Greening Energy Market and Finance
First GrEnFIn Summer School

Team Works Presentation:
Section 7 - The most significant effects of climate change (Vulnerability matrix)

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Vulnerability

- **According to the IPCC*:**
  - *"[Vulnerability is] the propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt."*
  - **Vulnerability = Risk (predicted adverse climate impacts) – Adaptation****
- *"Vulnerability assessment is more than measuring potential harm using information about climate impacts. It includes an assessment of the region's or sector's ability to adapt."* **
  - **Risk** → Analysis of the solar installation's exposure to a given climate change effect and its sensitivity to this effect → **Vulnerability matrix**
  - **Adaptation measures**
- Vulnerability matrices for two different locations:
  - Bologna, Italy
  - Manila, Philippines
- Climate change effects that we analyse

*IPCC Report Glossary. **Downing, T.E. & Patwardhan, A. (2005). ***The European Climate Adaptation Platform Climate-ADAPT.

Sensitivity matrix

Object	Area	Air temperature increase	Rainfall change	Average wind speed change	Sea level rise	Storms	Flooding	Wild fire	Air quality
Solar instalation	Mechanical damage to installations								
	Energy production from installations								
	Access to the installation								

Climate change effects that we analyse:

- Air temperature increase
- Storms
- Flooding
- Wild fire
- Air quality

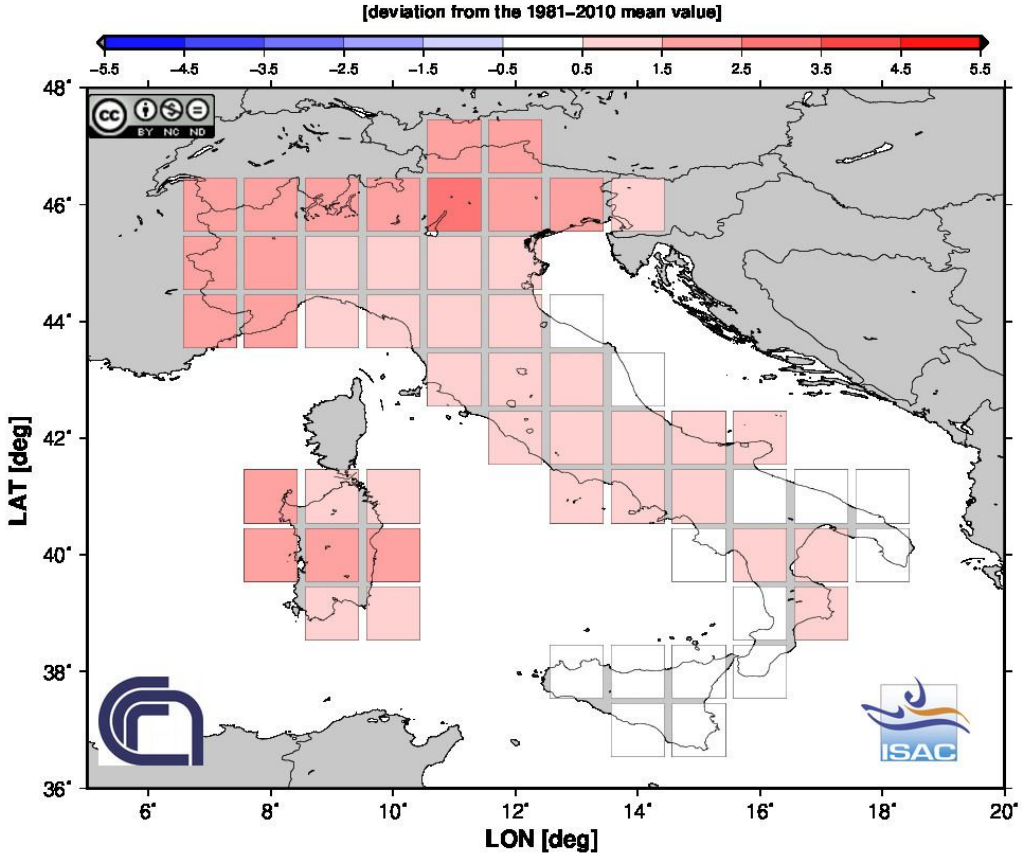
Vulnerability matrix for Bologna, Italy

		Exposure		
		Low	Medium	High
Sensitivity	Low			
	Medium	Air temperature increase Air quality		
	High	Flooding	Wild fire	Storms

The mean temperature - from 1981 to 2010

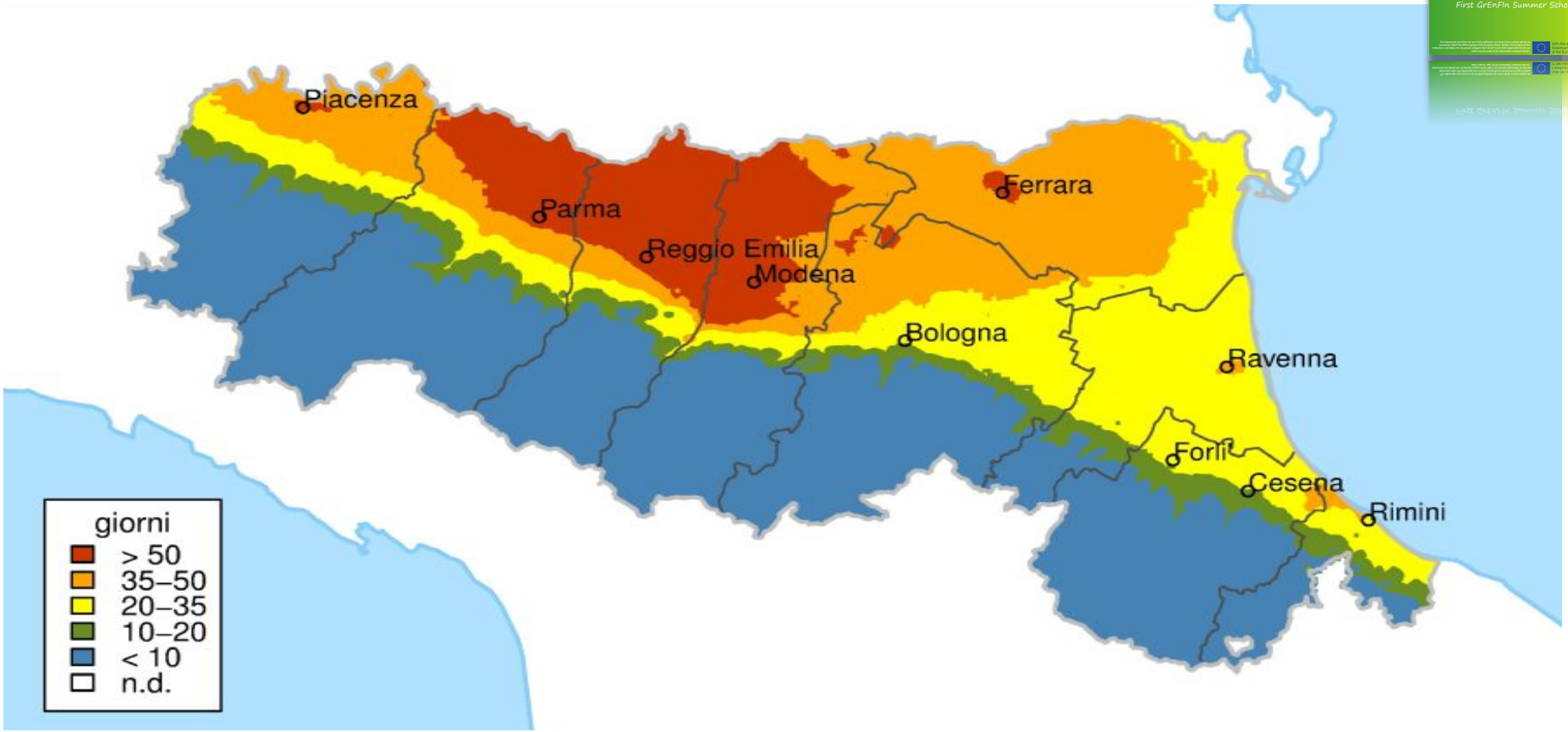
Analysis implemented by SAC CNR Bologna

http://www.isac.cnr.it/~climstor/climate/latest_month_TMM.html



AIR QUALITY:

Number of days in 2017 in which the daily average exceeds 50µg/m^3 (Emilia Romagna, Italy)
https://apps.arpae.it/qualita-aria/bollettino-qa-provinciale/bo



The other effects in our vulnerability matrix:

- Storms: Two are the main catastrophic effects
  1) Damage to the system ➡ stop production
  2) Storms dropped near the solar farm: installation of surge protector and lightning-rod

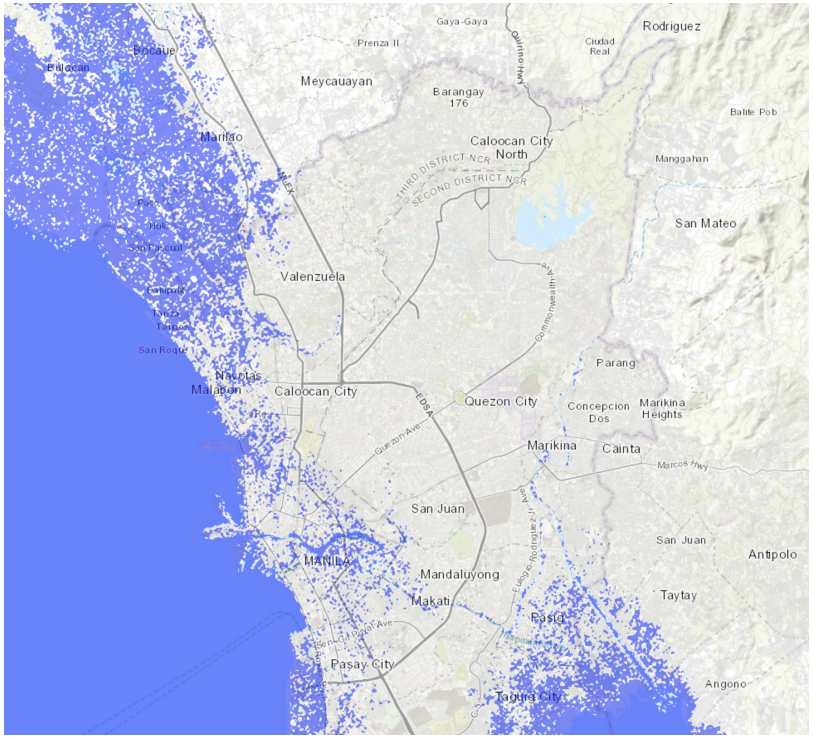
- Wild fire: we referred mostly to arsons

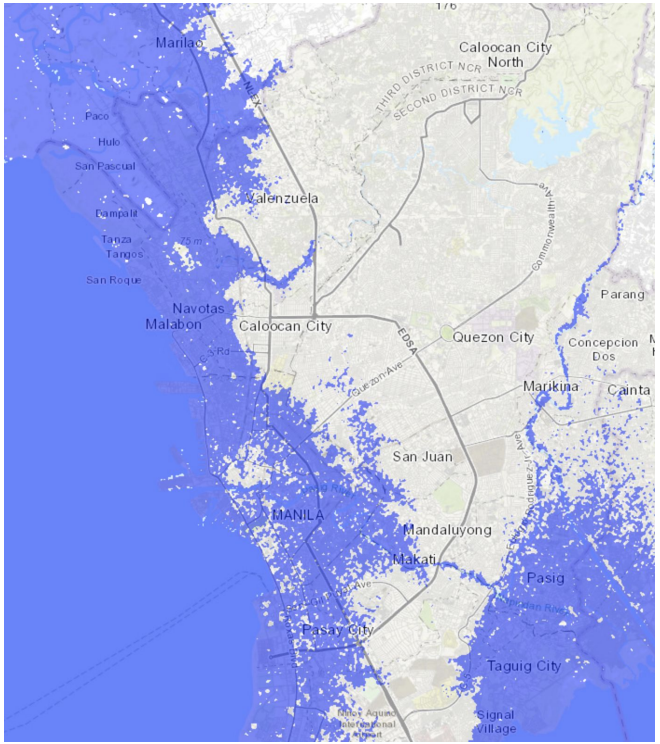
- Flooding: very unlikely in Bologna

Vulnerability matrix for Manila, Philippines

		Exposure		
		Low	Medium	High
Sensitivity	Low		Average speed wind change	Rain change
	Medium		Air quality Wild fire Air temperature increase	
	High			Storms Flooding Sea level rise

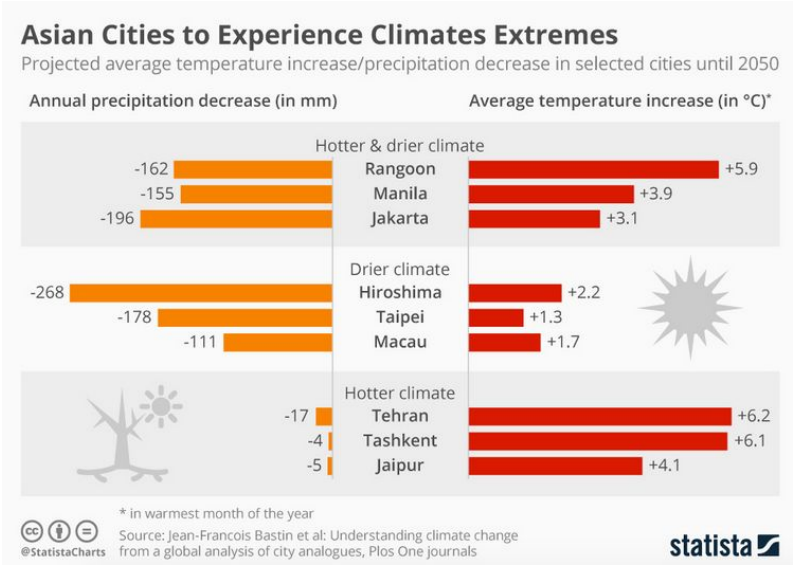
Flood simulation - 5m (left) and 10m (right)

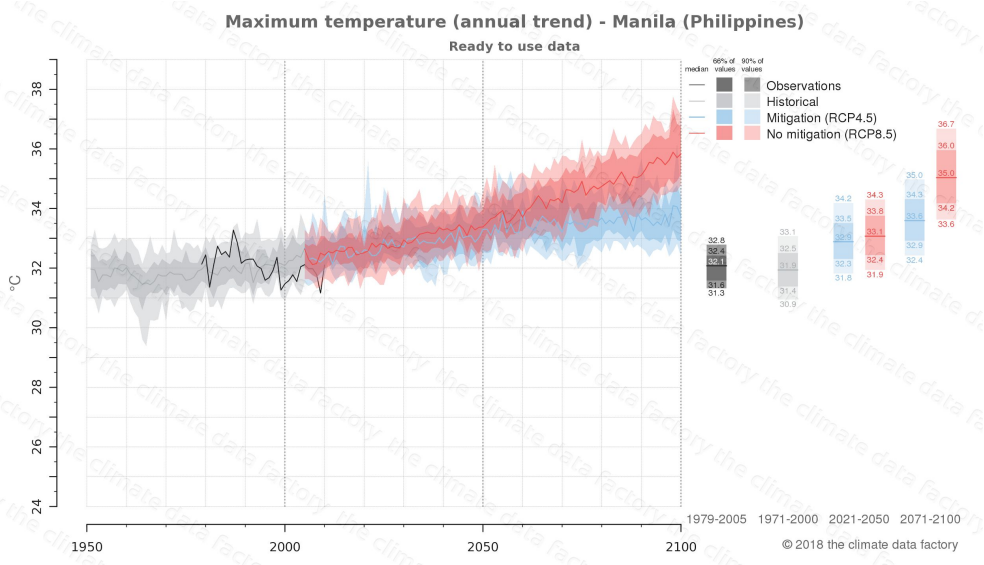




Source: floodmap

Air temperature increase scenarios - medium level



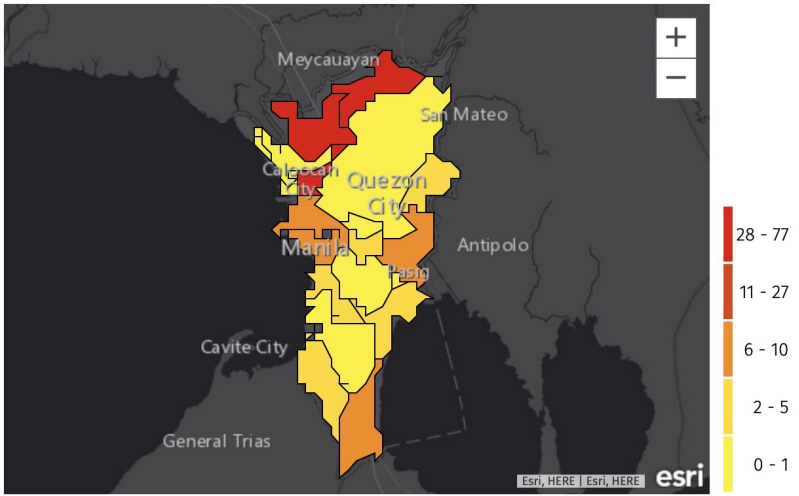


Source: The climate data factory, Statista

Wildfire alerts over the past year - medium level

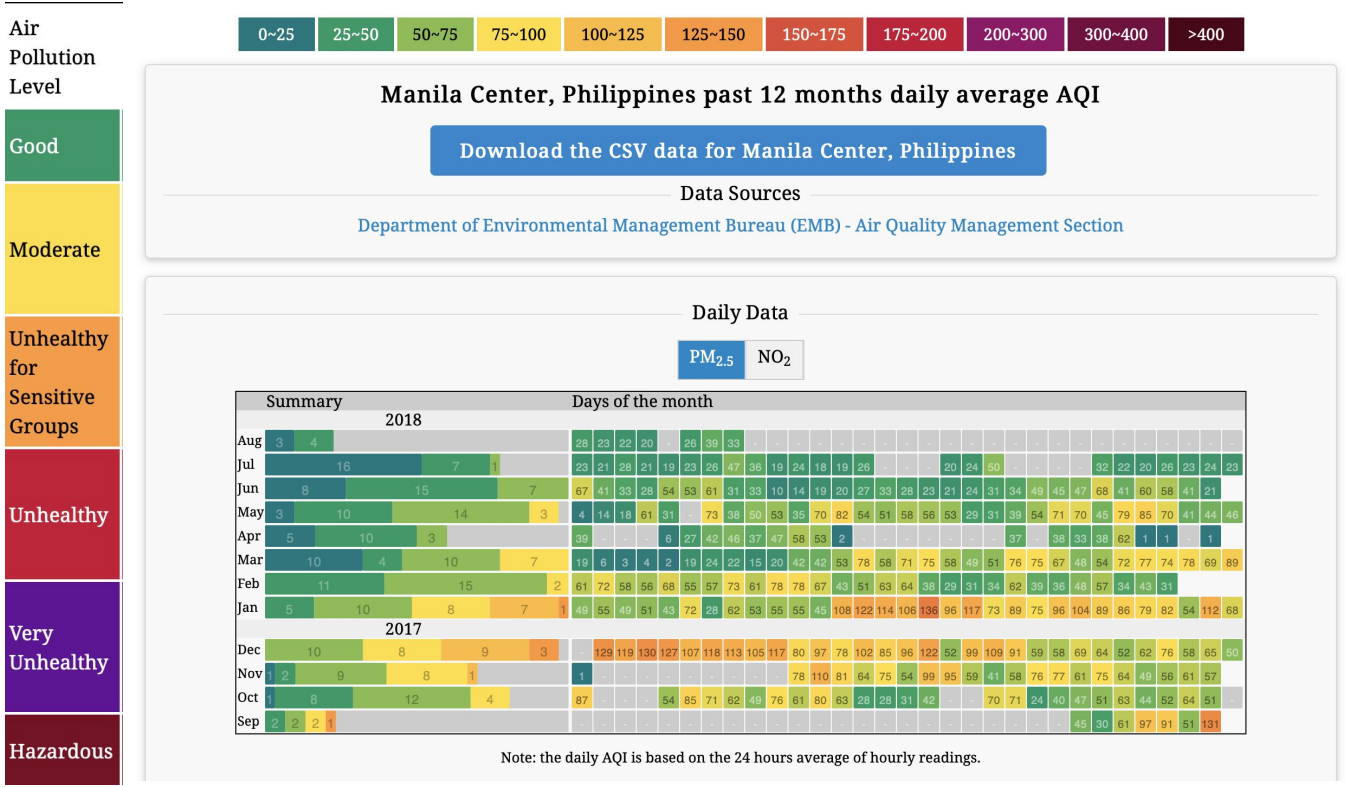
GREATEST NUMBER OF FIRE ALERTS BY CITY 10 JUN 2019 - 9 JUN 2020

Subregion	Province	#
Kalookan City	Metropolitan Manila	77
Valenzuela	Metropolitan Manila	27
Muntinlupa	Metropolitan Manila	10
Manila	Metropolitan Manila	7
Pasig City	Metropolitan Manila	7
Las Piñas	Metropolitan Manila	5
Marikina	Metropolitan Manila	3
Pasay City	Metropolitan Manila	2
Mandaluyong	Metropolitan Manila	1
Taguig	Metropolitan Manila	1



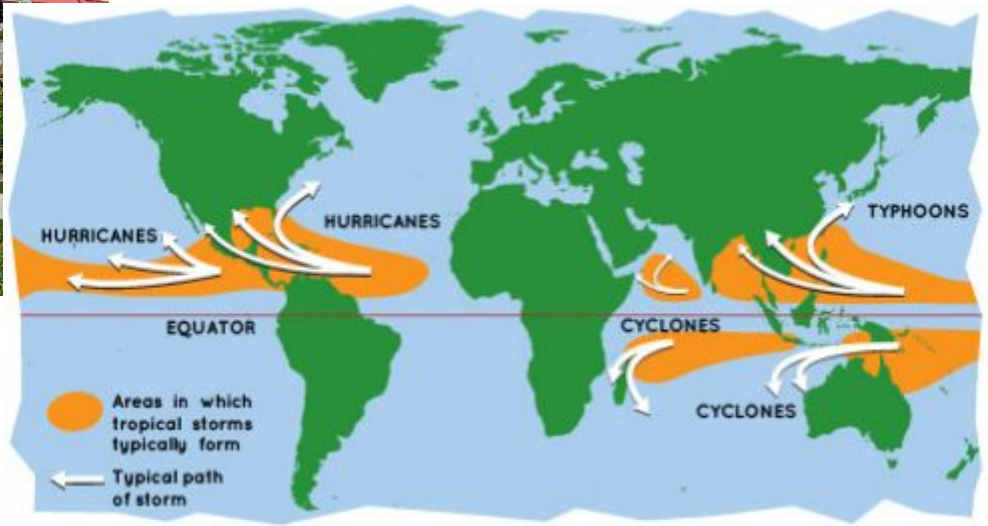
Source: Global Forest Watch System Status

The air quality index PM 2.5 for Manila



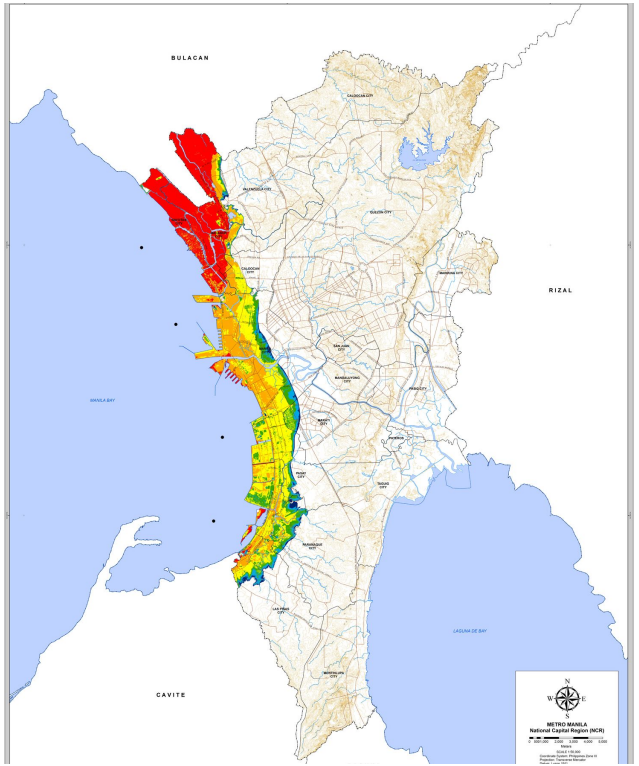
Source: Air Quality Historical Data Platform

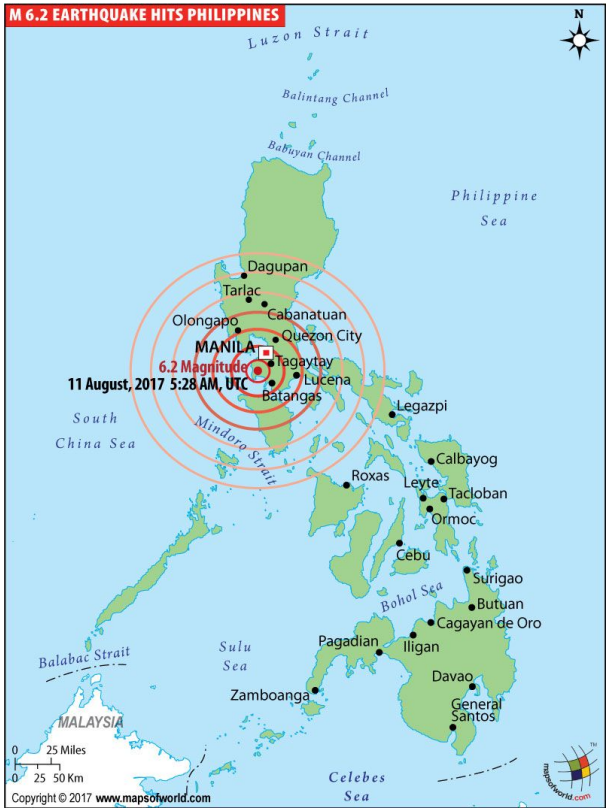
Rising sea level, Tropical Storms



Source: The New York Times, NASA

Tsunamis, earthquakes





Source: mapsofworld.com, Philippine Institute of Volcanology and Seismology

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