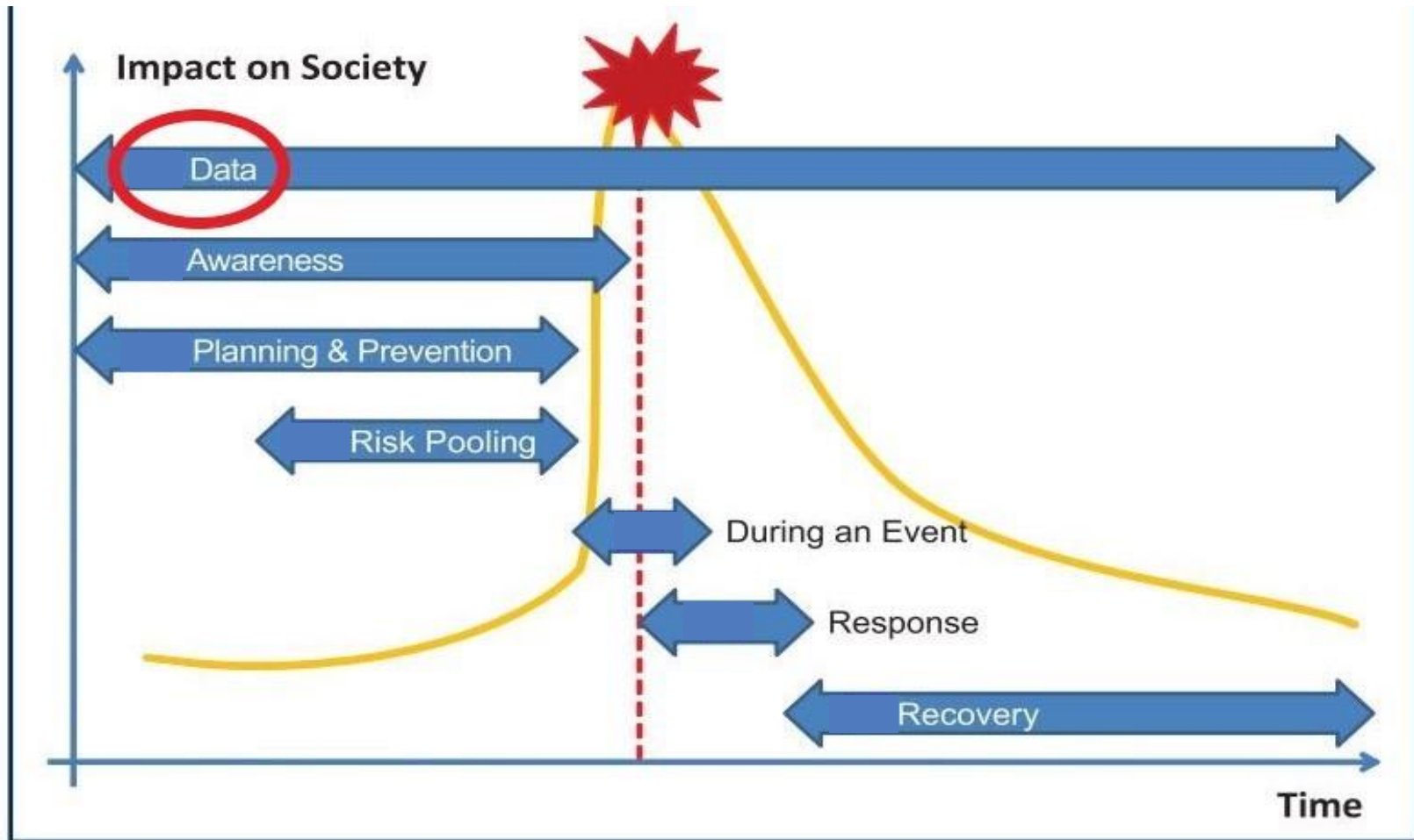


Figure 3: Natural disaster timeline



# Post-ante scheme of DRM

## Response

Order & Control

Assessment

Pay out

Quick

Use of funds

## Recovery

Loss adjustment

rebuilding

Community adaptation

Sustainable

Financial support



**Insurance** is a financial product sold by insurance companies to safeguard one and one's property against the risk of loss, damage or theft.

The Association of British Insurers, 2019

**Reinsurance** is insurance for insurance companies. It's a way of transferring or ceding some of the financial risk insurance companies assume in insuring things to another insurance company, the reinsurer.

Insurance Information Institute, 2021



# Role of stakeholders

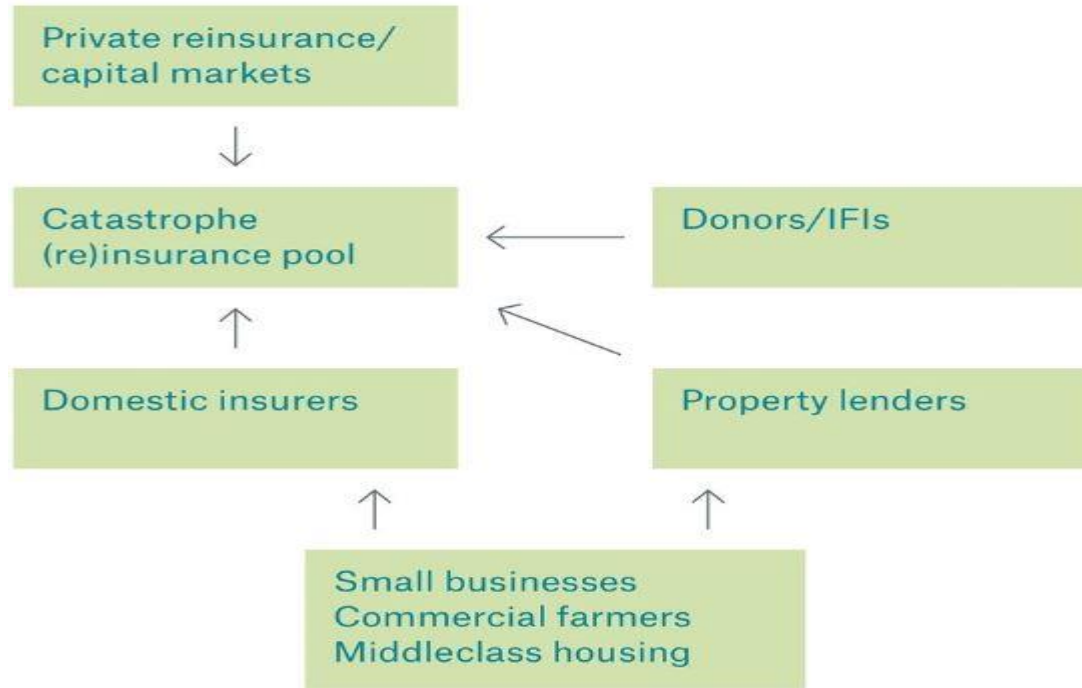


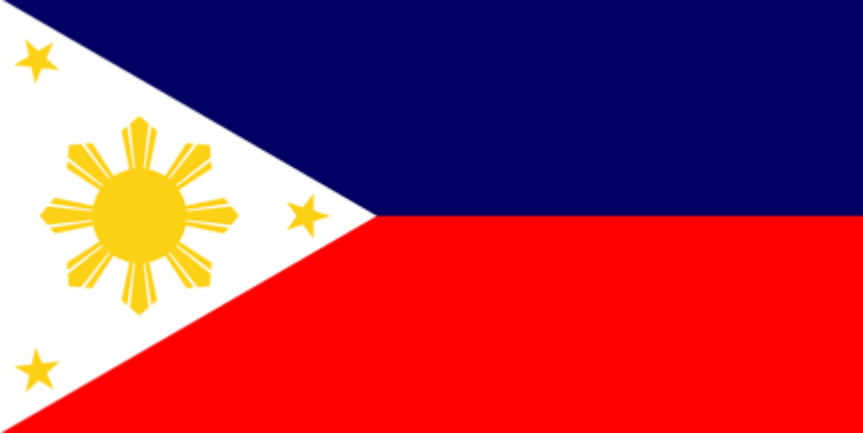
Figure 4: Role of private sector in disaster management

\*IFIs: International Financial Institutions

## 2 The Philippine Context



# The Philippines & Manila



# The Philippines

general information | population | disasters



- archipelago state
- 7,100 islands and islets
- land area of approximately 300,000 km<sup>2</sup>

The Philippines - Population

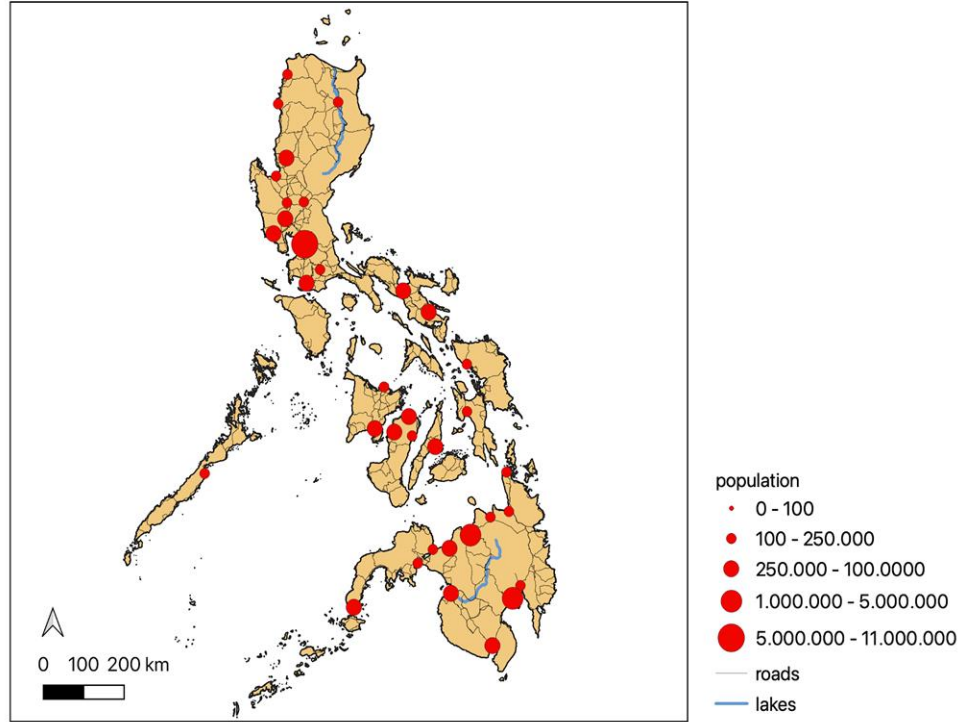


Figure 5: The Philippines population (own illustration)

# The Philippines

general information | **population** | disasters

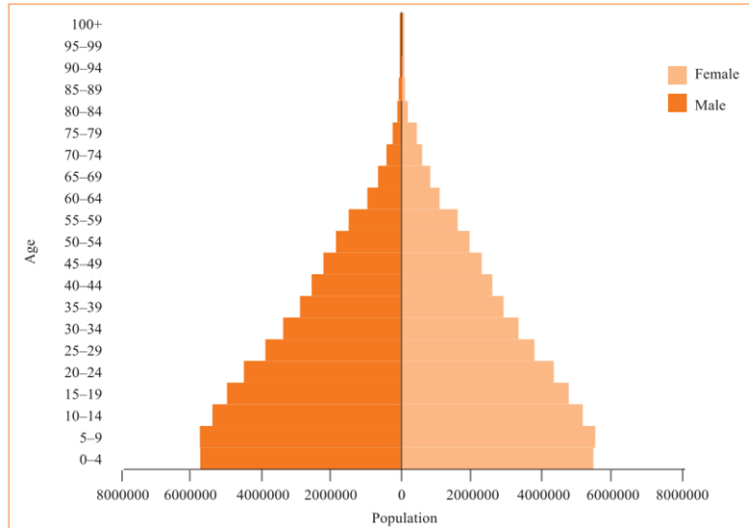


Figure 6: The Philippines' national population pyramid (Brown, D., Dodman, D., 2014)

- the Philippines population is very young
- median age: 22,7

- about 65% is expected to live in an urban environment by the year 2050

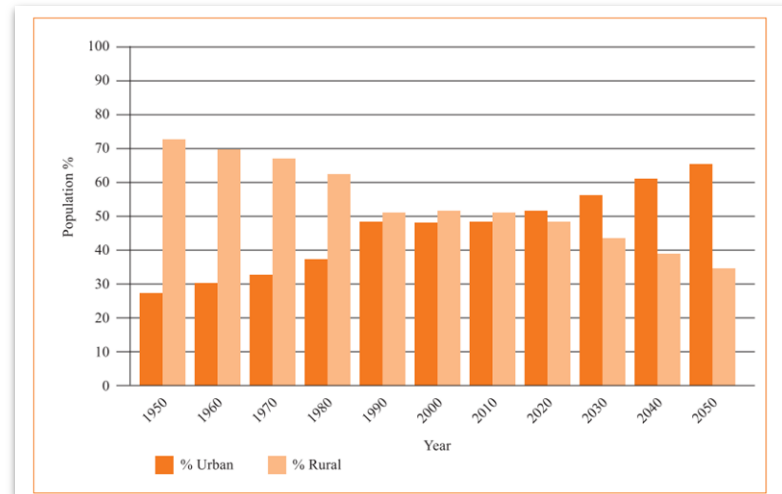


Figure 7: The Philippines' urban transition (Brown, D., Dodman, D. (2014)

## The Philippines

general information | **population** | disasters



- Philippines perform poorly in comparison to its fellow asian countries
- 25.2 % live below the poverty line
- people who live in poverty are highly vulnerable to disasters

Pennington, J., (2017)

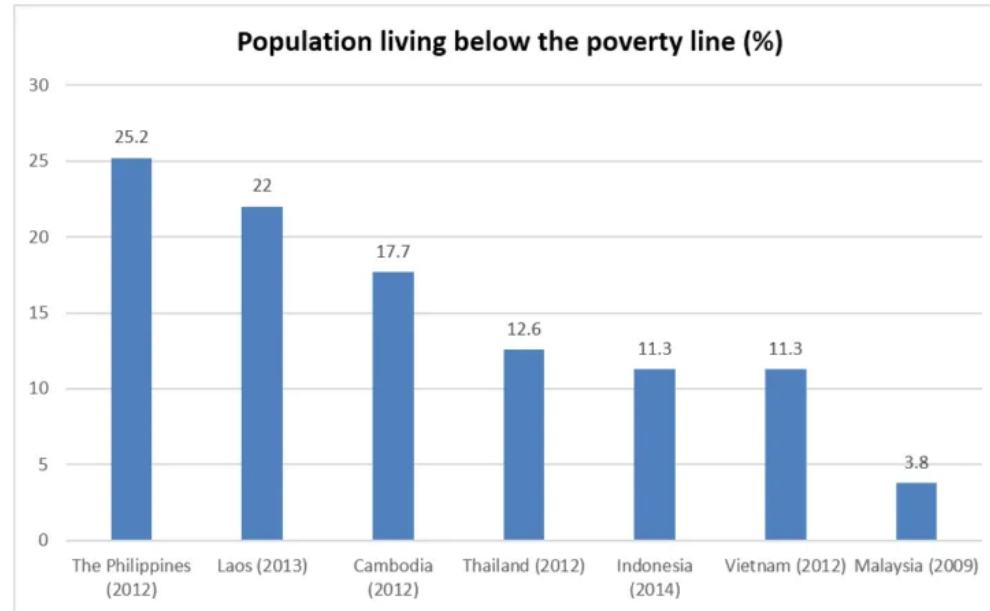


Figure 8: Population living below the poverty line (Pennington, J., 2017)

## The Philippines

general information | population | **disasters**



- combined hydro-meteorological disasters are the most common and severe
- Earthquakes, strong winds and rain, big waves

Ravago, M. et al., (2020)

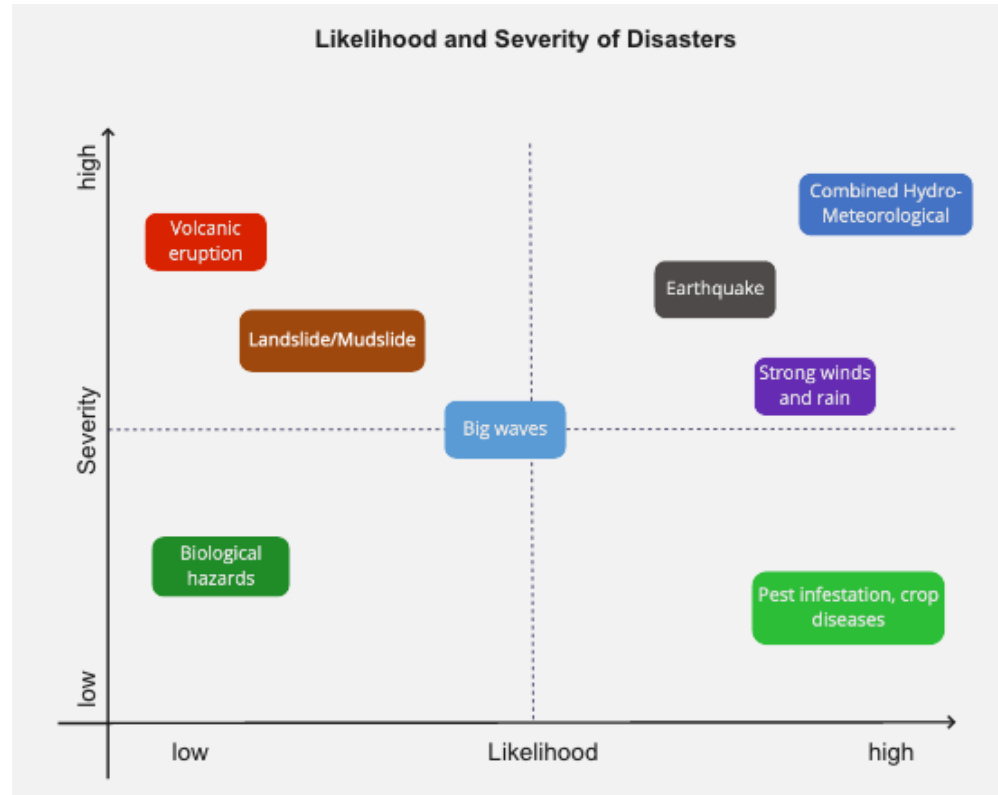


Figure 9: Likelihood and Severity of Disasters in the Philippines

## The Philippines

general information | population | **disasters**



- ranked 9th among all the countries with the highest risks in 2020

World Risk Report 2021

- 60% of the landmass of the country is under risk of multiple hazards
- 74% of the population is susceptible for their impact

(GFDRR, 2017)

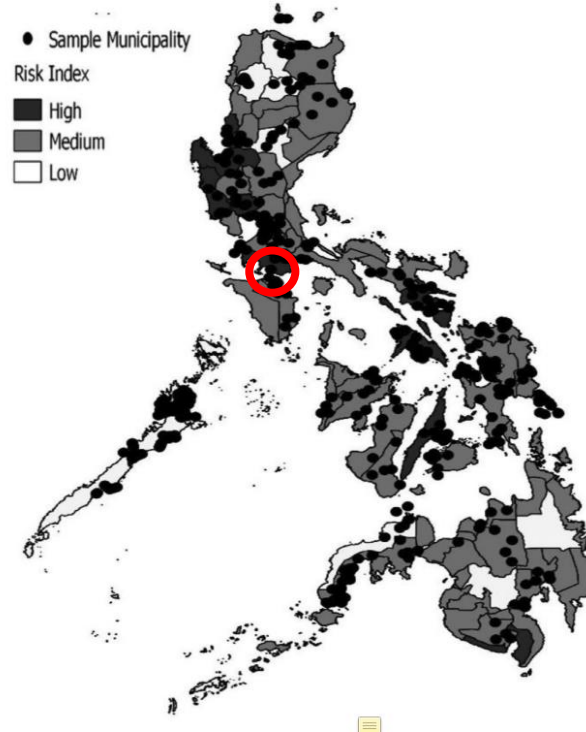


Figure 10: Risk index of the Philippines (Ravago, M. et al., (2020)



## Manila

**general information** | population | disasters

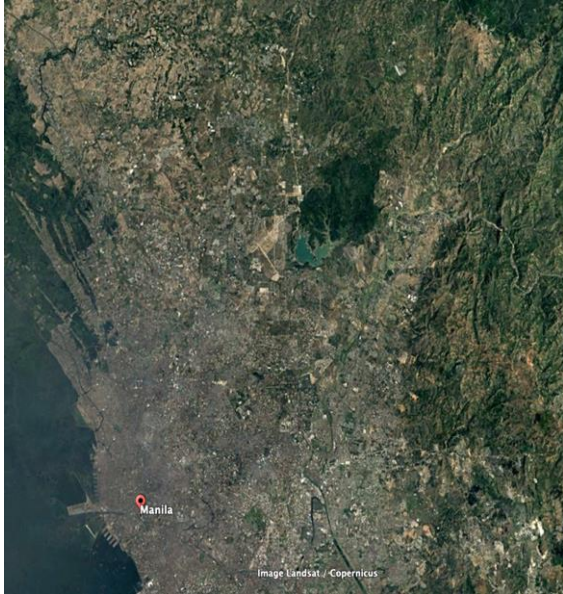


- Metropolitan Manila
- Is composed of 16 cities
- total population: 12,877,253
- area: 619 km<sup>2</sup>

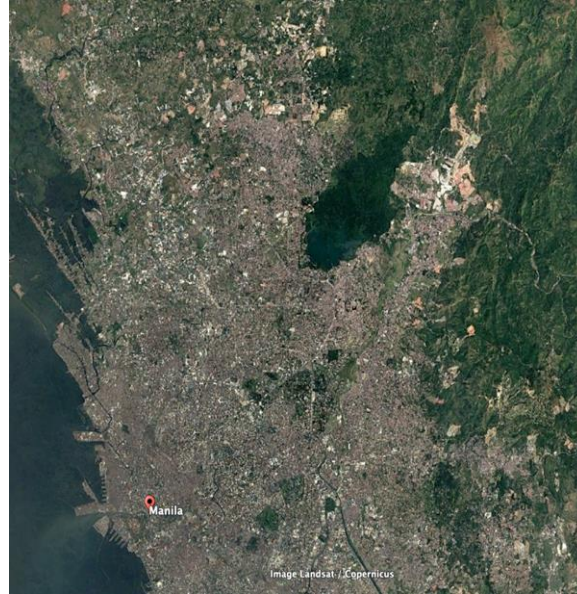
# Manila

general information | **population** | disasters

1990



2015



- Manila has experienced substantial suburbanization
- Population density in 2015: 20,785 people per km<sup>2</sup>
- Density increase of 62% compared to the year 1990

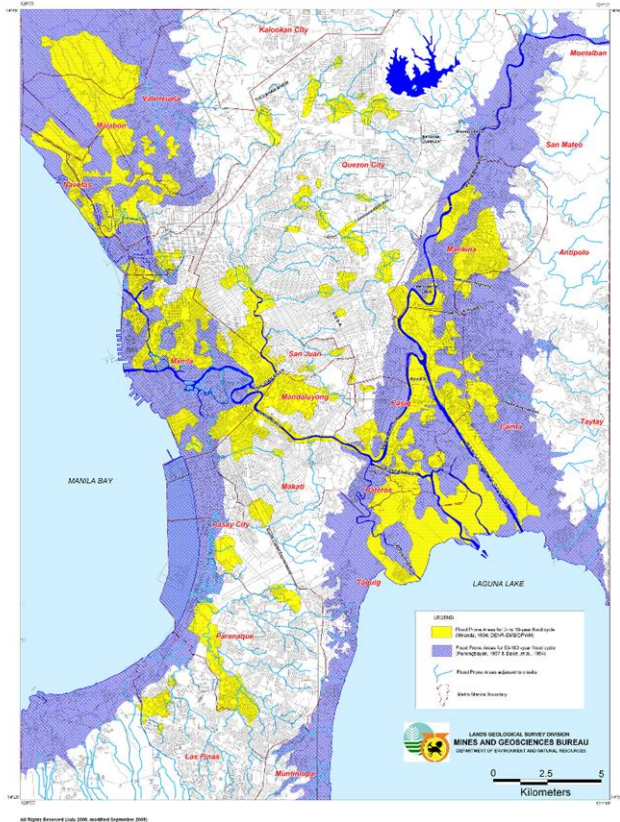
Alvarez, M., et al. (2019)

Satellite Imagery obtained from Google Earth

# Manila



general information | population | **disasters**

FLOOD HAZARD MAP OF METRO MANILA



- population size and density
- deficiencies in infrastructure
- cities' location on a low elevation alluvial plain between two bodies of water

→ increased vulnerability to climate change effects such as stronger tropical cyclones

-  flood-prone area for 2 to 10 year flood-cycle
-  flood-prone area for 50 to 100 year flood-cycle

Manila  
general information | population | **disasters**

Flood impacts and DRM-tools in Manila



# 3 Disaster Risk Management Options



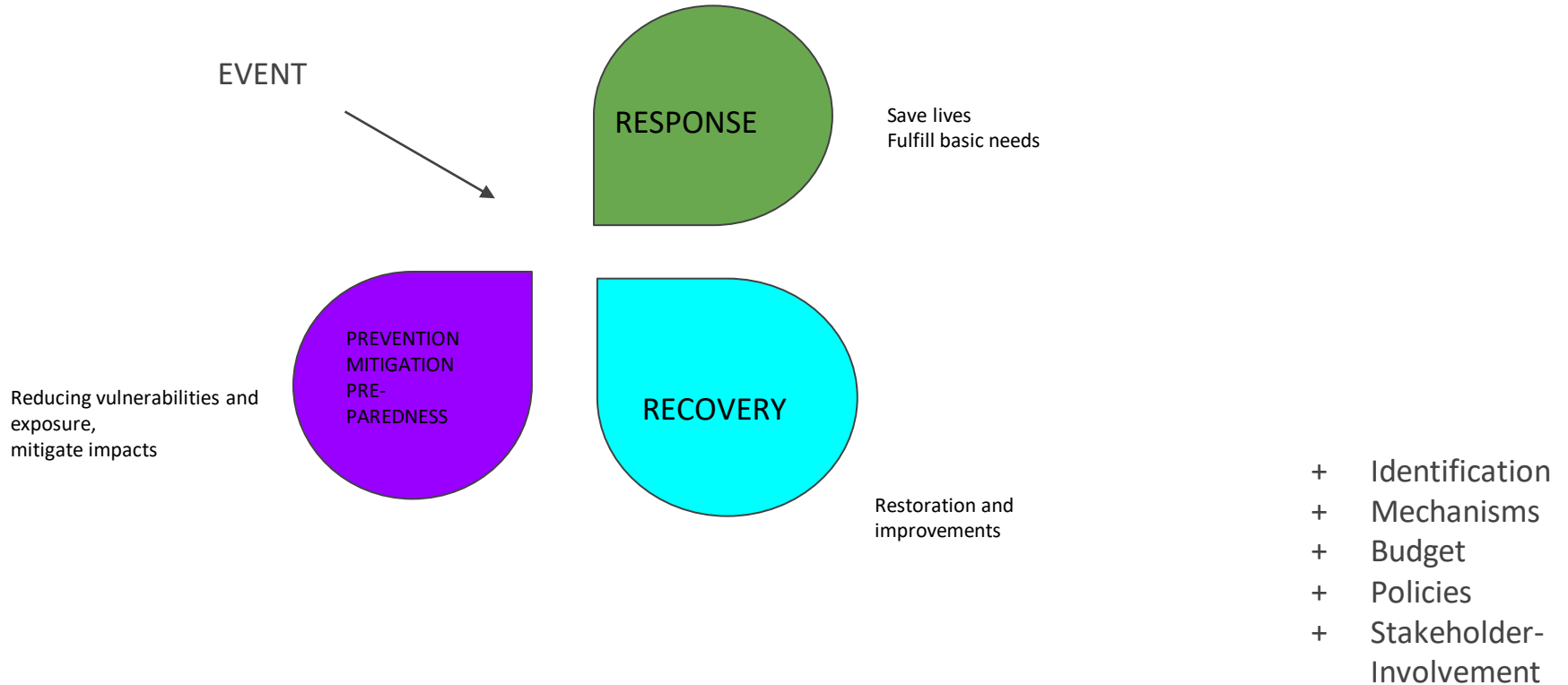


# What should an ideal DRM aim for?

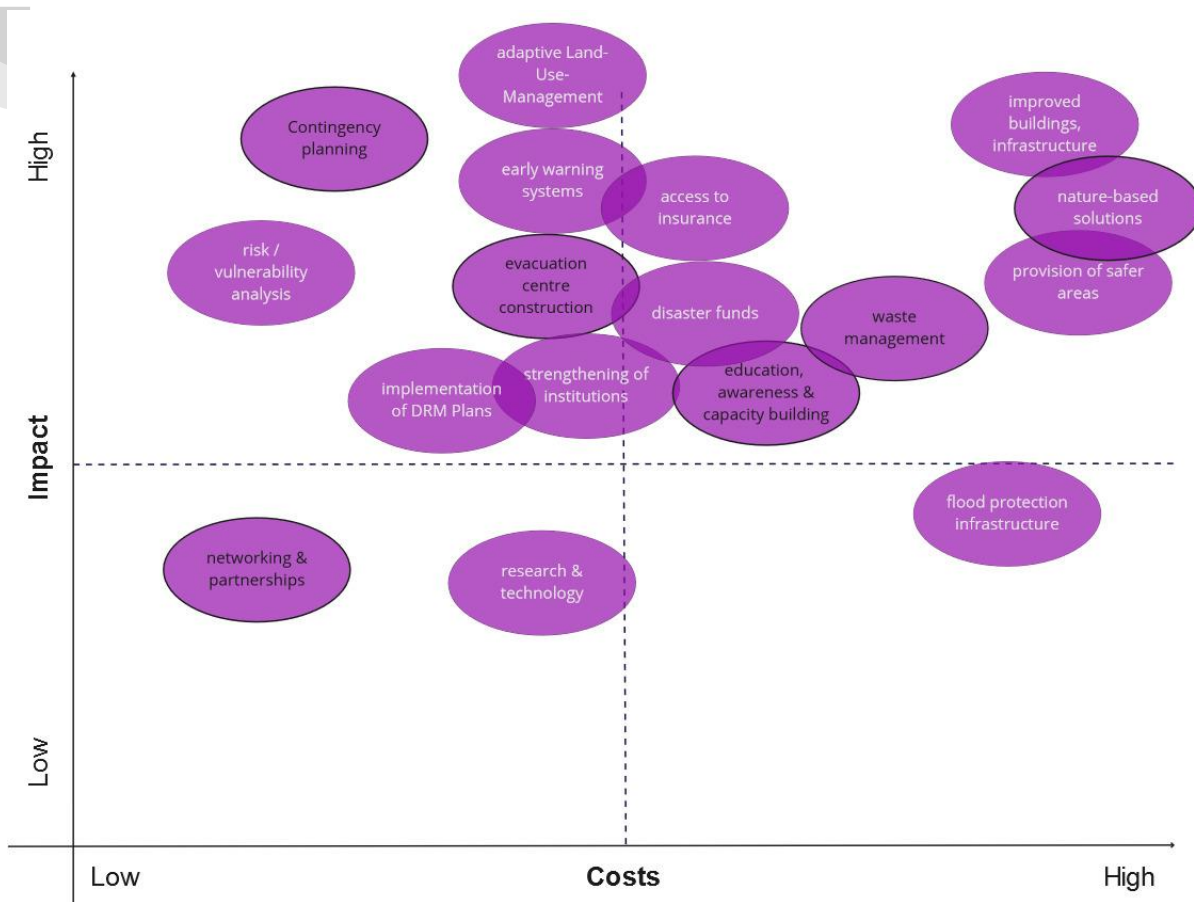
- From disaster preparedness to risk reduction
- Converging DRR and CCA\*
- Fostering behavioural change through knowledge & capacity building
- Establishing an enabling environment: infrastructure, strong institutions, livelihood opportunities, guidelines & policies
- Environmental protection
- Inclusiveness
- Community-based approaches

\* DRR: Disaster Risk Reduction / CCA: Climate Change Adaptation

# Different phases and their objectives



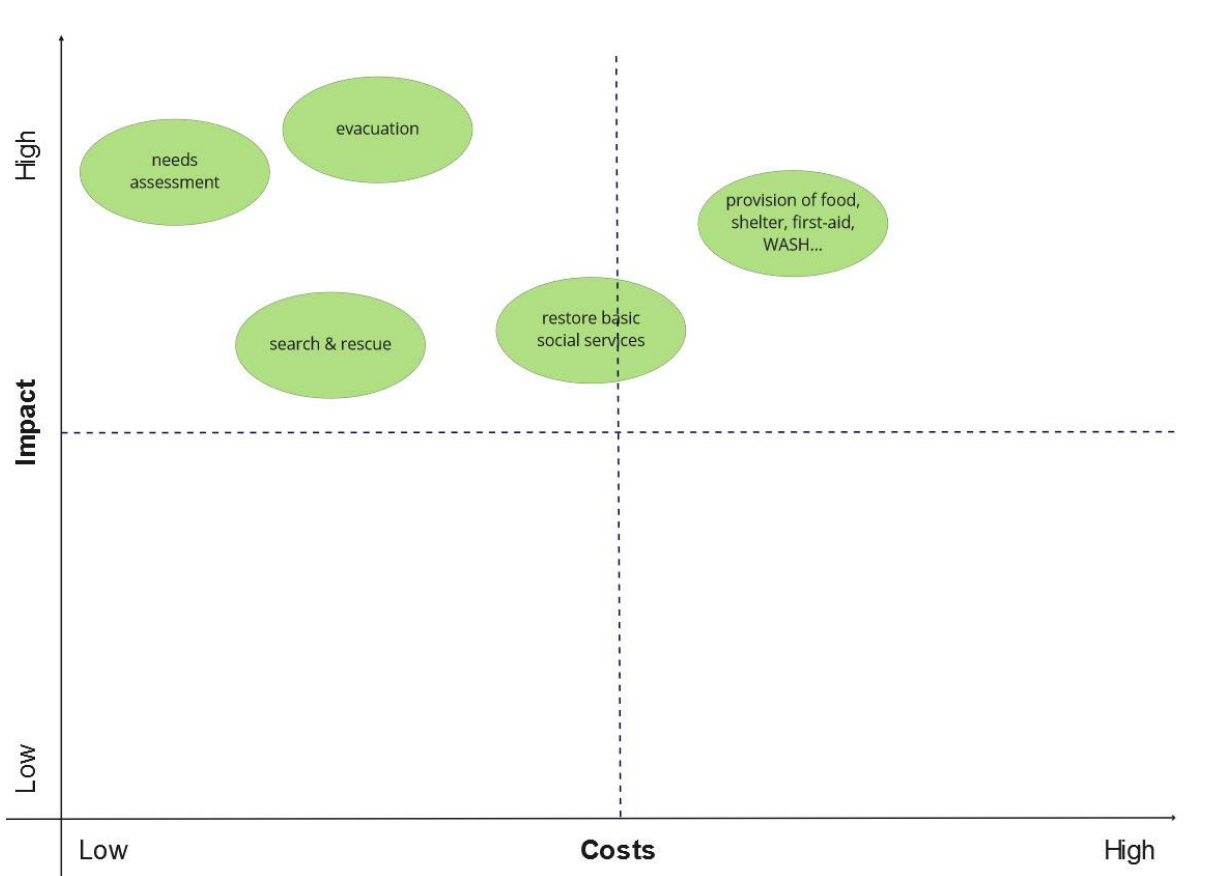
# Measures in the preparation phase



- + Infrastructure
- + Mainstreaming
- + Education
- + Capacities
- + Data Management

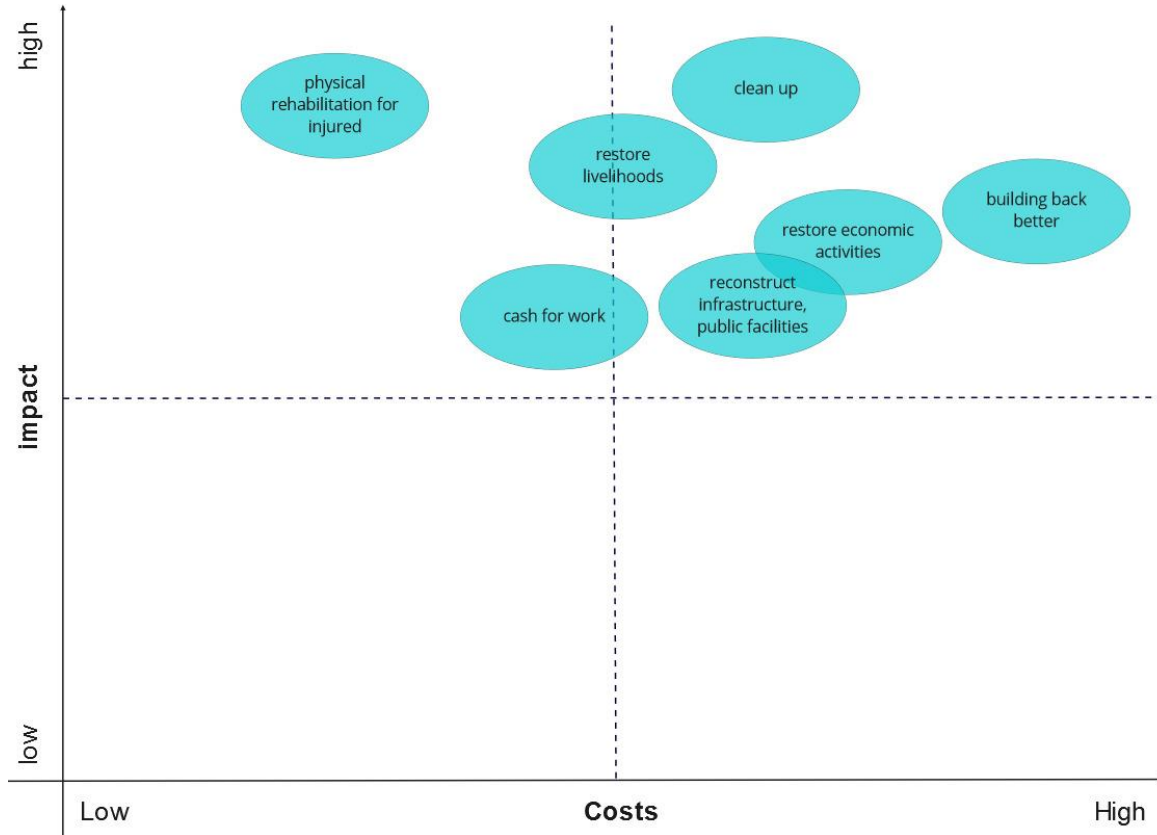


# Measures in the response phase

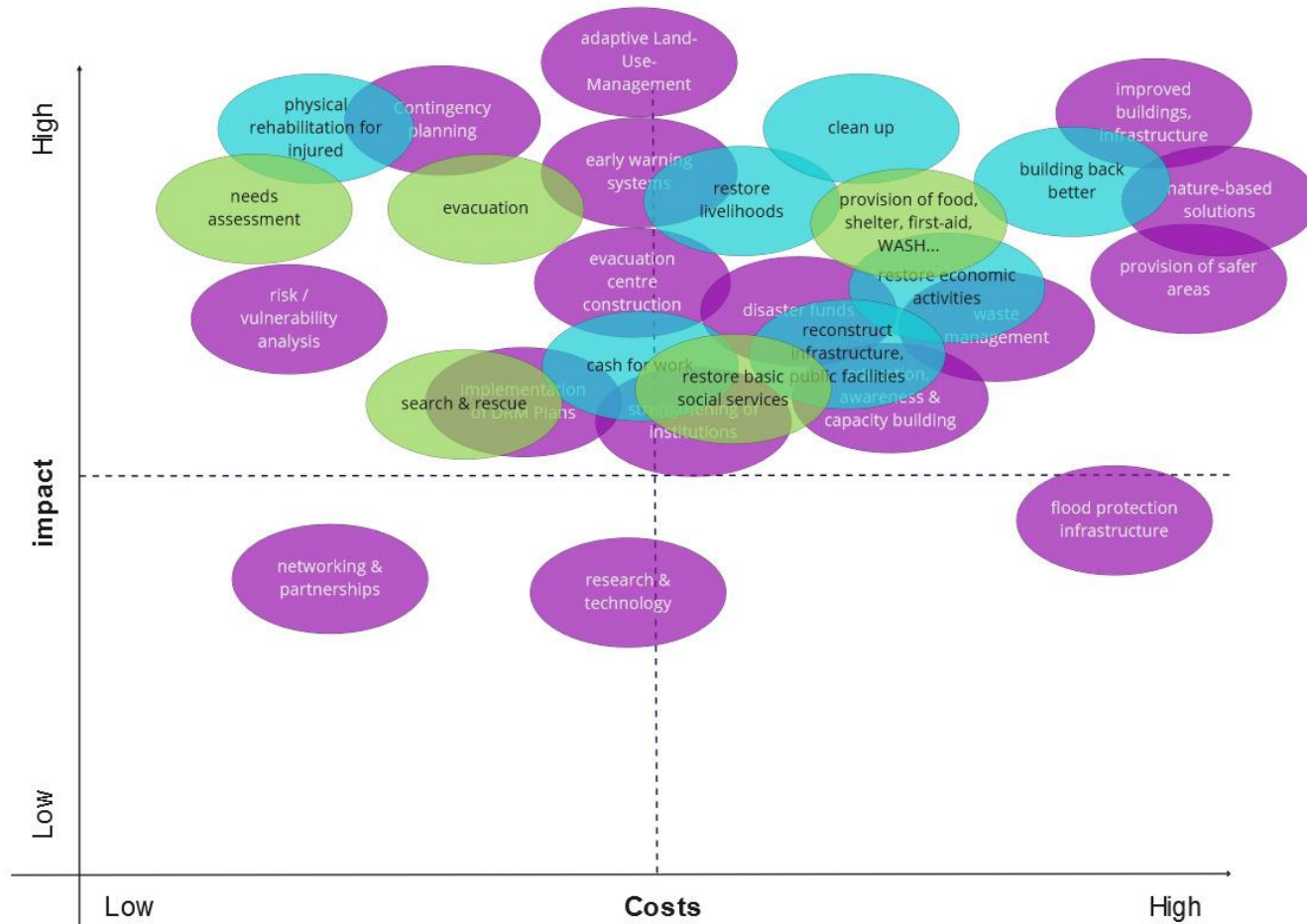


- + Cooperation
- + Coordination
- + Fundings
- + Legal frame

# Measures in the recovery phase



- + Facilitation
- + Funding
- + Learning



# 4 Most holistic measures



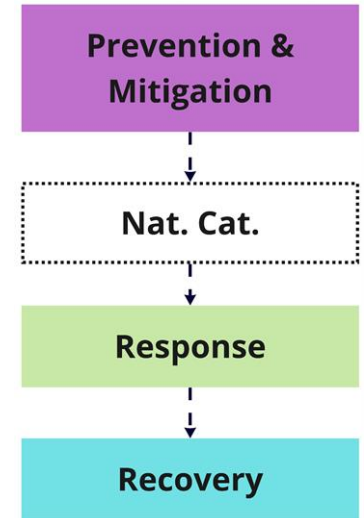


## Most Holistic Measures

Selection Process:

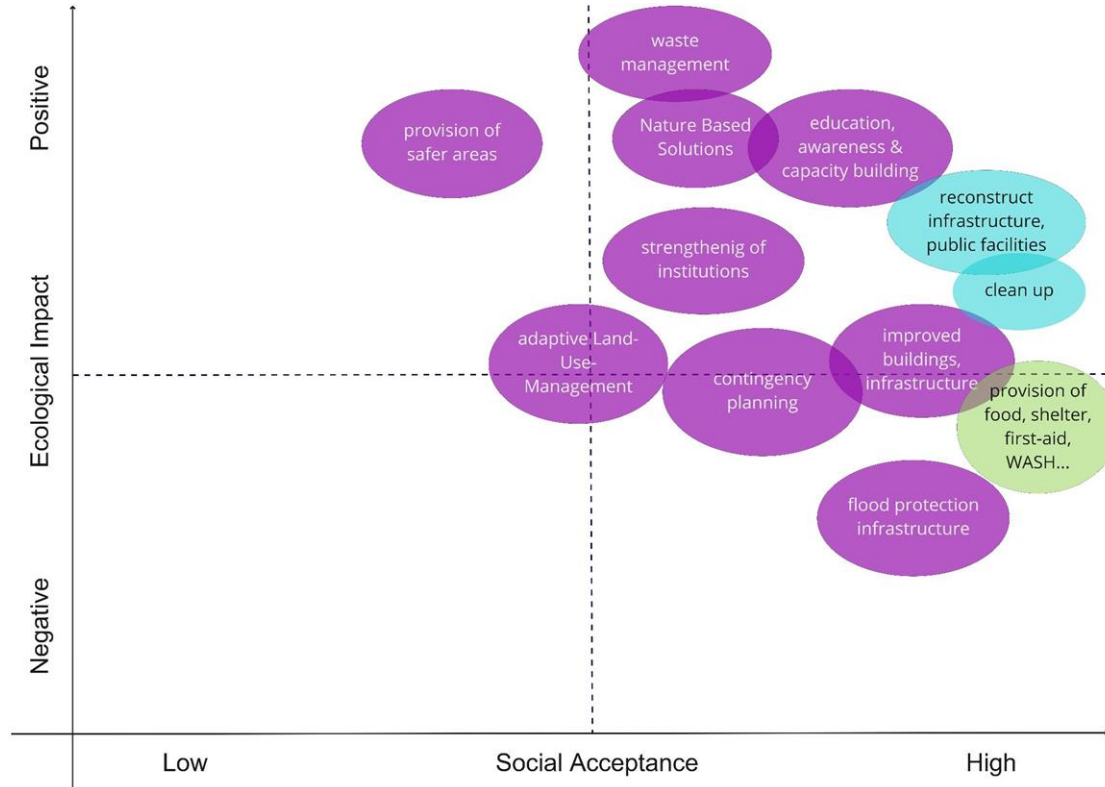
The matrix incorporating measures of all phases of intervention was reassessed to identify the best fitting and most relevant measures.

- Additional dimensions considered:
- Ecological Impact
  - 
  - Social Acceptance
  - Longevity
  - Effort



Phases of Intervention

# Results - Holistic Measure Selection





# Holistic Measure Grouping

Moving away from color coded intervention phases, we can group our findings into 3 spheres:

## Social & Humanitarian

### **-Education, Awareness and Capacity Building**

-Provision of food, shelter,  
first aid...

## Institutional

- Contingency Planning
- Strengthening of institutions
- Waste management**
- Clean up

## Infrastructural

- Provision of safer areas
- Adaptive Land-Use-Management**
- Infrastructure improvement
- Flood Protection Infrastructure**
- Nature Based Solutions
- Reconstruct infrastructure, public facilities

## Social & Humanitarian - Education, Awareness and Capacity Building

- Positive environmental outcome
- Socially well accepted
- Continuous, resource intensive effort
- Long-lasting, positive impact



Community Training at the Emergency Response Assistance Program (ERAP), Manila.

Source: <https://bit.ly/3cs0dZr>



## Social & Humanitarian - Education, Awareness and Capacity Building

Student Coastal Clean-Up



Source: <https://bit.ly/3dbElk8>

Manila inner city



Source: <https://bit.ly/39ghMJM>

## Institutional - Waste Management



- Positive environmental outcome
- Socially well accepted
- Continuous, resource intensive effort
- Long-lasting, positive impact if implemented

*Institutions need to act urgently!*

Plastic Pollution of local water courses, Manila.

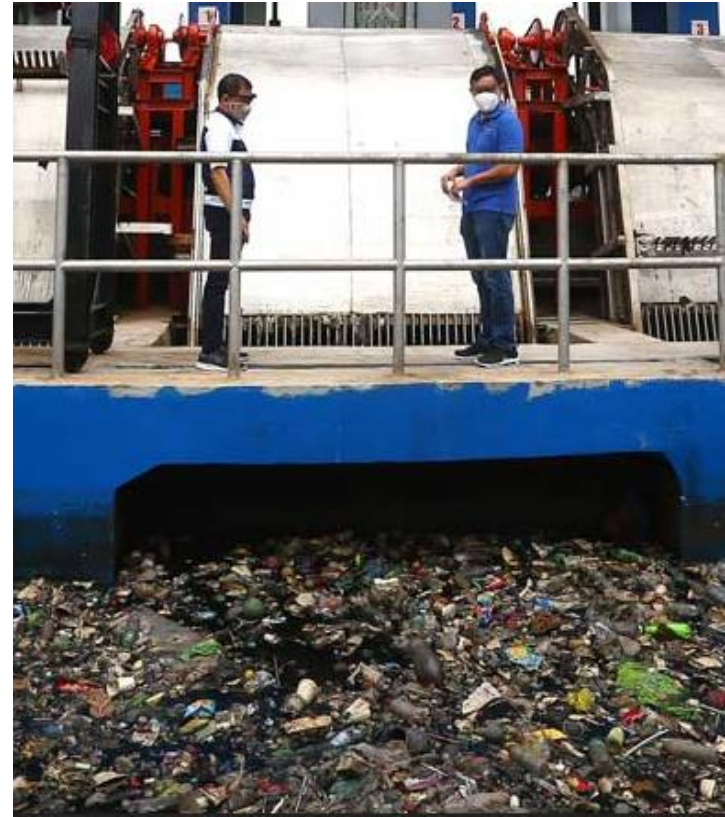
Source: <https://bit.ly/3w0CHdJ>

Waste among the most pressing issues and problematic in terms of

- Flood Protection
- Environmental degradation

*and*

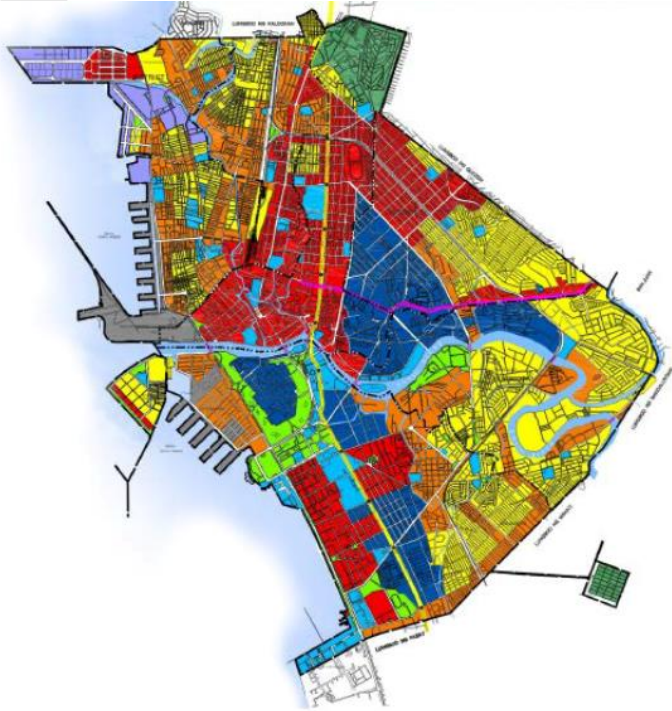
- Human health



Polluted flood pump, Manila.

Source: <https://bit.ly/31ndE6w>

## Infrastructural - adaptive Land-Use-Management



- Positive environmental outcome
- Socially well accepted
- Continuous, resource intensive Effort
- Long-lasting, positive impact if implemented

Land-Use Zoning in the harbour area, Manila Bay.

Source: <https://bit.ly/3d6Jda9>

## Infrastructural - Flood protection infrastructure

- Questionable environmental outcome
- Socially well accepted
- Resource intensive in construction, rather cost effective in maintenance
- Long-lasting, positive impact only if implemented in addition to other solutions



Roxas Blvd, before and during storm.

Source: <https://bit.ly/3suZa0q> ; <https://bit.ly/3tVP74x>.

## Most Holistic Measures



Urban Manila Cityscape

<https://bit.ly/39hi5nL>

Different Matrices show:

- Complex, multi-level and multi-impact conditions in Manila
- From our expertise it is clear that governmental commitment and appropriate funding from various sources is necessary to further advance Disaster Risk Management
- We will now shift the focus from the public sector to the private sector and elaborate from an insurance point of view possible business cases and scenarios

Source:

# 5 Business Cases for DRM Insurance



Case 1



# Improving resilience + flood insurance for Manila Bay

Investment Scheme:

Building resilience: Impact bond to afforest coral reef and plant mangrove forest in Manila Bay

&

Flood insurance: Insure the local government units (LGU) of the affected area of Manila against flooding



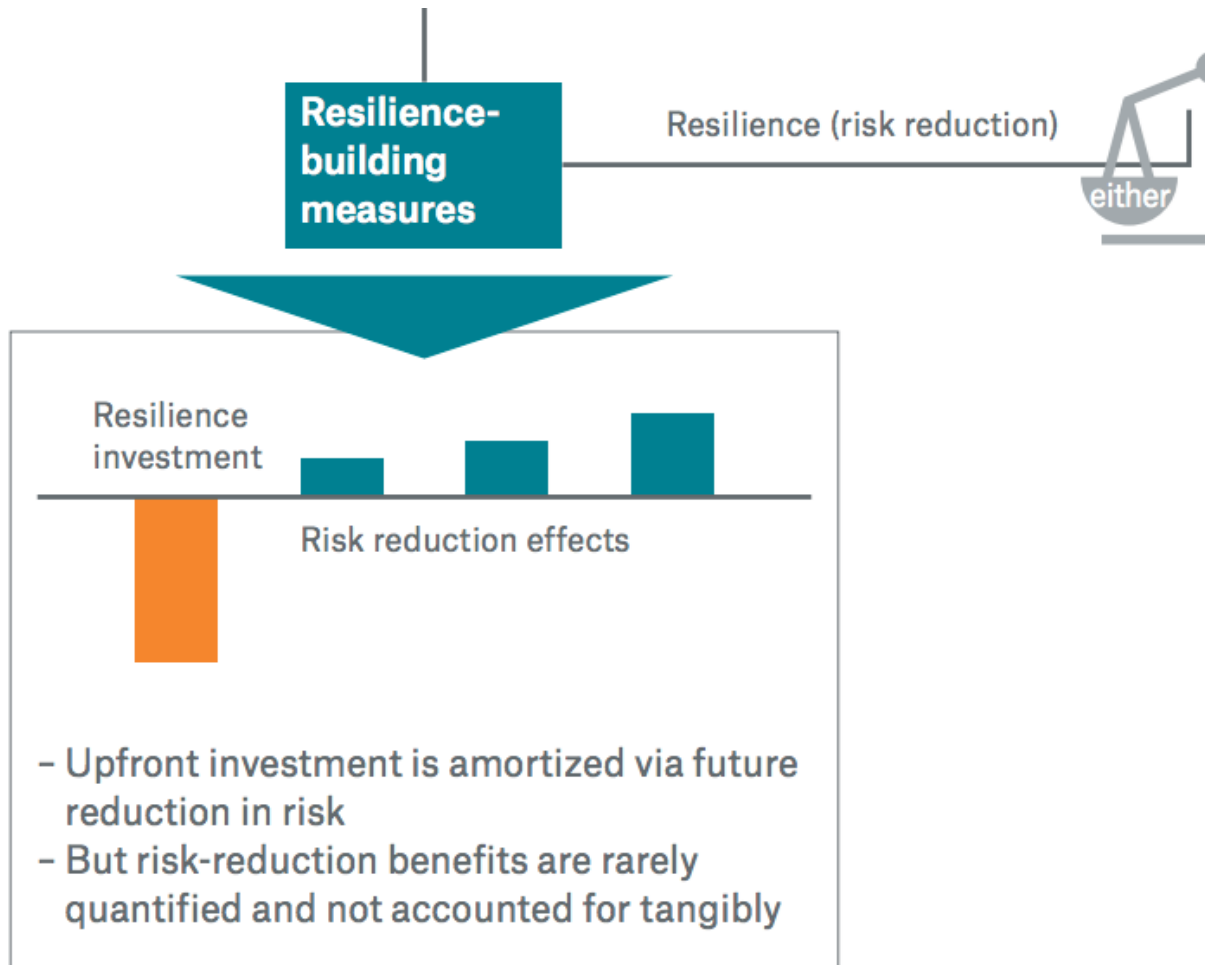


Figure 11: Part 1 Natural Disaster Risk Management (CIFOR, 2019)

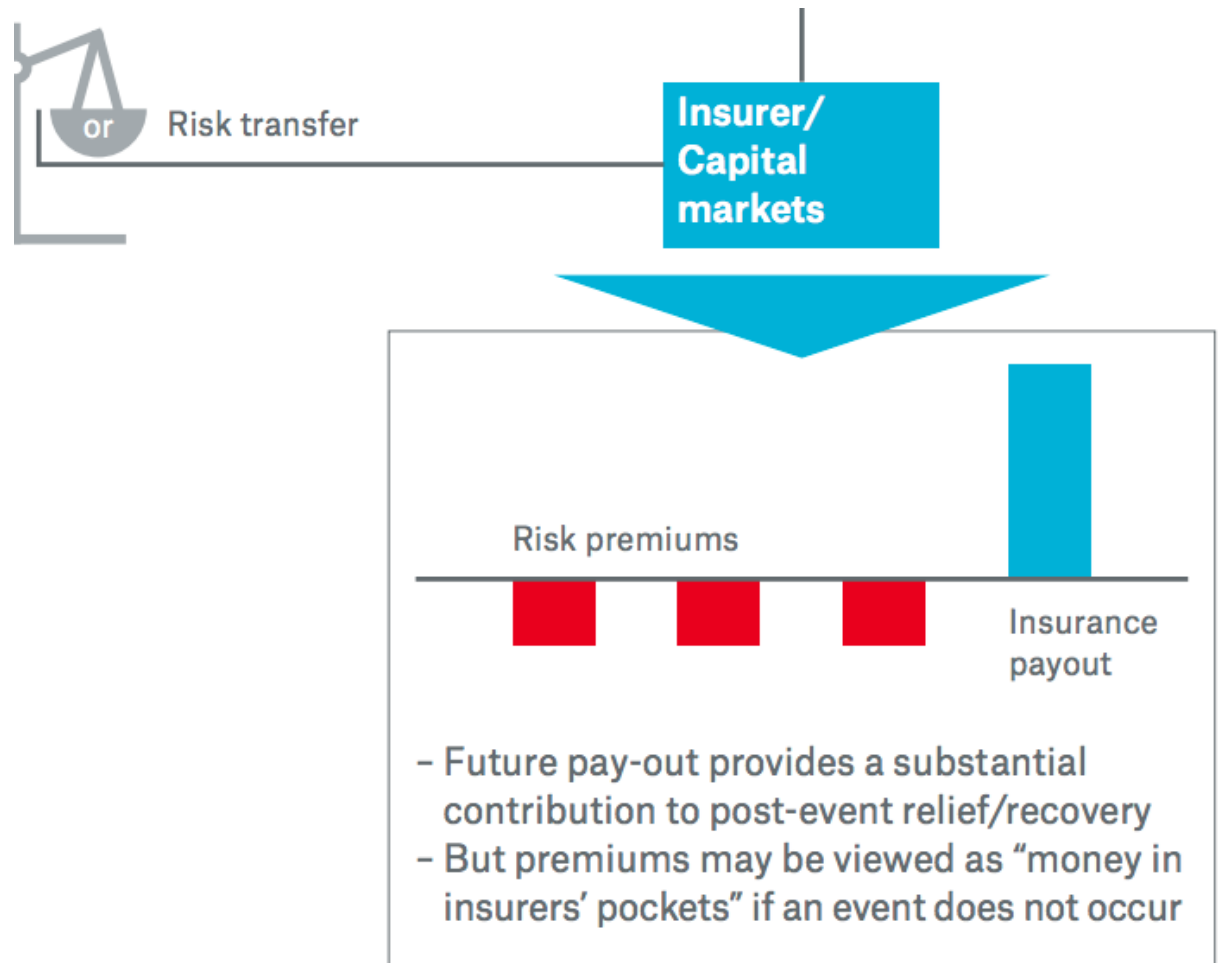


Figure 12: Part 2 Natural Disaster Risk Management (CIFOR, 2019)

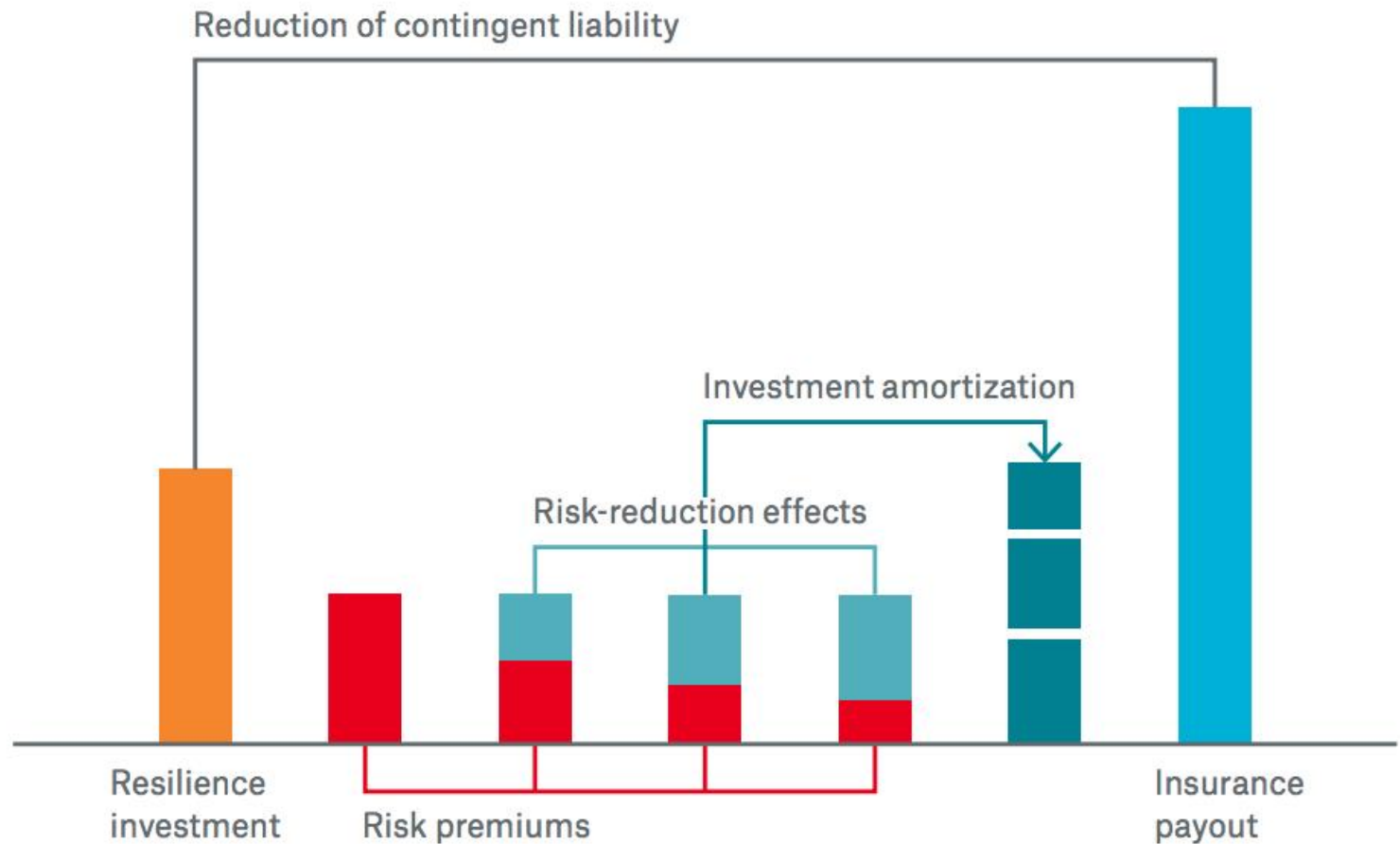
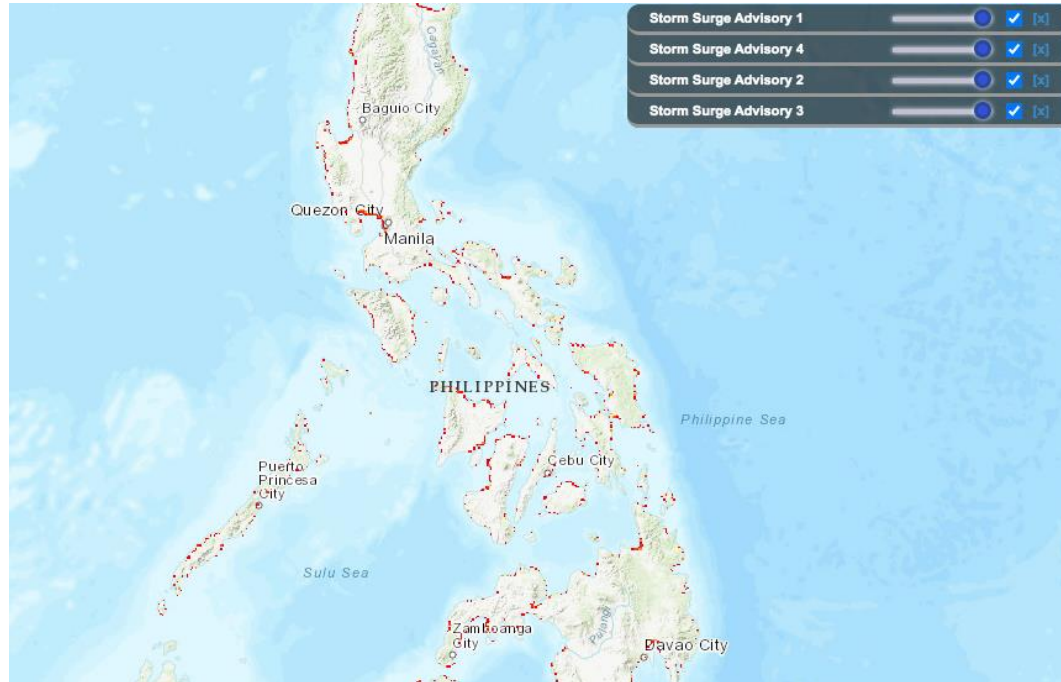


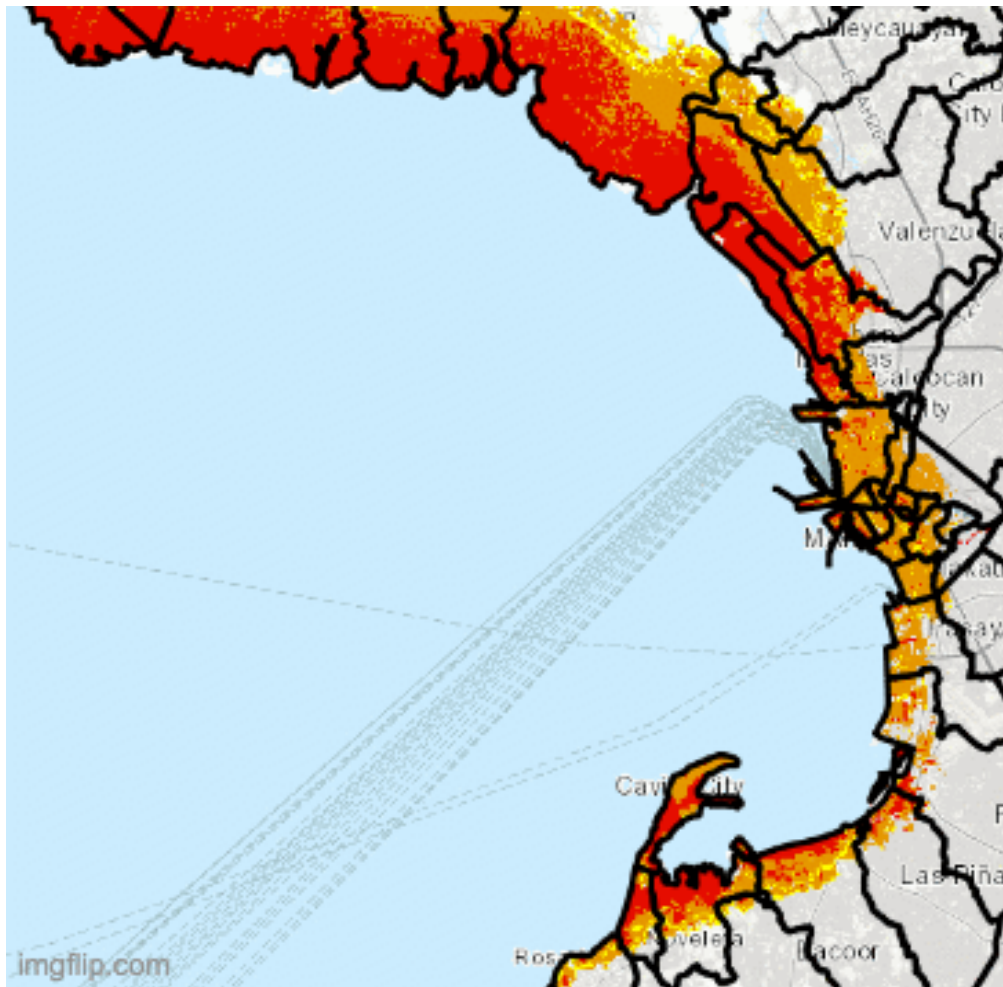
Figure 13: Reduction of contingent liability (CIFOR, 2019)

# Why choose Manila Bay?



- Prone for flooding (**exposure**)
- High amount of affected people (**vulnerability**)
- Mangroves & coral reef were already existing on site in the past

Figure 14: Storm Surges Philippines (NOAH, 2012)



Impact changes from Storm Surge with

3m wave height

to

4m wave height



Inundation > 1,5m



Inundation 0,5 - 1,5m

Figure 15: Impact of Storm Surge Advisory 2,3 in Manila Bay (NOAH,2012)



## People in need of evacuation in the LGU of Manila City:

Wave of 4m: 1,708,000 (over 50% highly in need)



Wave of 3m: 1,310,000 (about 15% highly in need)

large areas of mangroves can reduce storm surge heights by up to

**75%**

(C.Berg et al,2020)

Healthy coral reefs can reduce wave energy by up to

97%

(C.Berg et al,2020)



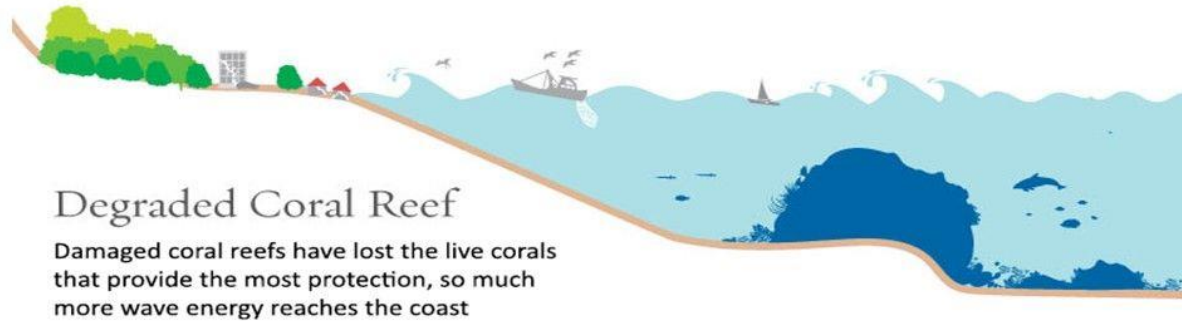
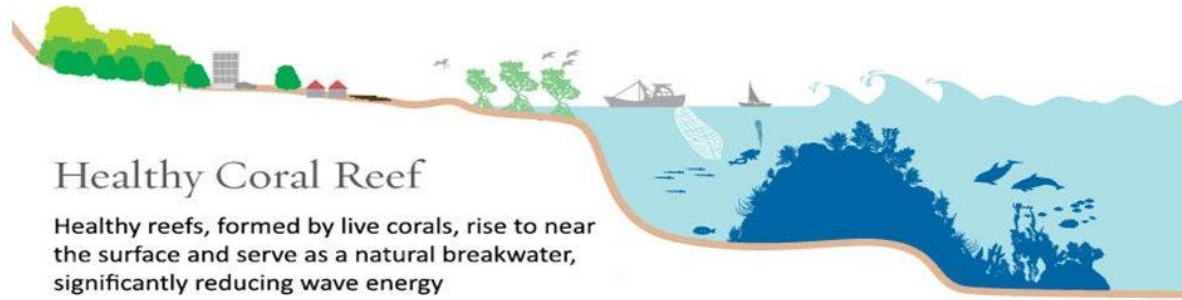


Figure 16: Healthy & degraded coral reefs and their effects (NCCOS, nd)

# Why use NBS?

- high biodiversity
- mangroves & coral reefs are native
- depth of bay (ca. 17m)
- positive effect for fisheries  
→ better quality of fish

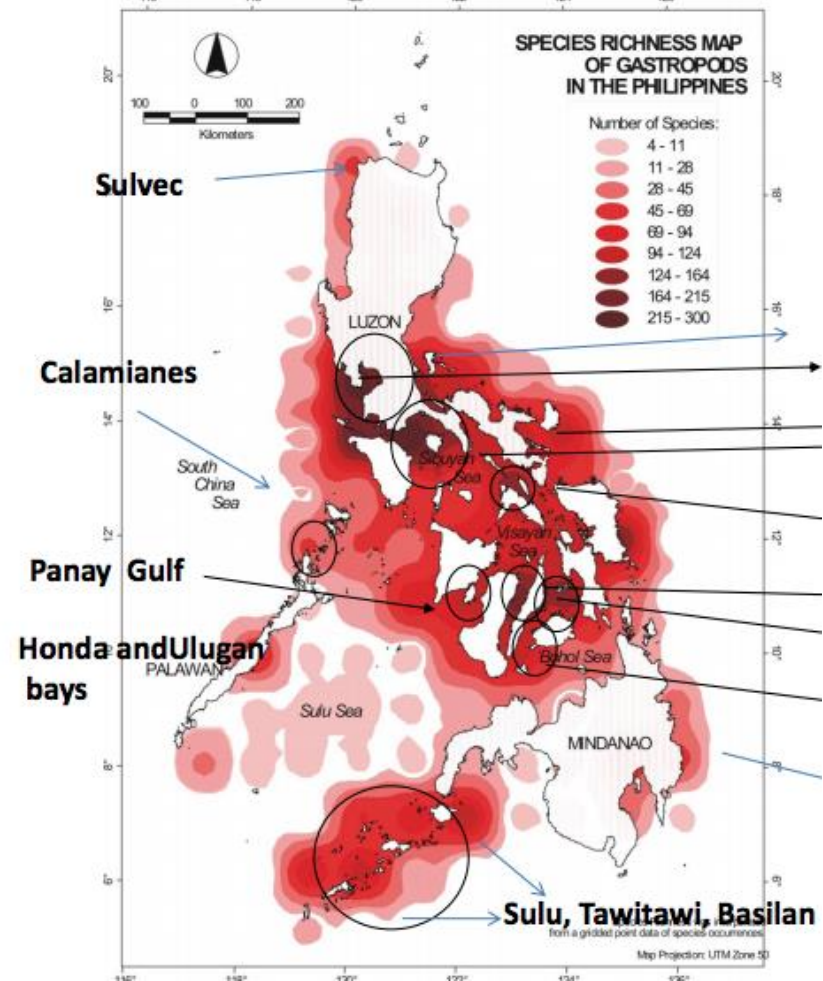


Figure 17: Species richness map (Vallejo, B., 2012)



## Who are possible stakeholders/partners?

- MSI (Marine Science Institute)
- UP (University of the Philippines)
- DENR (Department for Environment and Nature Reservation)
- Governments Local Government Units
- local NGOs
- local fishers
- ADB (Asian Development Bank)
- World Bank
- local Insurance company
- and more



# Why use an “impact bond”

- Local government units get the money upfront for implementing the measures from “Munich Re”
  - Have **more time** to gather the money
  - (Idea: Afforestation paid by companies that need to lower their carbon footprint)
- Money has to be paid back if parameters are met
  - Parameter: lowered wave height by 0.5m
  - 👍 premiums for the flood protection insurance will go down



# Which triggers will lead to a flood insurance payout?

## Parameters:

- inundation > 1 m
- hazard: storm surge

## Validation:

- satellite images
- shared Data via NOAA (though data send in by inhabitants via phone)
- people sending in pictures of the flood + gps data

## Payout use:

- use has to be within the ESG guidelines of Munich RE



# Building back better fast insurance

Investment Scheme:

Building back better & fast of companies to lessen follow-on effects of economic break down (ensure income of people again)

Parametric insurance:

**Parameters:** insured company is destroyed in a way that it is not able to operate anymore by a natural hazard (flood, earthquake, hurricane)

**Verification:** Pictures before & after + gps data, meteorological data about the hazard



## Building back better

Building according to sustainability standards (saver buildings, well thought through escape routes, etc.)

Depending on the damages:

- include **sustainable waste management system** as an incentive to have lowered premiums
- lowered probability for flooding, environmental damages



# Challenges for insurances

- different opinions of stakeholders about appropriate measures
- “one measure alone” is never enough/effective
- problems with corruption
- get verified data (impact bonds can lead to fraud)



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Figures:

Figure 1: Philippines with the color of its flag

Retrieved from: [https://commons.wikimedia.org/wiki/File:Flag\\_map\\_of\\_the\\_Philippines.svg](https://commons.wikimedia.org/wiki/File:Flag_map_of_the_Philippines.svg)

Figure 2: Integrated Approach to Disaster Risk Management

Retrieved from:

[https://www.youtube.com/watch?v=xjIPmSXj24Y&ab\\_channel=EasyFilmsTM-](https://www.youtube.com/watch?v=xjIPmSXj24Y&ab_channel=EasyFilmsTM-)

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Figure 3: Natural Disaster Timeline

World Economic Forum, 2011

Figure 4: Role of private sector in disaster management

<https://www.munichre.com/topics-online/de/climate-change-and-natural-disasters/resilience/disaster-prevention-works.html#&gid=1&pid=2>

Figure 5: The Population of the Philippines

Own illustration

Figure 6 & 7: Brown, D., & Dodman, D. (2014).

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Figure 8: Population living below the poverty line

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Figure 9: Likelihood and Severity of Disasters in the Philippines

Own illustration



Figure 10: Risk index of the Philippines

Ravago, M. L. V., Mapa, C. D. S., Aycardo, A. G., & Abrigo, M. R. M. (2020).

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Figure 11: Part 1 Natural Disaster Risk Management (CIFOR, 2019)

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Figure 12: Part 2 Natural Disaster Risk Management (CIFOR, 2019)

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Figure 13: Reduction of contingent liability (CIFOR, 2019)

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Figure 14: Storm Surges Philippines (NOAH, 2012)

University of the Philippines. (2012). *Nationwide Operational Assessment of Hazards (NOAH)*.  
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Figure 15: Impact of Storm Surge Advisory 2,3 in Manila Bay (NOAH,2012)

University of the Philippines. (2012). *Nationwide Operational Assessment of Hazards (NOAH)*. <http://noah.up.edu.ph/#/websafe>

Figure 16: Healthy & degraded coral reefs and their effects (NCCOS, nd)

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Figure 17: Species richness map (Vallejo, B., 2012)

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#### Decision-Matrixes:

Own elaboration, measures are based on the National Disaster Risk Reduction and Management Plan of the Philippines (2011-2028)

([https://www.dilg.gov.ph/PDF\\_File/reports\\_resources/DILG-Resources-2012116-420ac59e31.pdf](https://www.dilg.gov.ph/PDF_File/reports_resources/DILG-Resources-2012116-420ac59e31.pdf))

# Discussion & Questions

