SICORP

Strategic International Collaborative Research Program

e-ASIA Joint Research Program

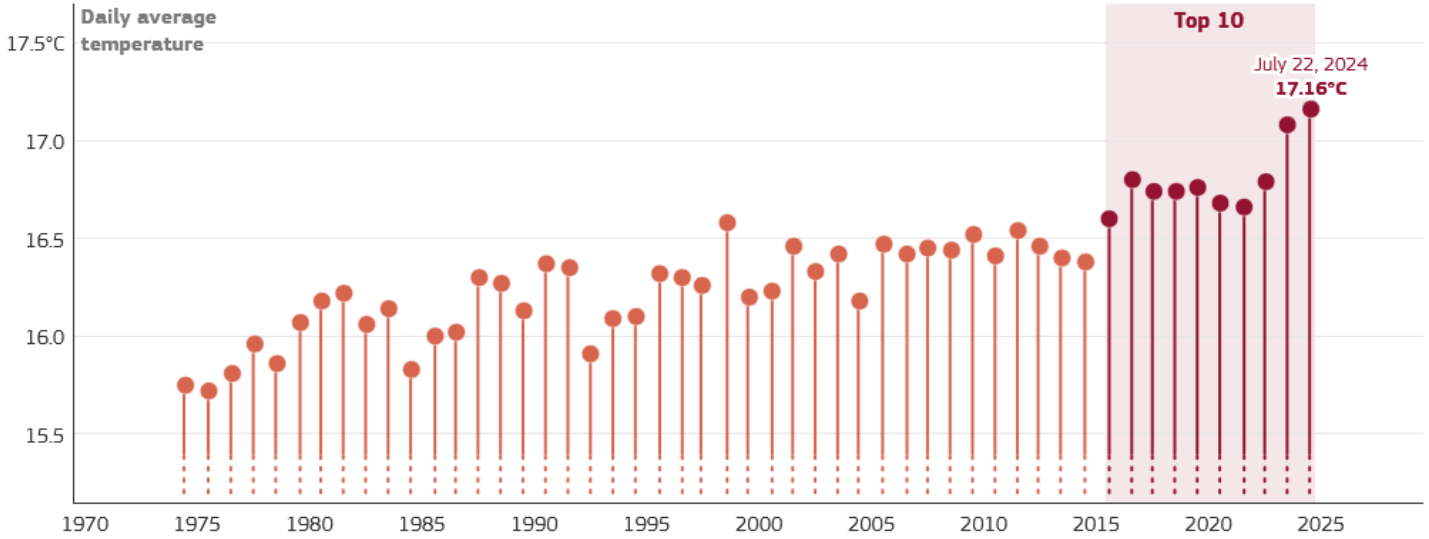
Disaster Risk Reduction and Management

Program Officer: Kenji Satake (Professor Emeritus, Univ. Tokyo)

Recent Natural Hazard and Disasters

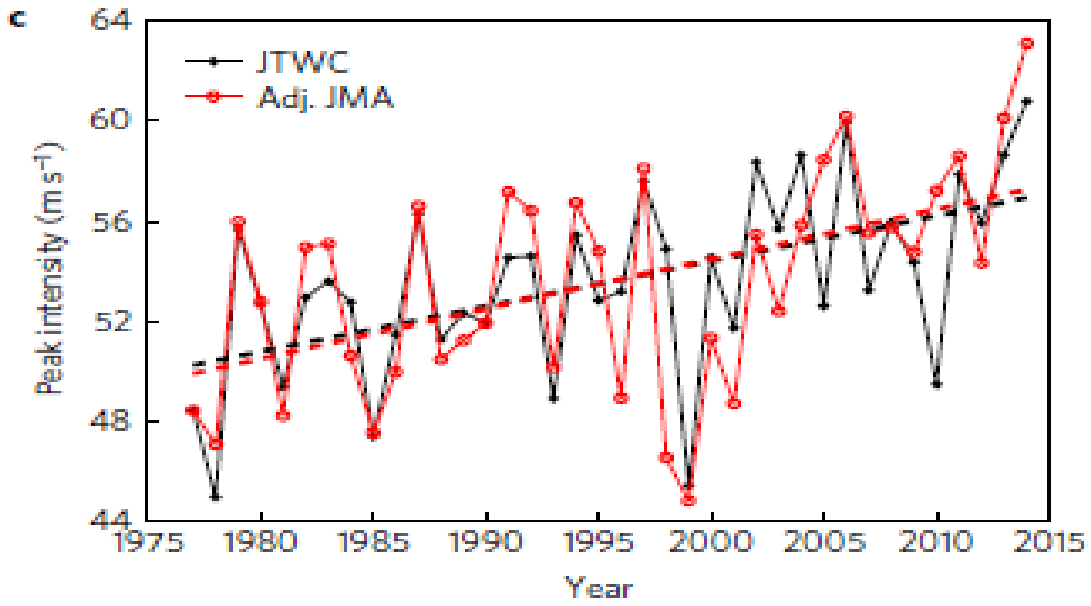
2022	January 15	HungaTonga-Hunga Ha'apai volcanic eruption	Tsunamis recorded globally	Infrastructure and internet connection in Tonga damaged
2023	February 6	Turkey–Syria earthquakes	M 7.8 and M 7.7 E Anatolia Fault	Nearly 50,000 casualties
2023	December 3	Marapi volcano (Sumatra) eruption		23 killed
2024	January 1	Noto peninsula earthquake	M 7.6	300 killed
2024	April 30	Ruang volcano (Sulawesi) Eruption	Plume 19,000 m	
2024	May 11	Golodo (Sumatra) flood		61 killed
2024	July	Typhoon Carina caused flood in Manila		48 killed

Climate Change and Natural Hazard



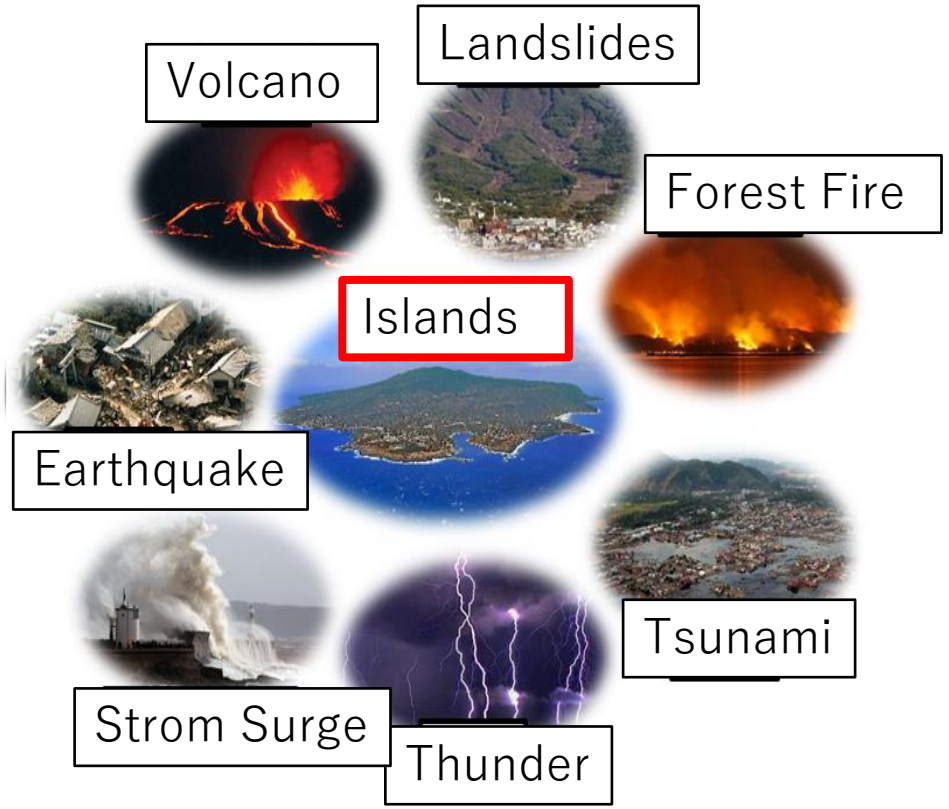
With increasing global temperature, typhoons have intensified

https://climate.copernicus.eu/new-record-daily-global-average-temperature-reached-july-2024

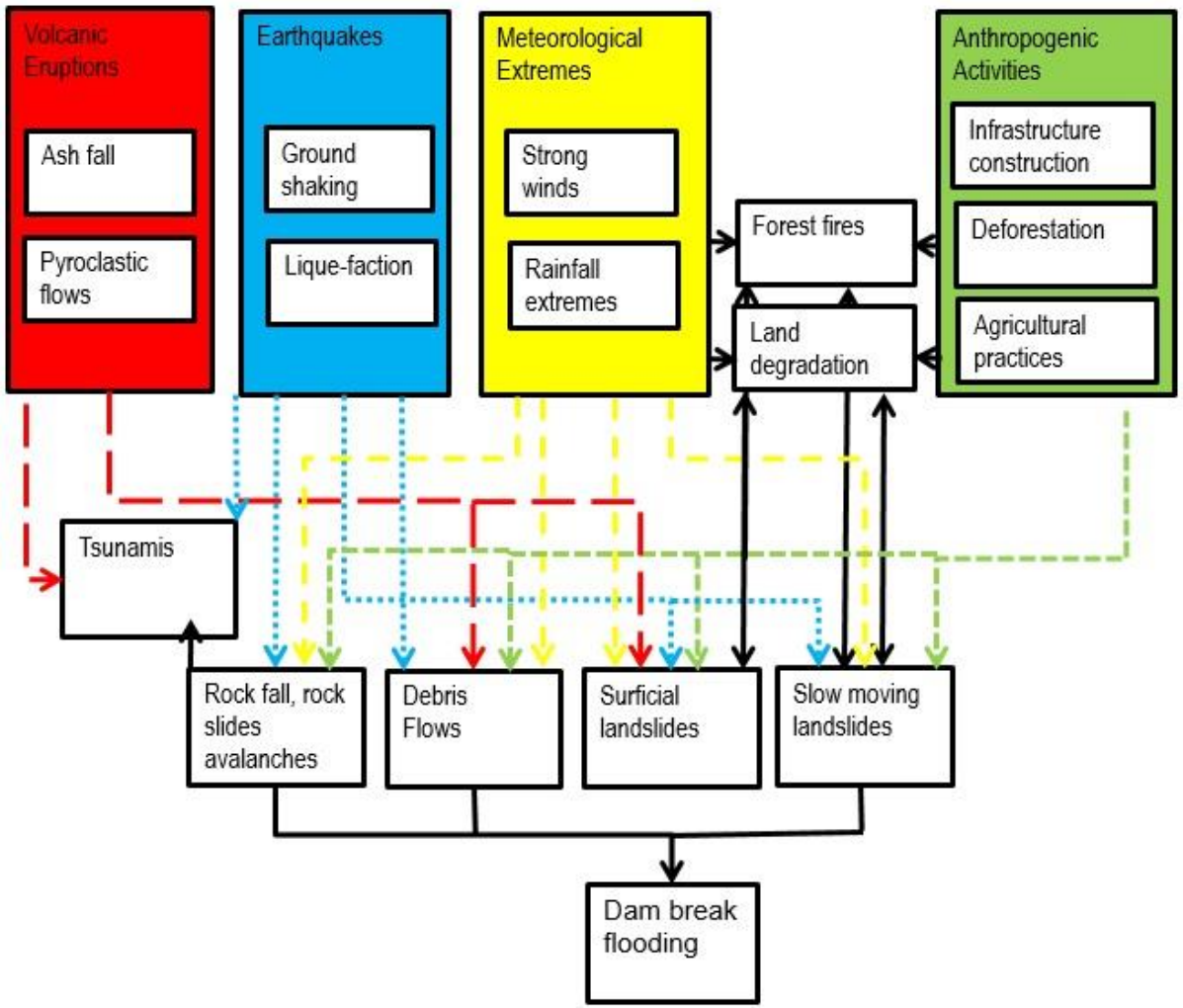


http://dx.doi.org/10.1038/ngeo2792

Multi –hazard



https://au-monitoring.org/island-disaster-prevention/



https://www.cdema.org/virtuallibrary/images/description/MultiHazards.jpg

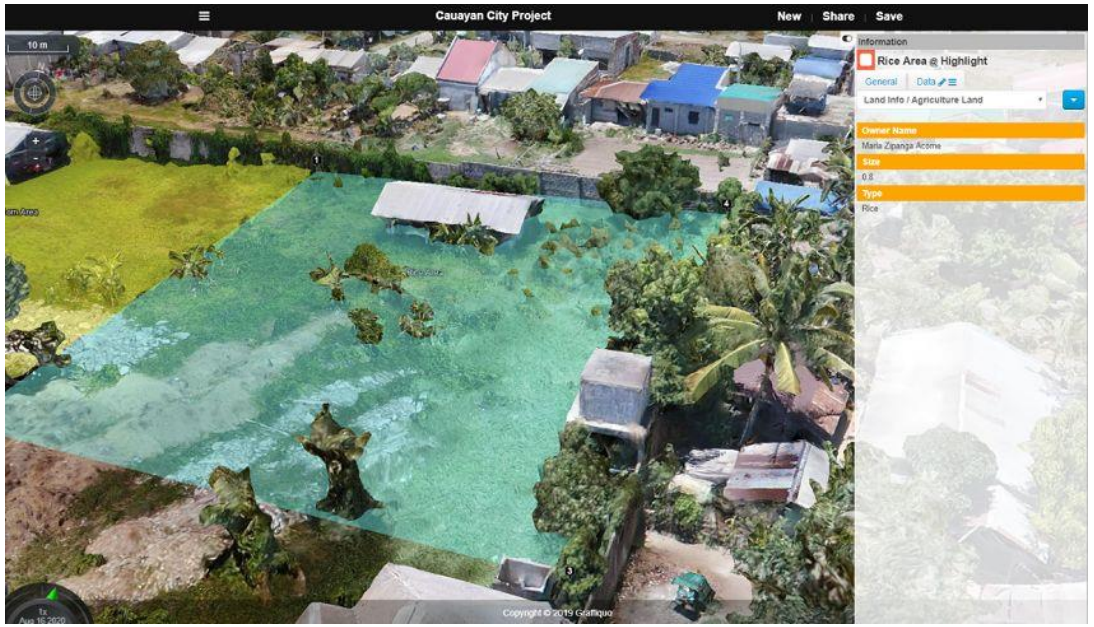
Digital Twin

Digital Twin (virtual replica of physical space) can help reduce natural disasters by
(1)Simulation to predict disaster risk
(2)Assessment of actual situation using real-time data
(3) Analysis and prediction for quick recovery

Virtual Singapore

https://www.geospatialworld.net/wp-content/uploads/2022/03/Virtual-Singapore.jpg

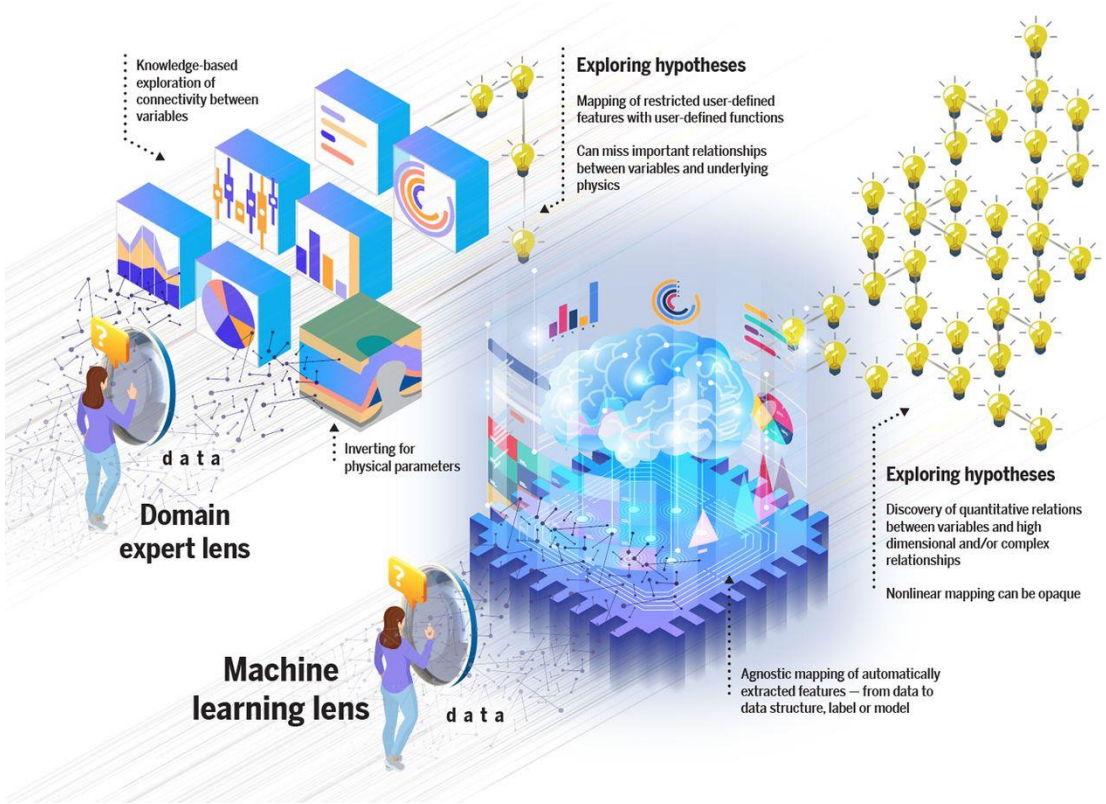
Cauayan city project

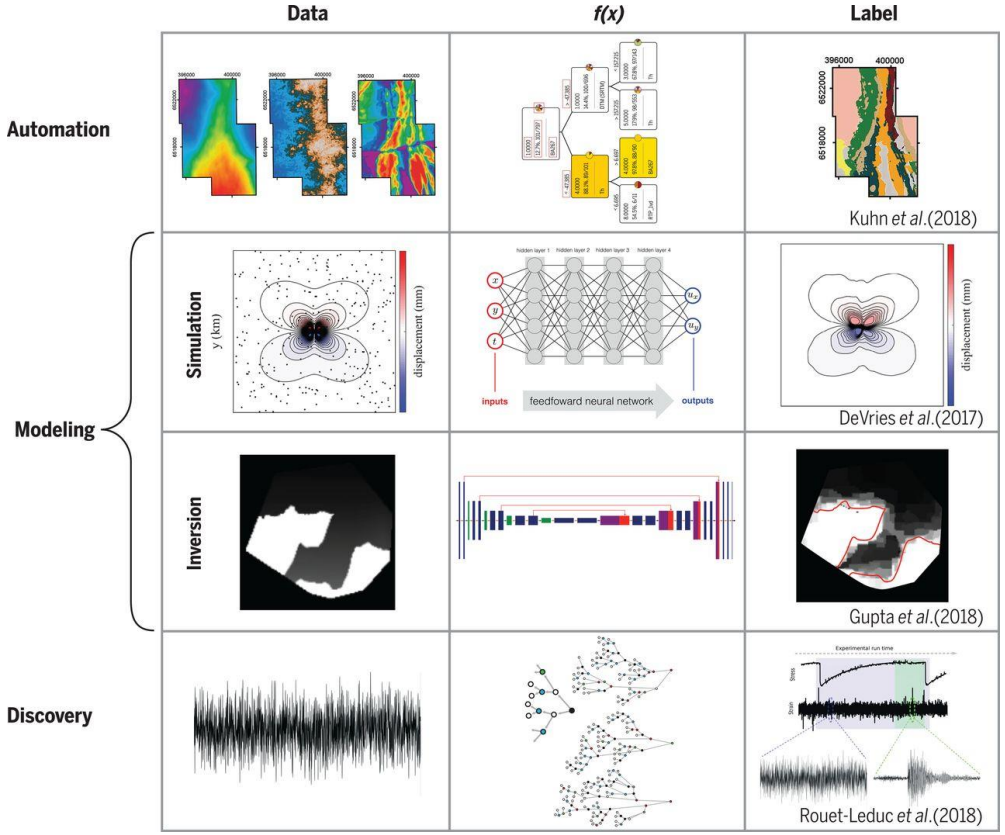


https://govinsider.asia/intl-en/article/cauayan-graffiquo-how-a-philippines-city-uses-digital-twins-for-disaster-recovery

AI and Machine Learning

Adopting machine-learning techniques is important for extracting information and for understanding the increasing amount of complex data collected in the geosciences.

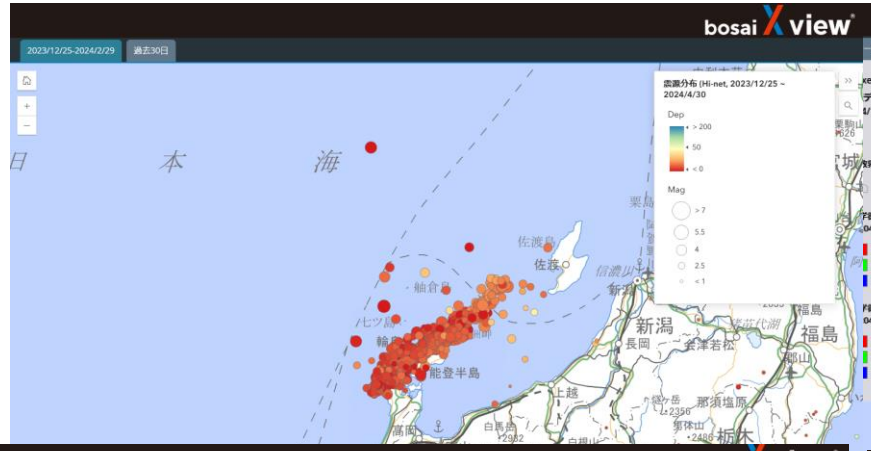


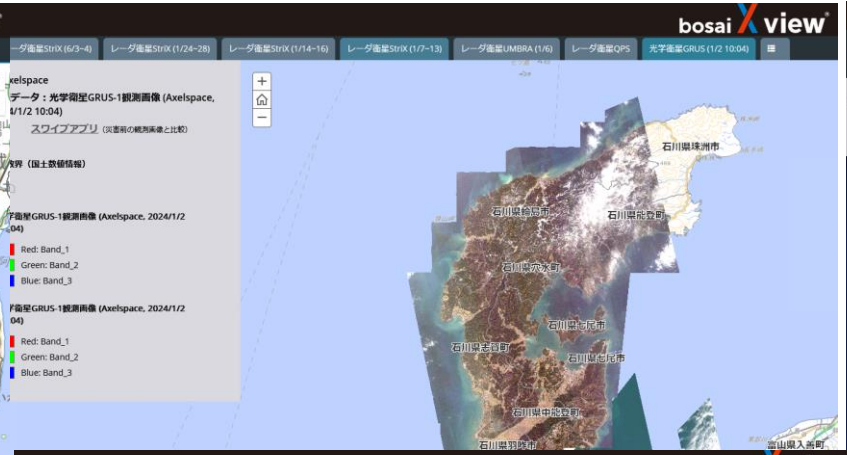


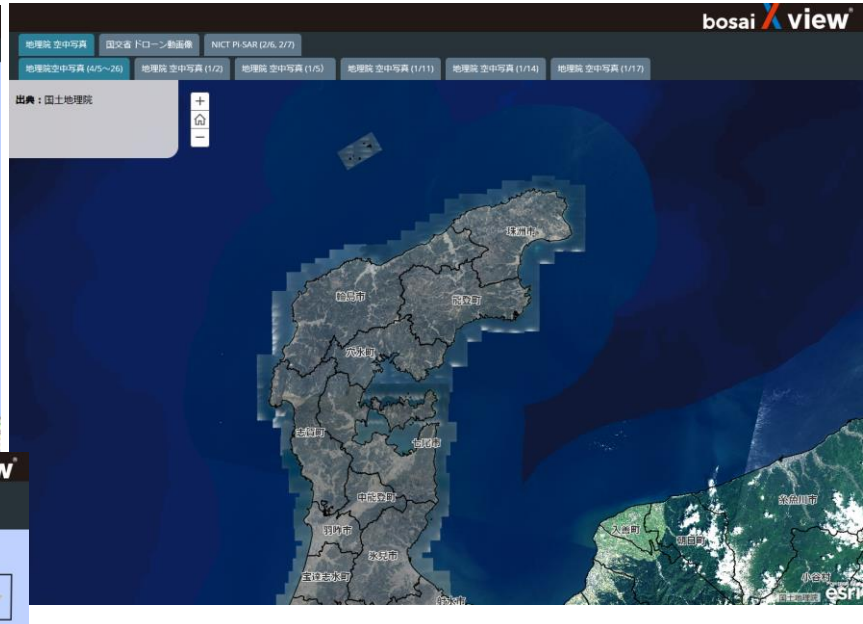
https://www.science.org/doi/full/10.1126/science.aau0323

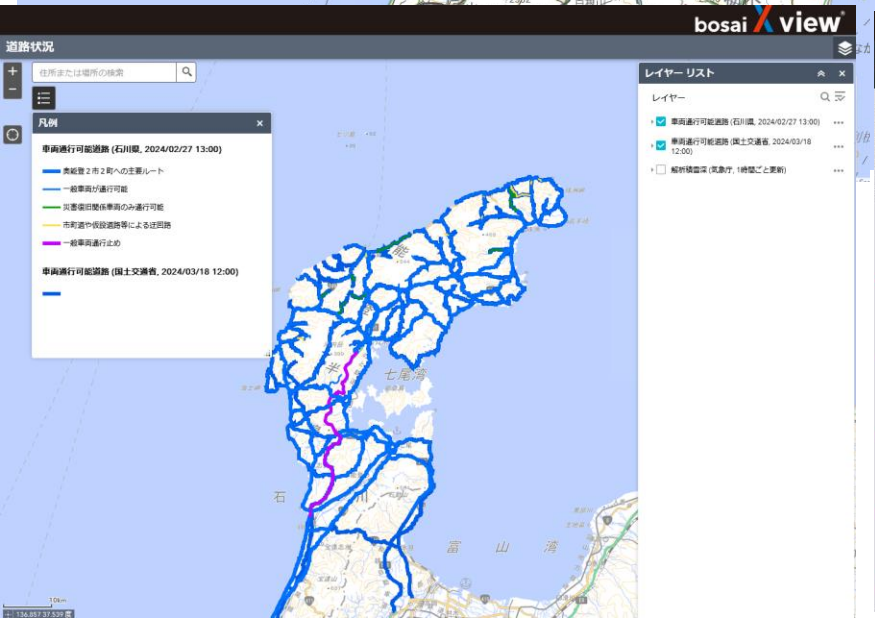
DX (Digital Transformation)

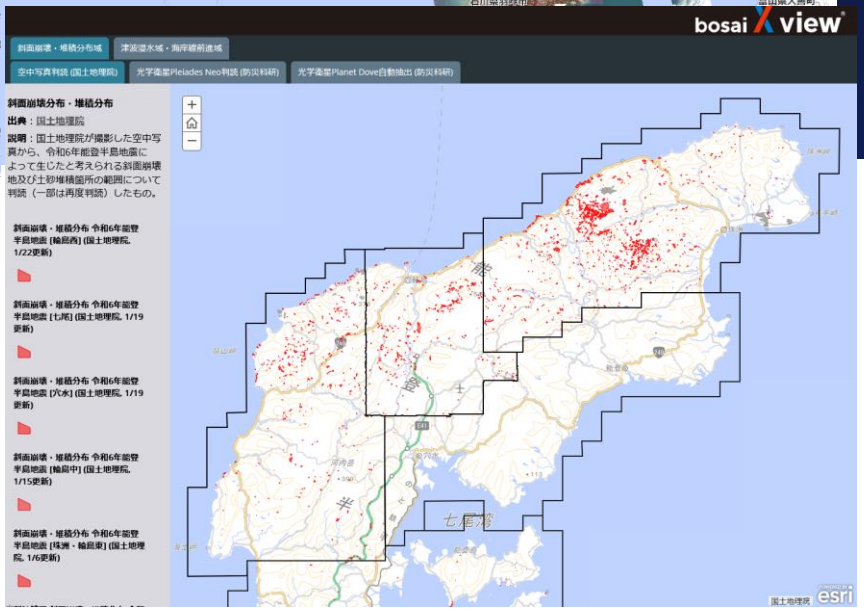
bosai X view (NIED): overlay various information in real-time
Example for the 2024 Noto earthquake











e-ASIA programs

- In light of the increasing frequency and severity of natural disasters, such as earthquakes, volcanic eruptions, or floods, innovative approaches to disaster risk reduction and management are crucial.
- Emerging technologies offer promising solutions to enhance our preparedness and response. Proposals for joint research partnerships to explore these and other innovative technologies are expected.
- By combining expertise and resources across borders, we can develop and implement cutting-edge solutions to mitigate the impact of natural hazards, safeguard infrastructure, and protect lives.
- This collaborative effort aims to advance our understanding and management of disaster risks on a global scale.

e-ASIA past programs

“Development of Information Gathering and Utilization Systems using Small UAV for Disaster Risk Assessment, Monitoring and Response”

August 2016 - March 2020, Japan + Philippine +Vietnam + Indonesia

“Monitoring and prediction of extreme weather using lightning detection network and micro-satellites”

August 2016 - March 2020, Japan+ Philippine + Indonesia

“Informational system for management of flood and land slide disaster areas using a distributed heterogeneous robotic team”

April 2019 - March 2022, Japan + Russia + Thailand

“Establishment of a Landslide Monitoring and Prediction System”

April 2019 - March 2023, Japan + Thailand + Vietnam

Towards Digitalization and Data-Driven Weather Forecasting for Disaster Risk Reduction and Management

Marcelino Q. Villafuerte II

Department of Science and Technology – Philippine Atmospheric, Geophysical and Astronomical Services Administration

E-Asia Call Development Workshop in Disaster Risk Reduction and Management
10 September 2024

WorldRiskReport 2023

Focus: Diversity

Rank	Country	WorldRiskIndex
1.	Philippines	46.86
2.	Indonesia	43.50
3.	India	41.52
4.	Mexico	38.17
5.	Colombia	37.64
6.	Myanmar	36.16
7.	Mozambique	34.61
8.	Russian Federation	28.20
9.	Bangladesh	27.29
10.	China	27.10
11.	Pakistan	26.45
12.	Papua New Guinea	26.30
13.	Peru	25.55
14.	Somalia	25.09
15.	Yemen	24.39
15.	Viet Nam	24.39

The Concept of the WorldRiskReport

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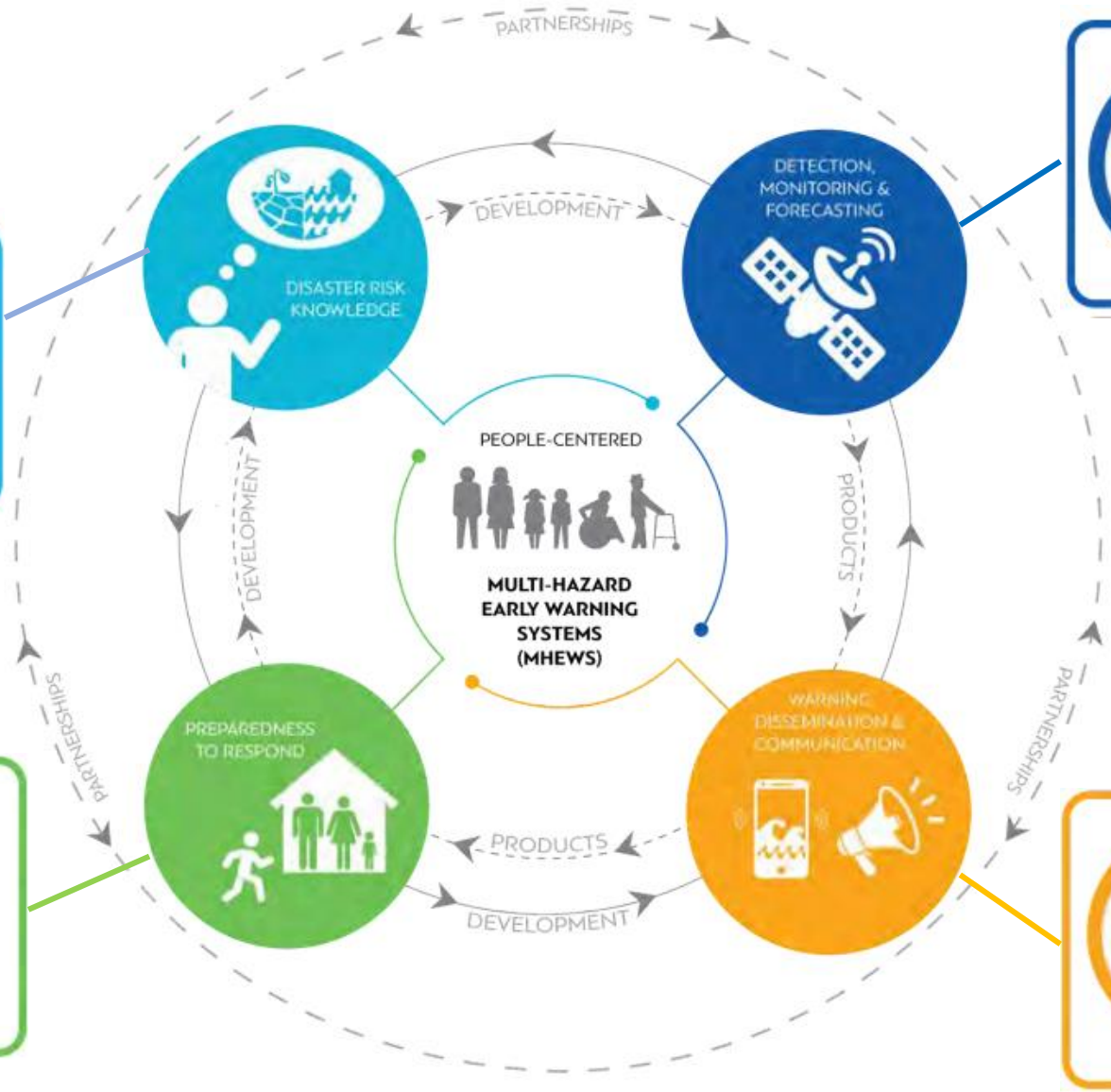
The Weather and Climate Authority

Payong PAGASA

MHEWS Components

UN Executive Action Plan 2023-2027



Disaster risk knowledge

Systematically collect data and undertake risk assessments

- Are the hazards and the vulnerabilities well known by the communities?
- What are the patterns and trends in these factors?
- Are risk maps and data widely available?

Detection, observations, monitoring, analysis and forecasting of hazards

Develop hazard monitoring and early warning services

- Are the right parameters being monitored?
- Is there a sound scientific basis for making forecasts?
- Can accurate and timely warnings be generated?

Preparedness and response capabilities

Build national and community response capabilities

- Are response plans up to date and tested?
- Are local capacities and knowledge made use of?
- Are people preapred and ready to react to warnings?

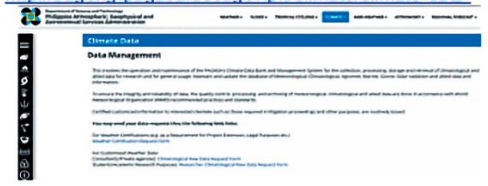
Warning dissemination and communication

Communicate risk information and early warnings

- Do warnings reach all of those at risk?
- Are the risks and warnings understood?
- Is the warning information clear and usable?

Philippines' Initiative: Online Data Dissemination through the *ClimDatPh*

Step 1: Access the webpage of 'ClimDatPh' through the PAGASA website:
http://bagong.pagasa.dost.gov.ph/climate/climate-data



Step 2: Choose a web link based on data user's needs

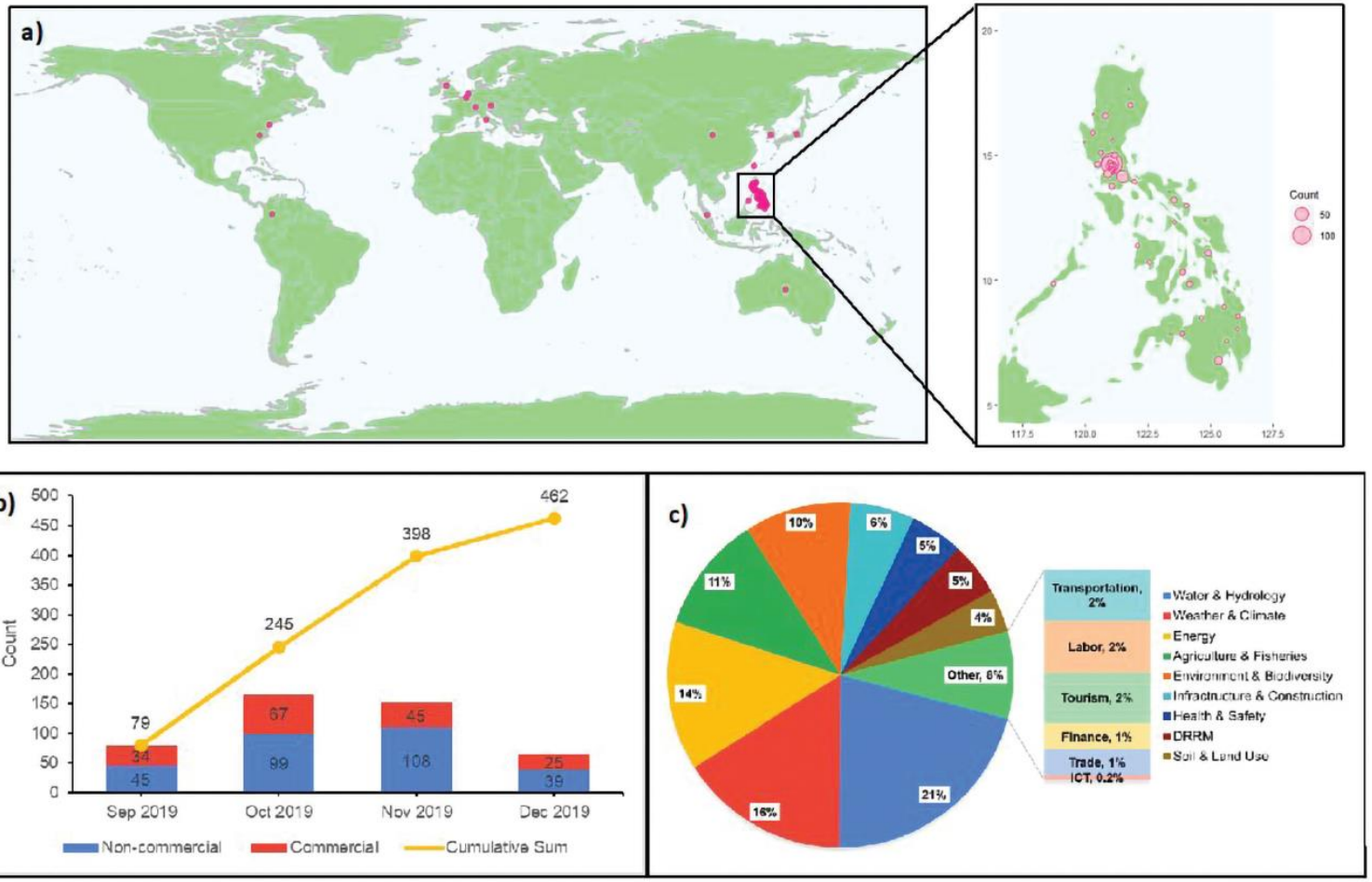
You may send your data requests thru the following Web links:

For Weather Certifications (e.g. as a Requirement for Project Extension, Legal Purposes etc.)
Weather Certification Request Form

For Customized Weather Data:
Consultants/Private Agencies: Climatological Raw Data Request Form
Students/Academic Research Purposes: Researcher Climatological Raw Data Request Form

Step 3: Input personal information, request information, inclusive dates, and purpose of use.

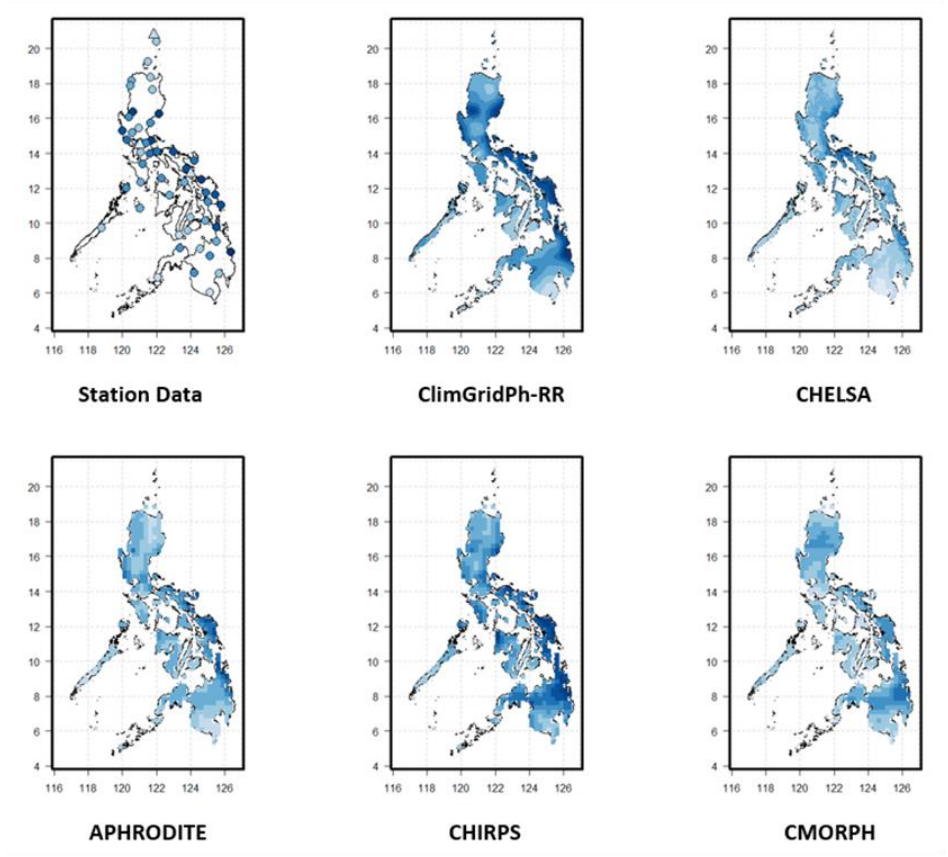
Step 4: Submit data request. Requested data will be available within 72 hours after submitting the validation requirements and will be sent to registered email address.



Source: Villafuerte et al., 2021

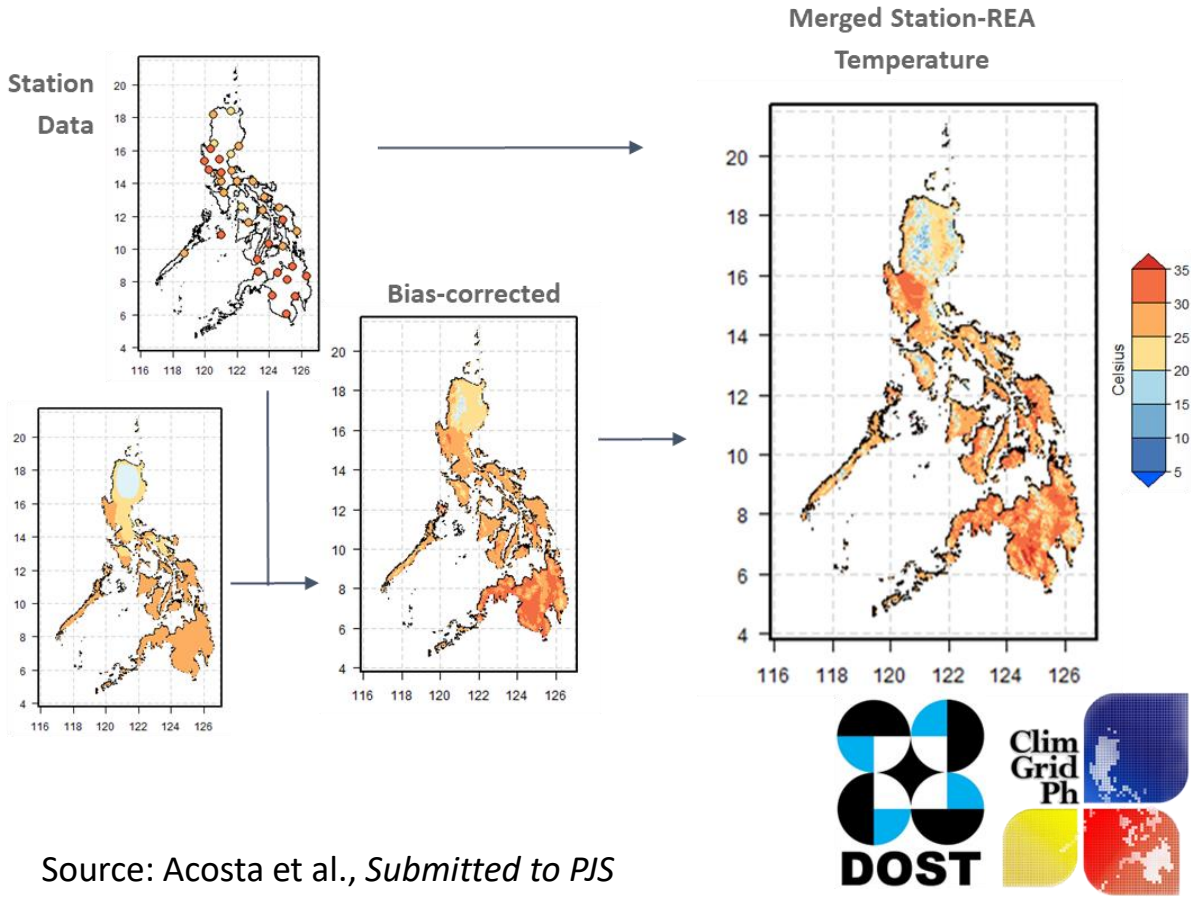
Philippines' Initiative: Development of high-resolution gridded climate data

Gridded Rainfall data @1km



Source: Estrebillo et al., *Submitted to Sci. Data*

Gridded Temperature data @1km



Source: Acosta et al., *Submitted to PJS*

DOST

Clim Grid Ph

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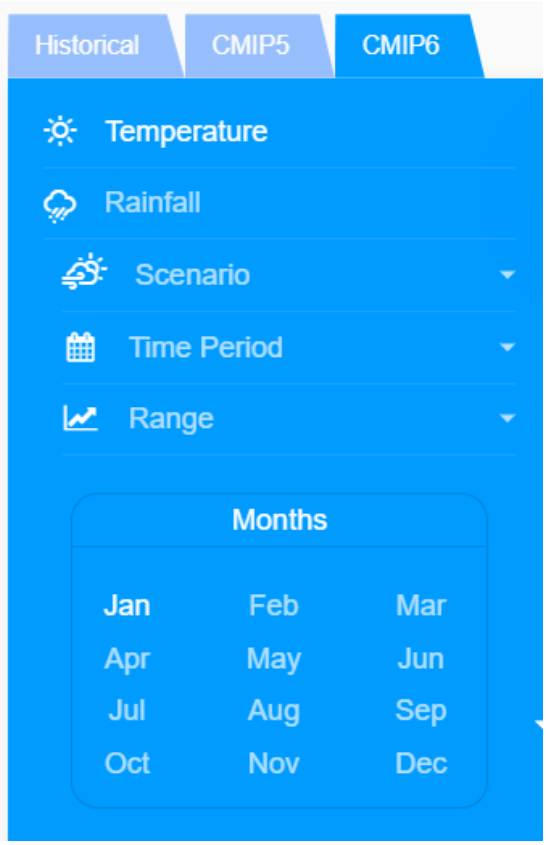
CliMap v2.0



SCAN ME

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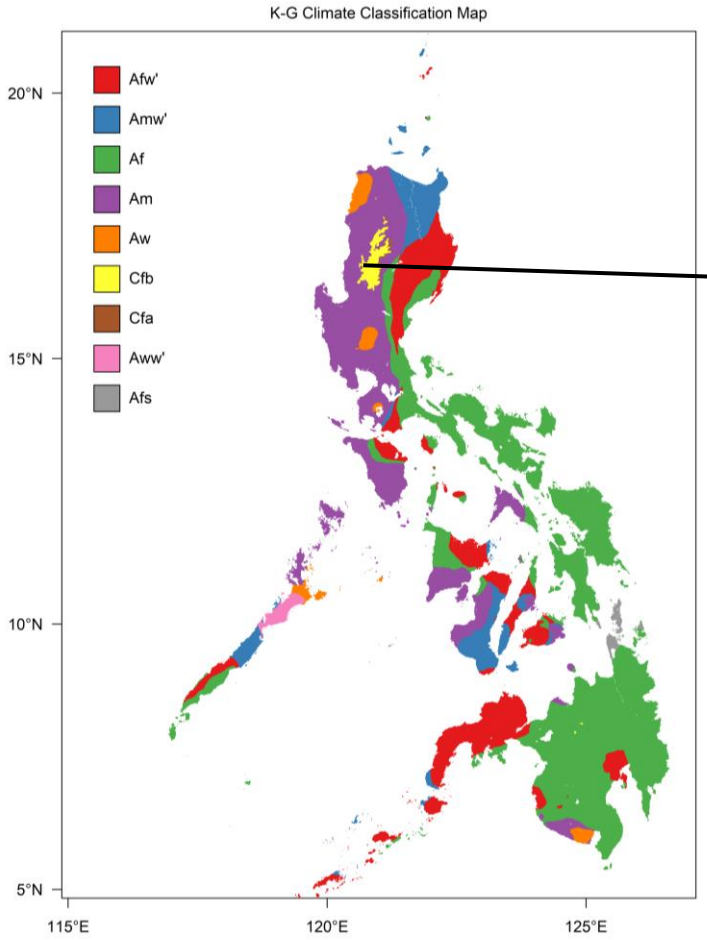

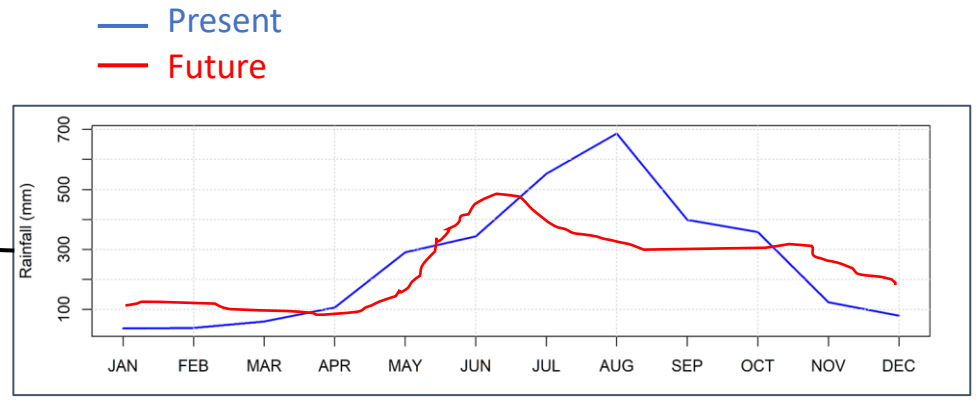

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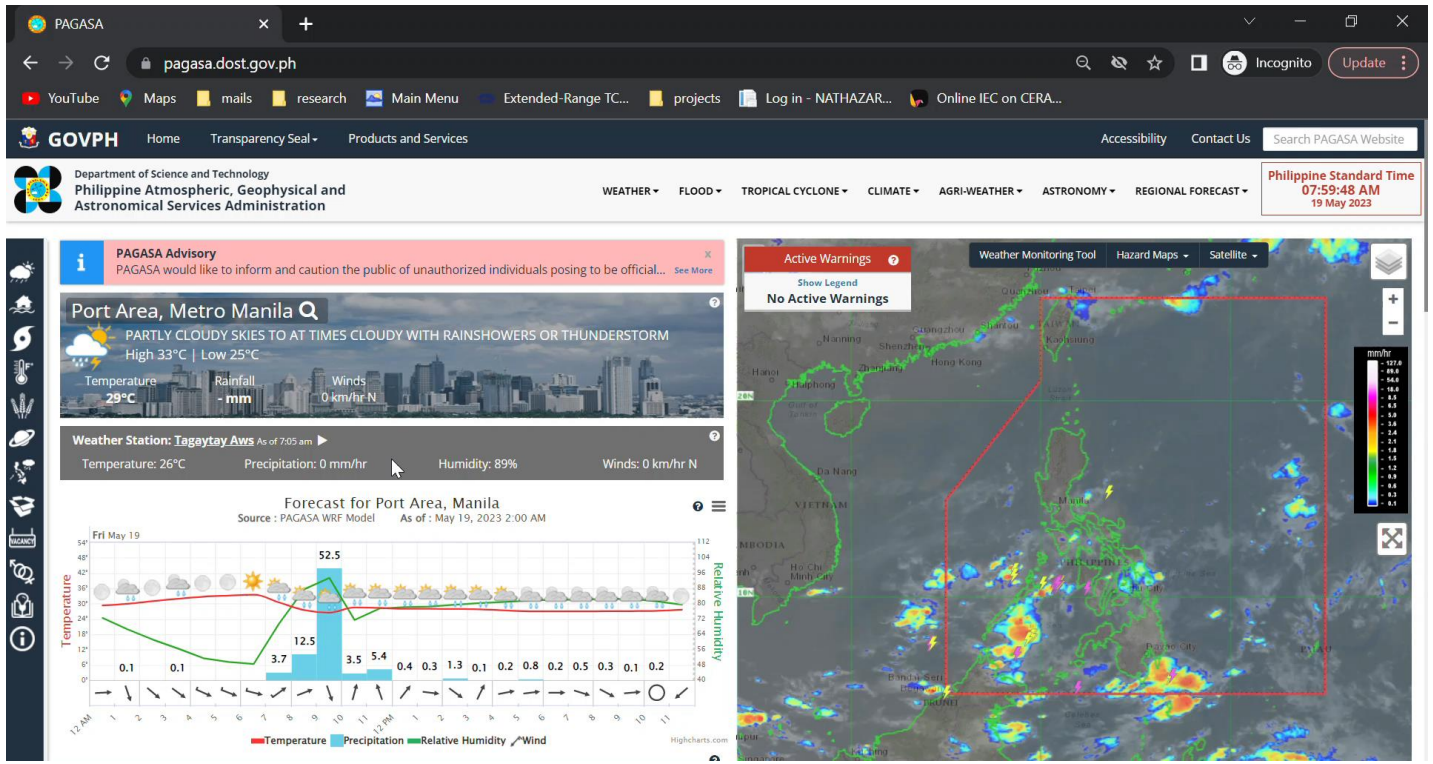
1. How would such projected change in climate could affect crop yields?
2. Are the current agricultural practices still applicable in the future?
3. What possible actions/adjustments can be taken to mitigate the impacts?

Source: Villafuerte et al., *In Prep.*

SatREx



- ✓ Provides near-real-time satellite rainfall estimates observed in the previous 1-, 2-, 3-, and 6-hour, as well as the previous 1-, 2-, 3-, and 5-day rainfall accumulations
- ✓ Translates observed rainfall relative to historical data
- ✓ Indicates areas possible to experience flooding

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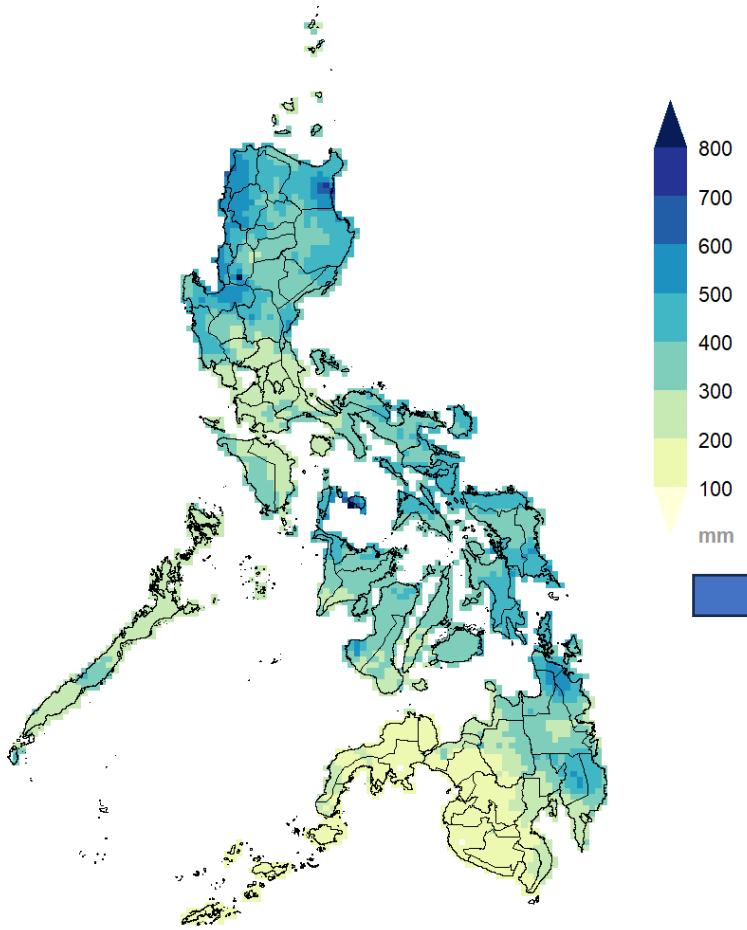
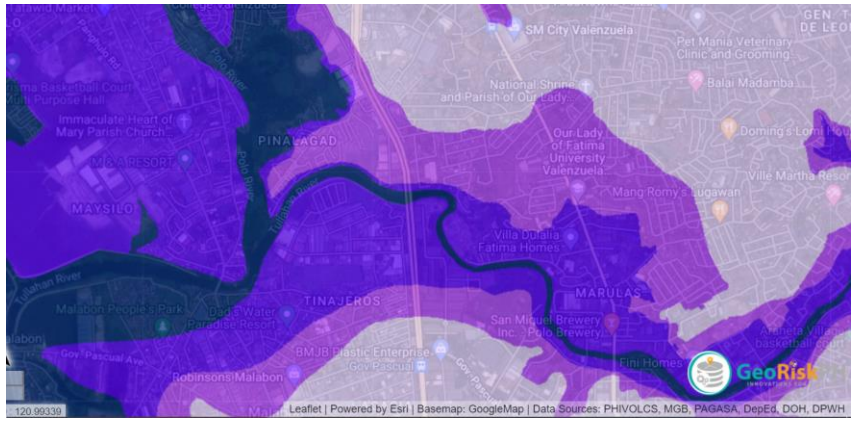
Once-in-20-yr rainfall event

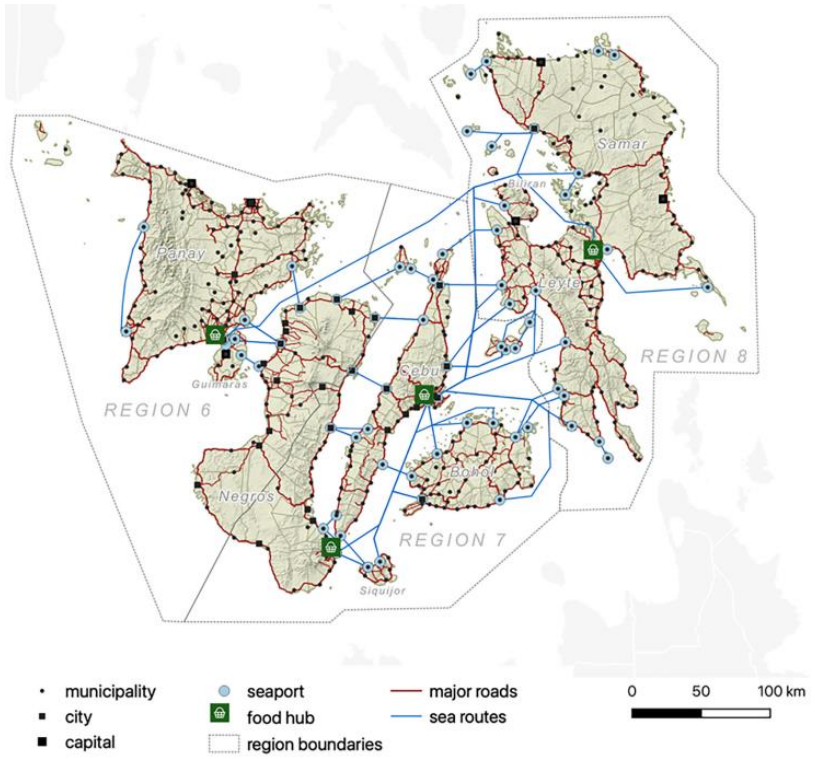


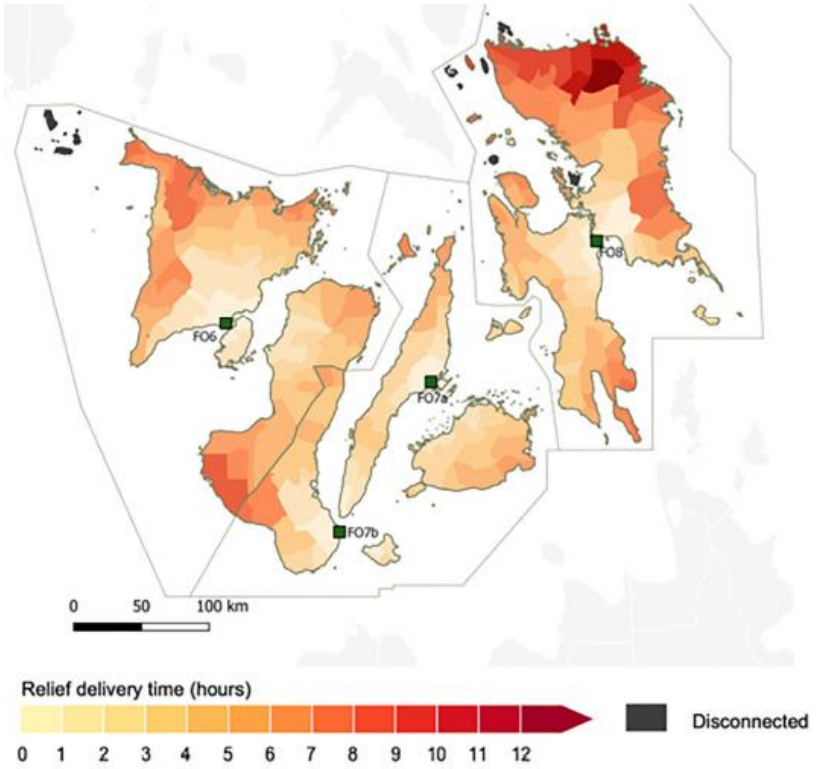
20-yr flood

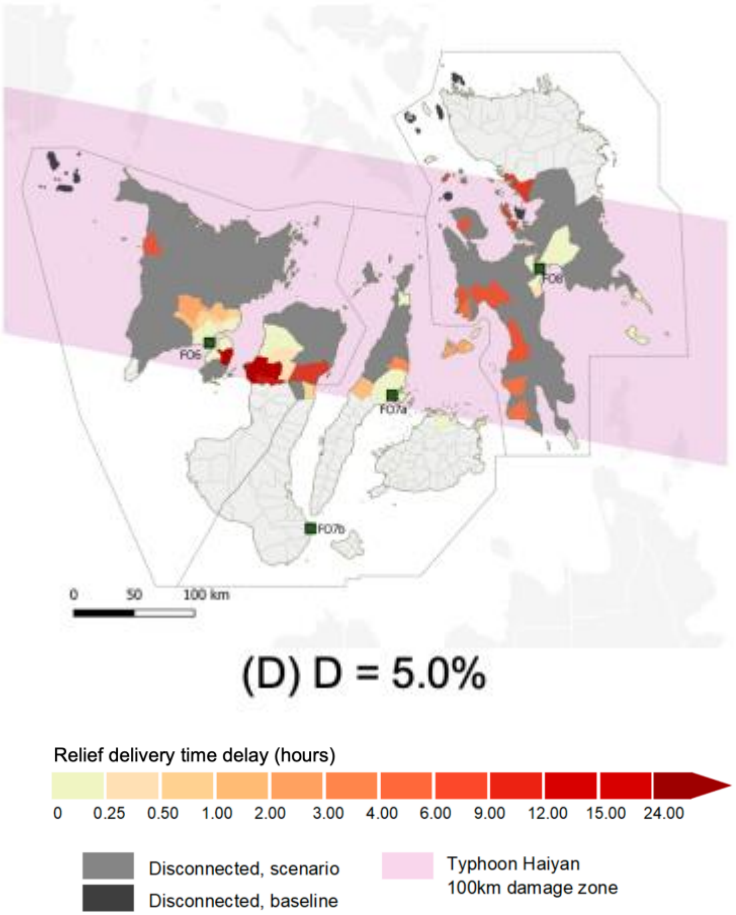


?

1. Can we provide translated rainfall forecasts into flood heights?
2. How flood risks might be affected by the projected change in extreme rainfall (based on SSPs)?
3. How much would SLR affect flooding on the coastal areas?
4. How much further could it be worsened by storm surge?







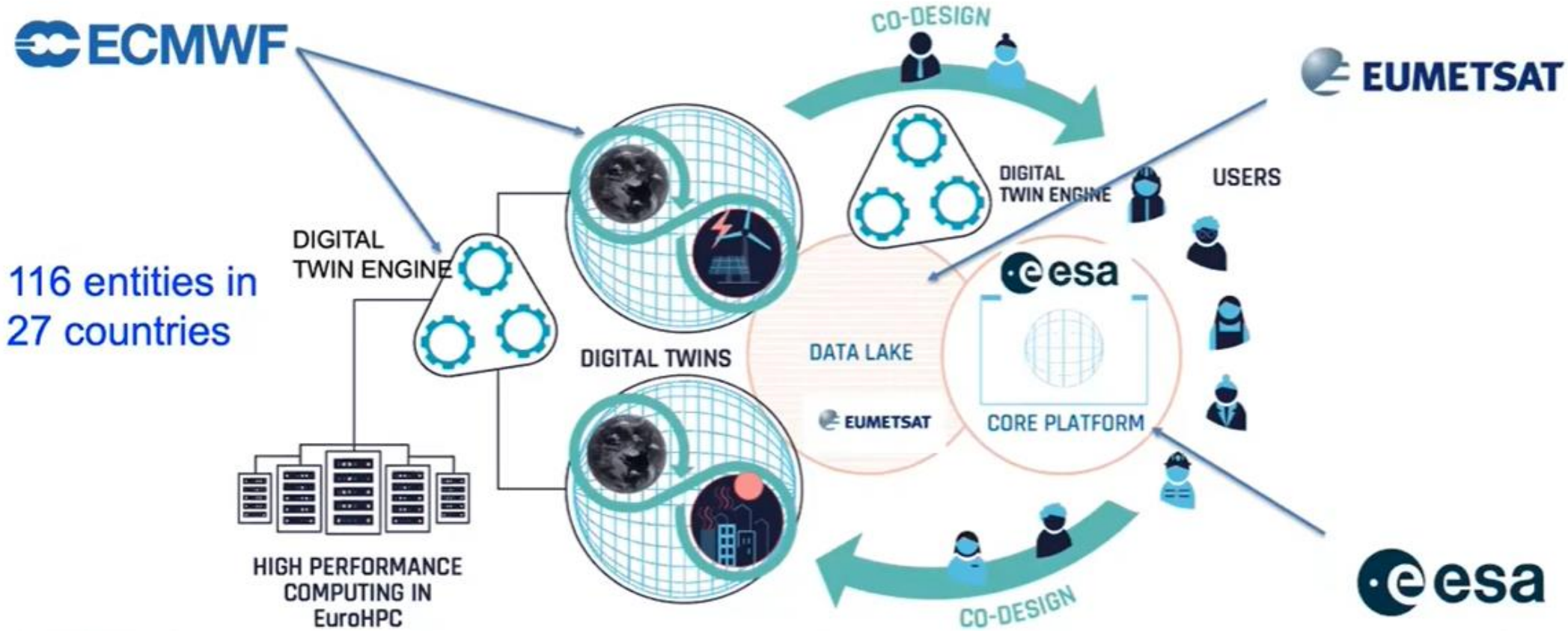
Source: Peralta et al. (2023), PJS

DESTINATION EARTH

Funded by the European Union

implemented by ECMWF esa EUMETSAT

DestinE: a novel information system



Source: Dr. Irina Sandu, EMS Webinar 2024

Thank you! ☺

Contact the Speaker: **Dr. Marcelino Q. Villafuerte II**

Email: mvillafuerte@pagasa.dost.gov.ph

Connect with us:

http://bagong.pagasa.dost.gov.ph/

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RISKSCAPES: EXPLORING RISK THINKING ON FLOOD-PRONE AREAS (CASE STUDY: INDONESIA)

Nurul Sri Rahatiningtyas
Universitas Indonesia (Department of Geography, PPGT, DRRC)
Martin Luther University Halle-Wittenberg Germany
(Department of Geosciences and Geography, ZIRS)
U-INSPIRE Indonesia / U-INSPIRE Alliance
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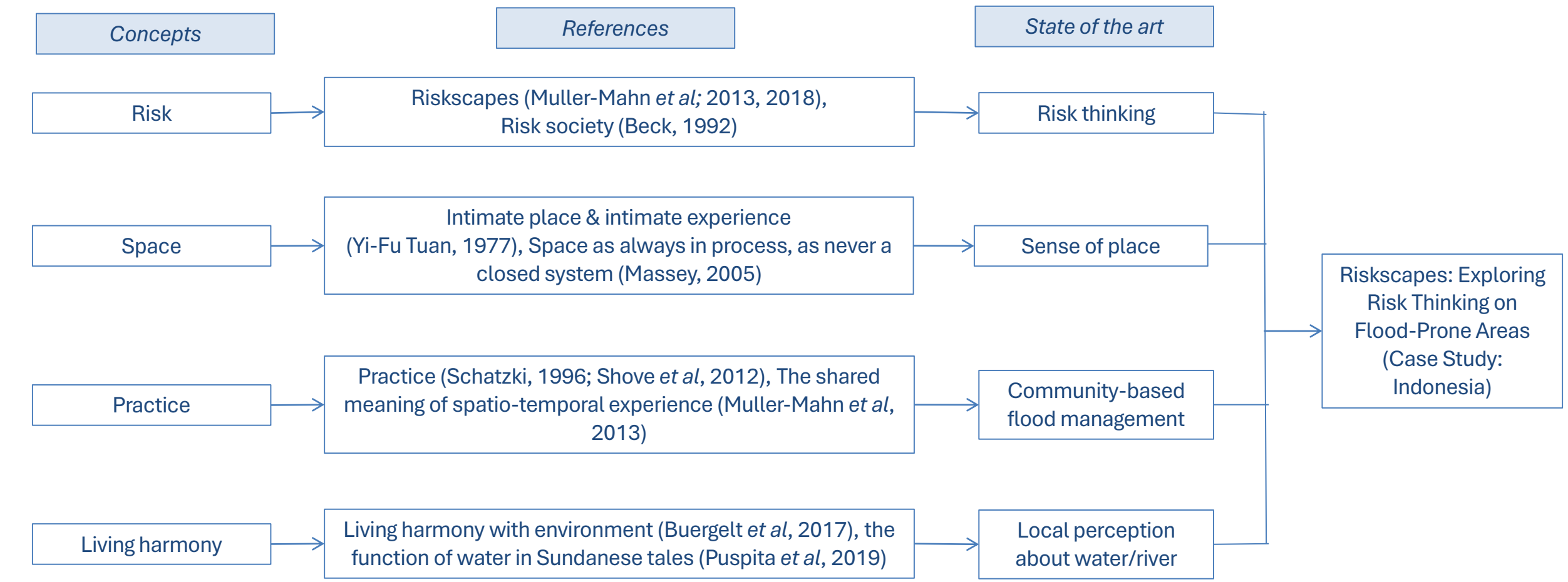
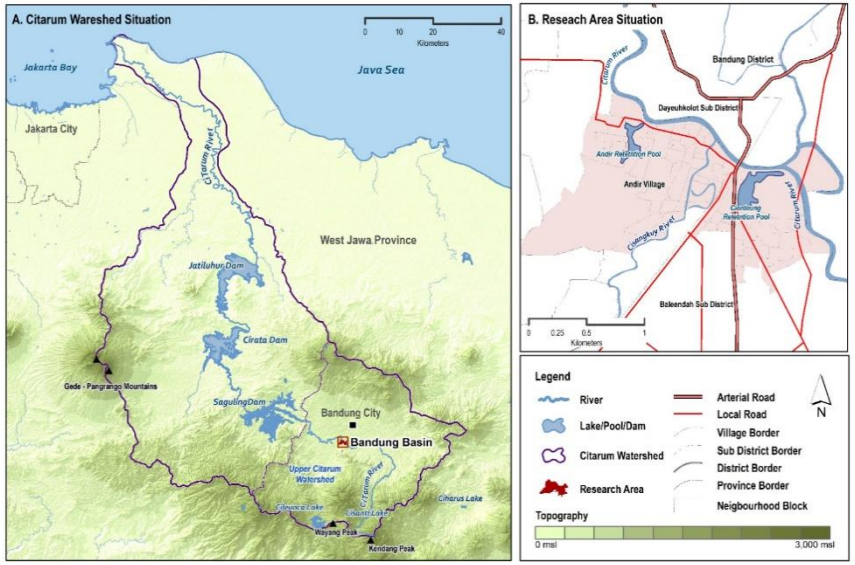
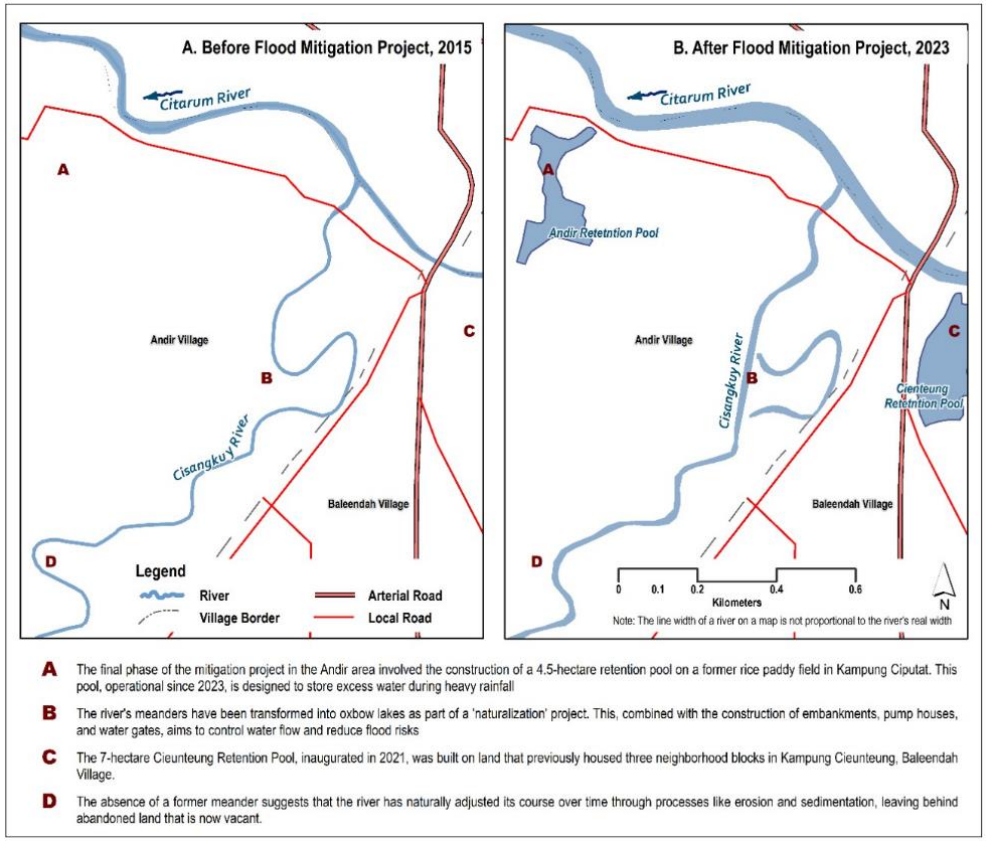




Three major floods in the Bandung Basin (Source: BBWS, 2023)

Study Area



The study aims to explore risk thinking on flood-prone areas in Indonesia through riskscapes approaches. This study will use risk thinking and riskscapes approach to identify community's strategies to live in flood-prone areas.

Research proposal on Disaster Risk Reduction and Management.

Parwati Sofan, Ph.D (Research Professor)

Group leader for Geoinformatics research

BRIN, Indonesia

Parwati@brin.go.id

Current activities:

- Geoinformatics research for disaster mitigation and environmental monitoring

Research Topic:

Geo-Artificial Intelligence (GEO-AI) for hydrometeorological disaster Early Warning System (Flood, drought and forest fire)