Moganshan Dialog: Geospatial I.D.E.A.S to Accelerate SDGs

GeoNow 2025, Deqing, China

ESCAP
Economic and Social Commission for Asia and the Pacific

Bridging the Science and Digital Innovation Divide through GeoAI: Use Cases for Disaster Risk Reduction

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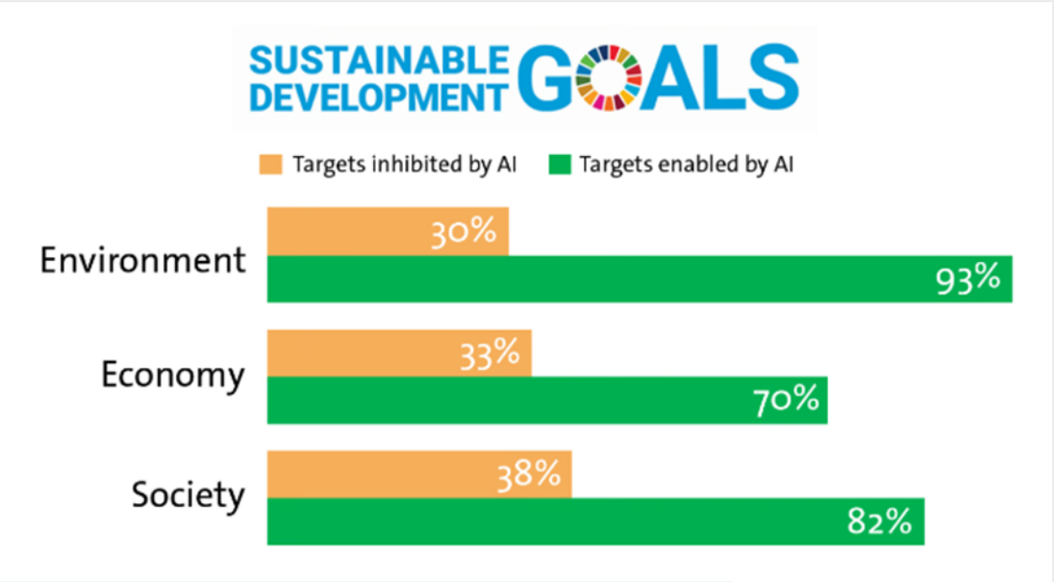
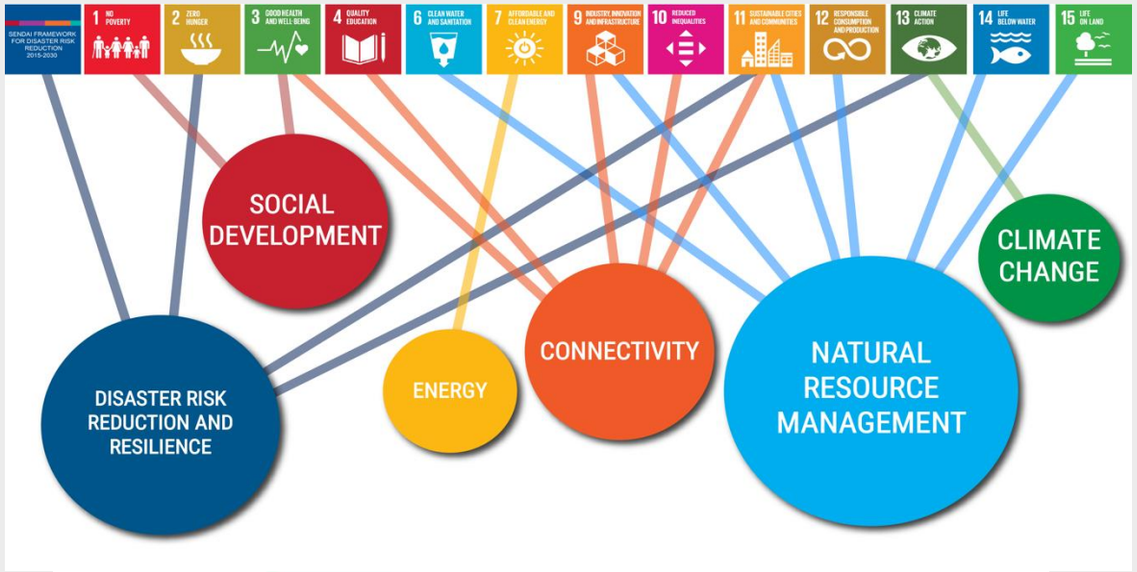
Our Mandates: Global

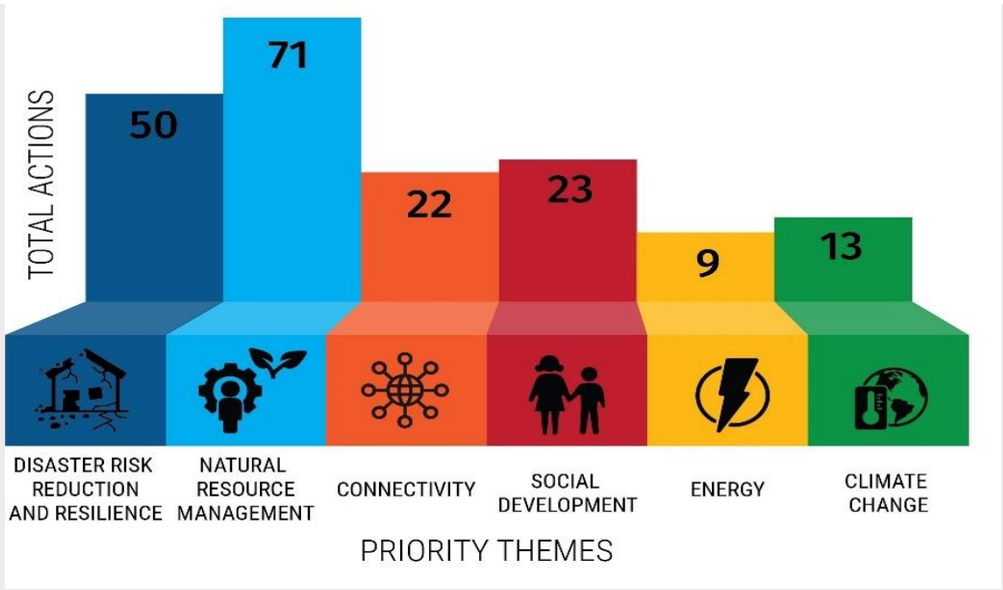


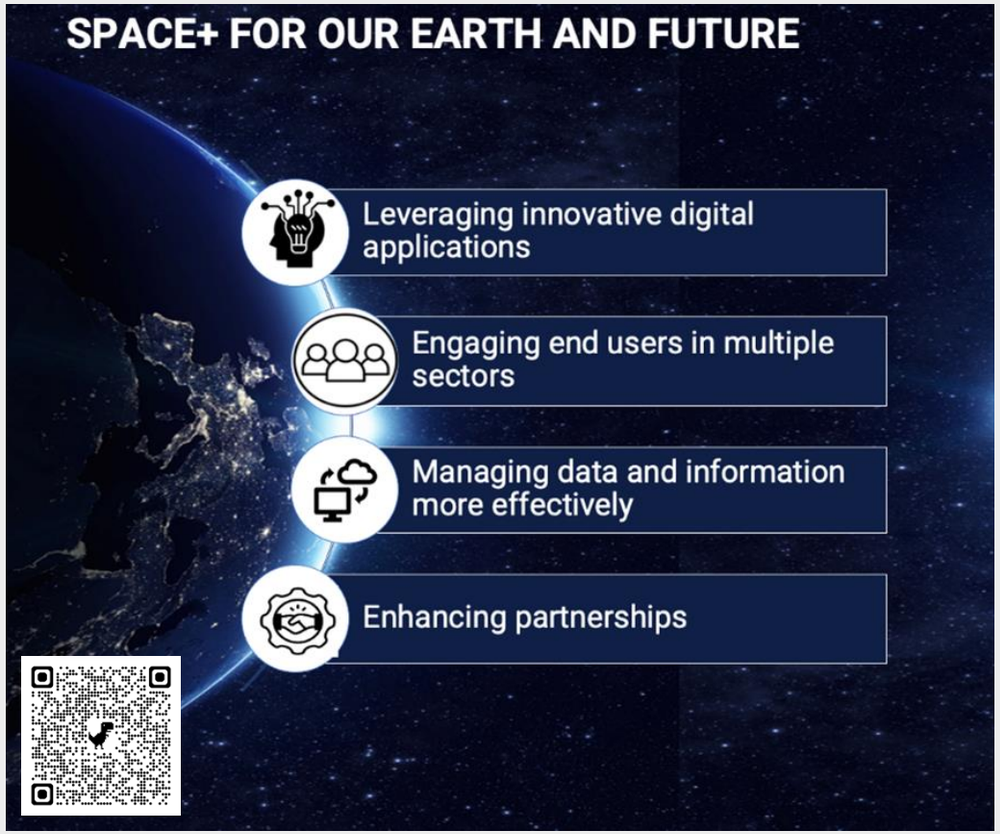
AI and SDGs

- In the Pact for the Future (Annex on **Global Digital Compact)**, AI is recognized as a transformative tool capable of accelerating progress toward the Sustainable Development Goals (SDGs).
- The **Declaration on Future Generations**, underscores the transformative potential of AI in achieving the SDGs.
- UN Resolution (A/RES/78/311): Enhancing international cooperation on **capacity-building of artificial intelligence.**
- The UN Resolution (A/RES/79/322): Role of artificial intelligence in **creating new opportunities** for sustainable development in Central Asia

Asia-Pacific Plan of Action on Space Applications for Sustainable Development (2018–2030)







The Fourth Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific

Jakarta, 26 October 2022

Supporting Countries by Leveraging AI and Digital Innovations in Geospatial Applications

Geospatial Practices Database and Dashboard

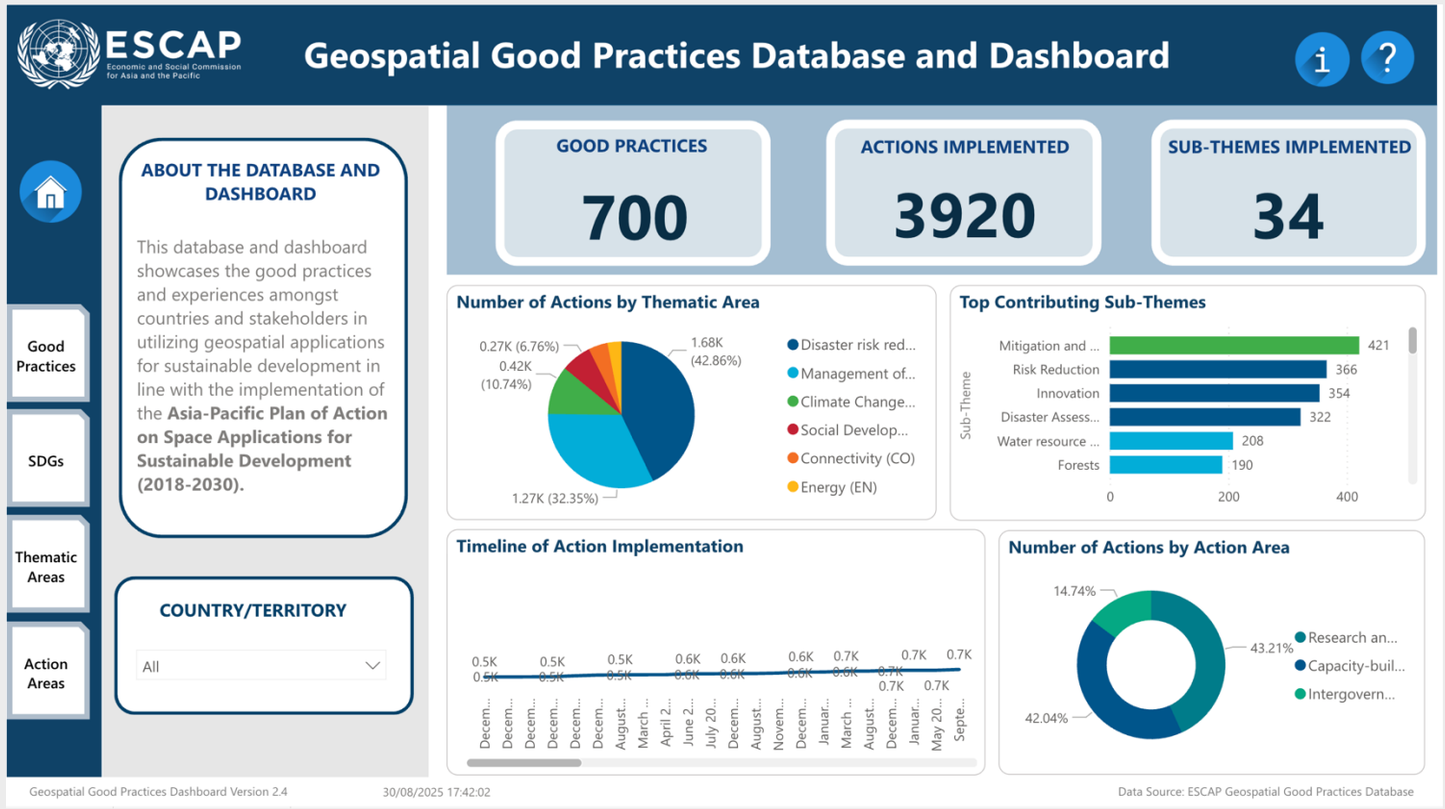
Sharing of implementation progress towards the Plan of Action

Easy-to-use storage and sharing of good practices from around the region

Allowing for data to be **uploaded and shared** via a portal **at any time**

It enables users to…

- **Showcase and share** good practices
- **Be inspired** by innovative examples
- **Seek collaboration**



Collect, **store**, and **share good practices** on space applications in support of sustainable development

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Seize the opportunities

GeoApps

- AI-powered tool
- Assists readers to query and generate information about geospatial practices across the Asia-Pacific
- Synthesizes information from the Compendium and other knowledge products

Visit **http://geo-apps.info** to learn more on how geospatial applications contribute to sustainable development!

Geospatial Practices for Sustainable Development: Compendium series

Disaster risk reduction and resilience

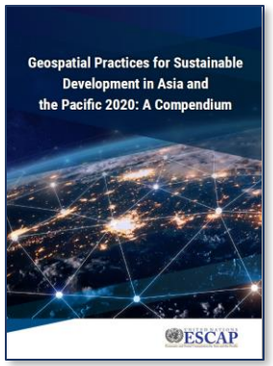
Management of natural resources

Connectivity

Energy

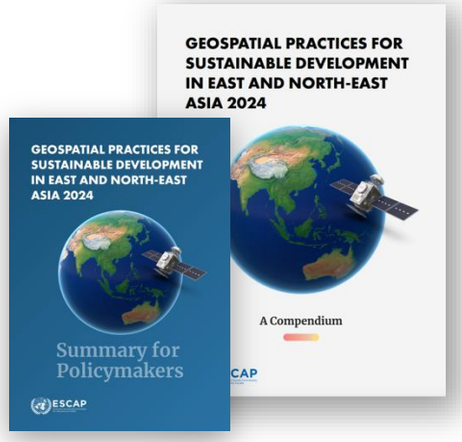
Social development

Climate change

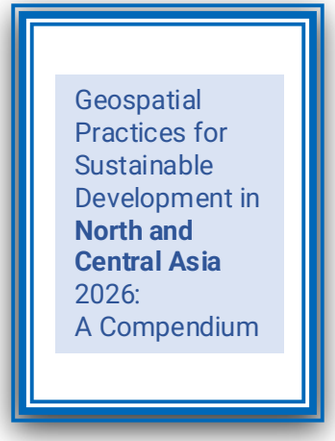


2020 edition

2022 edition



2024 edition



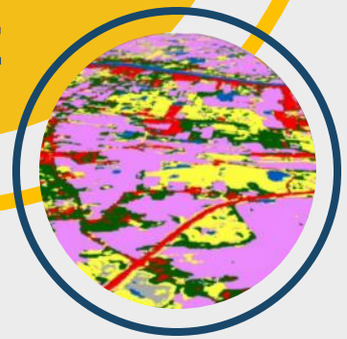
2026 edition (forthcoming)

The Compendium serves as a **benchmark** for the region's efforts to **implement the Plan of Action**, fostering knowledge-sharing, peer learning, and innovative solutions for sustainable development.

SATGPT

- Flooding has affected **over 3 billion people** and caused over $**900 billion in losses** in the past 30 years in the **Asia and the Pacific**.
- **SatGPT is a flood mapping expert accessible to every user in the region.**

Historical flood maps in less than 1 minute at a minimal cost



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Ethical AI

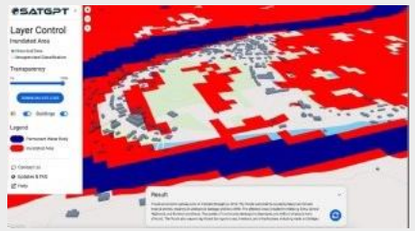
Participatory AI Modelling

End User

Customized UI

ChatGPT Query to Generate Code

Computing on GEE



Infrastructure

SATGPT

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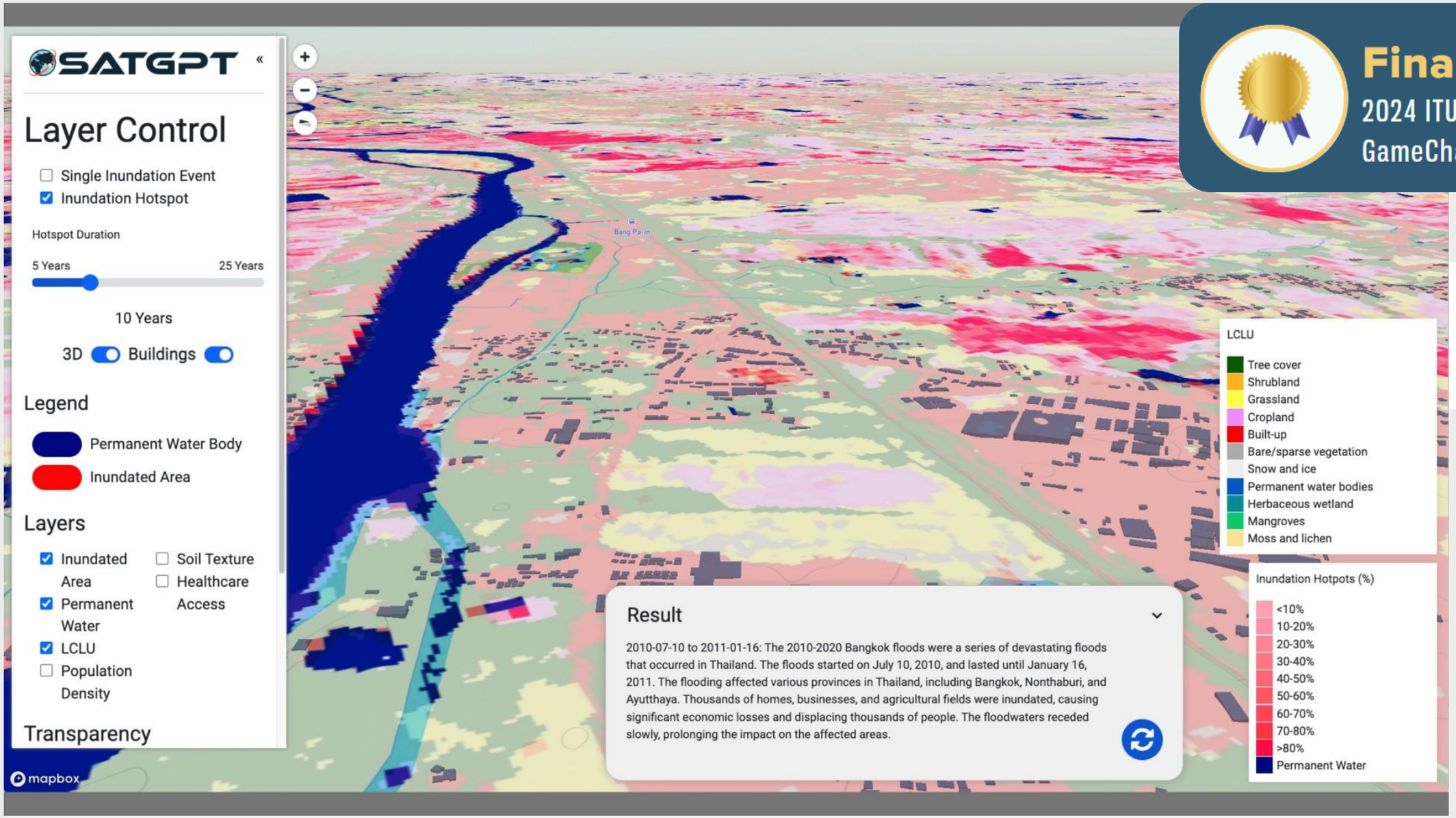
Seize the opportunities

GeoAI: Use Cases for Disaster Risk Reduction



Finalist
2024 ITU SDG Digital GameChangers Awards

SDG Digital

Assessing Economic Losses from Inundation in Karawang, Indonesia: A Multi-Platform Geospatial Analysis

Group 4:
Parwati, Marina, Jack, Koko, Rendi, Putri

INASA
INDONESIAN SPACE AGENCY

BRIN
BADAN RISET DAN INOVASI NASIONAL

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Total Losses (Rp)

2.8 trillion

2.3 T	362.8 B	42 B	35 B	22.8 B
Cropland	Wetland	Built-up	Forest	Mangrove

Introduction

Inundation is a recurrent issue in Karawang, Indonesia, causing significant socioeconomic and environmental disruptions. The region's vulnerability is heightened by its reliance on agriculture, infrastructure, and ecosystems. This study aims to quantify the extent and economic impact of the recent inundation using a geospatial analysis approach. By leveraging SATGPT, Google Earth Engine (GEE), and QGIS, we identify high-risk zones and estimate associated financial losses, contributing to better disaster risk management strategies.

Method

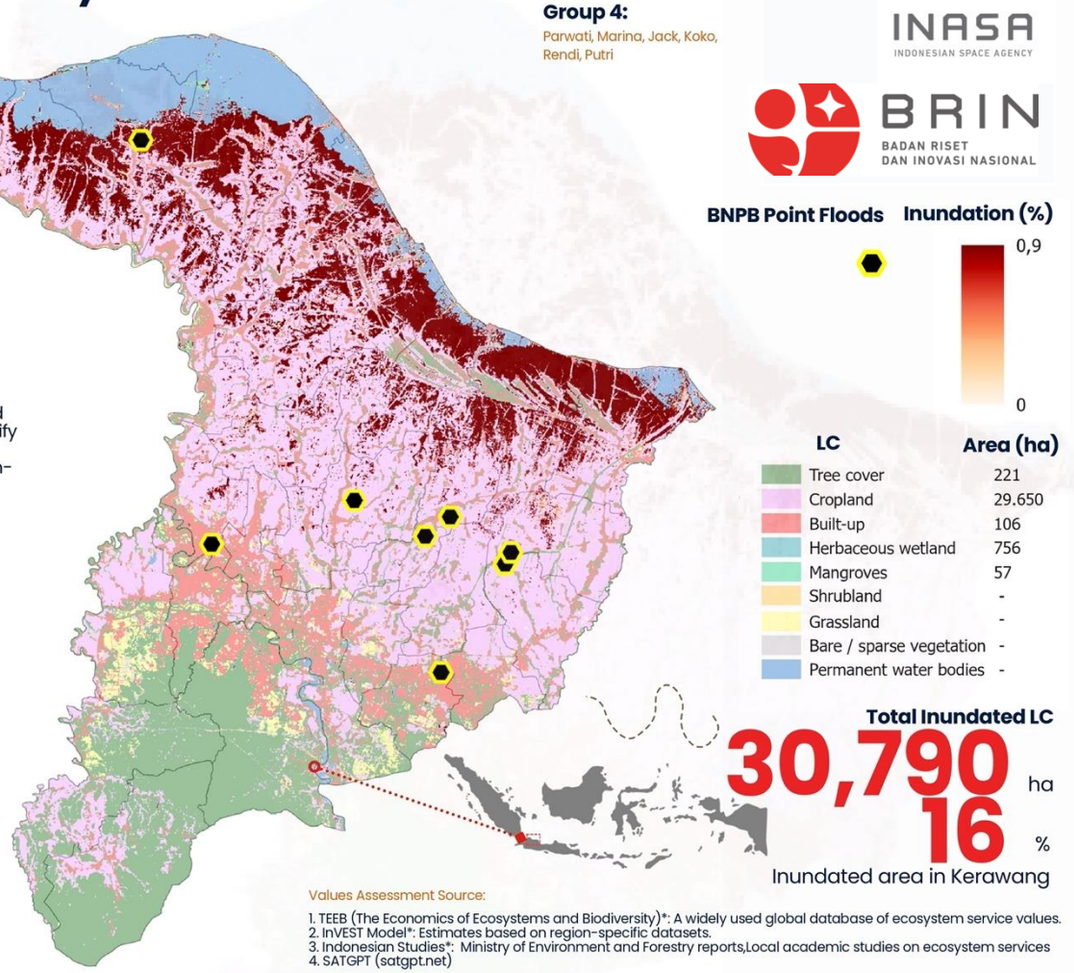
The study used **SATGPT** for initial inundation mapping, **GEE** for validation, and **QGIS** for detailed spatial and economic analysis. Affected land-use categories were quantified, and economic losses were estimated using standardized valuation metrics. Results were validated with **BNPB** data and visualized via **QGISWEB**.

Result

The inundation affected **30,790 hectares**, with cropland suffering the most significant damage. Total losses reached **Rp2,835,440,000,000**, affecting croplands, forests, wetlands, built-up areas, and mangroves. The model showed strong agreement with **BNPB data**, demonstrating its accuracy.

Discussion

The study underscores the value of geospatial tools in disaster analysis. **Croplands were the most vulnerable, highlighting the need for improved agricultural resilience**. Ecosystem restoration, like mangroves and wetlands, could mitigate future flood risks. The methodology offers a replicable framework for inundation-prone areas.



Values Assessment Source:

1. TEEB (The Economics of Ecosystems and Biodiversity)*: A widely used global database of ecosystem service values.
2. InVEST Model*: Estimates based on region-specific datasets.
3. Indonesian Studies*: Ministry of Environment and Forestry reports,Local academic studies on ecosystem services
4. SATGPT (satgpt.net)

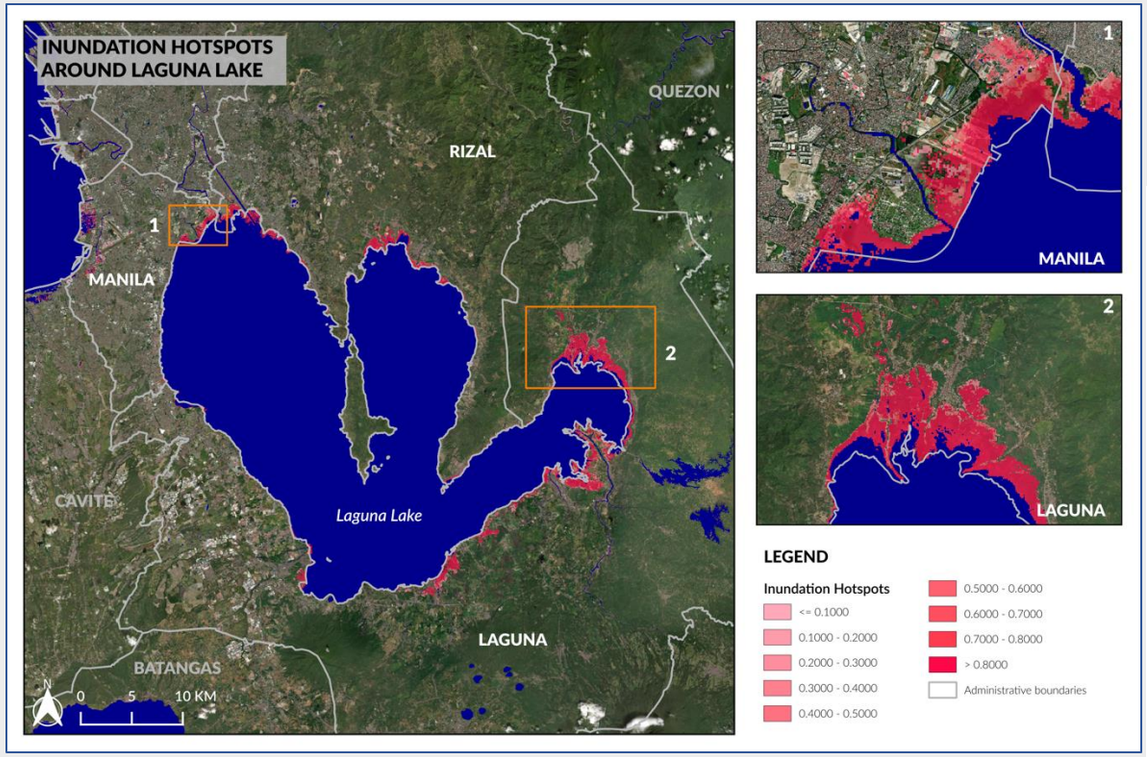
This case study was developed during the training hosted in November 2024 in Jakarta, Indonesia. Participants proceeded to publish this as a conference paper, which showcased **the use of SatGPT with socioeconomic data for estimating economic losses**.

Flood Impact Analysis: Karawang, Indonesia

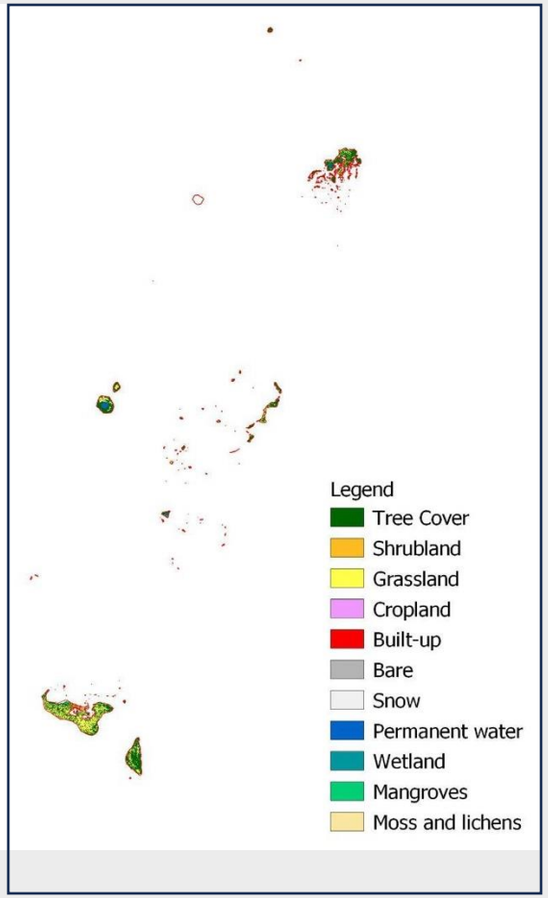
0.1109/AGERS65212.2024.10932922

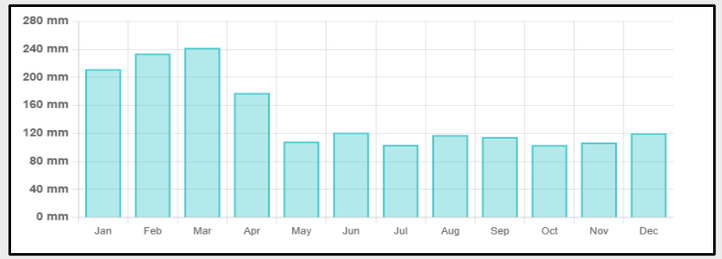
2024 Best Paper Award of the IEEE Aerospace & Electronics Systems and Geoscience and Remote Sensing Joint Chapter

SatGPT Case Studies



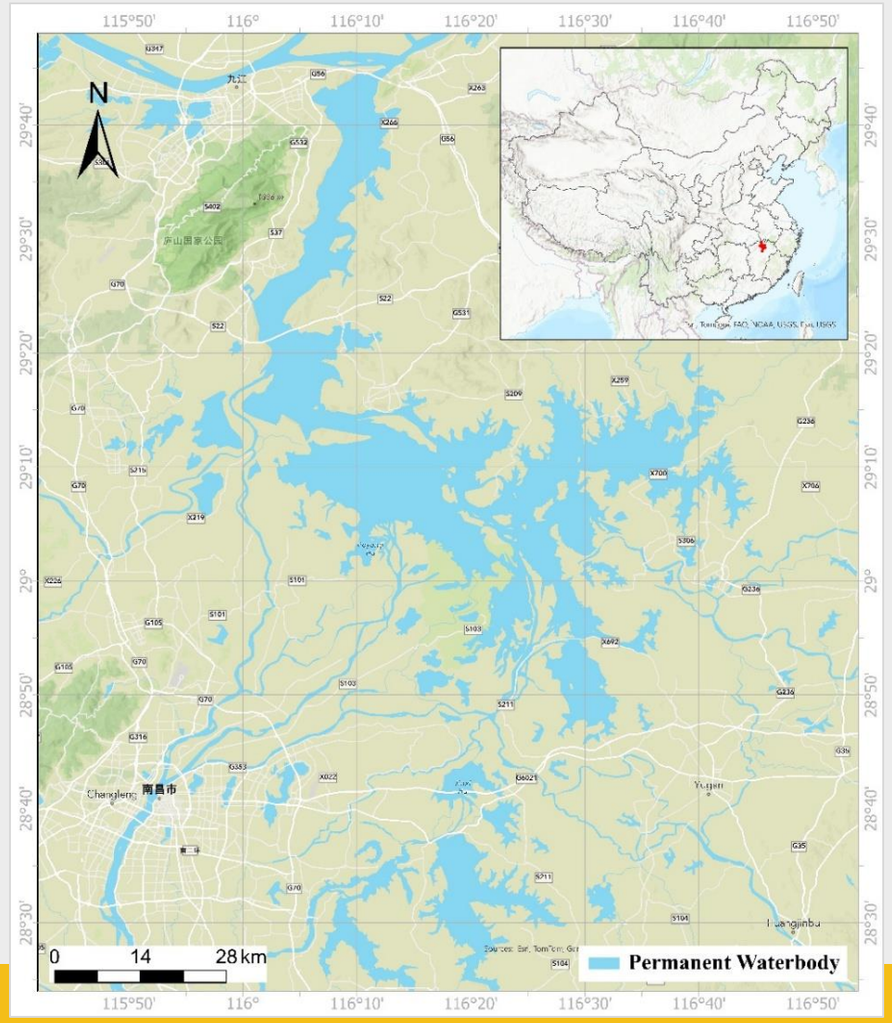
▲ Mapping inundation hotspots around **Laguna Lake (2010–2020)** with SatGPT **helps inform spatial planning and infrastructure development.**

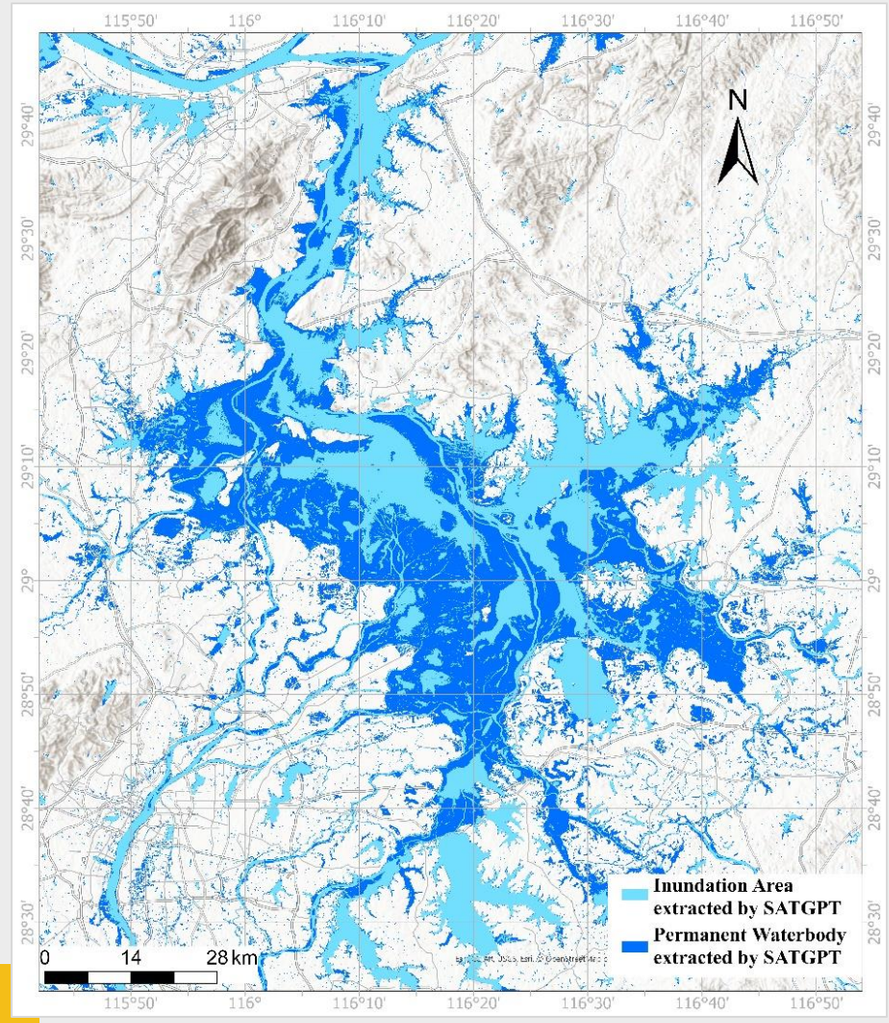




Effect of Flooding in Land Use and Land Cover: Laguna Lake, Philippines and Tonga

▲ Using the inundation hotspot generated by SatGPT, **the impact of heavy rainfall events in poorly drained lowland and urban areas can be determined.**

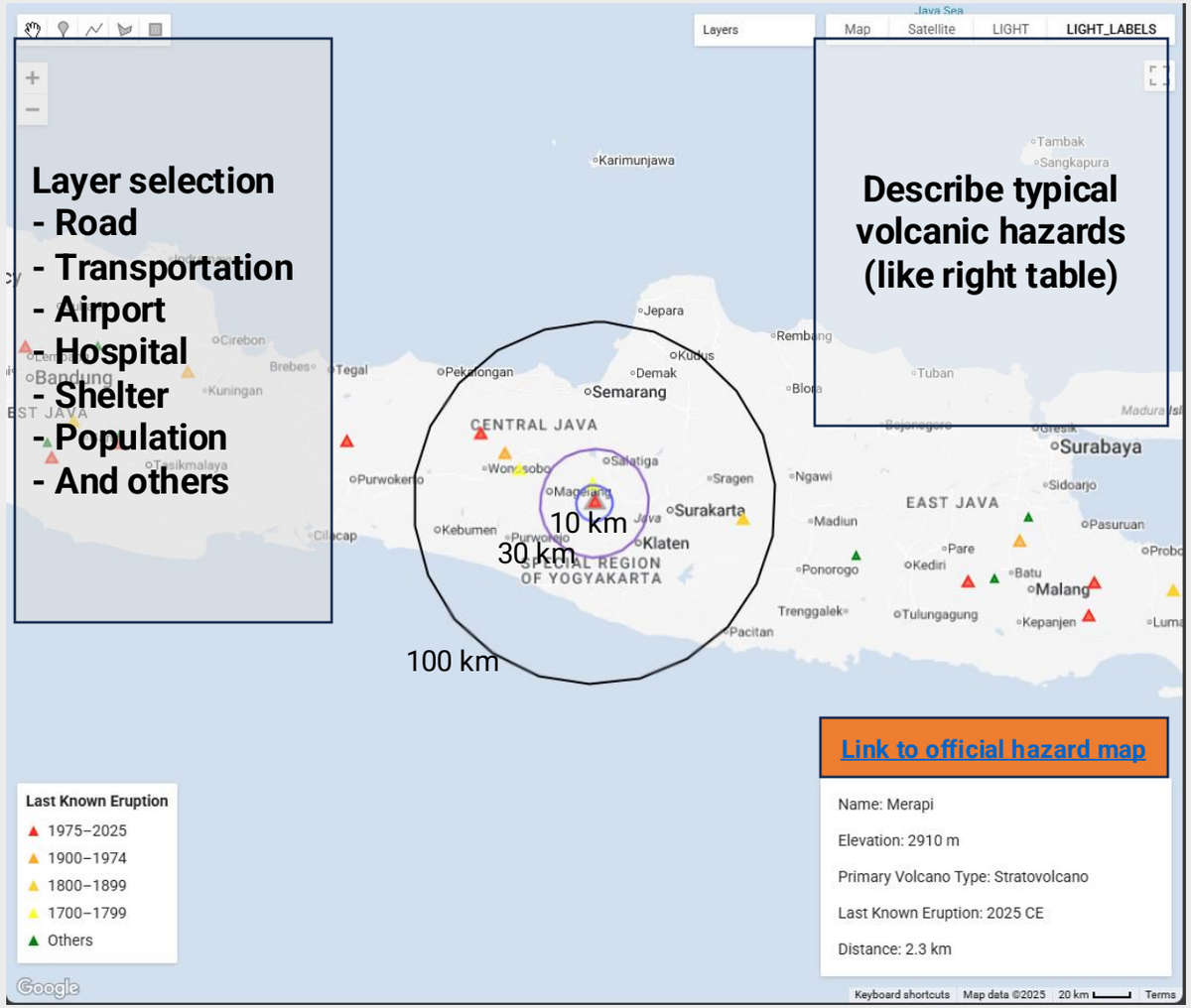




2020 Flood in Poyang Lake, China

The potential of SatGPT as a rapid flood mapping tool was also tested in **Poyang Lake, the largest freshwater lake in China**, during the 2020 flooding. Comparison with satellite-derived flood data using Sentinel-1 showed that **SatGPT was able to capture about 80 % of the flooding**.

"Active Volcano near me" Map

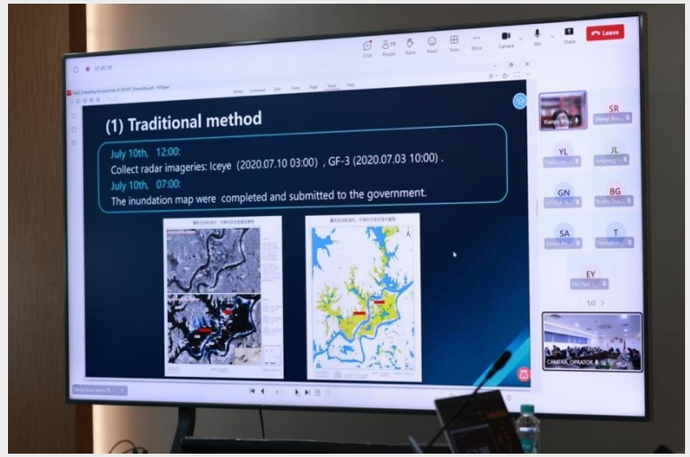


- Provide accessible information on nearby active or potentially active volcanoes and related hazards
- Enter a place name to find nearby volcanoes (~50 km); click a symbol to recenter, draw 5/10/30/50 km rings, and open a pop-up describing volcanic info
- Provides a plain-language hazard summary by GenAI

Typical volcanic hazards	
~5 km	• Volcanic ballistics and Base surges (causing instant death) • Lava flows
~10 km	• Pyroclastic density currents • Ash fall deposits (heavy) • Lahars, Landslides • Toxic gases
~30 km	• Ash fall deposits (moderate) • Lahars (within the valley)
~100 km	• Lahars (flowing alongside rivers) • Ash flow deposits (1 - 10 cm) • Tsunamis (if submarine)

Note: This table shows typical footprints; real events can differ substantially depending on eruption size and local factors

Collaborations



https://bit.ly/SatGPT_Training_Resources

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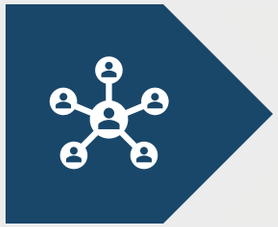
Collaborations

Map hotspots across range of disasters		**Develop SatGPT for forest fires, coastal ecosystem monitoring (mangroves, sea level rise), crop, and urban areas**
Training and Validation		**Conduct training and country-level validation on AI applications in geospatial analytics, with a specific emphasis on SatGPT**
Partnerships and Collaborations		**Strengthen partnerships in UN system, interested research entities, policy think tanks with objective of enabling integration of AI solutions, particularly SatGPT, into existing systems for disaster risk management and resource monitoring**
Engage the Youth		**Inspire youth through knowledge exchanges to promote the independent usage of SatGPT**

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THANK YOU

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