Implementation of the Jakarta Ministerial Declaration on Space Applications for Sustainable Development in Asia and the Pacific

Erna Sri Adiningsih

Indonesian Space Agency (INASA)

National Research and Innovation Agency (BRIN)

BRIN
BADAN RISET
DAN INOVASI NASIONAL

ESCAP
Economic and Social Commission
for Asia and the Pacific

Outcome of the 4th Ministerial Conference on Space Applications

Requests the secretariat to facilitate consideration of the initiatives of the Government of Indonesia concerning disaster risk management tools.



October 2022, in Jakarta

Proposed initiatives of the Government of Indonesia:

- Virtual satellite constellation disaster risk management focused on continuous pre-disaster risk assessments in risk hotspots
  (contributes to 9 actions of the Plan of Action)
- Rapid mapping of disaster hotspots through digital innovation tools such as machine learning
  (contributes to 9 actions of the Plan of Action)
- Establishment of a Youth forum on Space+ for our Earth and Future
  (contributes to 4+ actions of the Plan of Action)

Themes of the 4th Ministerial Conference on Space Applications



ESCAP
Economic and Social Commission for Asia and the Pacific

Leverage digital innovations to accelerate the implementation of the regional Space Plan of Action

Disaster Risk Hotspot Mapping

Use Big Earth Data, Cloud Computing and AI to decrease the cost and time to generate disaster risk hotspots in Asia and the Pacific.

We are working with countries and cooperation partners to build an ARRAY of tools and apps to address the data and information needs in Asia and the Pacific

2023



Flood Hotspot Mapping



Wildfire Hotspot Mapping

2026



Flood Mapping Tool (floodmapping.inweh.unu.edu)



- Listed in 2022 UN Climate Change Innovations Compendium
- Won the 2021 Popular Science Best of Whats New Award

WORKSHOP STRENGTHENING DISASTER RESILIENCE IN THE ASIA-PACIFIC REGION: INTEGRATED RISK MANAGEMENT THROUGH GEOSPATIAL DATA AND DISASTER HOTSPOT MAPPING FOR ENHANCED PREPAREDNESS

- Dates: 20 to 22 November 2024 BRIN Headquarter Office
- Participant: 70 people from Uzbekistan, Thailand (GISTDA), Indonesia (BRIN, PUPR, BNPB, Jakarta Local Government)





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

BRIN INASA ESCAP SATGPT

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

SCAN maps online

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

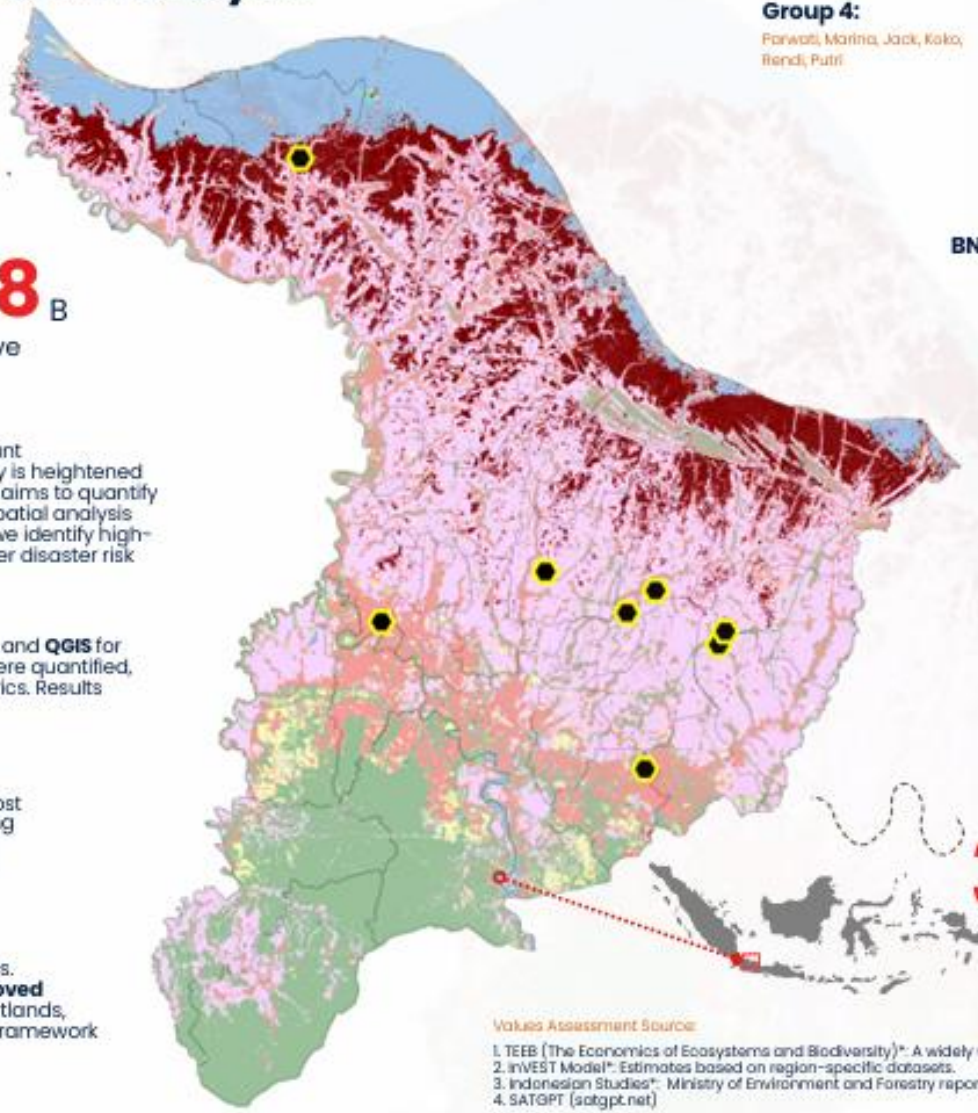
The study used **SATGPT** for initial inundation mapping, **GEE** for validation, and **QGIS** for detailed spatial and economic analysis. Affected land-use categories were quantified, and economic losses were estimated using standardized valuation metrics. Results were validated with **BNPB** data and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



BNPB Point Floods

Inundation (%)

0,9

0

LC	Area (ha)
Tree cover	221
Cropland	29.650
Built-up	106
Herbaceous wetland	756
Mangroves	57
Shrubland	-
Grassland	-
Bare / sparse vegetation	-
Permanent water bodies	-

Total Inundated LC

30,790 ha

16 %

Inundated area in Kerawang

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)

FLOOD IMPACT ANALYSIS IN SLUM AREA

Estimating and Visualizing Slum Areas Affected by Flooding

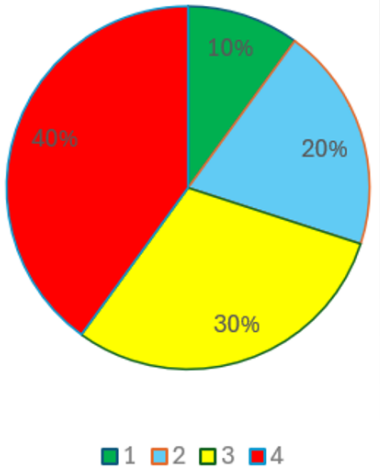
- ☑ Flood Reported
- ☑ Flood but Unreported
- ☑ Undected & Reported
- ☑ Undetect & Unreported



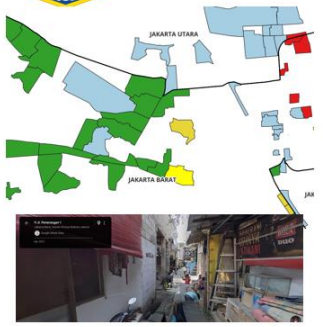
https://jakartasatu.jakarta.go.id/portal/apps/sites/#/public

Estimating and Visualizing Slum Areas Affected by Flooding

Flood Reported	68
Flood But Unreported	86
Undetected And Reported	109
Undetected And Unreported	182



Most Inundated Slum Area in Jakarta



Based on Category 1
Sub Distric: Wijaya Kusuma ,
RW 02, West Jakarta



Based on All Category
Sub Distric: Koja Kusuma ,
RW 07, North Jakarta

WORKSHOP BUILDING INSTITUTIONAL CAPACITY TO USE ARTIFICIAL INTELLIGENCE AND SPATIOTEMPORAL DATA FOR FLOOD IMPACT ANALYSIS

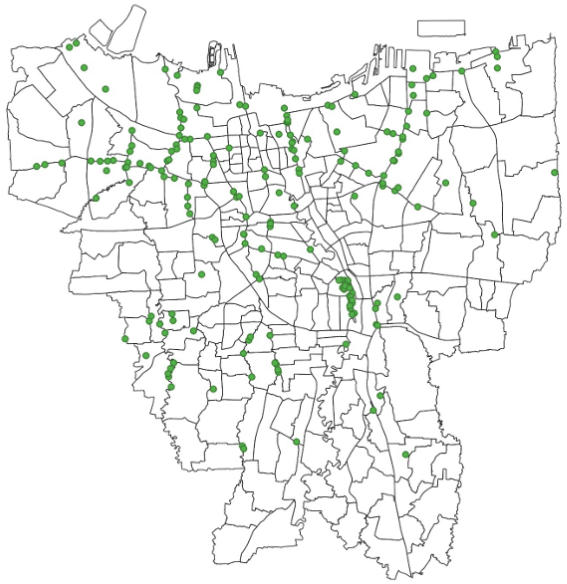
- Dates: 17 to 19 June 2025 BRIN Headquarter Office (Hybrid)
- Participant: 37 people from Philippine (PhilSA), Thailand (GISTDA), The Chinese University of Hongkong, Indonesia (BRIN, BNPB, Jakarta Local Government, Artha Graha Peduli, UNDIP, Danayasa SCBD)
- In conjunction with the 21st ASEAN Ministers Meeting on Science, Technology, and Innovation (AMMSTI-21) and the 87th ASEAN Committee on Science, Technology and [illegible].





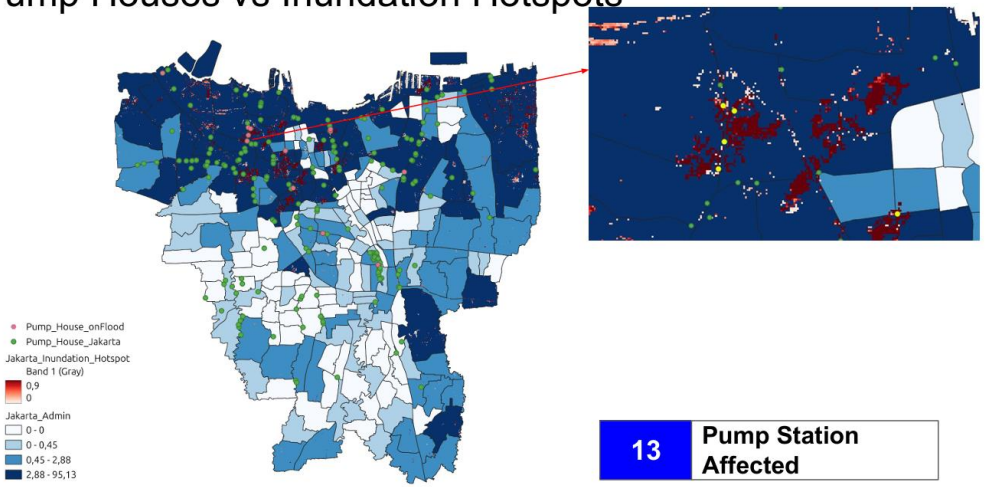
ASSESSING PUMP HOUSE LOCATIONS AGAINST INUNDATION HOTSPOTS: A SPATIAL STUDY IN JAKARTA

Current Pump House Locations in Jakarta

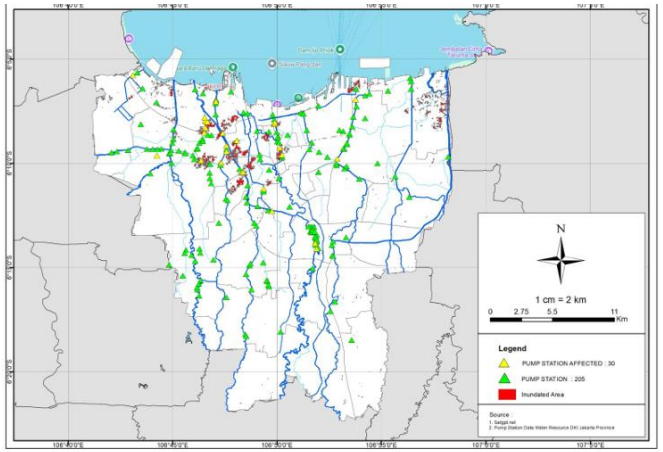


205	Total
48	West Jakarta
28	Central Jakarta
48	South Jakarta
24	East Jakarta
57	North Jakarta

Pump Houses vs Inundation Hotspots



13	Pump Station Affected



Buffer Area 50m

30	House Pump Affected

INFRASTRUCTURE AT RISK FROM FLOODING IN JAKARTA

ESCAP
Economic and Social Commission for Asia and the Pacific

Flood 2015 vs Flood 2020



Category	Flood 2015	Flood 2020
Inundation Area	549.09 Ha	623.57 Ha

Flood that occur in **2020** have a wider affected area up to **11.94%**

Flood 2015 vs Flood 2020



Category	Flood 2015	Flood 2020
Affected Buildings	2.26%	2.10%

Flood that occur in **2015** have a wider affected area up to **0.16%**

Flood 2015 vs Flood 2020 in Marunda



Category	Flood 2015	Flood 2020
Inundation Area	153.63 Ha	122.76 Ha

the most affected sub-district was Marunda. The flood extent analysis shows that in 2015, **33.87 Ha Wider** than 2020 .

NEXT AGENDA

- **Pilot Project:** Conduct a small-scale implementation of SATGPT with the Jakarta local government to test methodologies, validate results, and identify practical challenges.
- **Scientific Publication:** Prepare manuscripts of SATGPT applications for submission to high-impact peer-reviewed journals, aiming to disseminate findings widely within the scientific community.
- **Support the Sub-Regional Capacity-Building Workshop on Technology-Driven Solutions for Air Pollution in ASEAN** (12–13 November 2025, Bali, Indonesia), organized by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) and the Ministry of Environment of Indonesia.
- **Workshop at UGM** *(Early Nov or Early Dec 2025)***:** Organize a workshop at Universitas Gadjah Mada to promote SATGPT utilization, engage researchers, policymakers, and relevant stakeholders from Central Java, Yogyakarta, and surrounding regions, and gather feedback for further improvement.

THANK YOU