Policy analysis and strategic construction at the Geospatial Leadership Forum, 21 October, Deging, China



Strategies and Practices When Facing Technological Breakthroughs in Geospatial Applications

Tiziana Bonapace

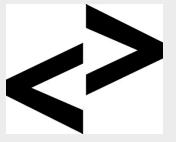
Director

Information and Communications Technology and Disaster Risk Reduction Division



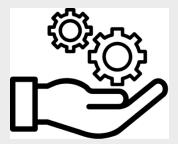
Contents

01



UN Frameworks
Global and Regional

02



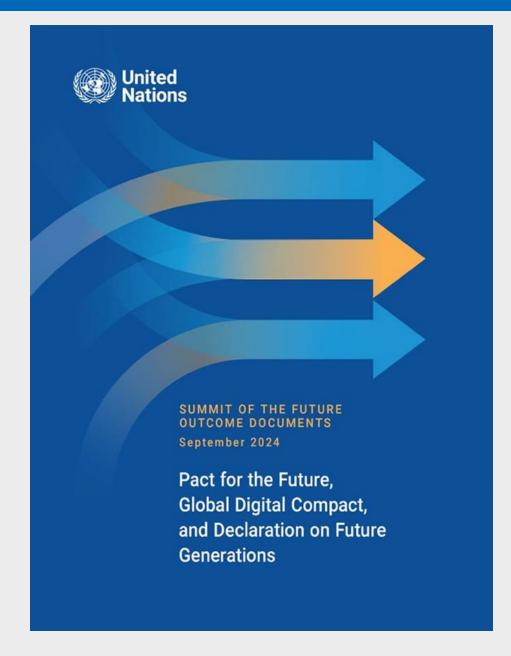
Our Practices Impact to the Countries

03

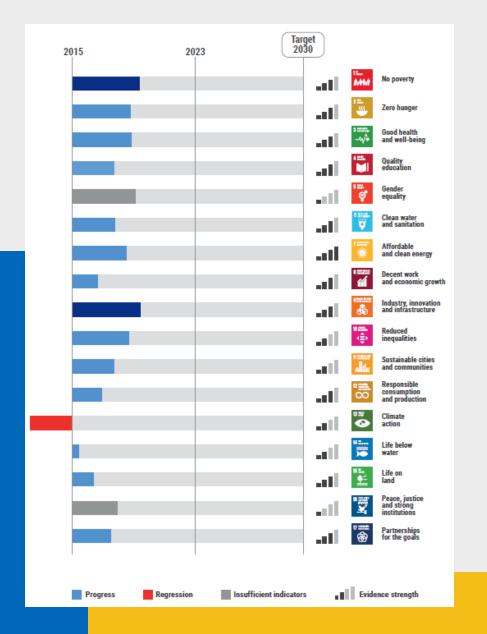


Interactive questions



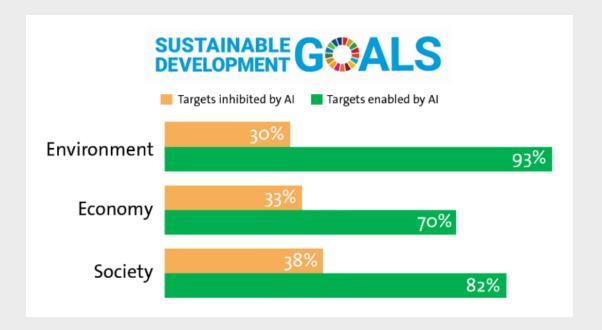


- ✓ In the Global Digital Compact, Al is recognized as a transformative tool capable of accelerating progress toward the Sustainable Development Goals (SDGs).
- ☑ The Declaration on Future Generations, underscores the transformative potential of AI in achieving the SDGs.
- ✓ UN Resolution (A/RES/78/311): Enhancing international cooperation on capacity-building of artificial intelligence.
- ✓ UN Resolution (A/RES/78/265): Seizing the opportunities of safe, secure, and trustworthy artificial intelligence systems for sustainable development,













Early Warnings for All (EW4All)







Develop early warning systems for all at the regional level

• ESCAP Resolution 79/1: Accelerating climate action for sustainable development (May 2023)



Further develop and implement a regional strategy in support of the global and country-level implementation of the four pillars of multi-hazard early warning systems

• ESCAP Committee on Disaster Risk Reduction (July 25-27, 2023)



Build national capacities by leveraging innovations, including digital and geospatial applications for early warning systems

• ESCAP Committee on Disaster Risk Reduction (July 25-27, 2023)

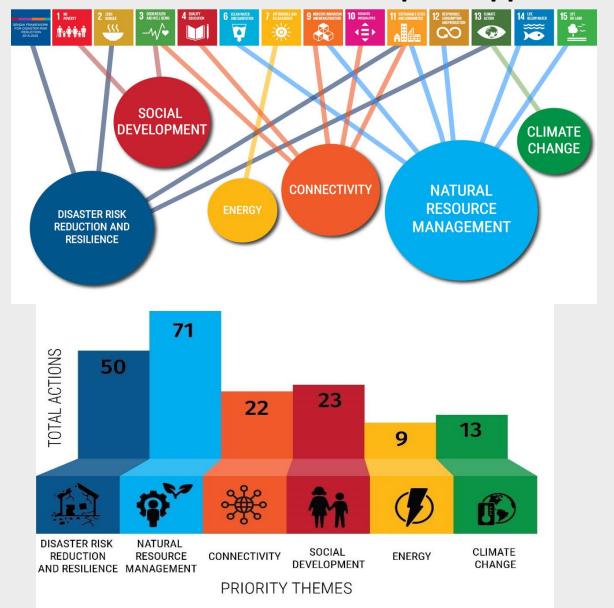


20th Anniversary of Indian Ocean Tsunami and contributions to ESCAP Trust fund to achieve early warnings for all

• ESCAP Committee on Disaster Risk Reduction (July 25-27, 2023)



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

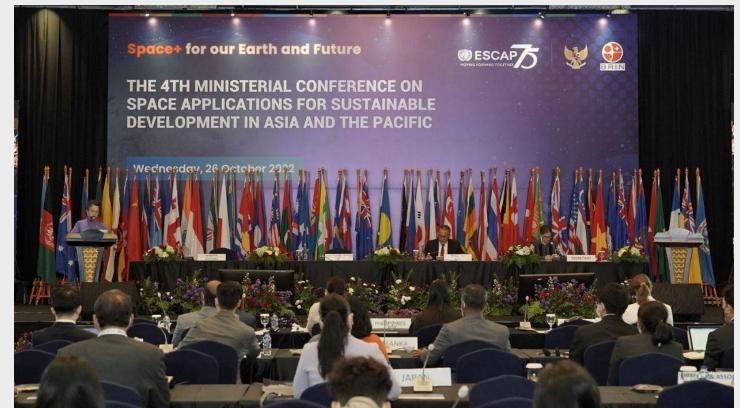








The Fourth Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific Jakarta, 26 October 2022





Geospatial Practices Database and Dashboard

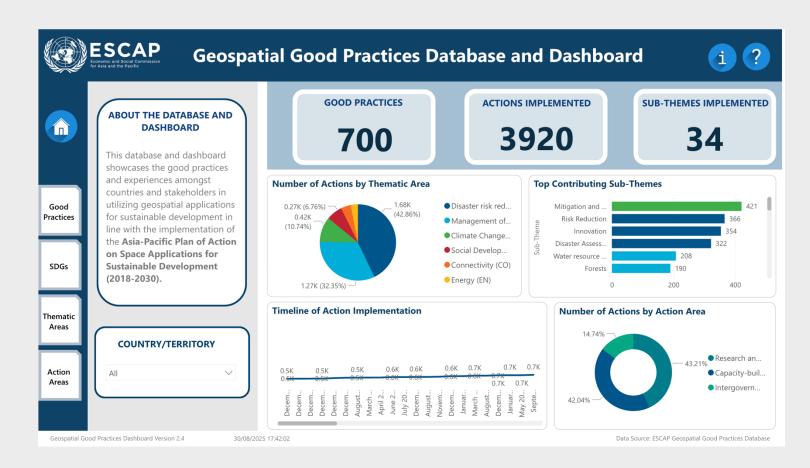
Sharing of implementation progress towards the Plan of Action

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

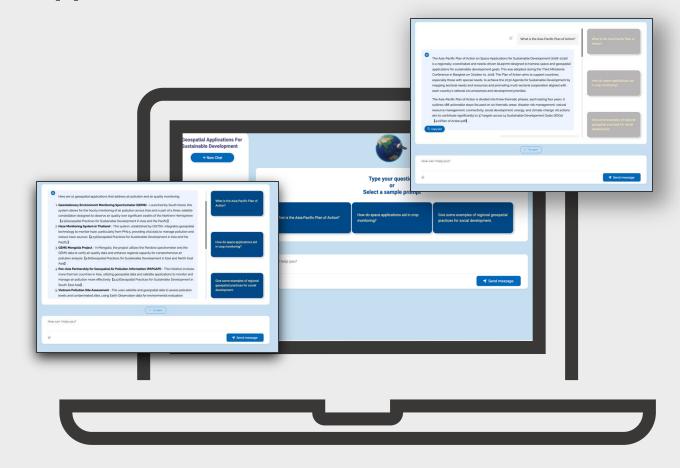


Collect, store, and share good practices on space applications in support of sustainable development



GeoApps

- Al-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

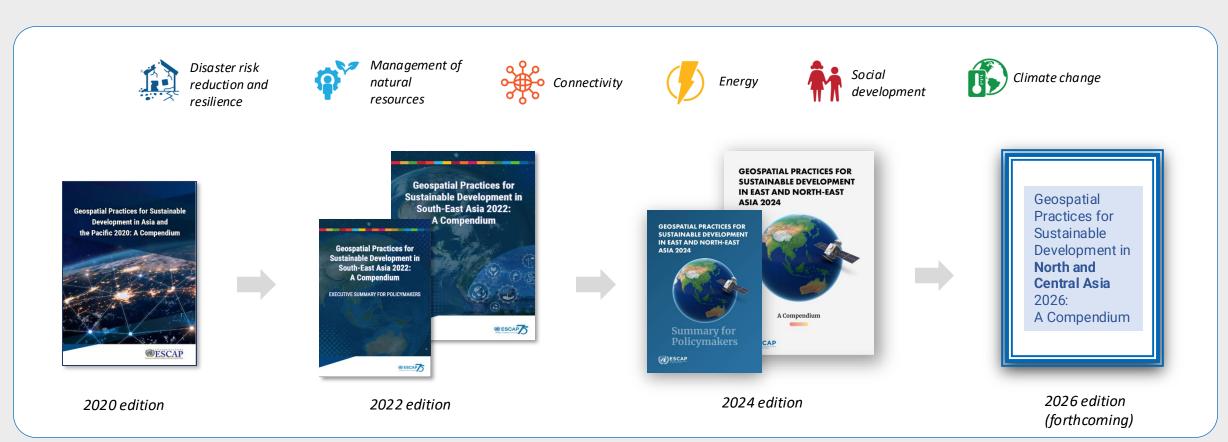




Visit http://geo-apps.info to learn more on how geospatial applications contribute to sustainable development!



Geospatial Practices for Sustainable Development: Compendium series



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.



Youth Forum on Innovative Geospatial Information Applications



























Building institutional capacity for the use of integrated spatio-temporal data in local SDG monitoring and decision-making









Indonesia



Thailand



Water quality monitoring and sustainable marine fish cage management

Uzbekistan



Pakistan



Selection of pond retention area

Soil salinity monitoring

Forest monitoring

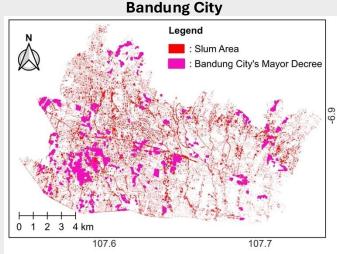


DEVELOPMENT OF A PLATFORM TO MAP SLUMS IN BANDUNG CITY (WEST JAVA PROVINCE) AND MAKASSAR CITY, (SOUTH SULAWESI PROVINCE) - INDONESIA

Slum classification

Makassar City

Capacity building activities



Machine learning-based Random Forest algorithm and local knowledge



Machine learning-based Convolutional Neural Network (CNN) model

TRAINING ON THE USE OF INTEGRATED SPATIO-TEMPORAL DATA IN LOCAL SDGs MONITORING AND DECISION-MAKING (2) ESCAP Bandung (7-10 Aug 2023









Makassar (2-6 Sep 202



Operational platforms

Bandung City

Platform for running model



Google Earth Engine

Operational display



Department of Housing and Settlements of West Java Province

Makassar City

Platform for running model



Operational display KOTA MAKASSAR

Regional Development Planning Agency of Makassar City



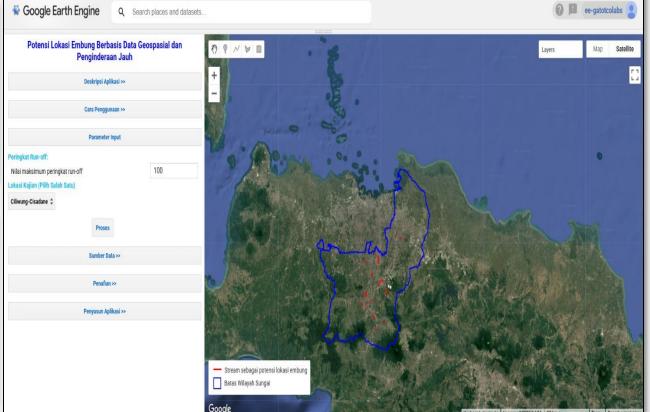




DEVELOPMENT OF POTENTIAL POND RETENTION LOCATION METHODS IN THE CIMANUK-CISANGGARUNG RIVER BASIN OF WEST JAVA PROVINCE USING BIG DATA AND ARTIFICIAL INTELLIGENCE











FGD with the Water Resources
Department of West Java Province

Model's results Field observations



Promoting Crop Biodiversity through Innovative Use of Space Applications



With support from the Aerospace Information Research Institute of the Chinese Academy of Sciences

Indonesia





Brawijaya University

Subnational focus area: Junrejo District, East Java

Malaysia



Malaysian Space Agency



Universiti Putra Malaysia (Sarawak Campus)

Subnational focus area: Tanjung Karang, Selangor

The Philippines



Philippine Space Agency



Mariano Marcos State University

Subnational focus area: Batac, Ilocos Norte

Indonesia





The Philippines







Earth observation-based drought monitoring systems for Central Asia



Customization of a crop monitoring system (focusing on wheat)



Development of drought information system



Technical assessments



Training activities



Regional knowledge sharing



Workshops in Tajikistan and Uzbekistan (August 13-20, 2025)





Building resilient agriculture in the Lower Mekong Basin















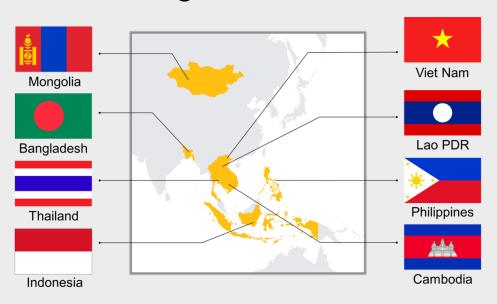








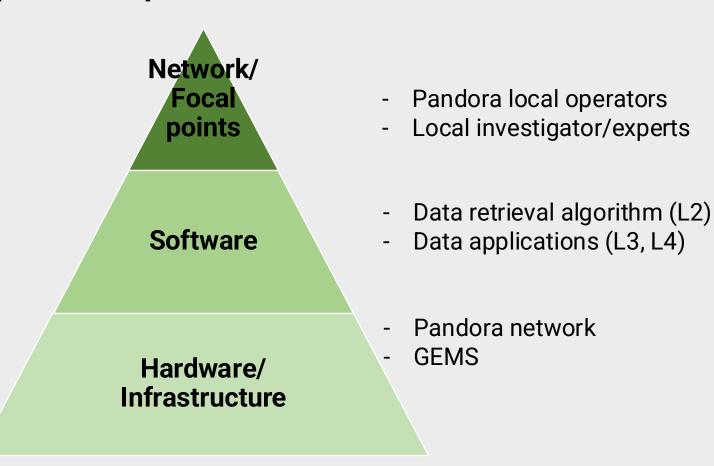
Building the Pan-Asia Partnership for Geospatial Air Pollution information



Subject Area	#	Member States
Space	4	BG, IN, PH, TH
Environment	4	KH, LA, MN, VT

Project coverage in the Asia Pacific region

- COUNTRIES: 17% no. of countries (World Bank, 2020)
- SPATIAL: 13.8% of land area (World Bank, 2020)



- There were a total of 213 participants in organized meetings over the years 2022 through 2024
- The participation is on an increasing trend.

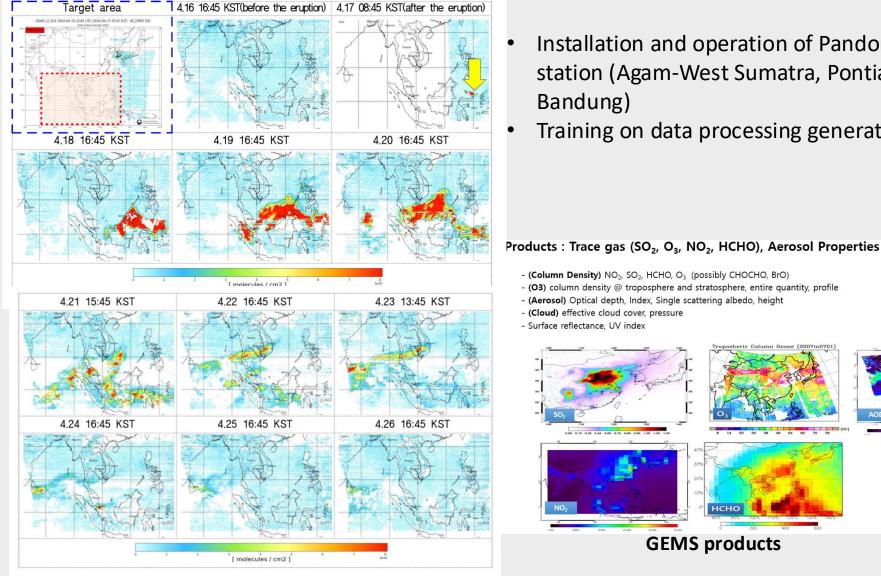






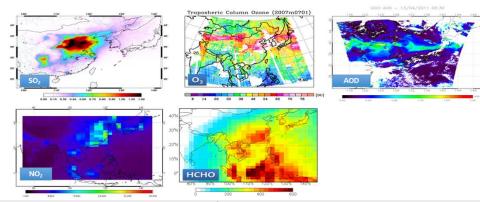


Geospatial Air Pollution Monitoring & Research in Indonesia



- Installation and operation of Pandora Sun Spectrometer at BRIN station (Agam-West Sumatra, Pontianak- West Kalimantan, and Bandung)
- Training on data processing generated by the RoK-GEMS satellite

- (Column Density) NO₂, SO₂, HCHO, O₃ (possibly CHOCHO, BrO) - (O3) column density @ troposphere and stratosphere, entire quantity, profile - (Aerosol) Optical depth, Index, Single scattering albedo, height - (Cloud) effective cloud cover, pressure - Surface reflectance, UV index



GEMS products

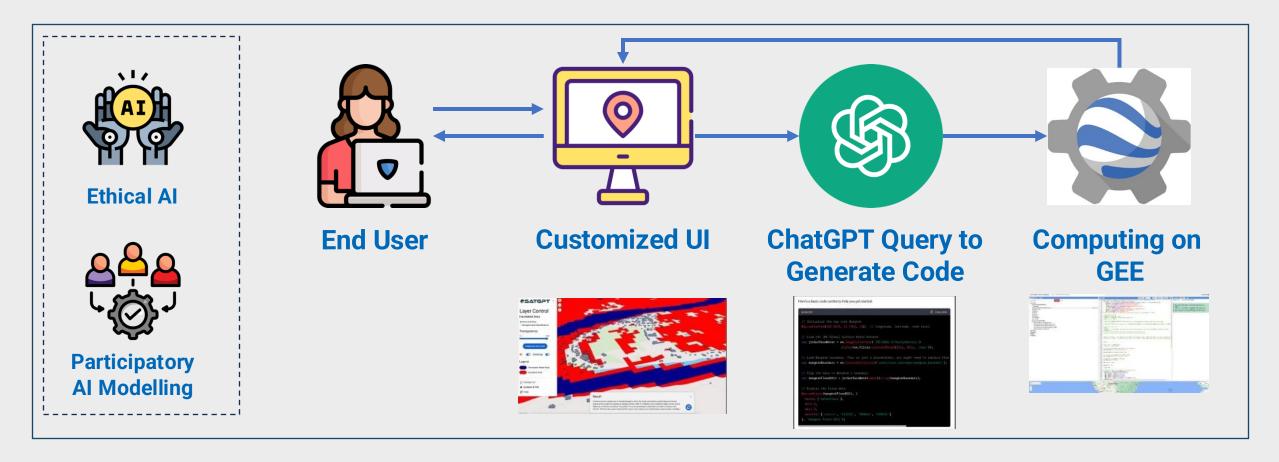


Pandora Instrument



- 1. How to address key challenges in integrating digital innovations in space and geospatial information applications for disaster risk reduction and sustainable development. Reinforce the importance of institutional support and long-term funding to create an enabling environment that supports digital transformation and sustains innovations.
- 2. How to further enhance substantive cooperation on space science and technology and their applications to leverage innovative digital applications, manage data and information more effectively, engage end users, and enhance partnerships with national, regional, and global stakeholders;
- 3. Identify approaches and practices related to the integrated applications of remote sensing, GIS, and satellite navigation and positioning for disaster preparedness and risk reduction, and for engaging the youth to actively participate in innovative geospatial applications; and
- 4. Opportunities to mobilize financial, technical, and human resource support to implement the Plan of Action and for potential contributions from ICC members.





Infrastructure





SatGPT for Flood Hotspot Mapping

- 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



Website: SatGPT.net



- Analysis by BRIN and local government teams;
- 2024 Best Paper Award of the IEEE Aerospace & Electronics Systems and Geoscience and Remote Sensing Joint Chapter

Half a day for demonstration by users of SatGPT applications for flood risk mapping

-Venue:

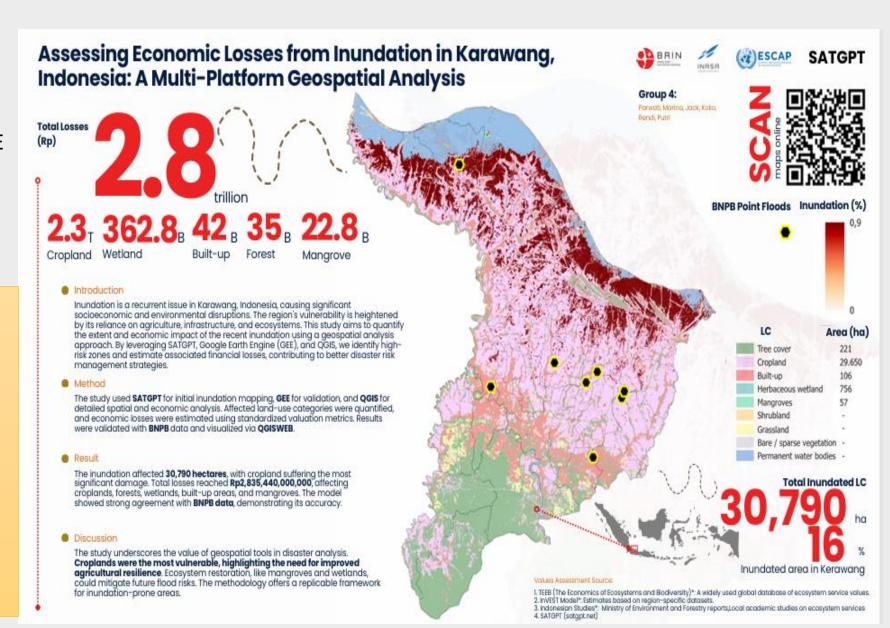
Opt.1: @Jakarta local government

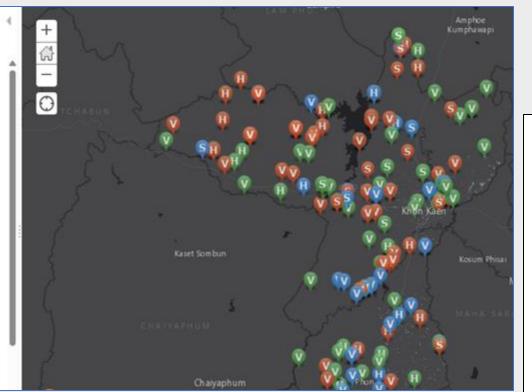
Opt.2: @BRIN Headquarters

-Date/time: TBD (BRIN will

coordinate with relevant Jakarta

government and users' agencies)





▲ SatGPT inundation hotspot data can help in identifying villages, schools, and critical infrastructure that can support disaster preparedness and recovery.

Urban Flooding: Khon Kaen, Thailand and Jakarta, Indonesia

1 About Content Legend

Legend

aridcode

Villages
gridcode

♀ > 7 times

♀ > 3 - 7 times

♀ 0 - 3 times

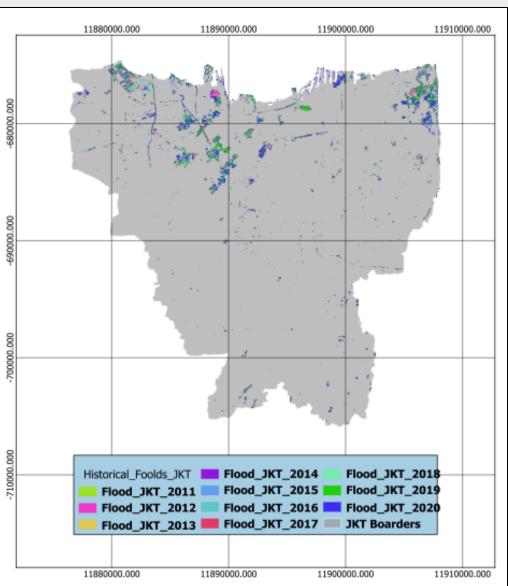
> 7 times > 3 - 7 times

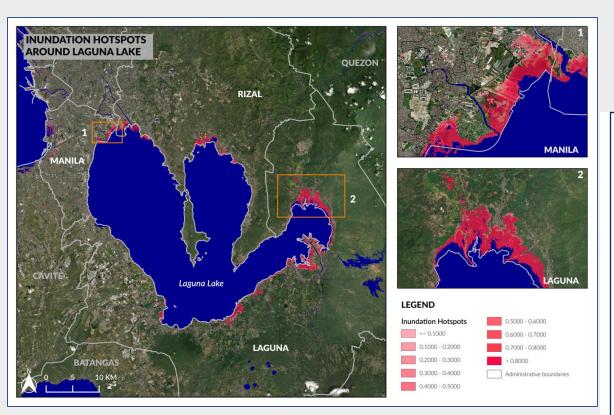
0-3 times

► SatGPT can help map annual historical flooding and determine its relationship with weather related events. It also allows the identification of healthcare facilities that are frequently affected by floods.

SatGPT Case Studies





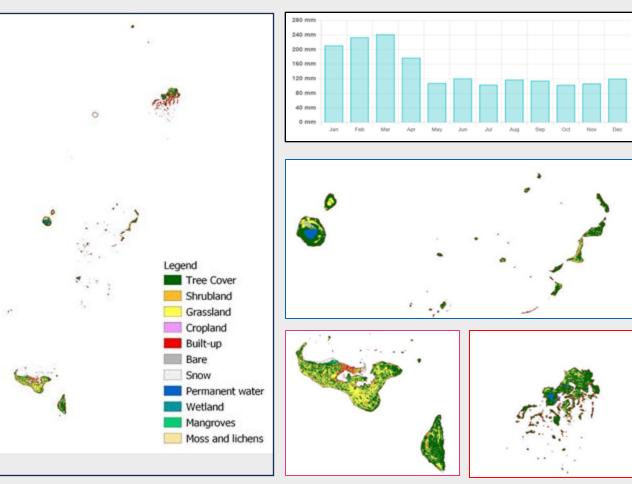


▲ Mapping inundation hotspots around Laguna Lake (2010–2020) with SatGPT helps inform spatial planning and infrastructure development.

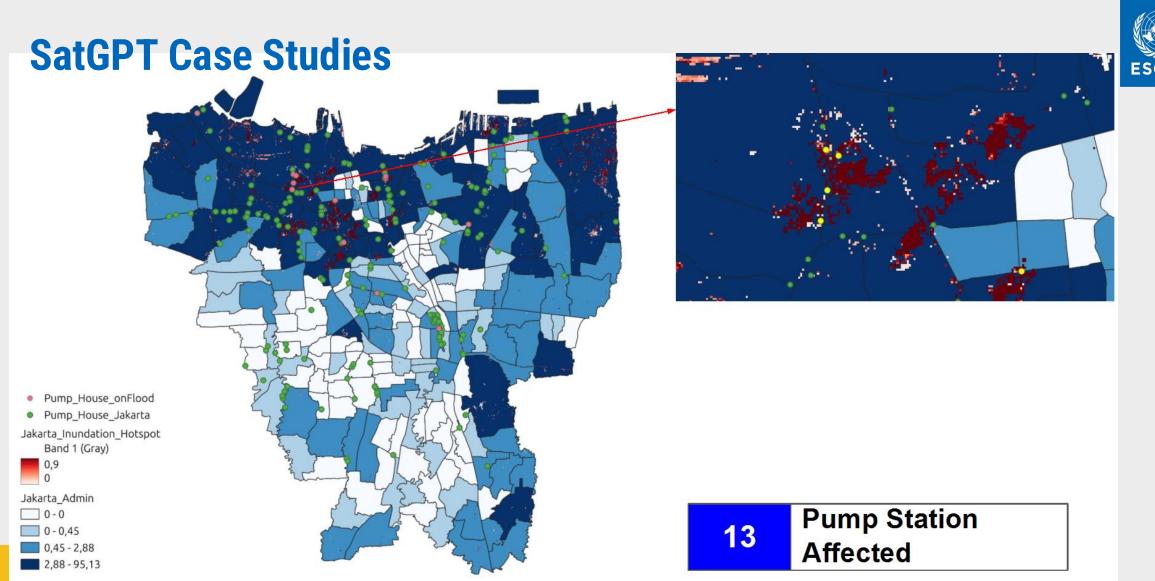
Effect of Flooding in Land Use and Land Cover: Laguna Lake, Philippines and Tonga



SatGPT Case Studies



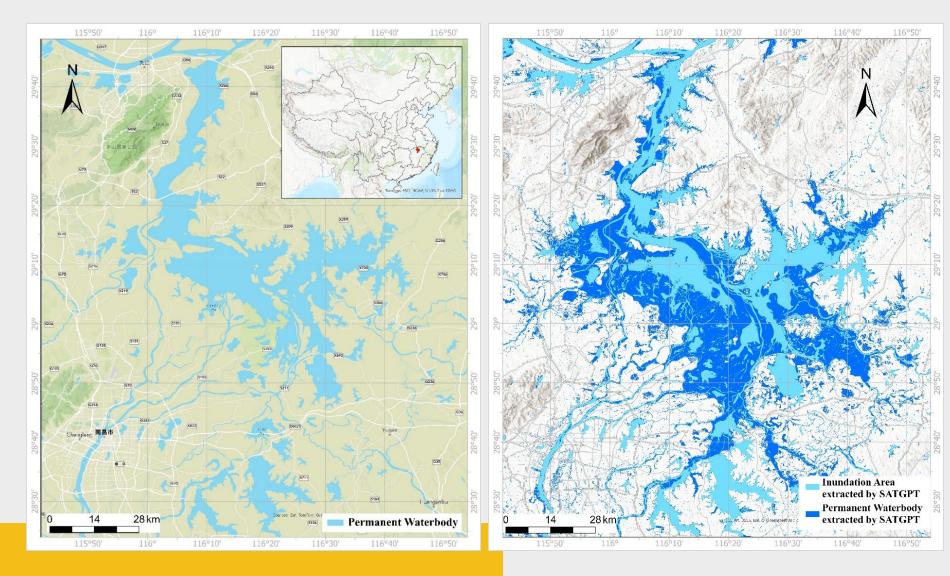
▲ Using the inundation hotspot generated by SatGPT, the impact of heavy rainfall events in poorly drained lowland and urban areas can be determined.





▲ Pump houses are critical infrastructure to evacuate excess water from low-lying areas. Improper pump capacity may lead to inefficiency or failure in flood response. By mapping the inundations hotspots in Jakarta using SatGPT, a total of 13 pumps and 30 pump houses were revealed to be at risk due to flooding.





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 satellitederived flood data using Sentinel-1 showed that SatGPT was able to capture about 80 % of the flooding.



Virtual Satellite Constellation for Disaster Risk Management (VSC)

The VSC will develop a mechanism for sharing satellite imagery within Asia and the Pacific to build resilience in disaster risk hotspots



Set up an informal working **group** to work out the operational details and conduct a study to map free and commercial remote sensing data providers and share the catalogue with all member States.



to set aside a percentage of their satellite operational time or data archive for use by high disaster-risk and low-capacity countries.









Develop a satellite imagery sharing mechanism for enhanced pre-disaster monitoring of risk in high disaster - low risk countries



6

Match support and demand for satellite data by the secretariat using the VSC Catalog and form a working group to facilitate data transfer.

Provide technical assistance

the satellite data.

sensor design.

Share the data requests

to the target countries in hosting,

storing, processing and analysing

with all the spacefaring nations to

ensure that the regional needs are

addressed in future satellite and



Contribute to the Asia-Pacific Plan of Action on Space Applications for Sustainable Development (2018-2030) in the areas of:



Disaster Risk Reduction and Resilience



Social **Development**



Provide inputs to the spacefaring nations on the design of future satellites and sensors which address national and regional data needs



Improve the capacity of local

management-related agencies to be prepared and manage disasters over

governments and disaster

their entire cycle



Management of Natural Resources

Questions for the participants

- 1. The geographic information industry is undergoing a chain of changes in technology, model, and pattern. Technological breakthroughs may overturn the existing market rules. Is it a country needs-driven, or a tech development push?
- 2. Which is more important? Vision, Tech, Finance, Human Capacity? How to address key challenges in integrating digital innovations in geospatial applications? What will be your roles?
- 3. How to further enhance substantive cooperation on geospatial applications to leverage innovative digital applications, manage data and information more effectively, engage end users, and enhance partnerships with national, regional, and global stakeholders?
- 4. Can you tell me about approaches and practices related to the integrated applications of remote sensing, GIS, and satellite navigation and positioning for sustainable development? How to engage the youth to actively participate in innovative geospatial applications?



THANK YOU

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unitednationsescap





