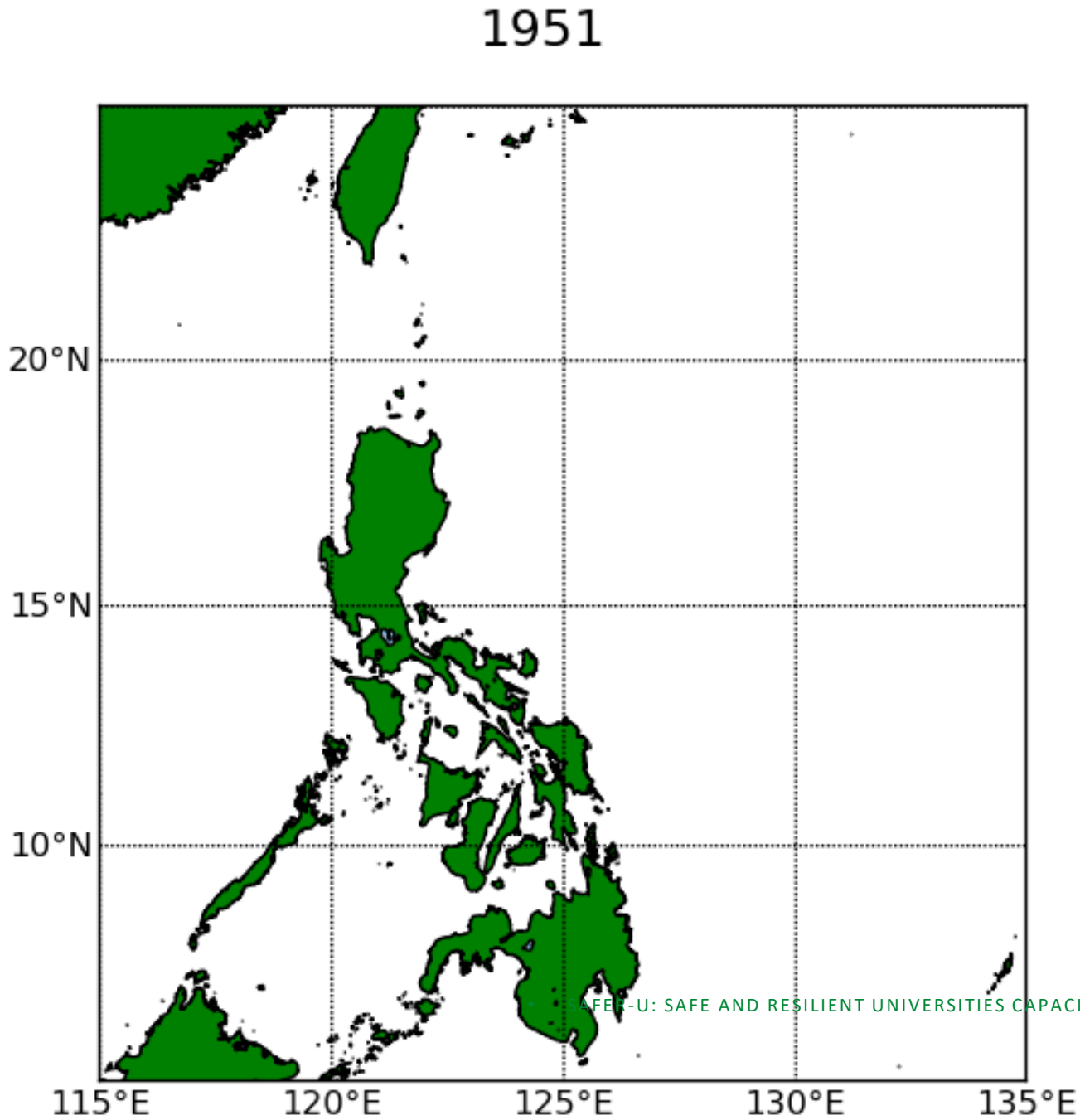
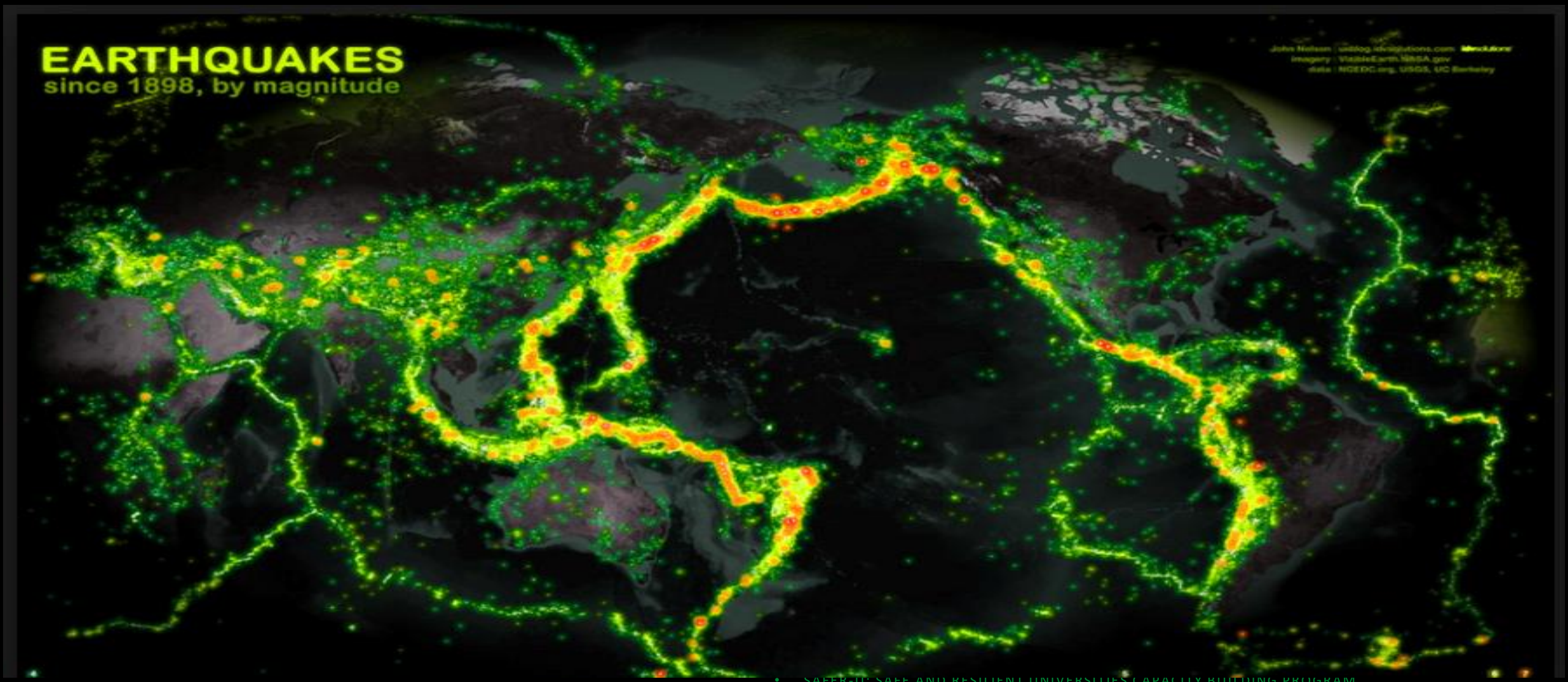
Discussion on how to improve community resilience

A.M.F. Lagmay

UP NOAH Center


1951
20°N
15°N
10°N
115°E
120°E
125°E
130°E
135°E



SAFER-U: SAFE AND RESILIENT UNIVERSITIES CAPACITY BUILDING PROGRAM

Reducing the impacts of hazards

- Short Term
  - Hazard Specific, Area-Focused and Time-Bound Warnings
  - Use of maps that show where the safest places are in the community
  - Openly available real-time monitoring (web and mobile apps)
  - Extensive use of sensors (low-cost technologies and Internet of Things)

- Long term
  - Anticipatory planning (Probabilistic Risk Assessment in CLUP, CDRA, DRRMP)
  - Open Data
  - Ecosystems based approach
  - Education
  - Scientific Research

- PEOPLE CENTERED EARLY WARNING SYSTEM

Hazard Specific, Area-Focused and Time-Bound Warnings

Officials, netizens share tips to inprt emergency alerts

By CNN Philippines Staff

Published Dec 3, 2019 8:56:35 AM

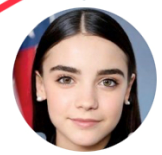
Metro Manila (CNN Philippines, December 3)— Days before typhoon Tisoy hit land, the National Disaster Risk Reduction and Management Council (NDRRMC) once again hogged the spotlight with its mobile emergency alerts issued regularly.

The dissemination of these emergency alerts and warning messages— done through the agency's partner telecommunication companies— is required under the Republic Act No. 10639. The measure mandates service providers to issue free messages— which include storm signals and rainfall warnings— in light of disasters and calamities.

Philstar.com @PhilstarNews · 11/12/20

Office of Civil Defense Asec. Casiano Monilla denies that government was caught flat footed by #UlyssesPH and shifts blame to citizens who supposedly did not heed early warnings | via @XaveGregorio

164 10.2K 3,173



Ang Pagpuna sa Pamahalaan ay Isang Tungkulin
@filipartisan

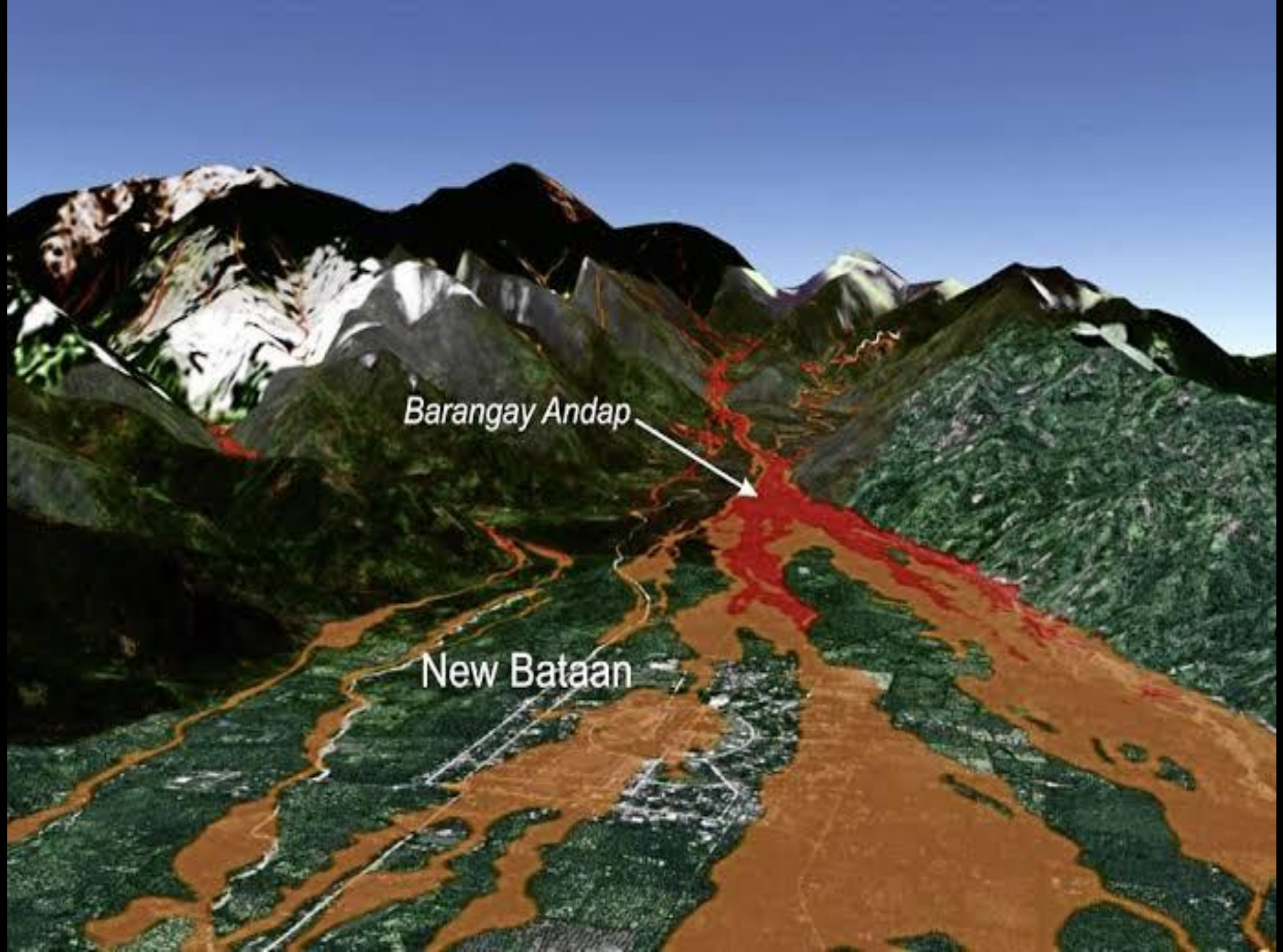
Replying to @PhilstarNews and @XaveGregorio

Are we sure people ignore warnings? Or are they just fatigued from the overwhelming number of alerts this government has made re the many events happening? Methinks govt officials need to learn some psychology.

12:19 PM · 11/12/20 · Twitter for Android

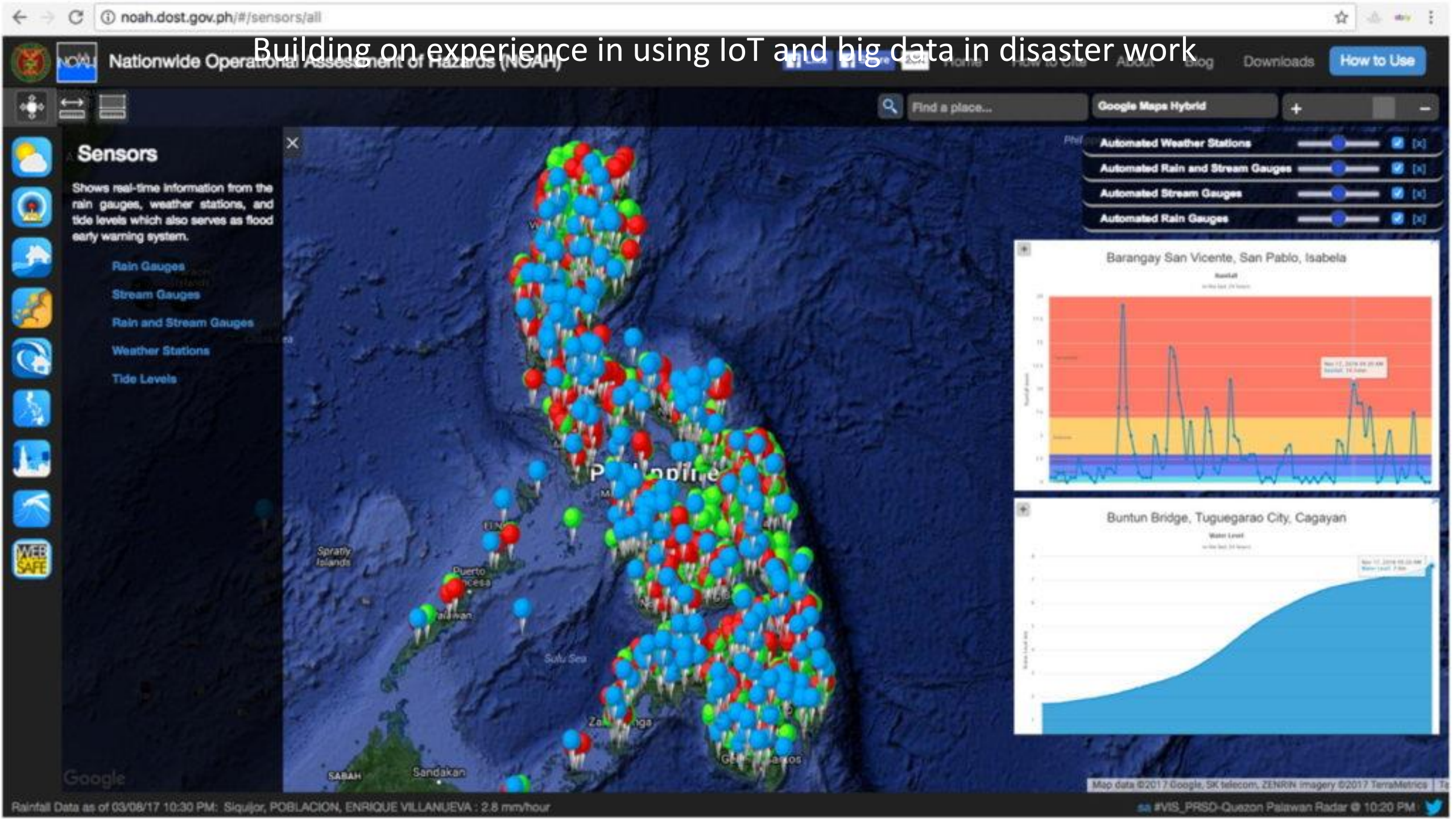
2 Retweets **6** Likes

Tweet your reply

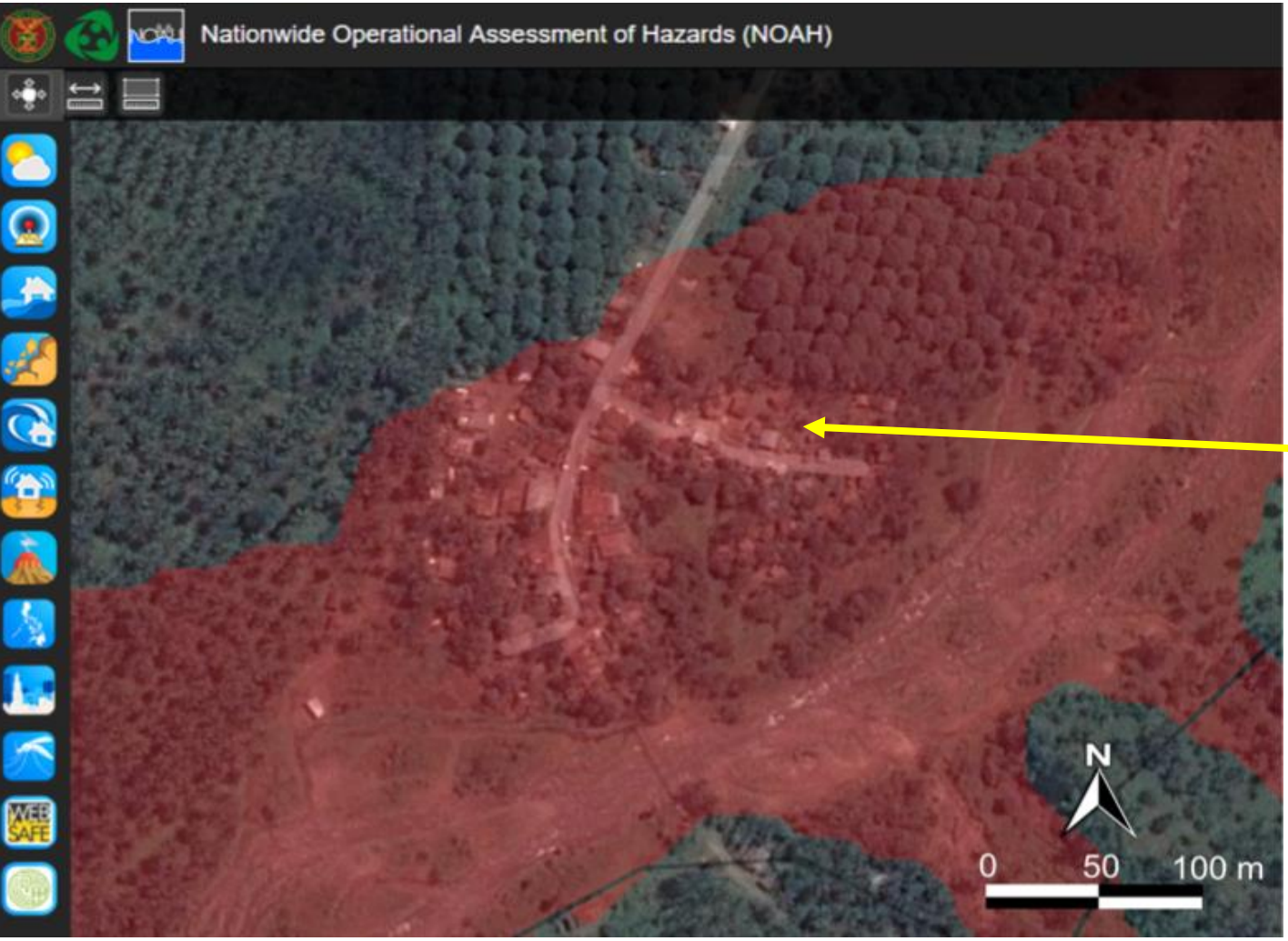

Barangay Andap
New Bataan


DOST – Project NOAH

Building on experience in using IoT and big data in disaster work



Hazard maps that show where the
safest places are located in a community

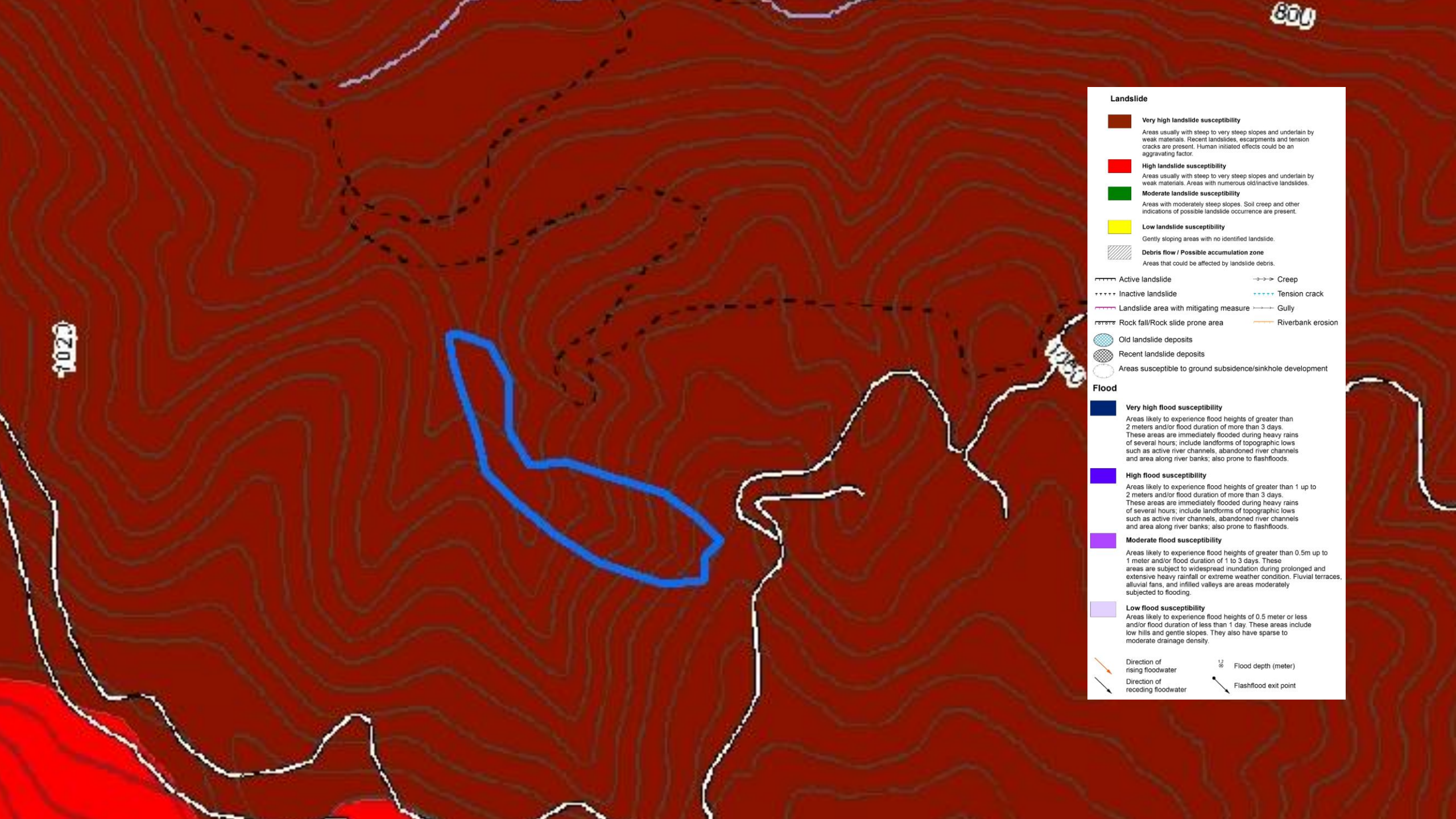

Nationwide Operational Assessment of Hazards (NOAH)
N
0
50
100 m

Ompong Disaster

Even mountainous places may have safe havens where evacuation centers can be placed. But science and technology must be used.


Unstable Slopes Maps
Barangay Boundaries
Alluvial Fan Hazards
Landslide Hazard Maps
200 m

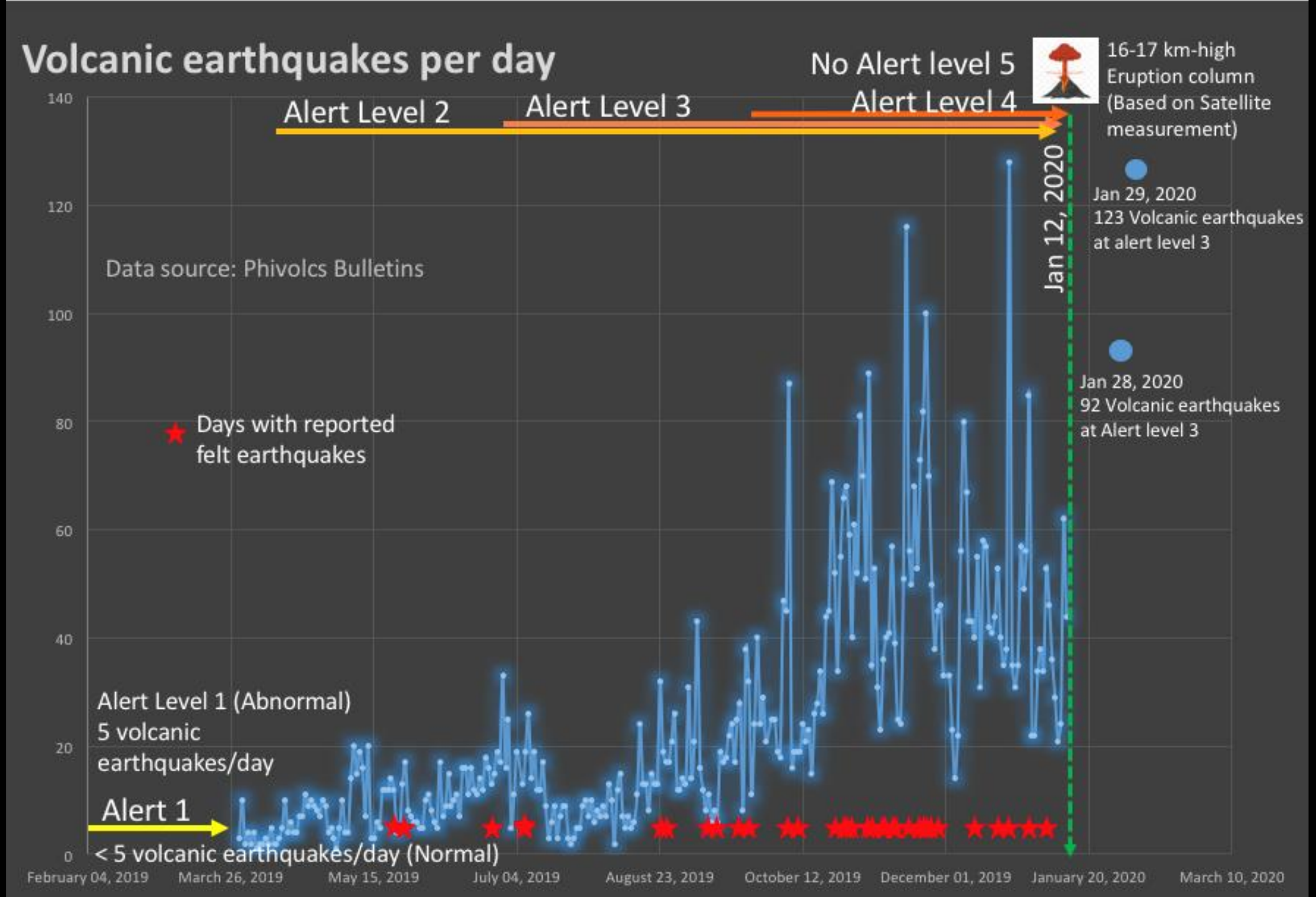

Ucab, , Lanao del Norte
Tropical Storm Vinta

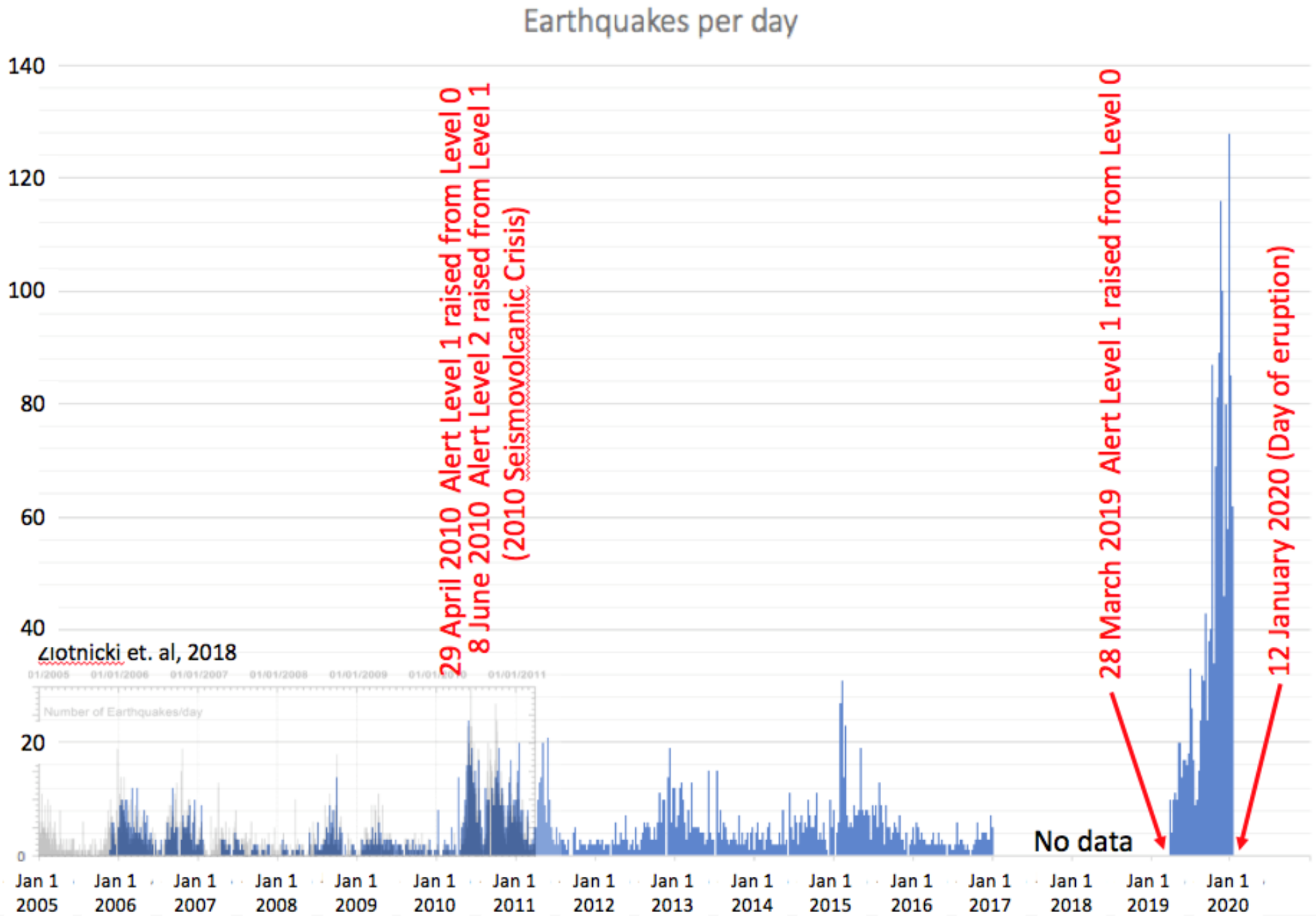

800
1020
Landslide
Very high landslide susceptibility
Areas usually with steep to very steep slopes and underlain by weak materials. Recent landslides, escarpments and tension cracks are present. Human initiated effects could be an aggravating factor.
High landslide susceptibility
Areas usually with steep to very steep slopes and underlain by weak materials. Areas with numerous old/inactive landslides.
Moderate landslide susceptibility
Areas with moderately steep slopes. Soil creep and other indications of possible landslide occurrence are present.
Low landslide susceptibility
Gently sloping areas with no identified landslide.
Debris flow / Possible accumulation zone
Areas that could be affected by landslide debris.
Active landslide
Creep
Inactive landslide
Tension crack
Landslide area with mitigating measure
Gully
Rock fall/Rock slide prone area
Riverbank erosion
Old landslide deposits
Recent landslide deposits
Areas susceptible to ground subsidence/sinkhole development
Flood
Very high flood susceptibility
Areas likely to experience flood heights of greater than 2 meters and/or flood duration of more than 3 days. These areas are immediately flooded during heavy rains of several hours; include landforms of topographic lows such as active river channels, abandoned river channels and area along river banks; also prone to flashfloods.
High flood susceptibility
Areas likely to experience flood heights of greater than 1 up to 2 meters and/or flood duration of more than 3 days. These areas are immediately flooded during heavy rains of several hours; include landforms of topographic lows such as active river channels, abandoned river channels and area along river banks; also prone to flashfloods.
Moderate flood susceptibility
Areas likely to experience flood heights of greater than 0.5m up to 1 meter and/or flood duration of 1 to 3 days. These areas are subject to widespread inundation during prolonged and extensive heavy rainfall or extreme weather condition. Fluvial terraces, alluvial fans, and infilled valleys are areas moderately subjected to flooding.
Low flood susceptibility
Areas likely to experience flood heights of 0.5 meter or less and/or flood duration of less than 1 day. These areas include low hills and gentle slopes. They also have sparse to moderate drainage density.
Direction of rising floodwater
Flood depth (meter)
Direction of receding floodwater
Flashflood exit point

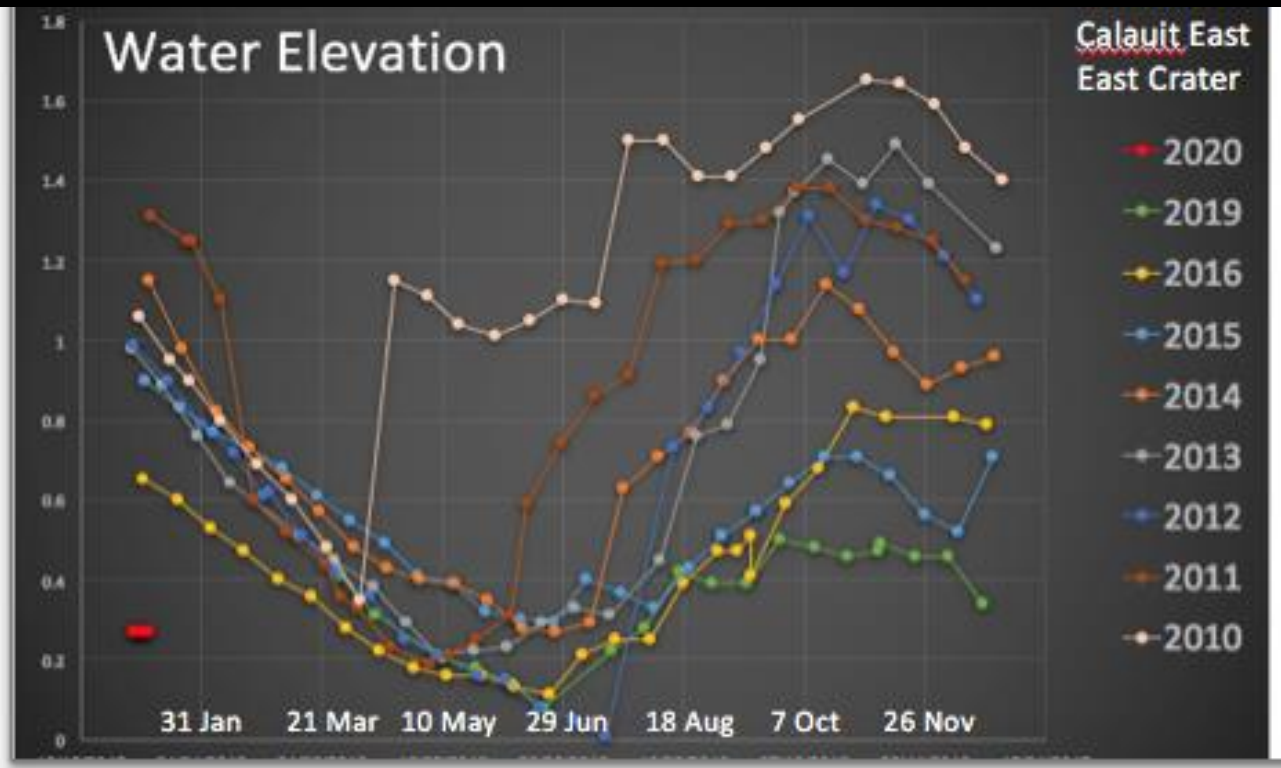
Openly available real-time monitoring
(web and mobile apps)

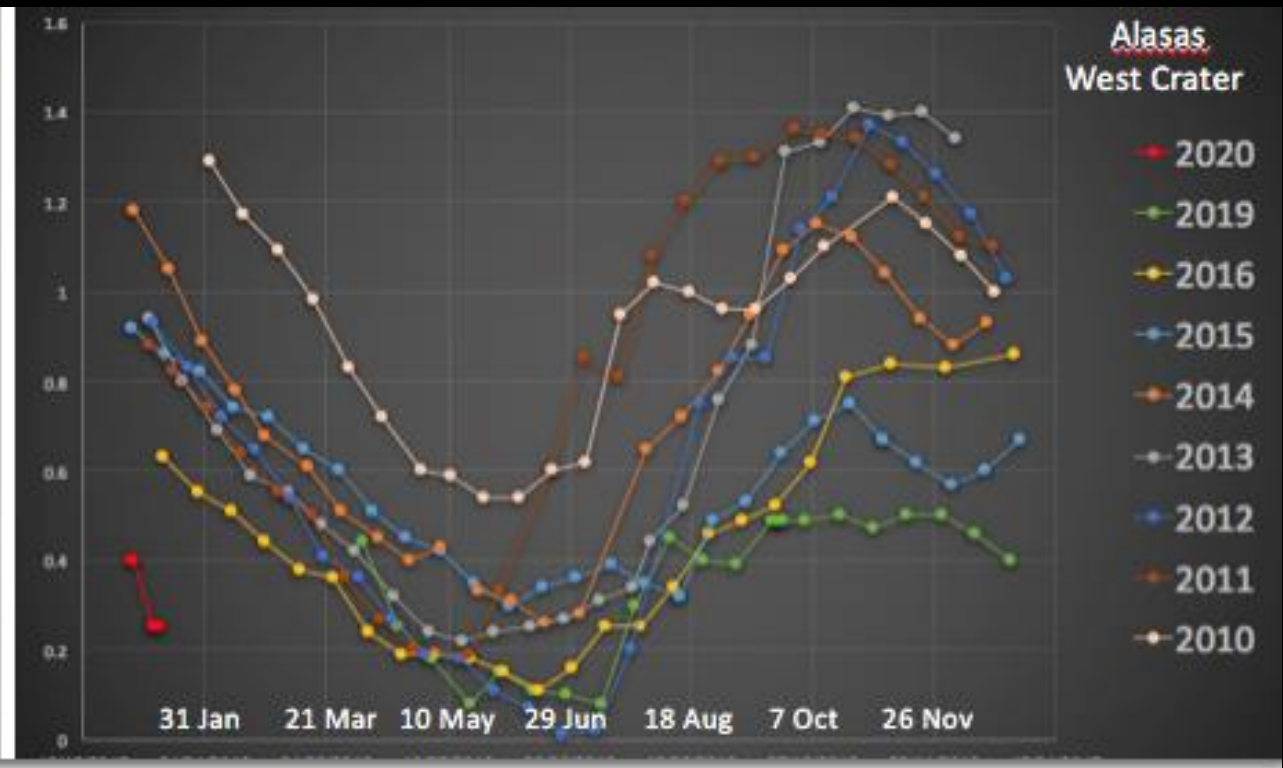
5 Parameters that were elevated

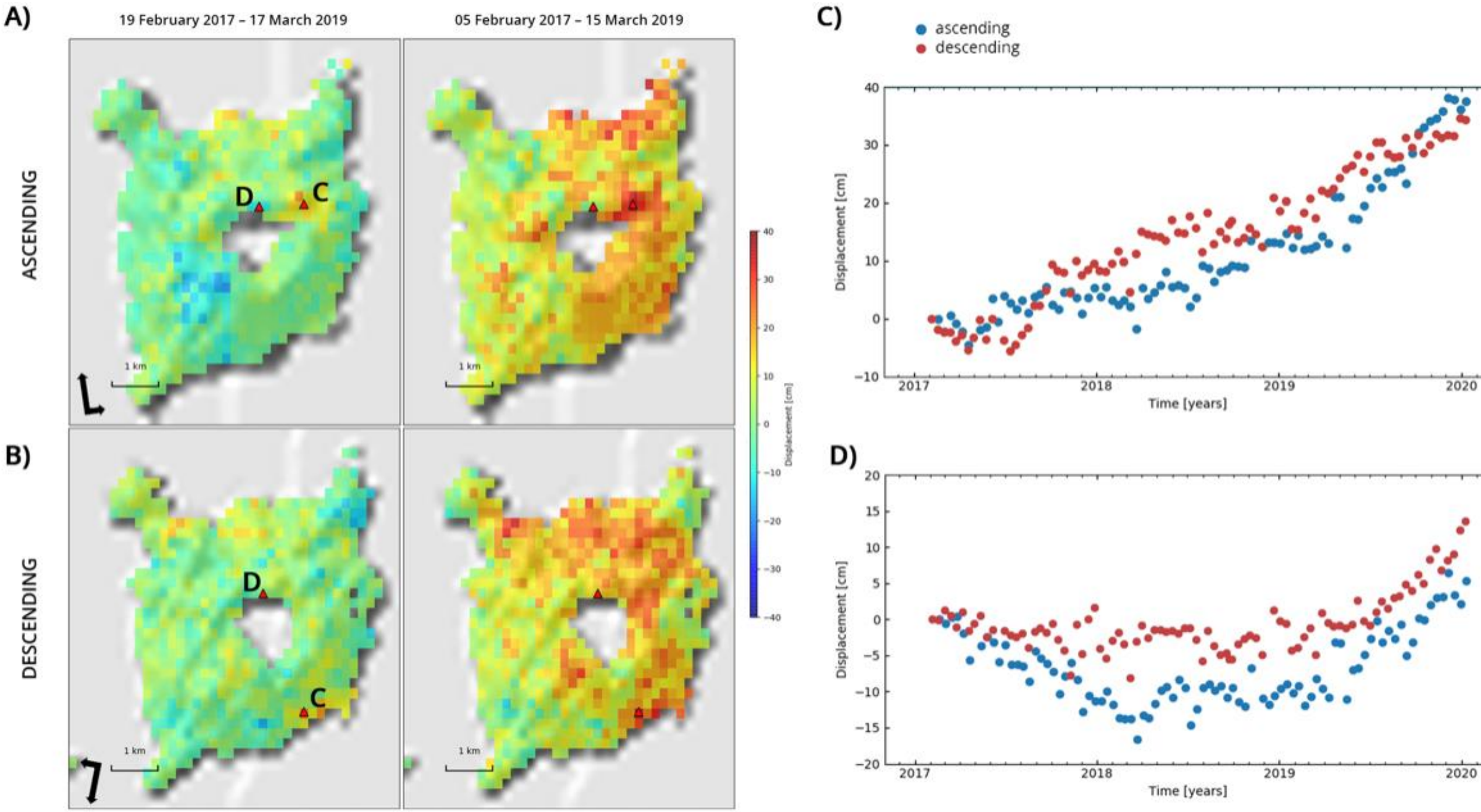
- Number of daily earthquakes with more than a hundred since October 2019. At least alert level 2
- Number of felt earthquakes (Alert level 3 states some events felt)
- Water level was low in comparison to previous years event with the 2010 seismovolcanic crisis at Taal Volcano
- Inflation of the volcano (alert level 3 states bulging of the volcano
- CO2 was the first precursory sign of the 2020 eruption when CO2 a few weeks before the seismic unrest started to increase above 1000 T/days


Volcanic earthquakes per day
No Alert level 5
Alert Level 4
Alert Level 3
Alert Level 2
16-17 km-high
Eruption column
(Based on Satellite
measurement)
Jan 12, 2020
Jan 29, 2020
123 Volcanic earthquakes
at alert level 3
Jan 28, 2020
92 Volcanic earthquakes
at Alert level 3
Data source: Phivolcs Bulletins
Days with reported
felt earthquakes
Alert Level 1 (Abnormal)
5 volcanic
earthquakes/day
Alert 1
< 5 volcanic earthquakes/day (Normal)
140
120
100
80
60
40
20
0
February 04, 2019
March 26, 2019
May 15, 2019
July 04, 2019
August 23, 2019
October 12, 2019
December 01, 2019
January 20, 2020
March 10, 2020

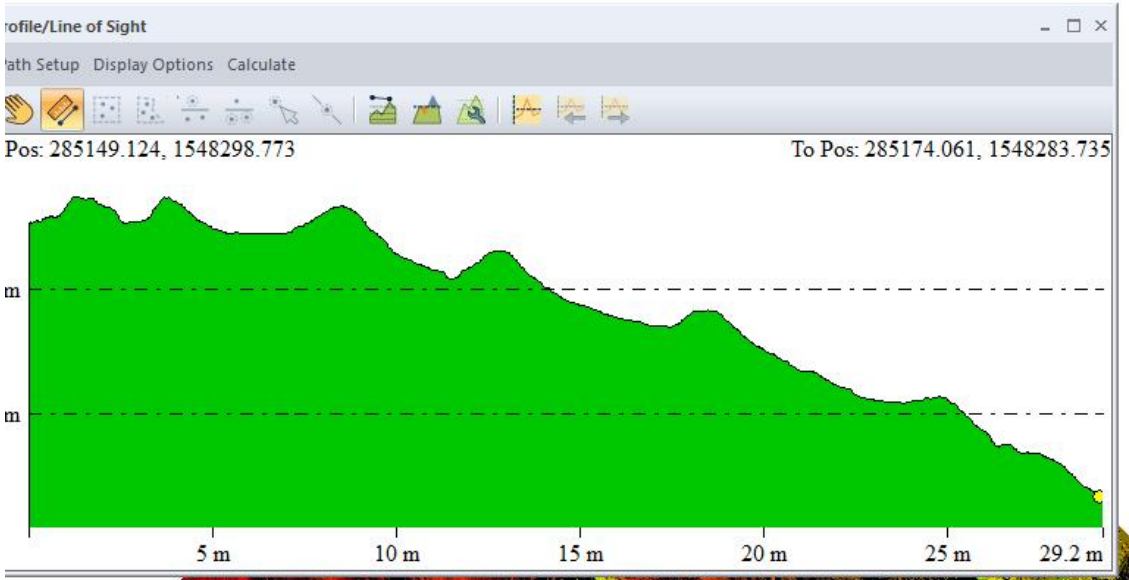

Earthquakes per day
140
120
100
80
60
40
20
0
29 April 2010 Alert Level 1 raised from Level 0
8 June 2010 Alert Level 2 raised from Level 1
(2010 Seismovolcanic Crisis)
28 March 2019 Alert Level 1 raised from Level 0
12 January 2020 (Day of eruption)
No data
Zlotnicki et. al, 2018
Number of Earthquakes/day
Jan 1 2005
Jan 1 2006
Jan 1 2007
Jan 1 2008
Jan 1 2009
Jan 1 2010
Jan 1 2011
Jan 1 2012
Jan 1 2013
Jan 1 2014
Jan 1 2015
Jan 1 2016
Jan 1 2017
Jan 1 2018
Jan 1 2019
Jan 1 2020

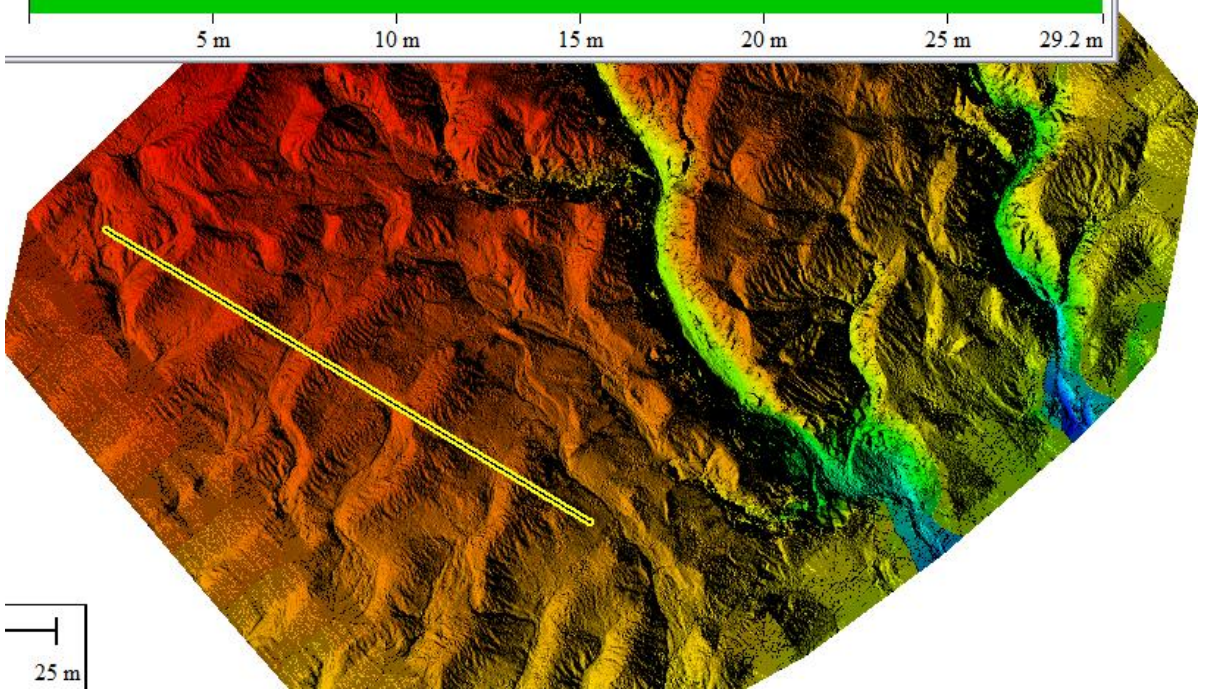

Water Elevation
Calauit East
East Crater
2020
2019
2016
2015
2014
2013
2012
2011
2010
31 Jan
21 Mar
10 May
29 Jun
18 Aug
7 Oct
26 Nov


Alasas
West Crater
2020
2019
2016
2015
2014
2013
2012
2011
2010
31 Jan
21 Mar
10 May
29 Jun
18 Aug
7 Oct
26 Nov


A)
19 February 2017 – 17 March 2019
05 February 2017 – 15 March 2019
ASCENDING
B)
DESCENDING
D
C
1 km
L
Displacement [cm]
C)
ascending
descending
Displacement [cm]
Time [years]
D)
Displacement [cm]
Time [years]


Taal Volcano


rofile/Line of Sight
ath Setup
Display Options
Calculate
Pos: 285149.124, 1548298.773
To Pos: 285174.061, 1548283.735
m
m
5 m
10 m
15 m
20 m
25 m
29.2 m


25 m

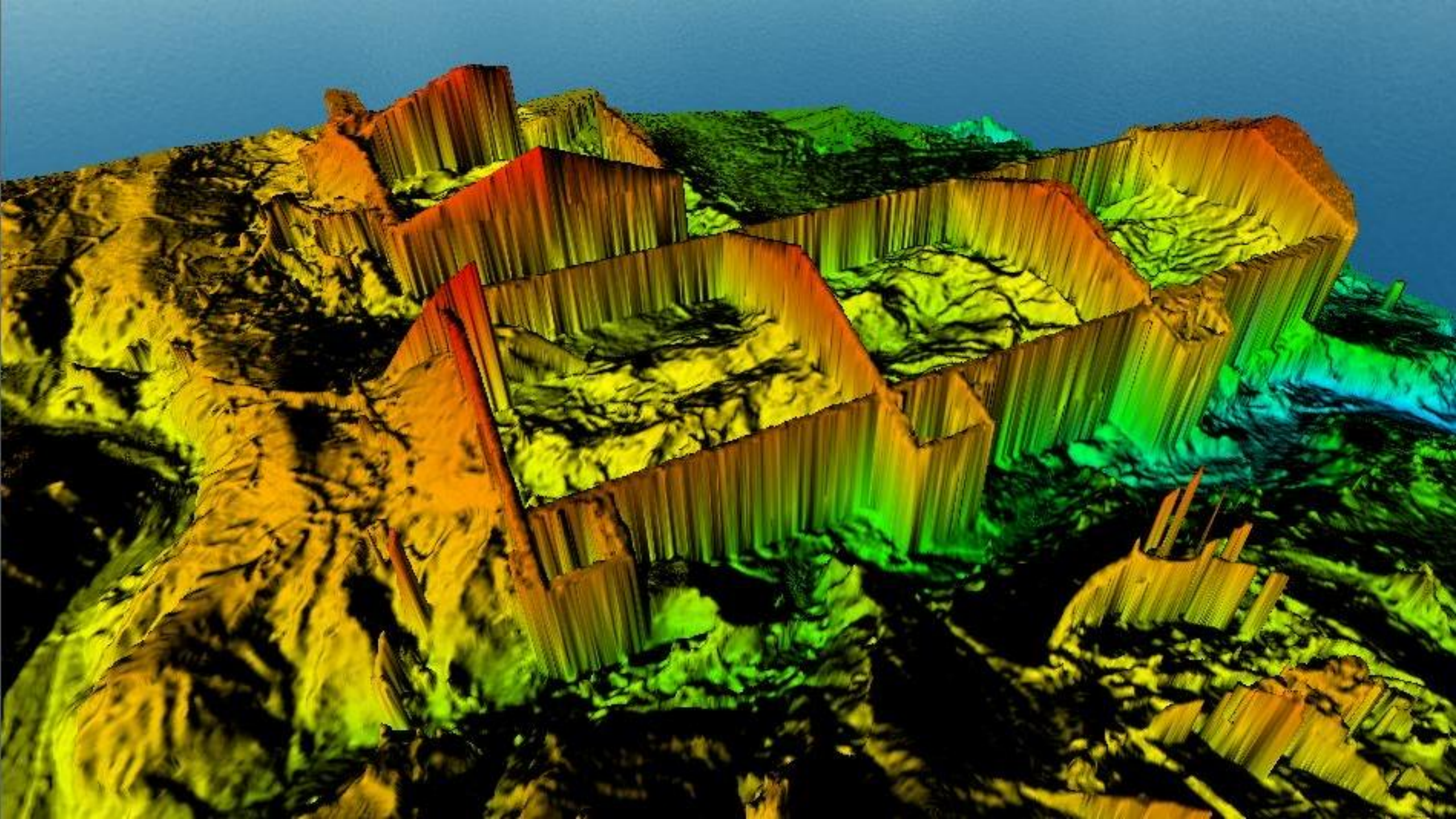

CRATER

A.

C.

C.

D.



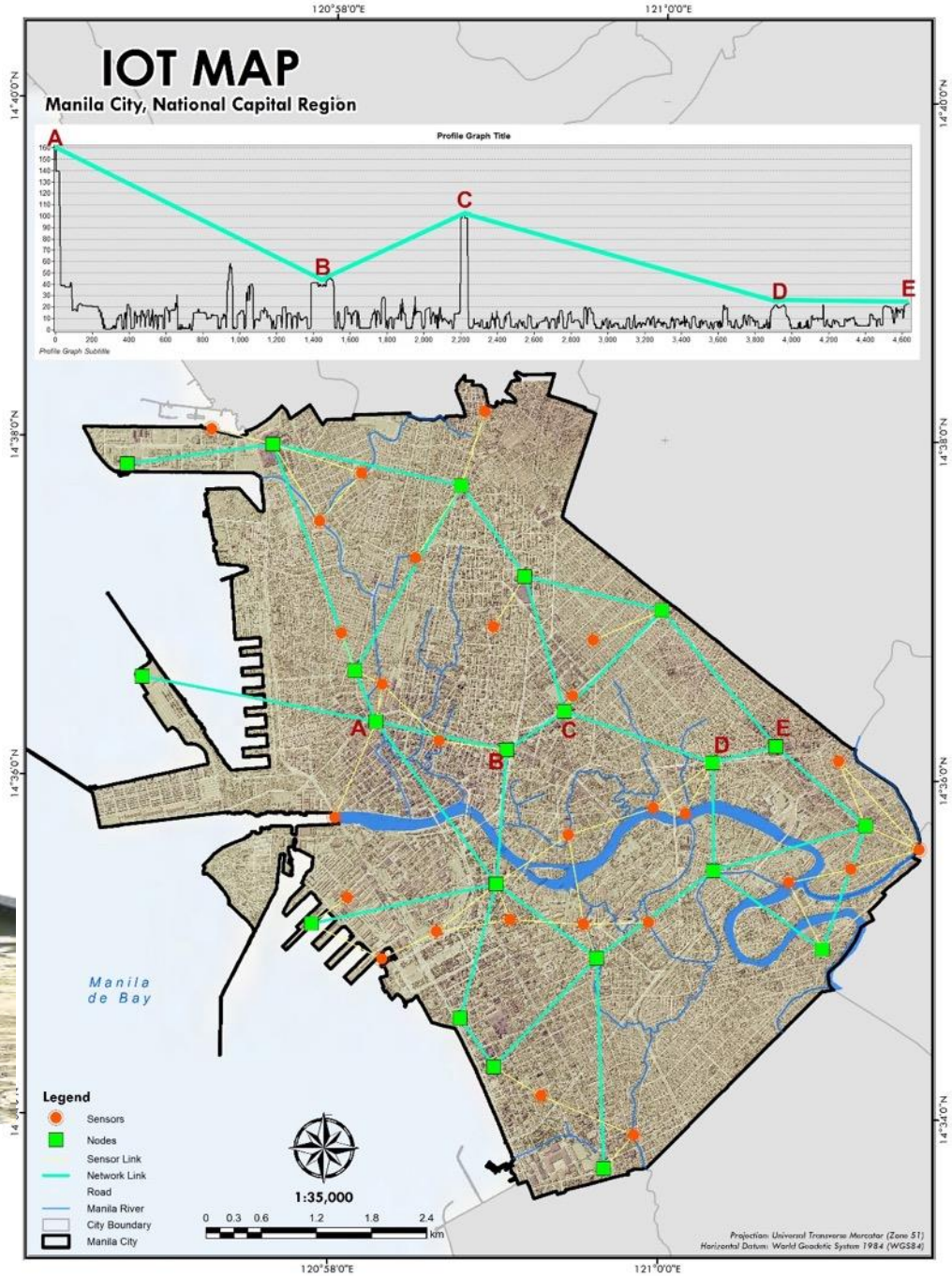
Extensive use of sensors
(low-cost technologies and Internet of Things)

Advanced technology (low-cost IoT) for disaster preparedness

Street Flood Sensor

Rain Gauge

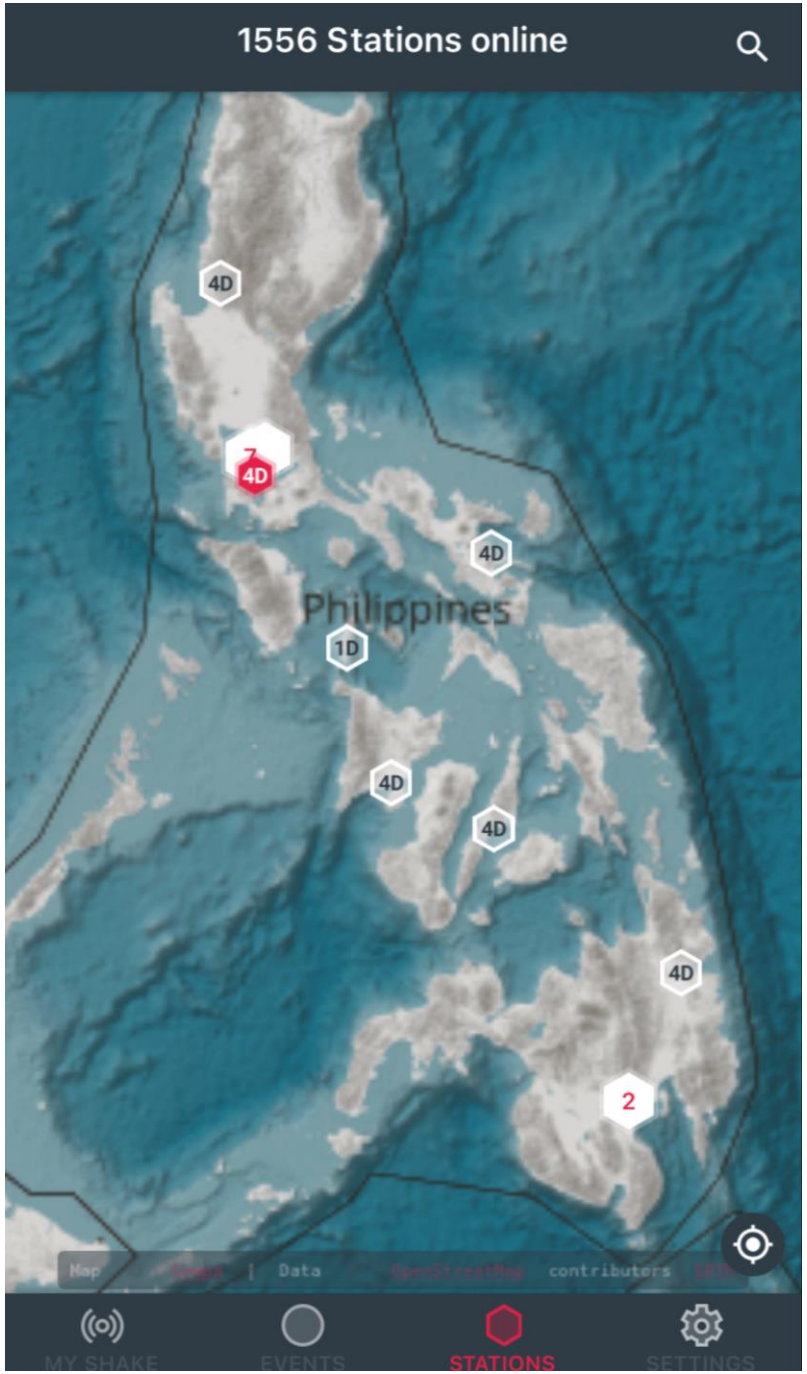
Tide Gauge

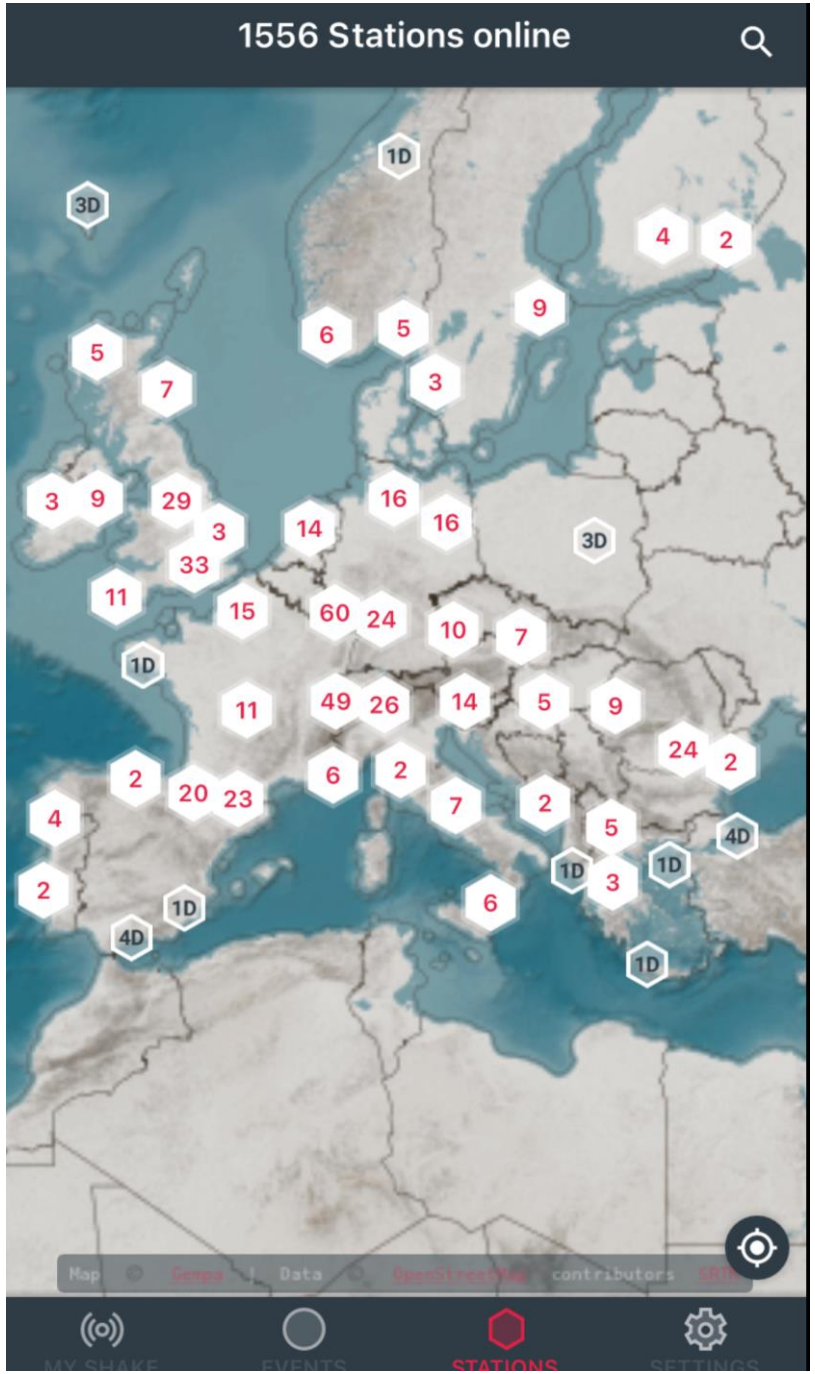


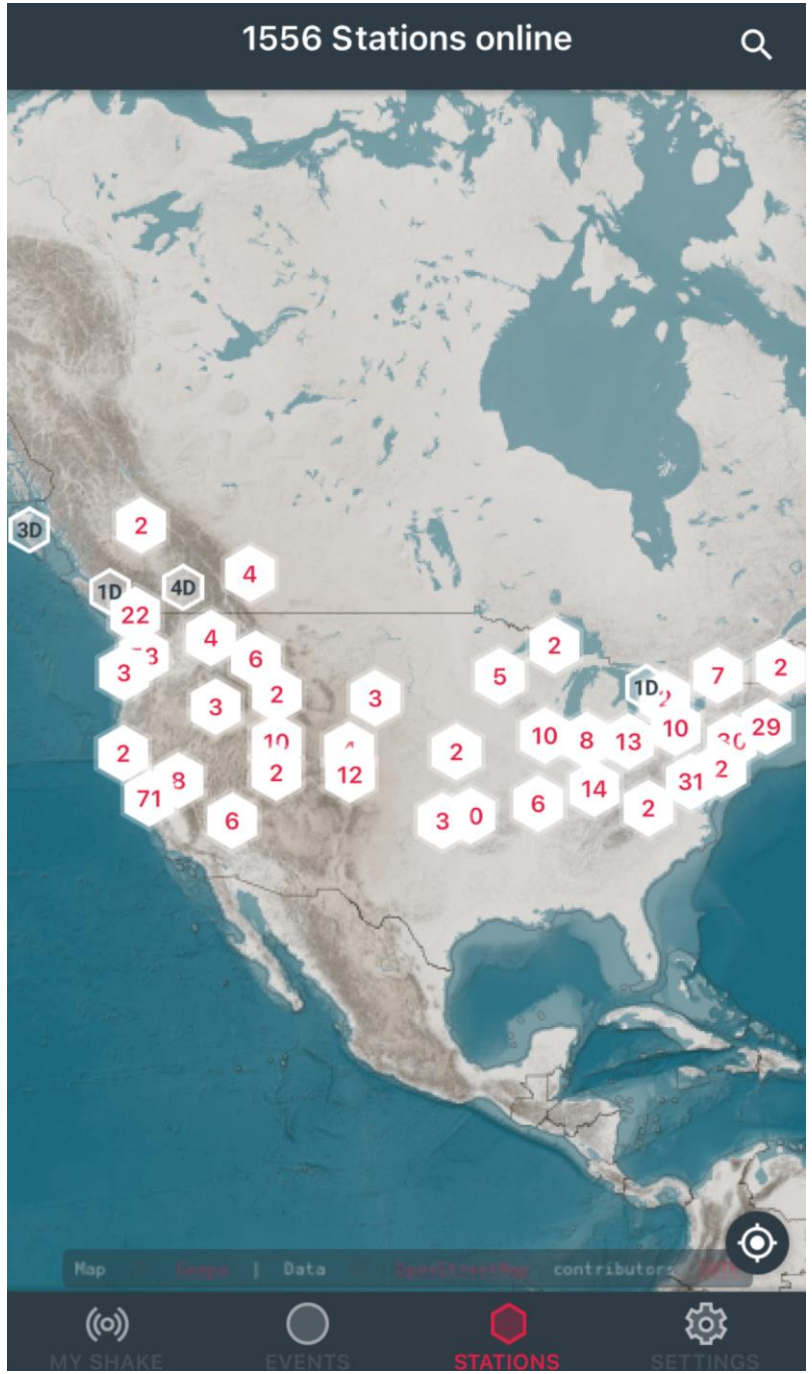
Accelerometer

Pollution meter

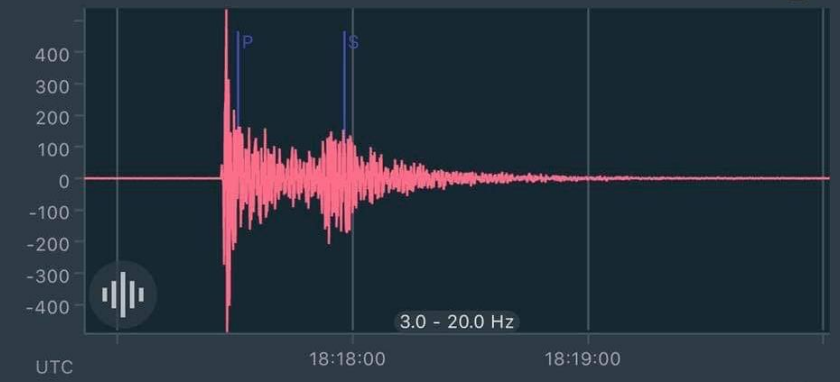
River water level & water quality sensor


1556 Stations online
Philippines
MY SHAKE
EVENTS
STATIONS
SETTINGS

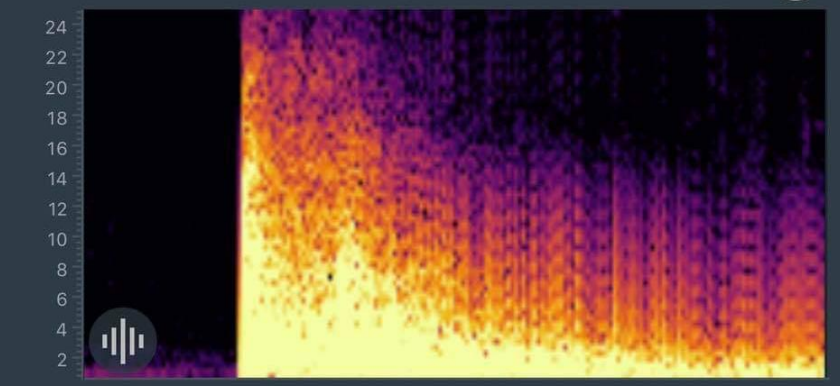

1556 Stations online
MY SHAKE
EVENTS
STATIONS
SETTINGS

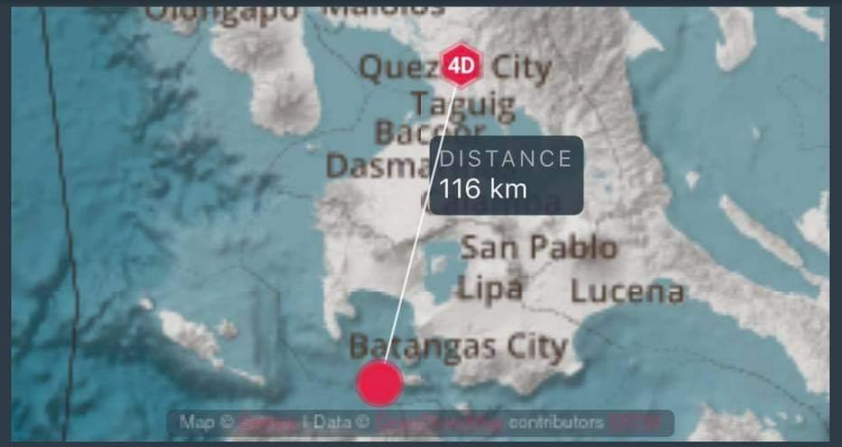

1556 Stations online
MY SHAKE
EVENTS
STATIONS
SETTINGS

WAVEFORM (µm/s)

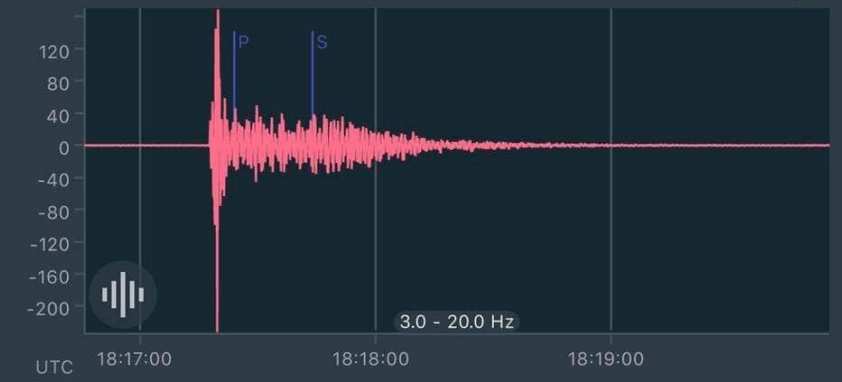


FREQUENCY (Hz)

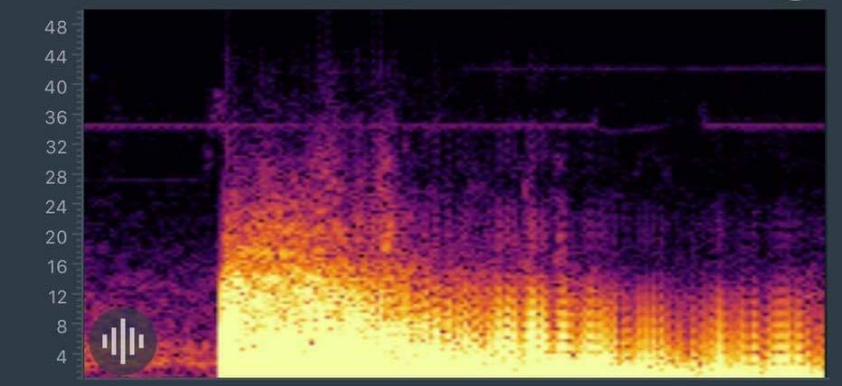




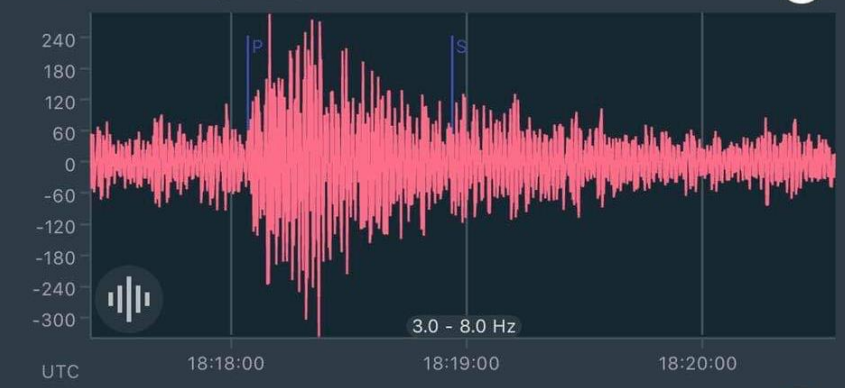
WAVEFORM (µm/s)



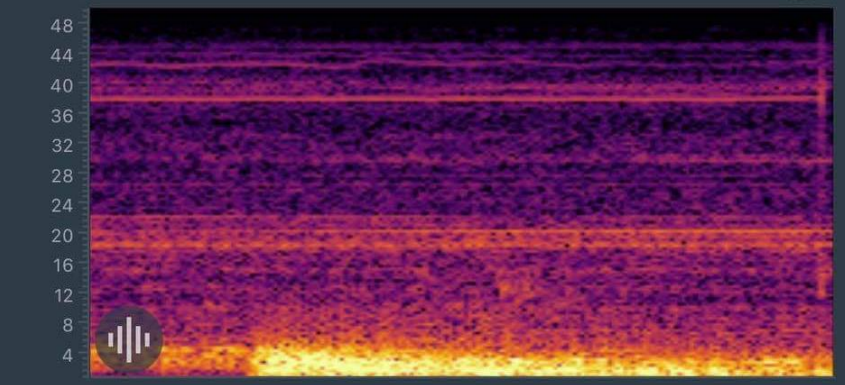
FREQUENCY (Hz)

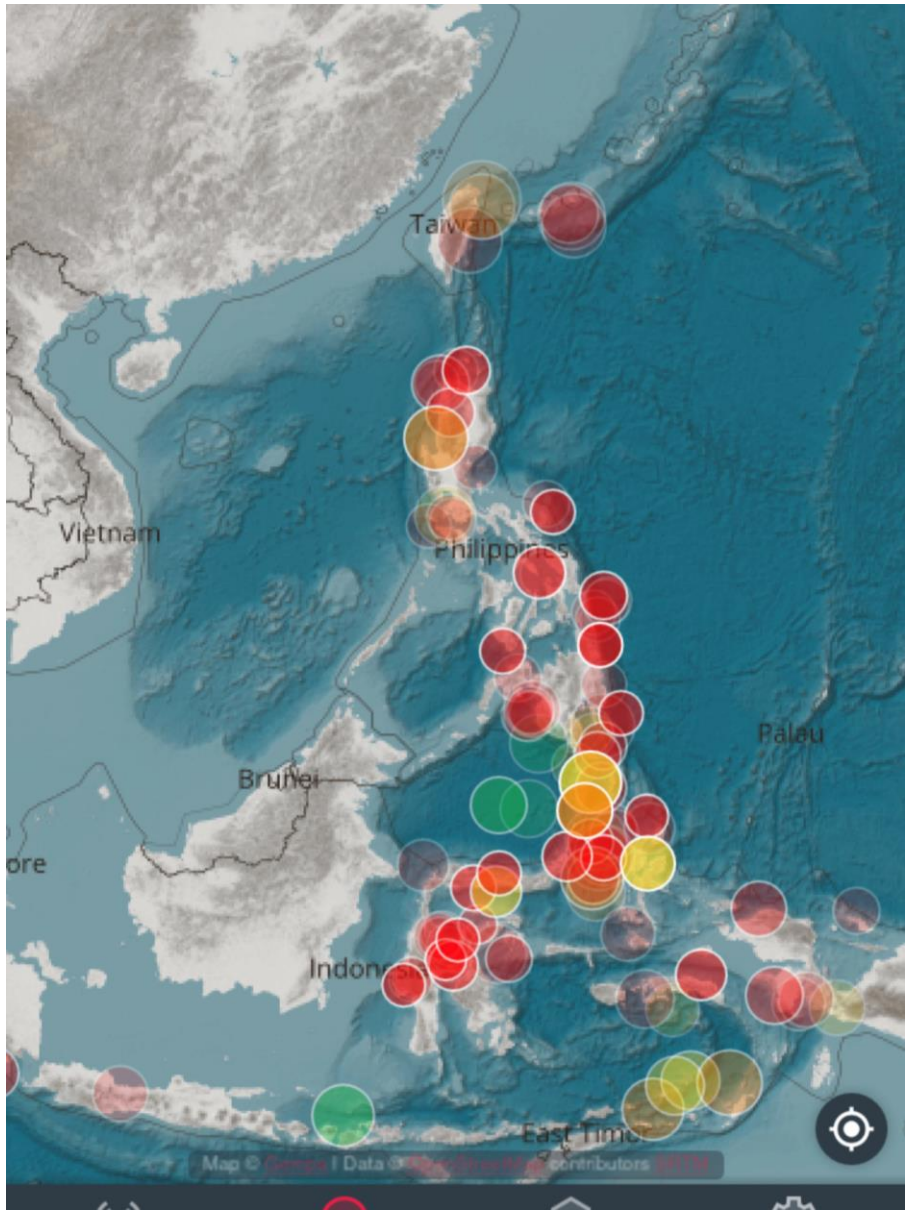


WAVEFORM (µm/s)

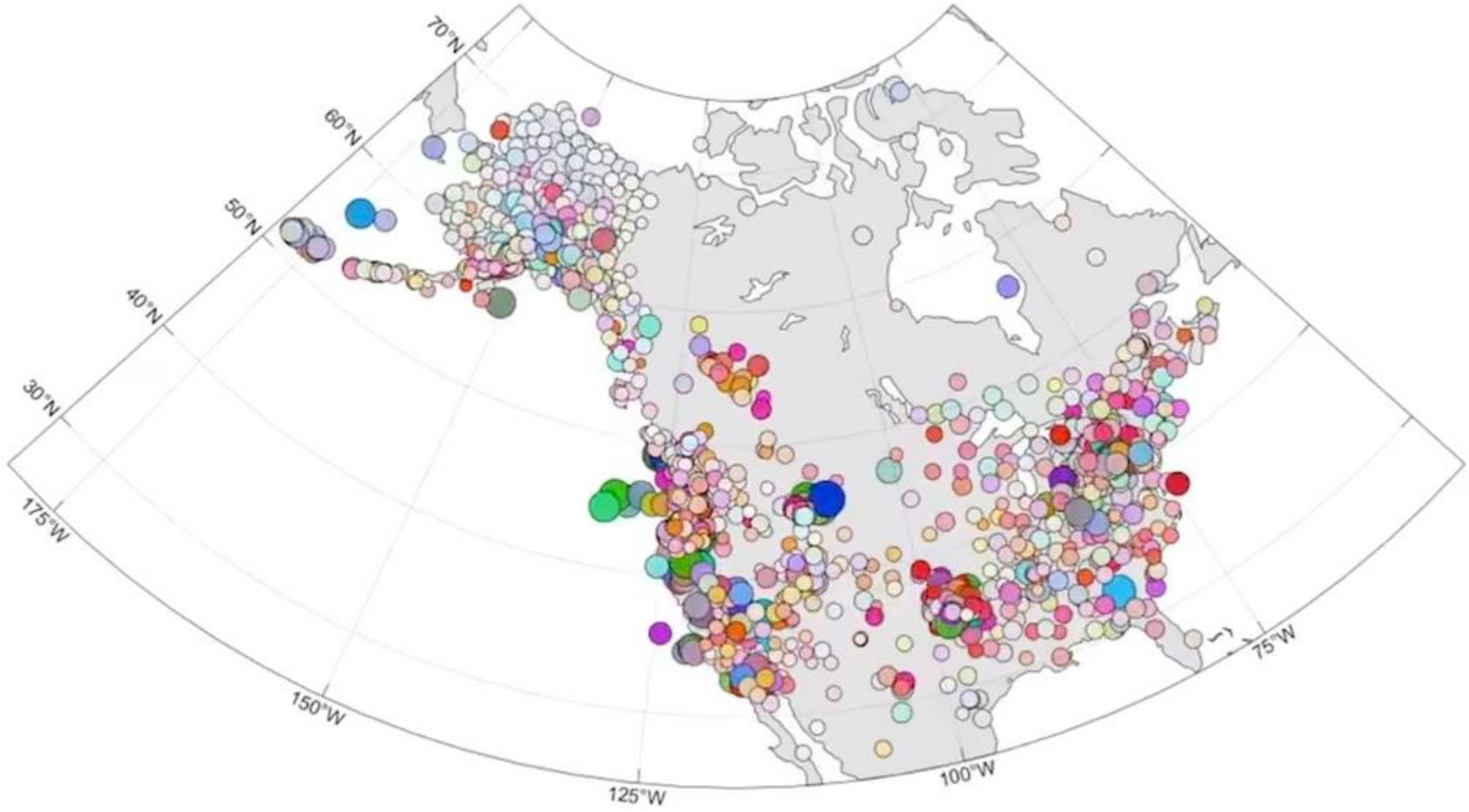


FREQUENCY (Hz)



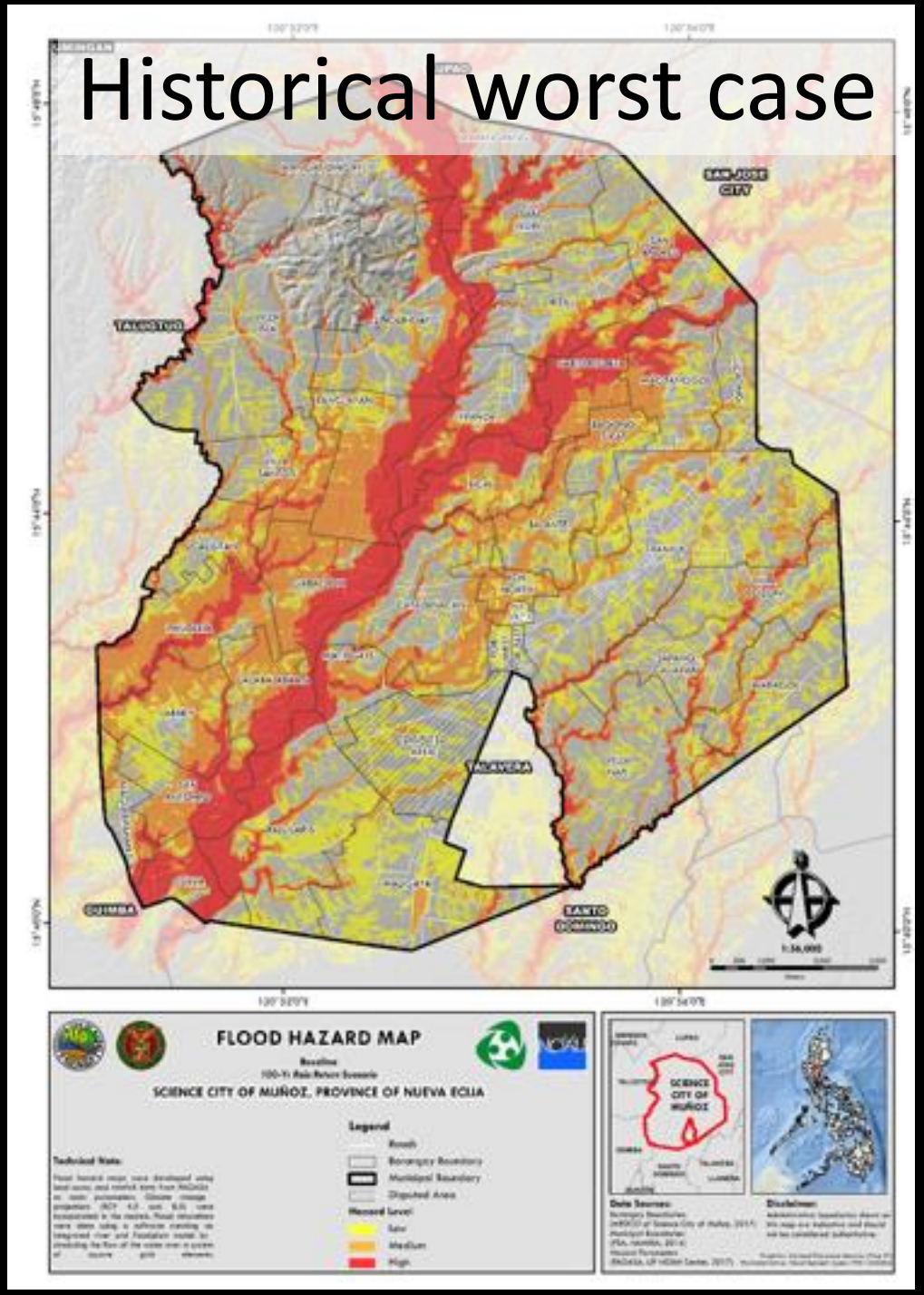

Taiwan
Vietnam
Philippines
Palau
Brunei
East Timor


Cotabato
Maguindanao
Sultan Kudarat

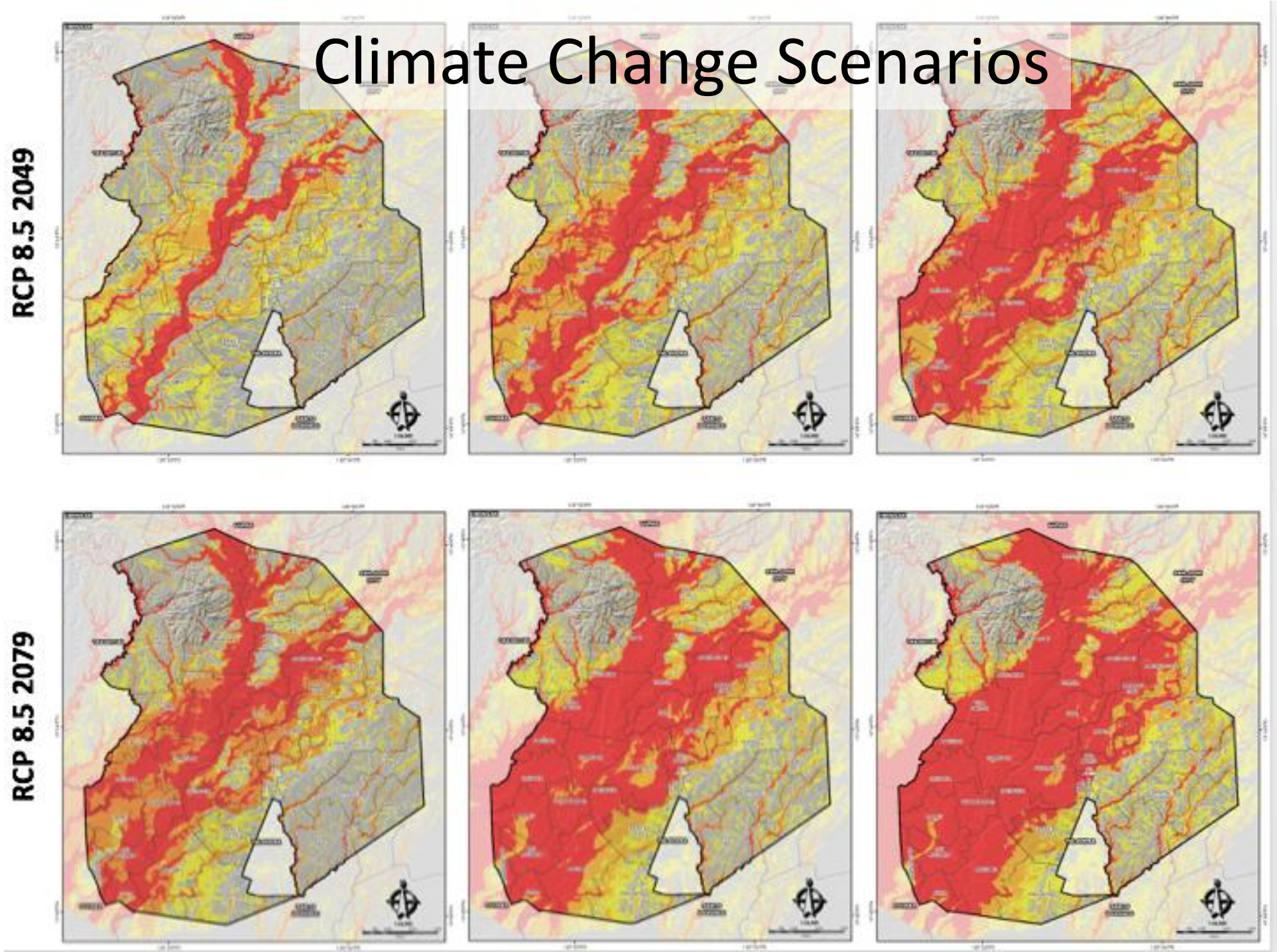

70°N
60°N
50°N
40°N
30°N
175°W
150°W
125°W
100°W
75°W

Anticipatory planning
(Probabilistic Risk Assessment in CLUP, CDRA, DRRMP)

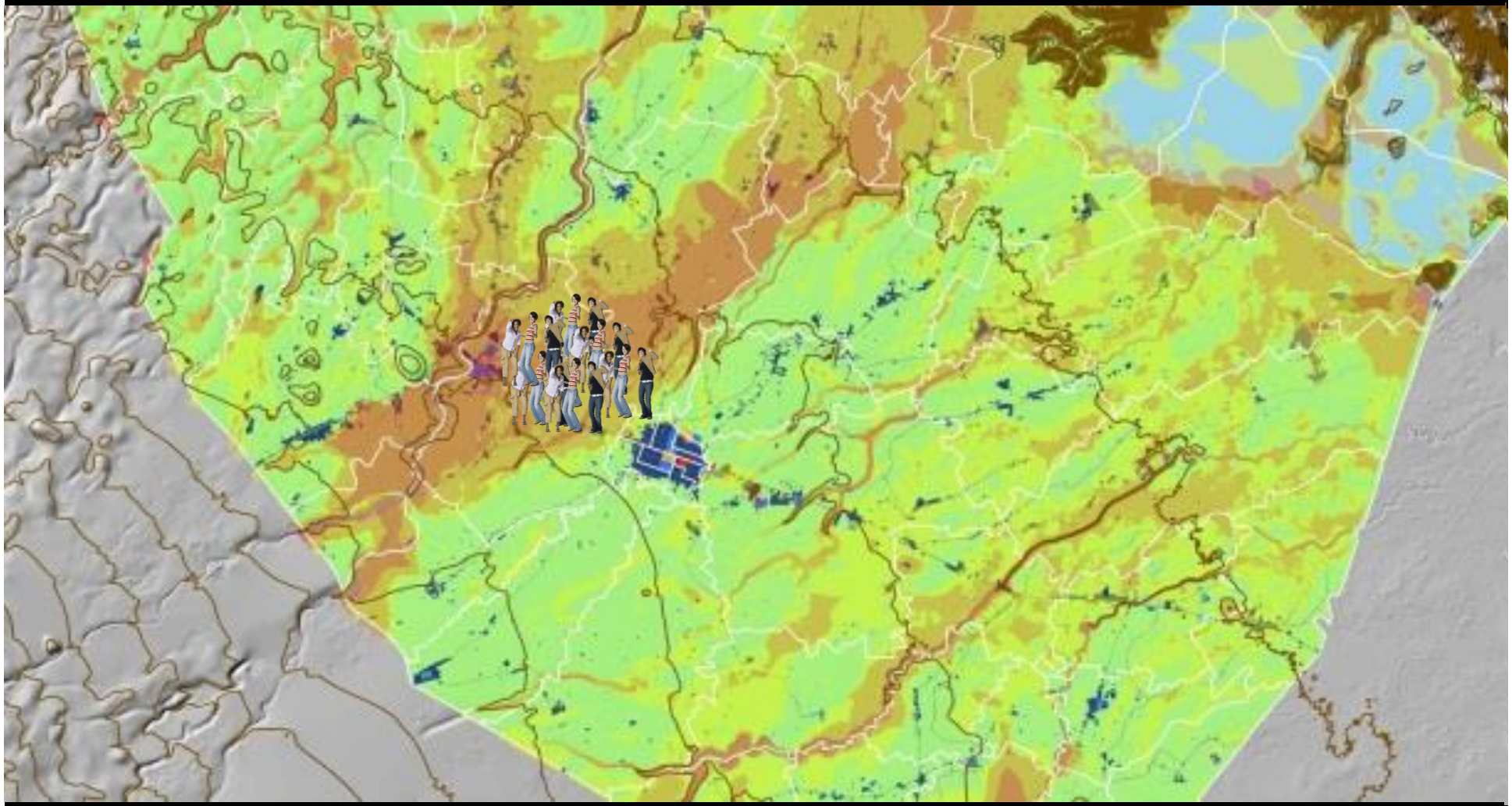
Historical worst case



Climate Change Scenarios



100 –year rain
return flood



Mahina si Mayor

Dahil sa Mining

Kulang sa plano

Climate Change

Pinutol ang mga puno

Si Mar Roxas kasi

Hindi naintindihan

Dahil sa Corruption

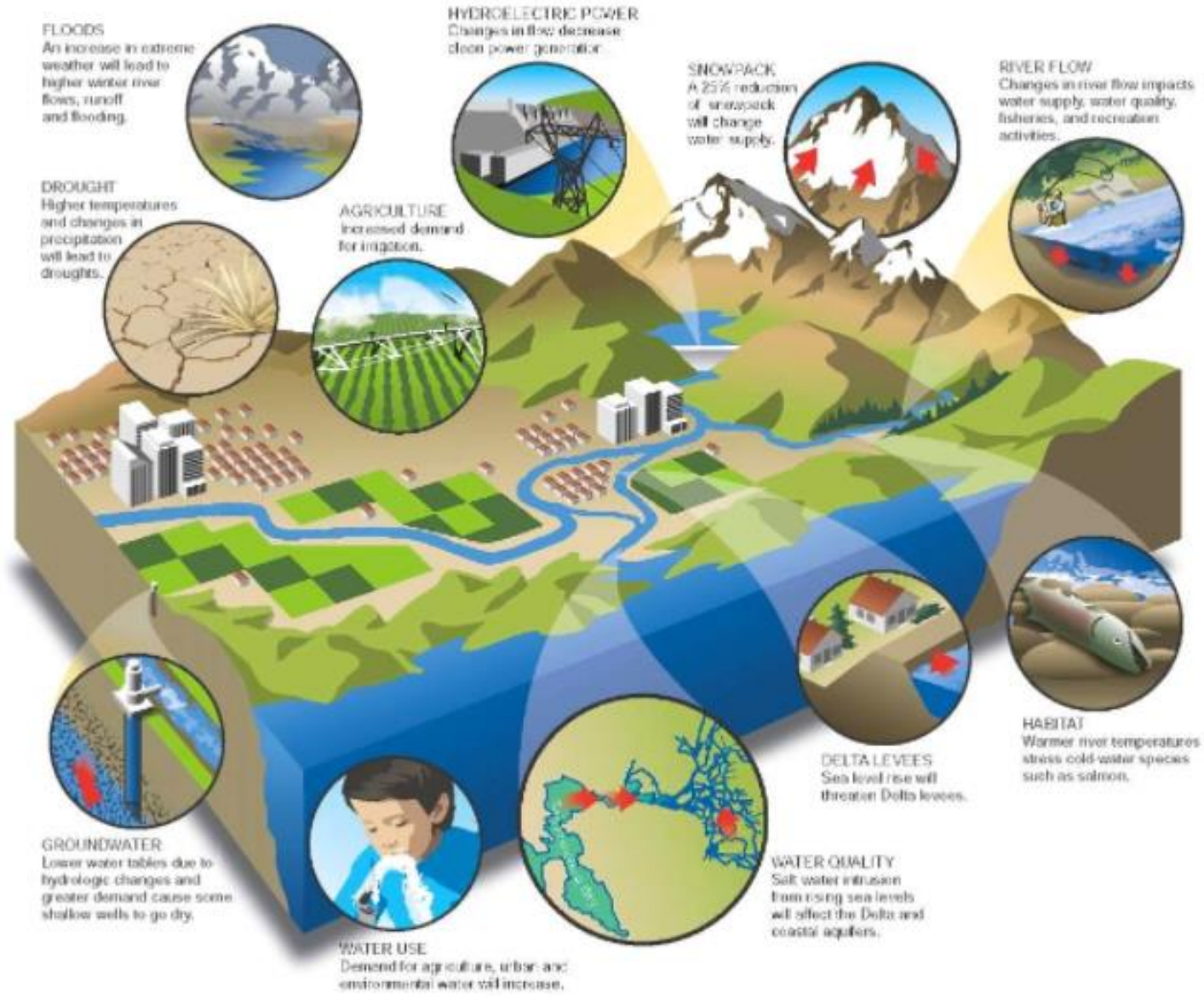
Walang Action

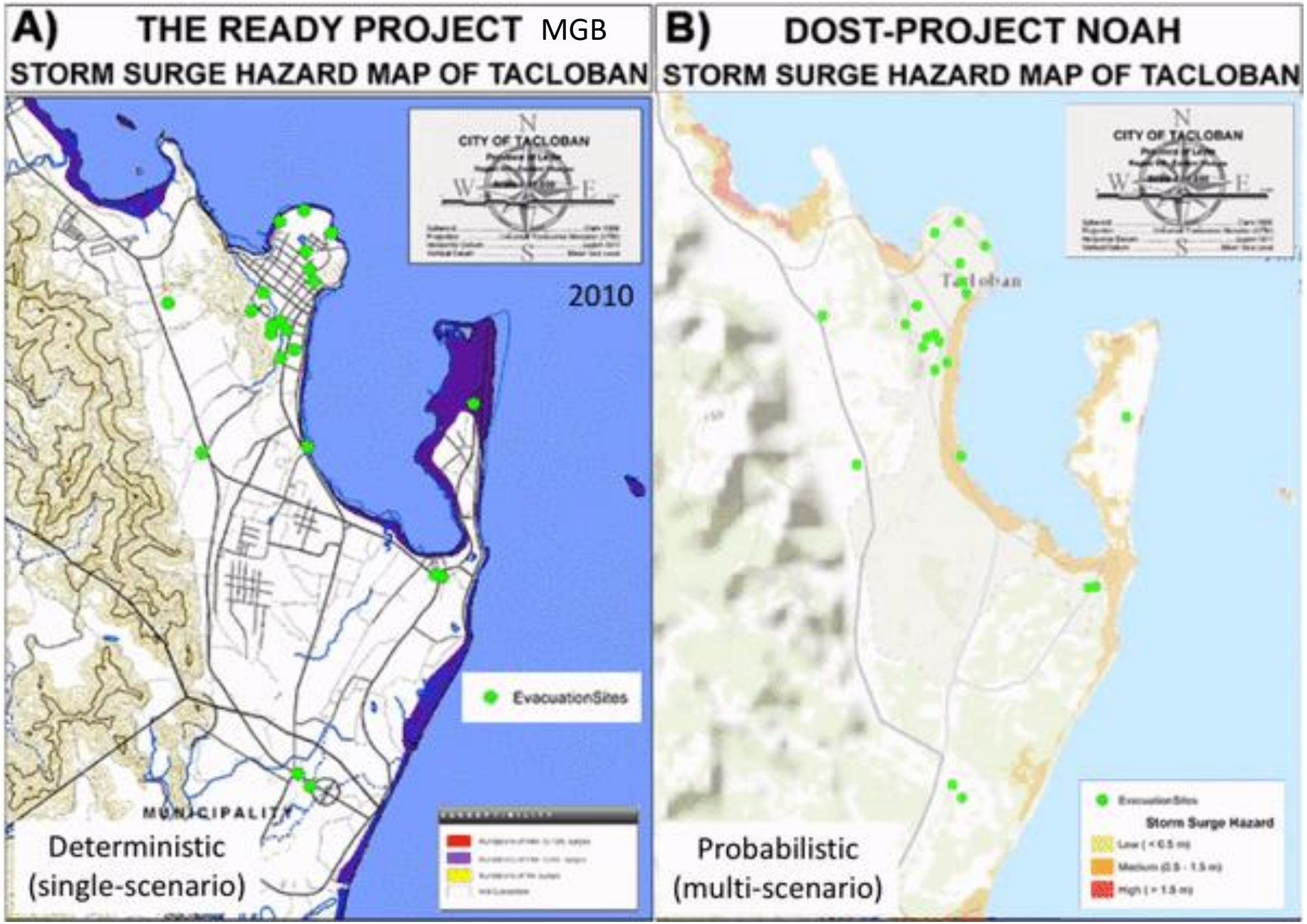
Kulang sa pondo

English English pa kasi

Plans cut across all sectors

- Agriculture
- Coastal
- Water
- Health
- Forestry
- Biodiversity
- Environment
- Energy
- Education
- Tourism
- Infrastructure
- Settlement
- Mining



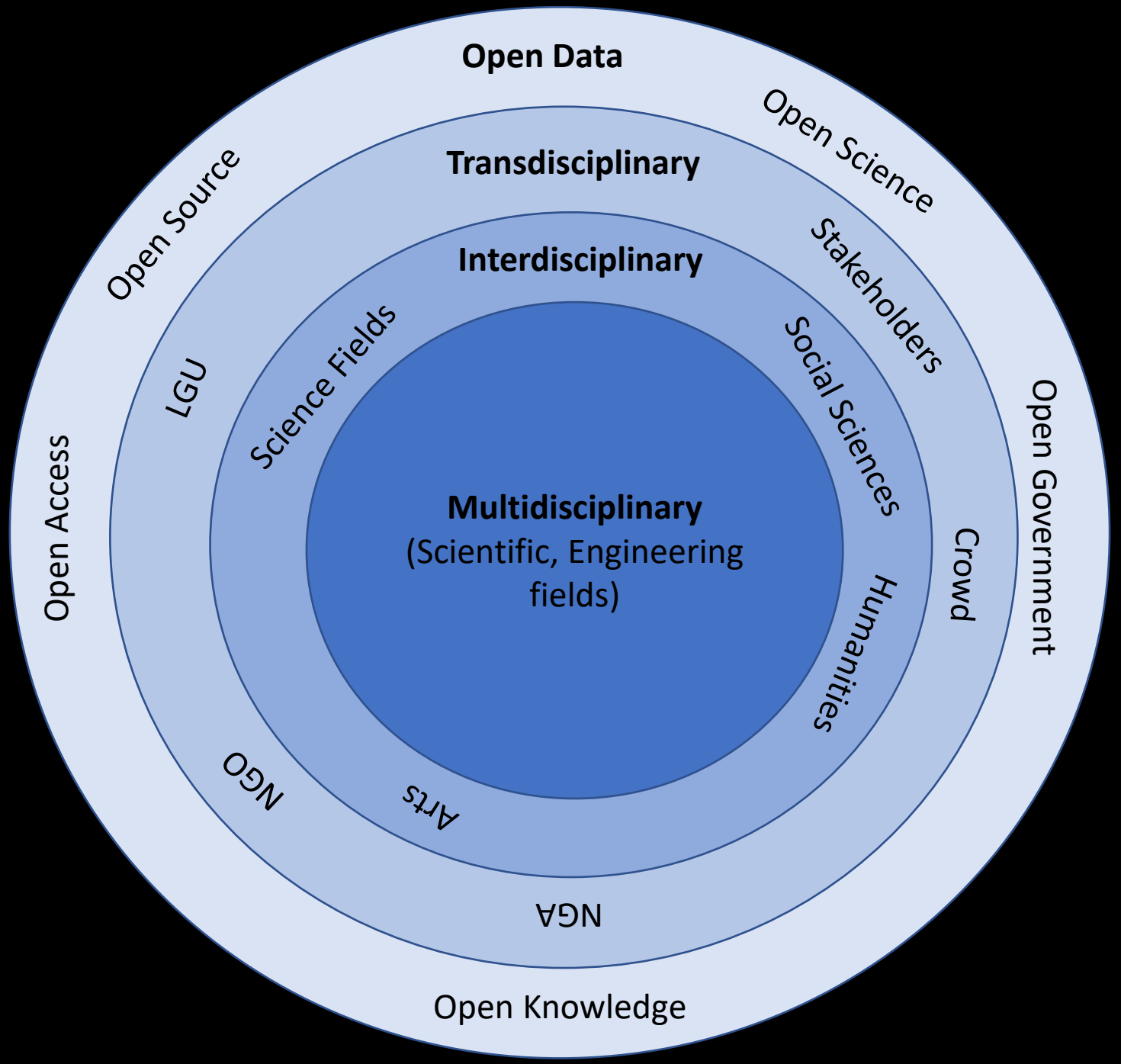

A) THE READY PROJECT MGB
STORM SURGE HAZARD MAP OF TACLOBAN
CITY OF TACLOBAN
2010
EvacuationSites
MUNICIPALITY
Deterministic
(single-scenario)
B) DOST-PROJECT NOAH
STORM SURGE HAZARD MAP OF TACLOBAN
CITY OF TACLOBAN
Tacloban
Storm Surge Hazard
Probabilistic
(multi-scenario)

Ecosystems based approach

Ecosystem-based Approaches to Climate Change Adaptation, or Ecosystem-based Adaptation (EbA) involves a wide range of ecosystem management activities to increase the resilience and reduce the vulnerability of people and the environment to climate change.

Ecosystem-based Adaptation conceptualized in the Driving Forces-Pressures-State-Impacts-Responses (DPSIR) framework. Image Source: IUCN, n.d.

Open Data


Open Data
Open Science
Open Government
Open Knowledge
Open Access
Open Source
Transdisciplinary
Stakeholders
Crowd
NGA
NGO
LGU
Interdisciplinary
Social Sciences
Humanities
Arts
Science Fields
Multidisciplinary
(Scientific, Engineering fields)

AN OPEN DATA LAW FOR CLIMATE RESILIENCE AND DISASTER RISK REDUCTION

DR. ALFREDO MAHAR FRANCISCO A. LAGMAY

stratbase + ADR PUBLICATIONS

Copernicus EU
@CopernicusEU

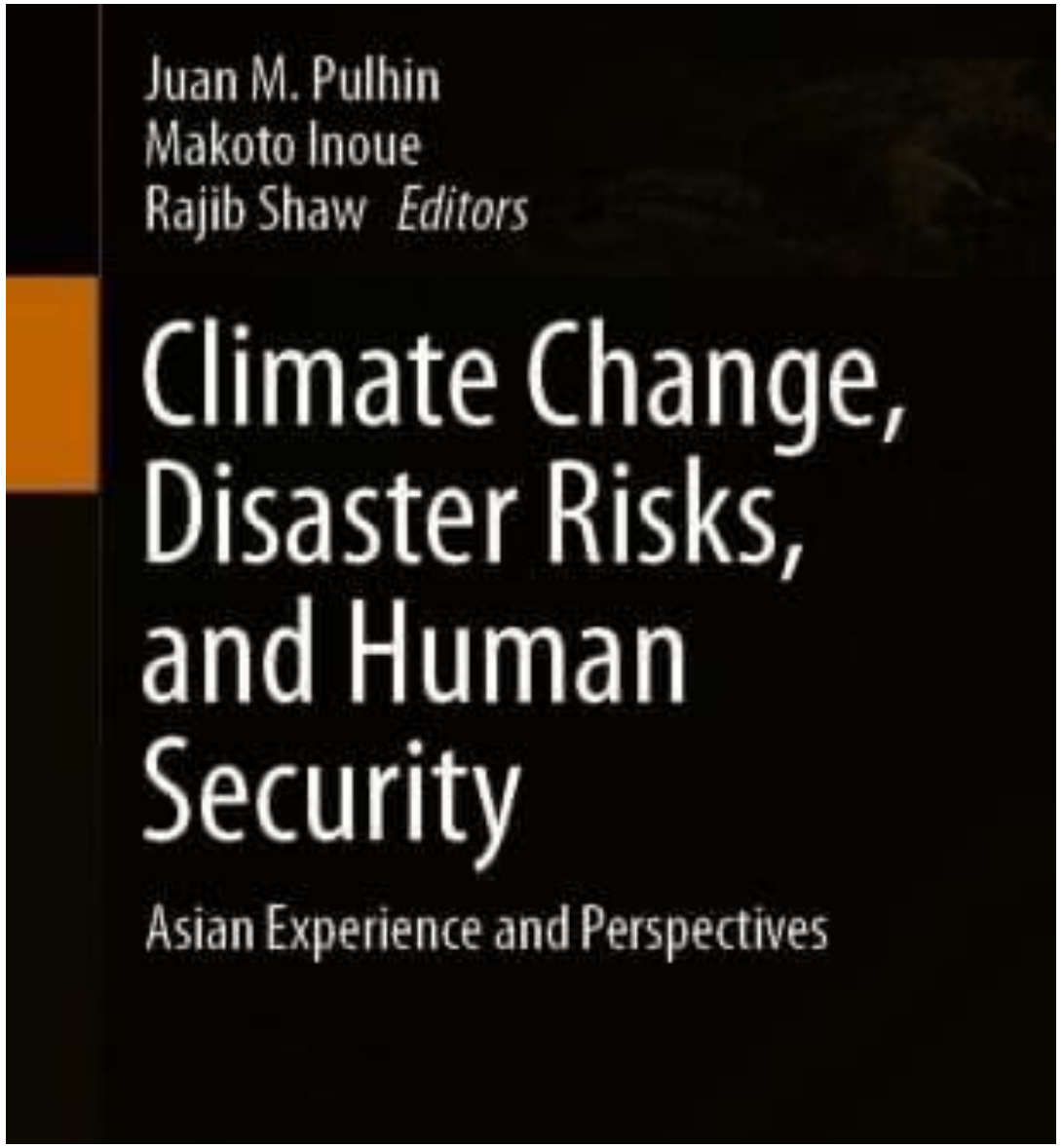
🌍Today is #EarthDay🌎!

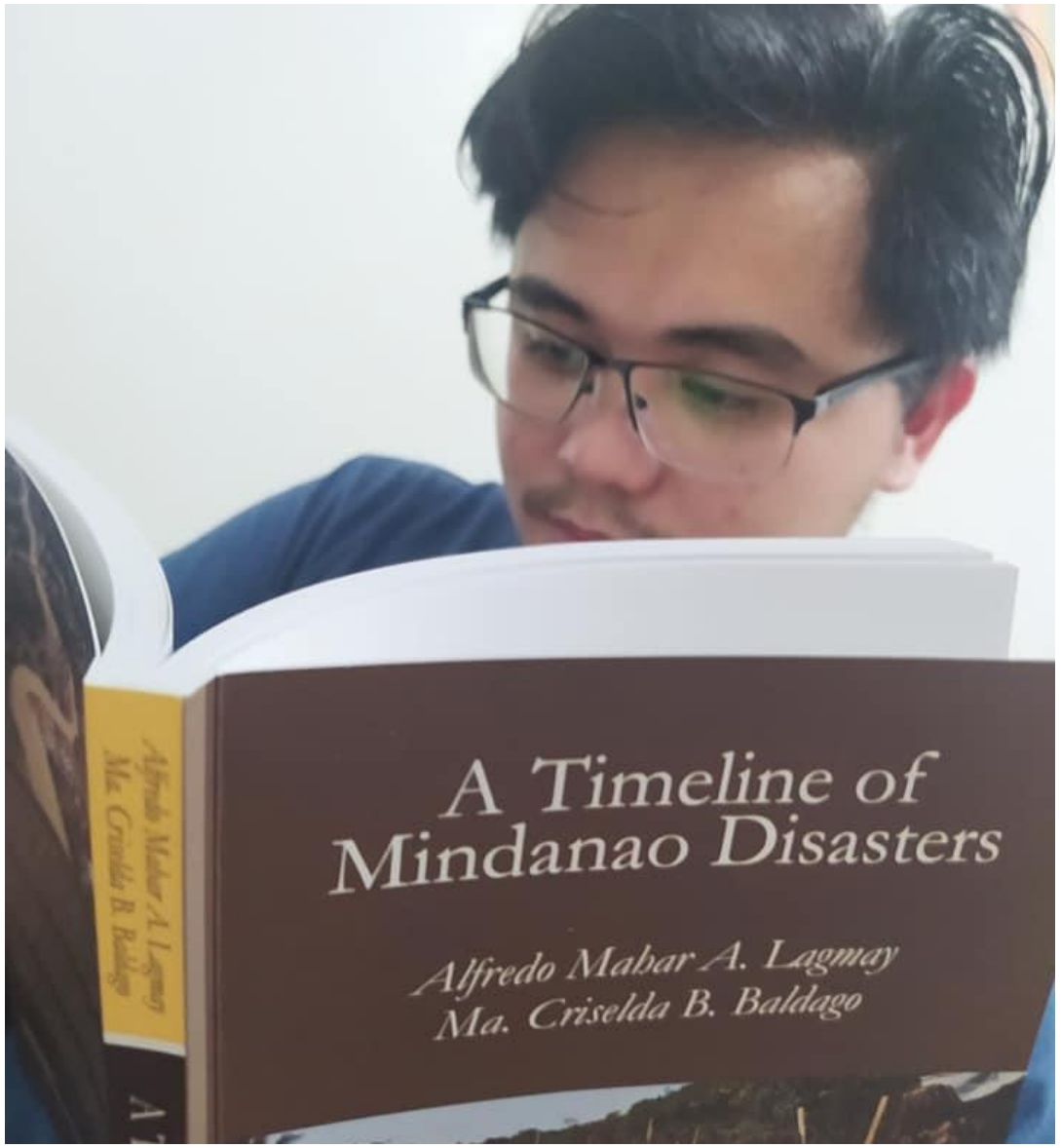
🛰️The #Copernicus programme provides a wide range of free and open data to help monitor #OurPlanet.

@EU_Commission's new Knowledge Centre on #EO will create synergies across policy areas such as the #EUGreenDeal and help in the fight against #ClimateChange

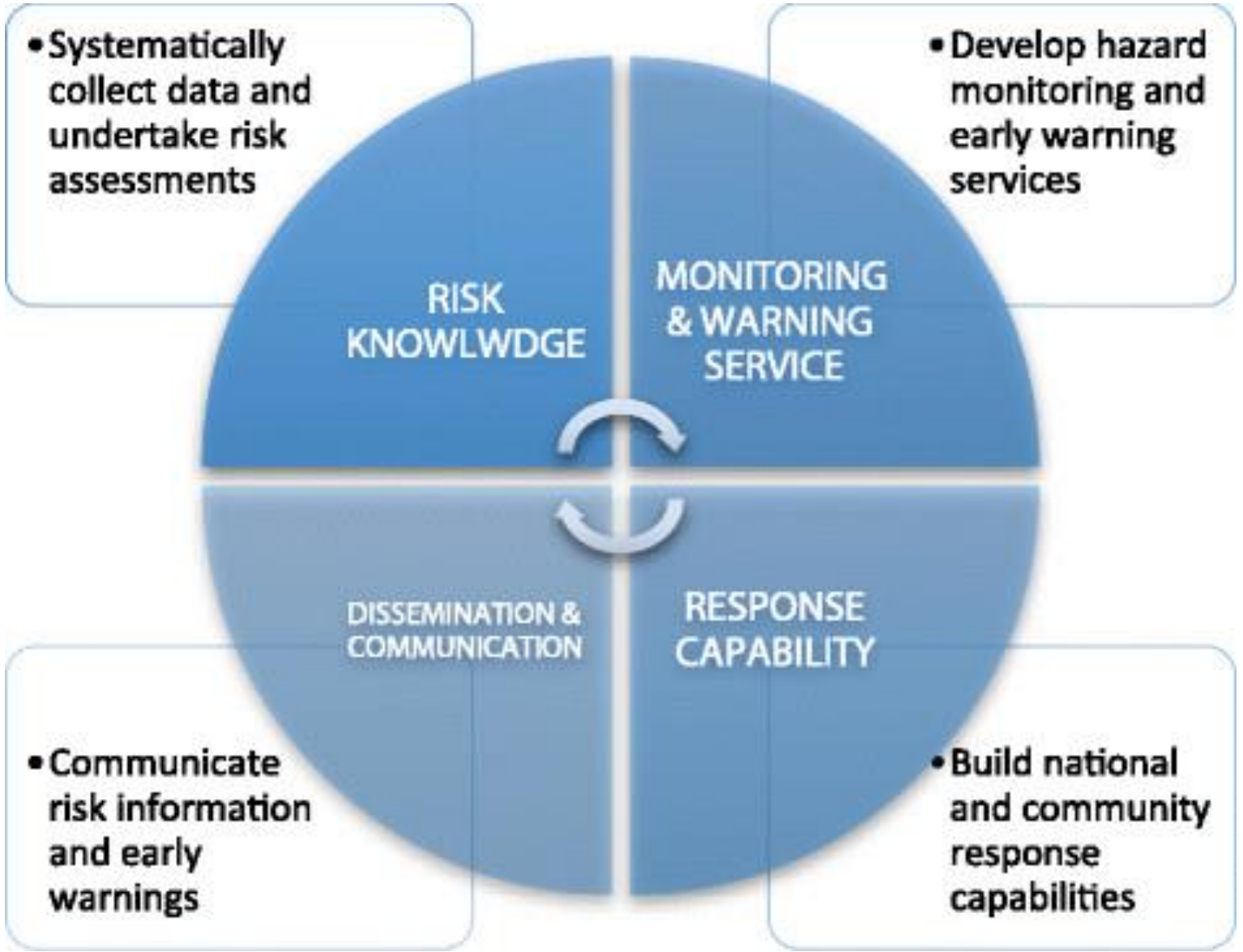
EU_ScienceHub and 9 others

Education


Juan M. Pulhin
Makoto Inoue
Rajib Shaw Editors
Climate Change, Disaster Risks, and Human Security
Asian Experience and Perspectives

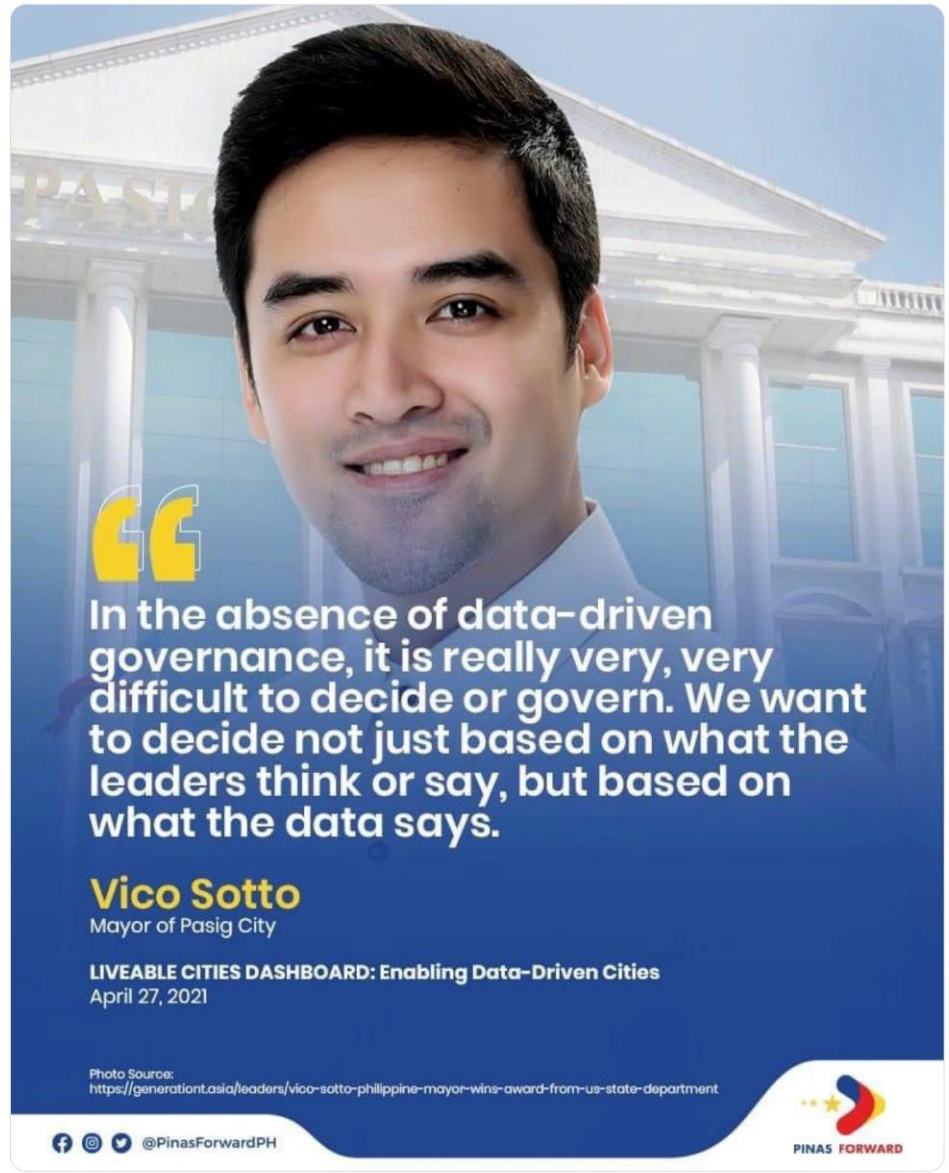

A Timeline of Mindanao Disasters
Alfredo Mahar A. Lagmay
Ma. Criselda B. Baldago

Scientific Research


• Systematically collect data and undertake risk assessments
• Develop hazard monitoring and early warning services
RISK KNOWLWDGE
MONITORING & WARNING SERVICE
DISSEMINATION & COMMUNICATION
RESPONSE CAPABILITY
• Communicate risk information and early warnings
• Build national and community response capabilities

Mahar Lagmay @nababaha · 14h

Way to go



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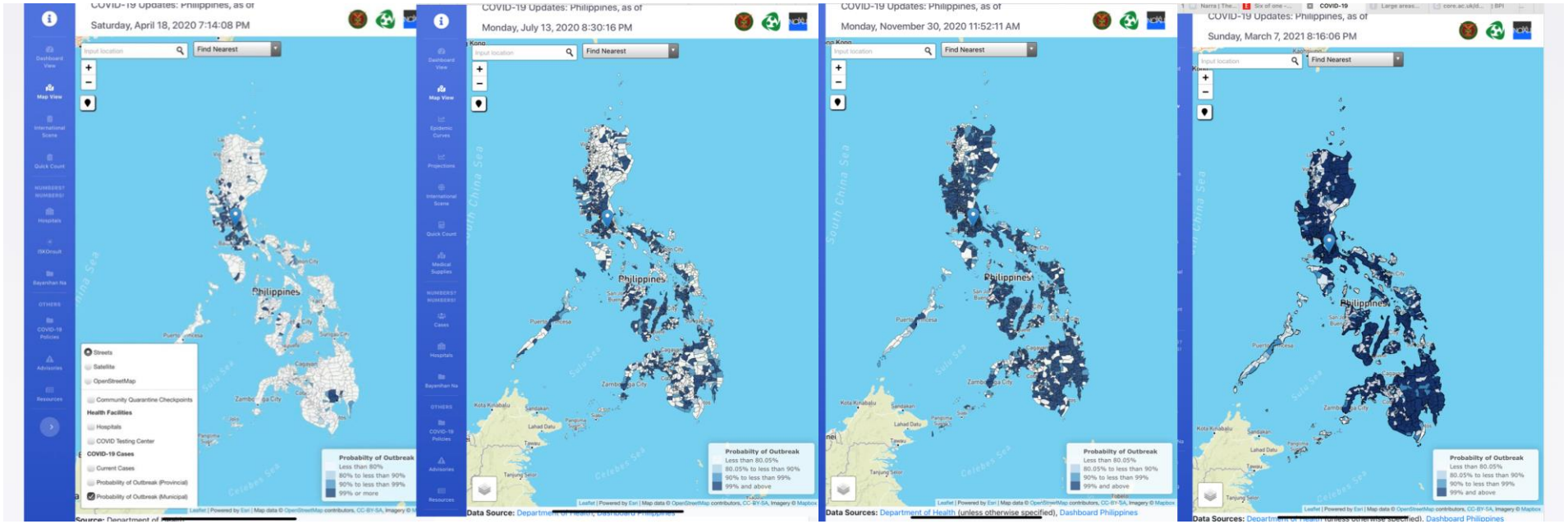

Thank you for listening