



Hack4Resilient Jakarta 2025

Unspire
Indonesia

RiverSense

Turning E-waste into Useful Data

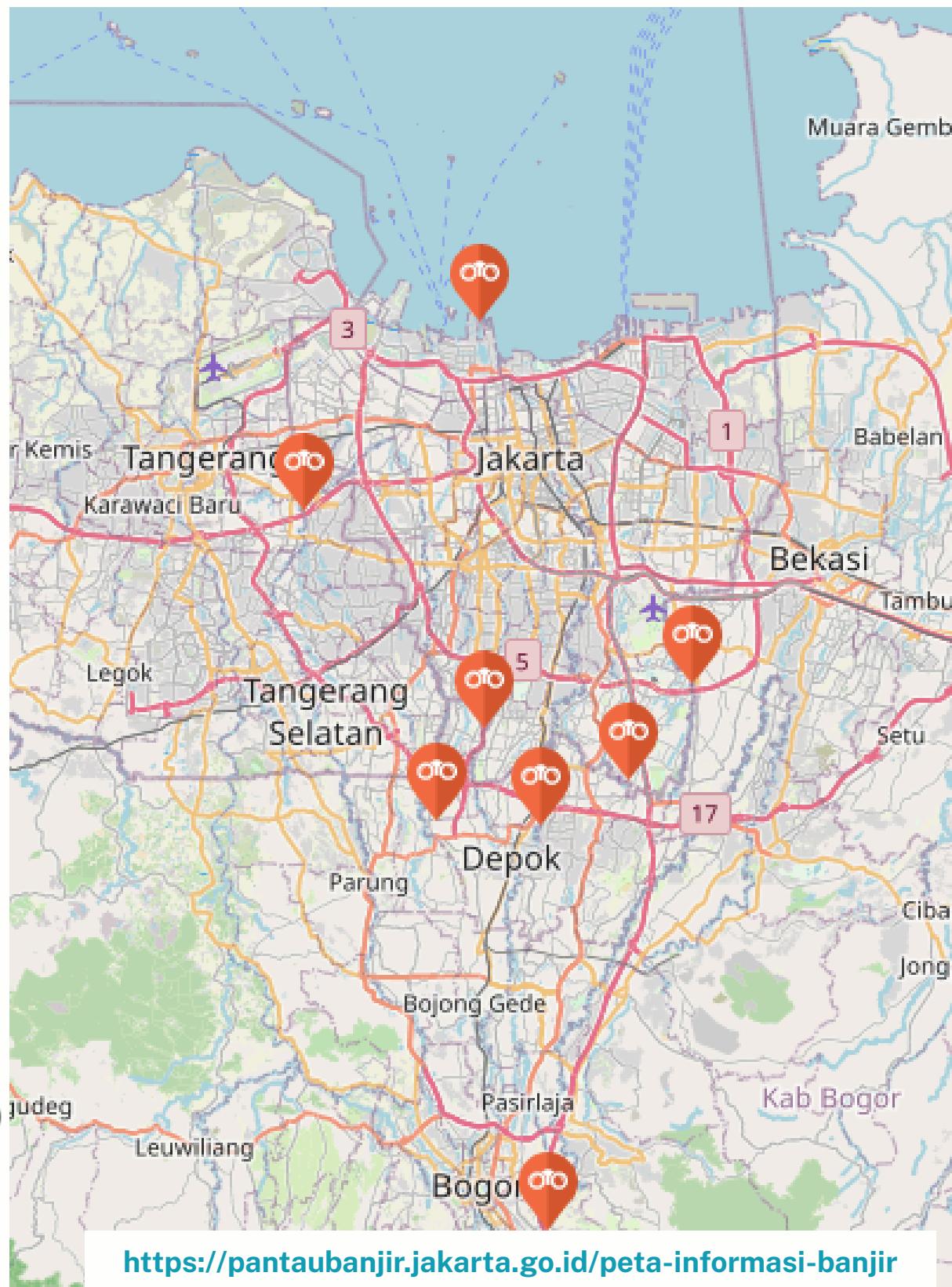
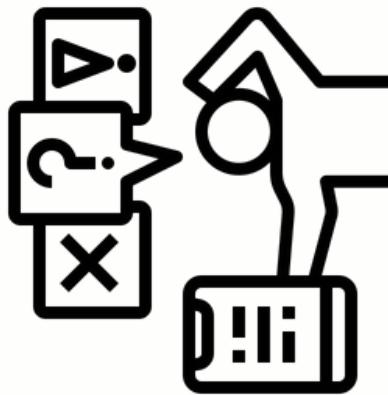
A community-powered
water monitoring network for Jakarta

Jakarta's Urgent Dual Challenge



Jakarta faces a **critical situation** with inadequate flood monitoring and escalating e-waste issues. Addressing these challenges is essential for improving urban resilience and ensuring community safety amidst increasing climate-related threats.

<https://centralinsight.com/indonesia-growing-e-waste-problem/>



PEMANTAUAN TINGGI MUKA AIR (TMA)

Sumber : Dinas SDA Prov. DKI Jakarta

08 / 13 / 2025 Filter

Pintu Air	Waktu									
	14:00	13:00	12:00	11:00	10:00	09:00	08:00	07:00	06:00	
Bendung Katulampa	20 cm (T)	20 cm (MT)	20 cm (M)							
Pos Depok	100 cm (T)	105 cm (T)	105 cm (T)	105 cm (MT)	110 cm (M)					
Manggarai BKB	650 cm (T)	660 cm (T)	660 cm (T)	660 cm (T)	660 cm (M)	680 cm (M)				
PA. Karet	310 cm (T)	310 cm (T)	310 cm (T)	310 cm (T)	320 cm (T)	320 cm (T)	330 cm (T)	340 cm (T)	340 cm (MT)	340 cm (M)
Pos Krukut Hulu	50 cm (T)	60 cm (T)	60 cm (T)	60 cm (T)	60 cm (T)	70 cm (T)				
Pos Pesanggrahan	90 cm (T)	125 cm (T)	125 cm (T)	125 cm (T)	125 cm (T)	125 cm (T)	125 cm (T)	125 cm (T)	130 cm (M)	130 cm (M)
Pos Angke Hulu	-175 cm (T)	-180 cm (T)	-175 cm (T)	-175 cm (T)	-170 cm (T)	-170 cm (T)	-165 cm (T)	-160 cm (M)	-160 cm (M)	-155 cm (T)

<https://bpbd.jakarta.go.id/waterlevel>

SELAMAT DATANG DI WEBSITE POSKOBANJIR

Bend. Katulampa:29cm||P.S Depok:105cm||P.A Manggarai:582cm||P.A Istiqlal:126cm||P.A. Marina Ancol :208cm
Tinggi Muka Air

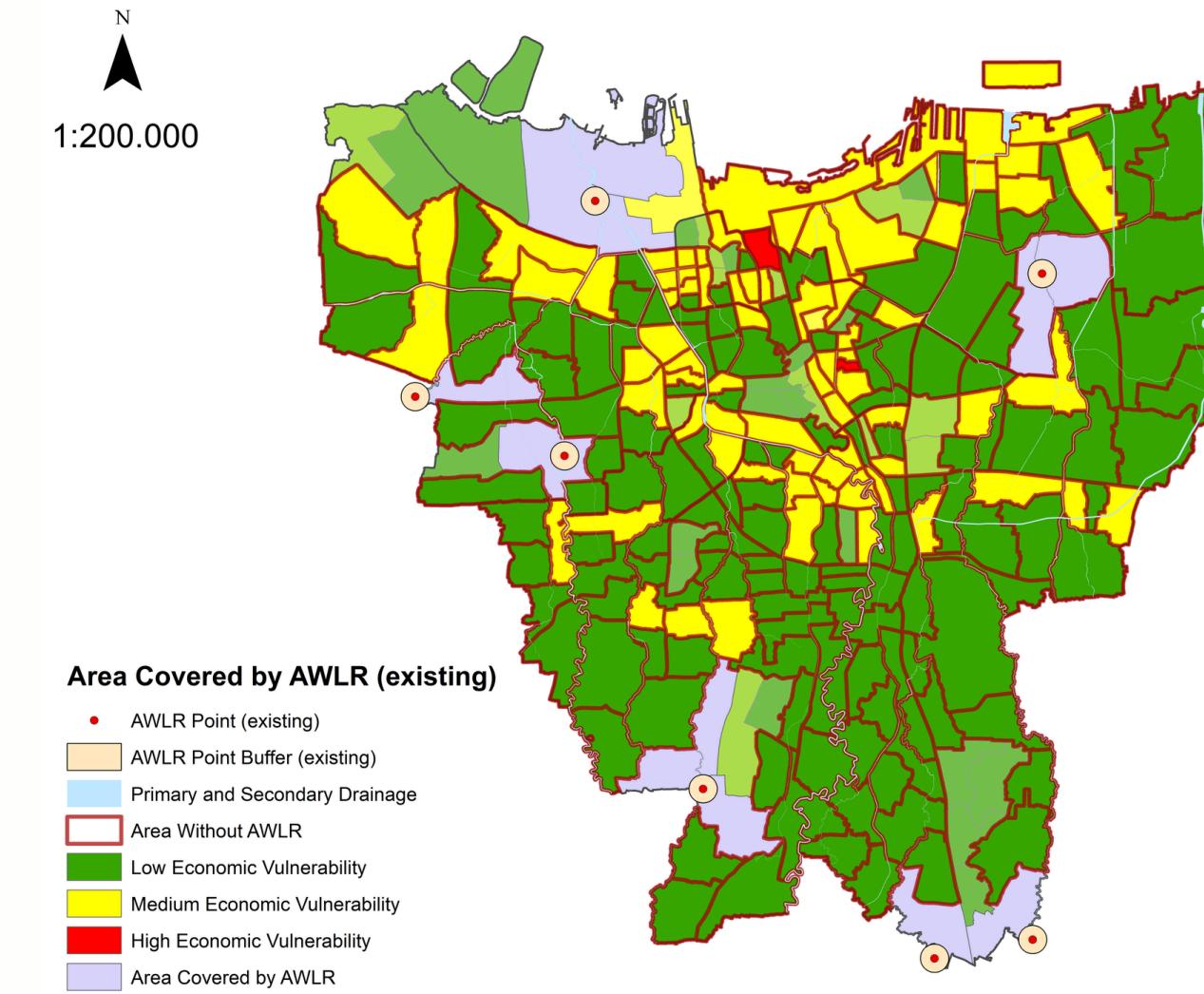
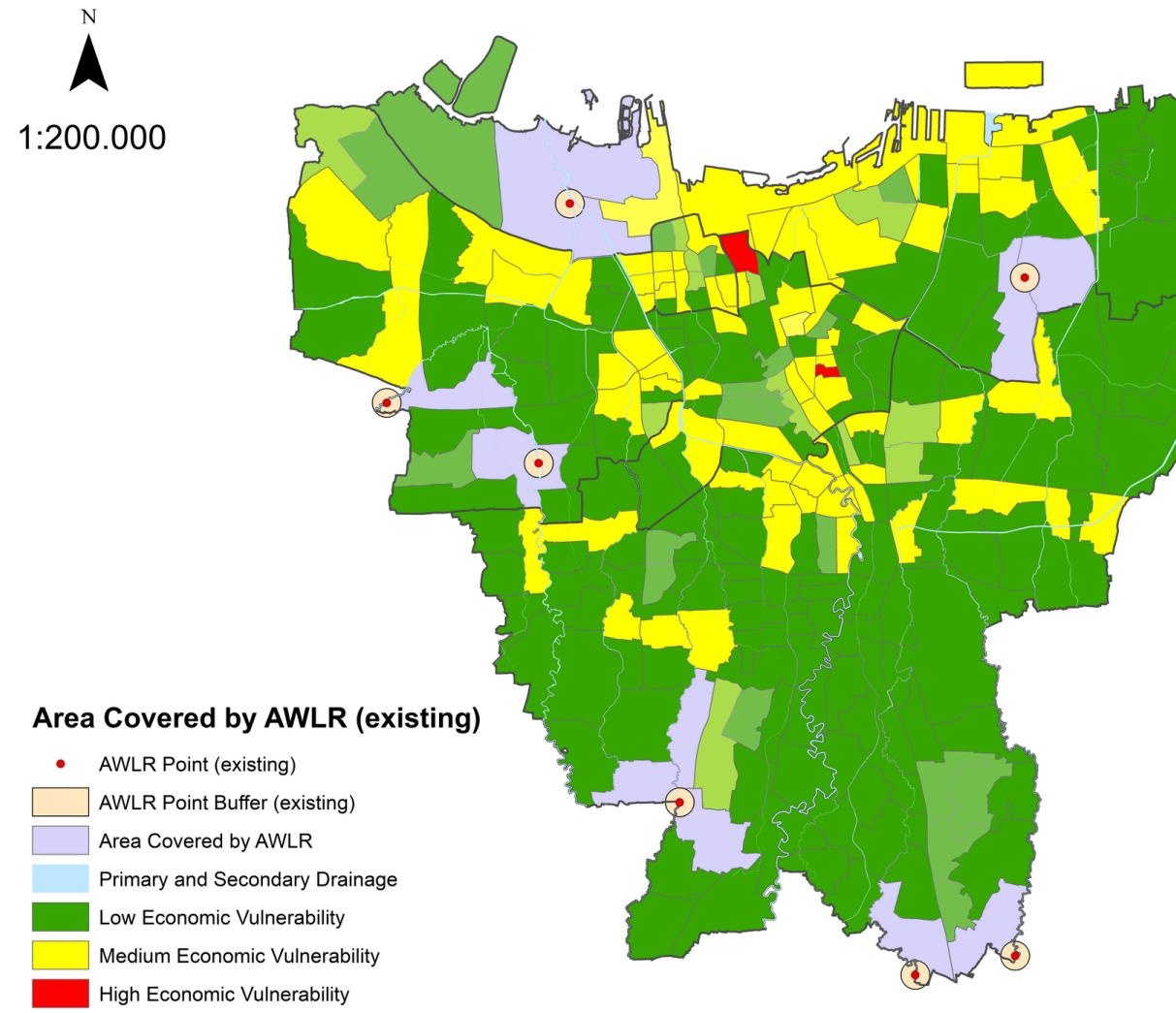
No	Lokasi Pengamatan	Sungai	Kab/Kota	Tinggi Muka Air (cm)	Perubahan	Tanggal	Jam	Status
1.	Bendung Cibalon - Gadog (Baru)	Ciliwung	Bogor	2	✓	13/08/2025	14:45	●
2.	Bendung Katulampa (Hulu)	Ciliwung	Bogor	29	✗	13/08/2025	14:45	●
3.	P.S. Depok (Baru)	Ciliwung	Depok	105	✗	13/08/2025	14:50	●
4.	Kampung Rambutan (Baru)	Cipinang	Jakarta Timur	69	✓	13/08/2025	14:45	●
5.	P.A. Manggarai (Baru)	Ciliwung	Jakarta Selatan	582	✓	13/08/2025	14:45	●
6.	P.S. Krukut Hulu (Baru)	Krukut	Jakarta Selatan	48	✓	13/08/2025	14:45	●
7.	Pompa Cideng (Baru)	Cideng Siantar	Jakarta Pusat	28	✗	13/08/2025	14:45	●
8.	P.A. Karet (Baru)	Barujer Kanal Barat	Jakarta Selatan	298	✗	13/08/2025	14:45	●
9.	P.A. Marina Ancol (Baru)	Laut	Jakarta Utara	208	✗	13/08/2025	14:40	●
10.	P.A. Marina Ancol (Baru)	Kali	Jakarta Utara	188	✓	13/08/2025	14:45	●
11.	Pompa Pasar Ikan (Baru)	Laut	Jakarta Utara	209	✓	13/08/2025	14:45	●
12.	Rumah Pompa Pluit (Baru)	Waduk Pluit	Jakarta Utara	-176	✗	13/08/2025	14:45	●
13.	P.S. Pesanggrahan (Baru)	Pesanggrahan	Depok	89	✗	12/08/2025	09:55	●
14.	P.S. Angki			5	✓			●
15.	P.S. Sunte			0	✓			●
16.	P.A. Pulo gadung (Baru)	Sunter	Jakarta Timur	325	✗	13/08/2025	14:45	●

<https://poskobanjirdsda.jakarta.go.id/>

Collaborative city should exemplify how collaboration should be,
especially if they want to achieve the title of Global City.

Existing AWLR Point

Sistem Informasi Manajemen Bencana (Simba) BPBD Provinsi DKI Jakarta



With existing AWLR Buffer Point data, we can find out which kelurahan are covered by AWS within a distance of 500m...

... and it's only 13 Kelurahan.

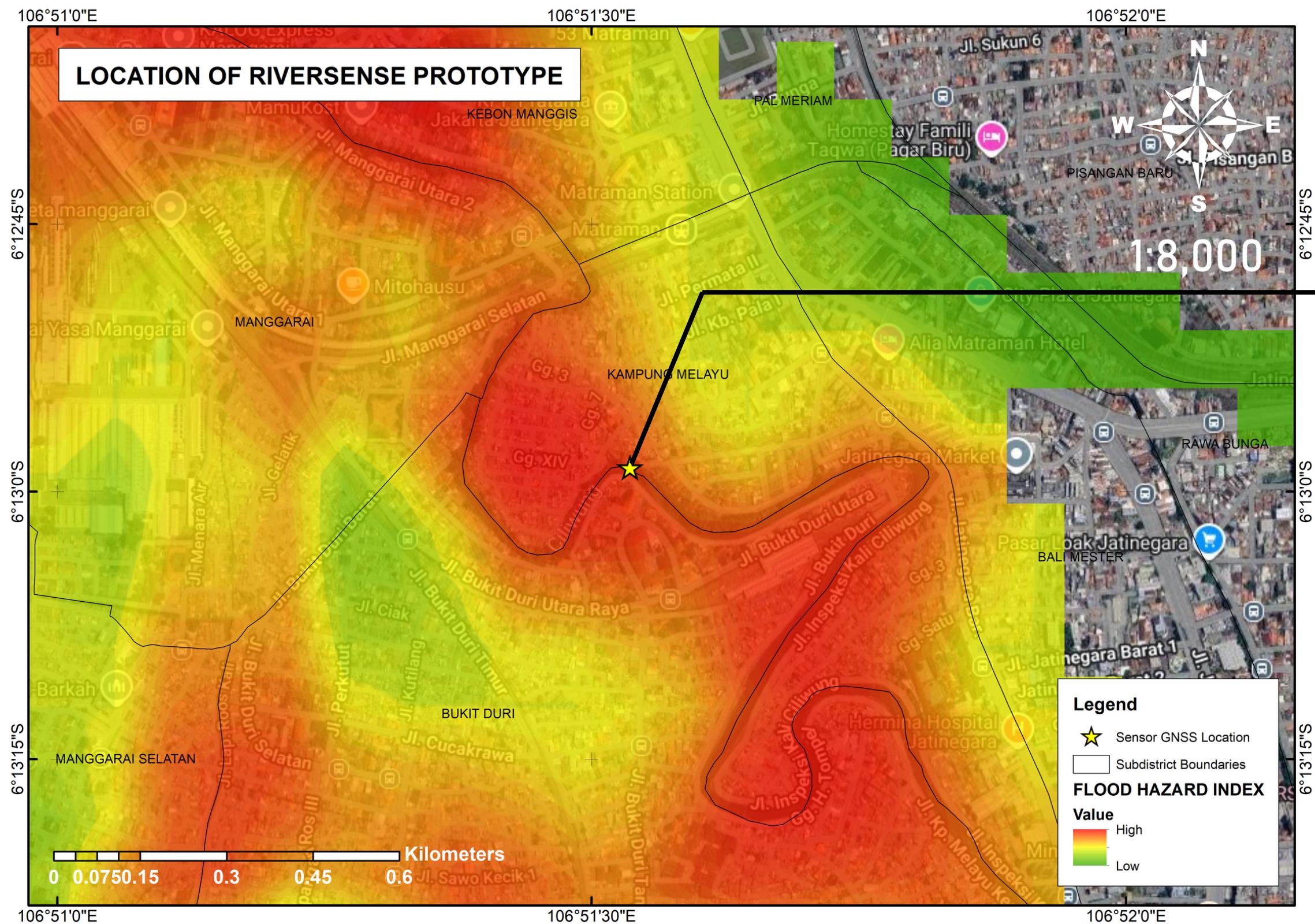
The river (primary and secondary, with buffer of 30m*) passes through 227 kelurahan, but **there is 214 kelurahan without AWLR coverage (94,3%).**

It might threatens roughly 9.15million people, especially who live nearby river with economic vulnerability, to bounce back from flood impact.



RT 12 RW 04

Kel. Kampung Melayu,
Kec. Jatinegara

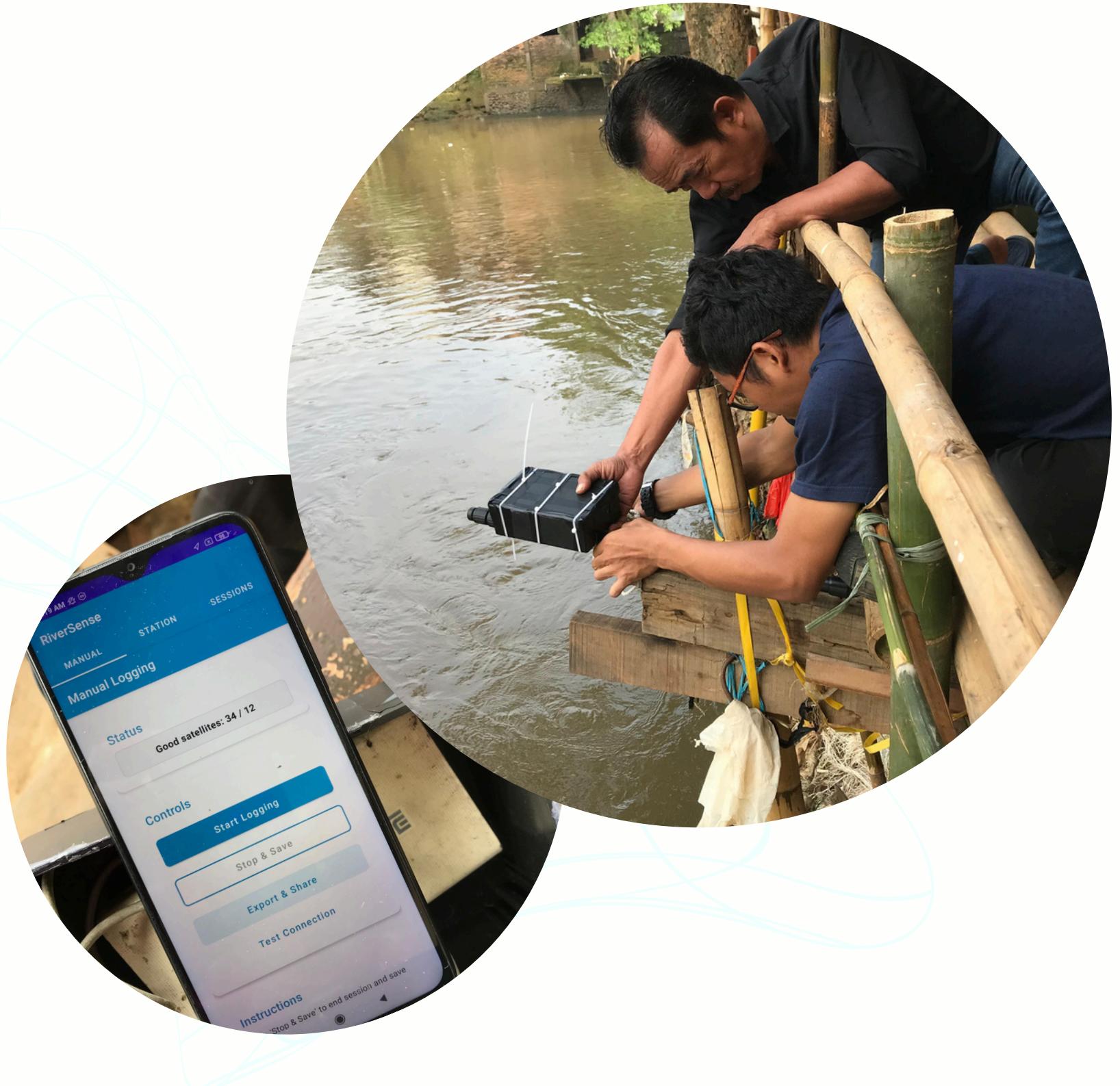


Why?

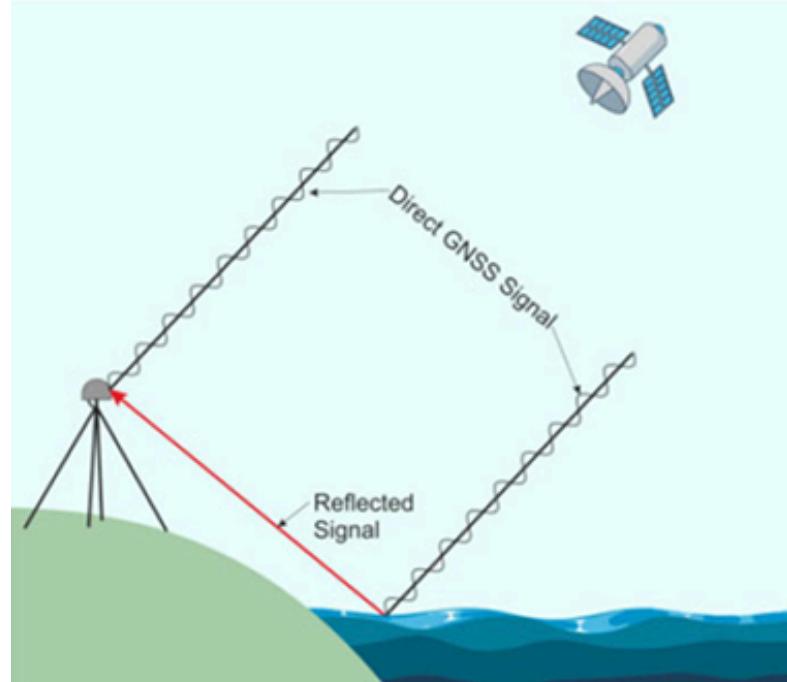
- High index of Flood Hazard
- Community Capacity
- Density of Population
- Location Accessible by Walk

Transforming old devices into monitoring station!

Unused Android phones can play a pivotal role in **community-driven** water monitoring. By utilizing their capabilities, we can create a network that collects valuable data, enables community engagement, and promotes **sustainable practices** in managing e-waste while ensuring better flood monitoring in Jakarta.



Understanding GNSS-IR Technology

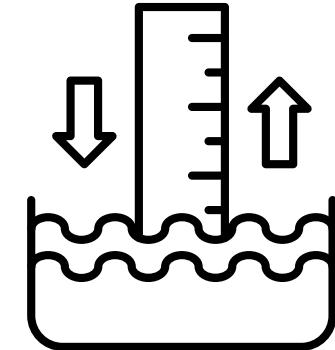


SATELLITE SIGNAL USED FOR

DIRECT



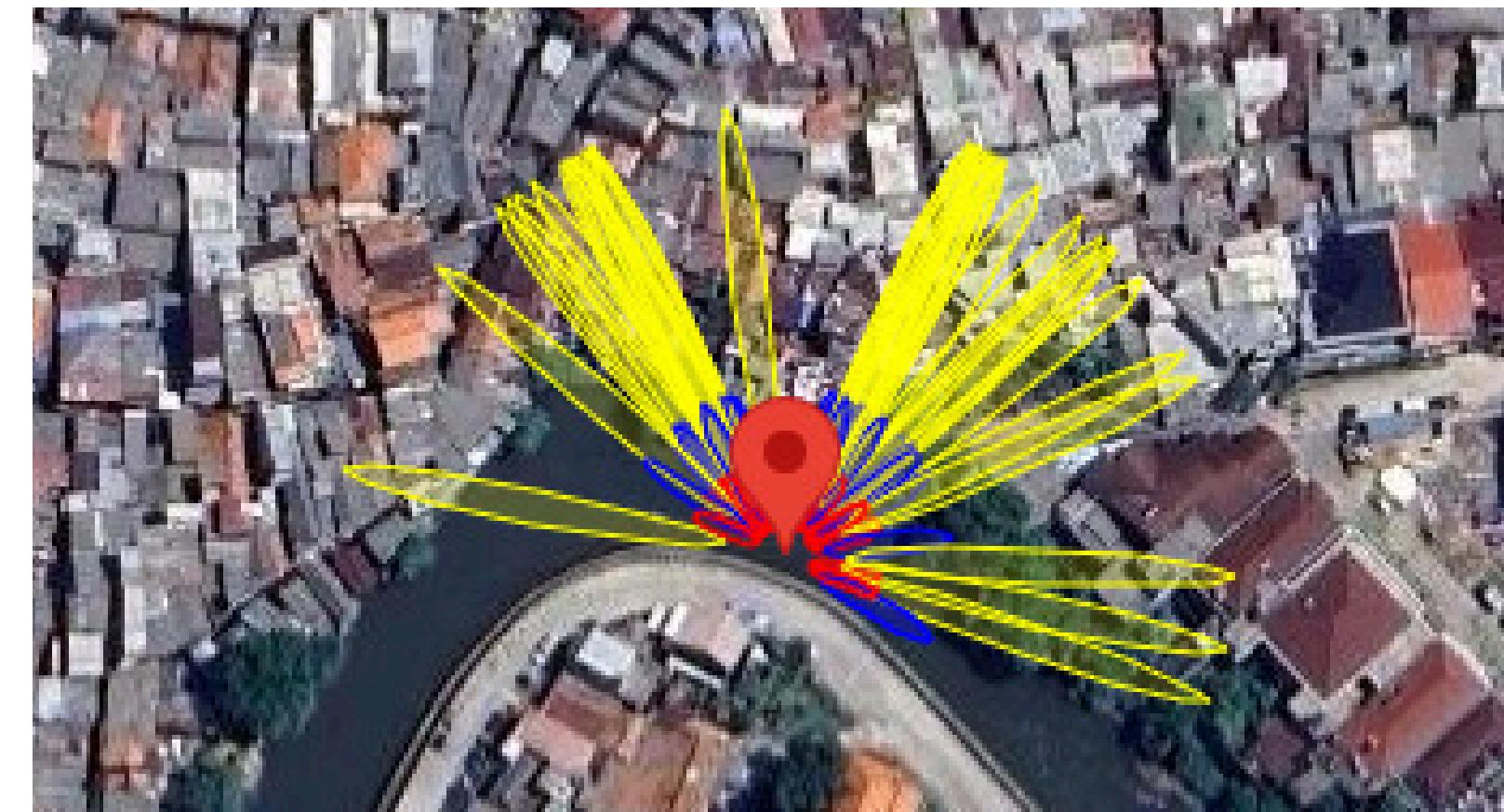
REFLECTED



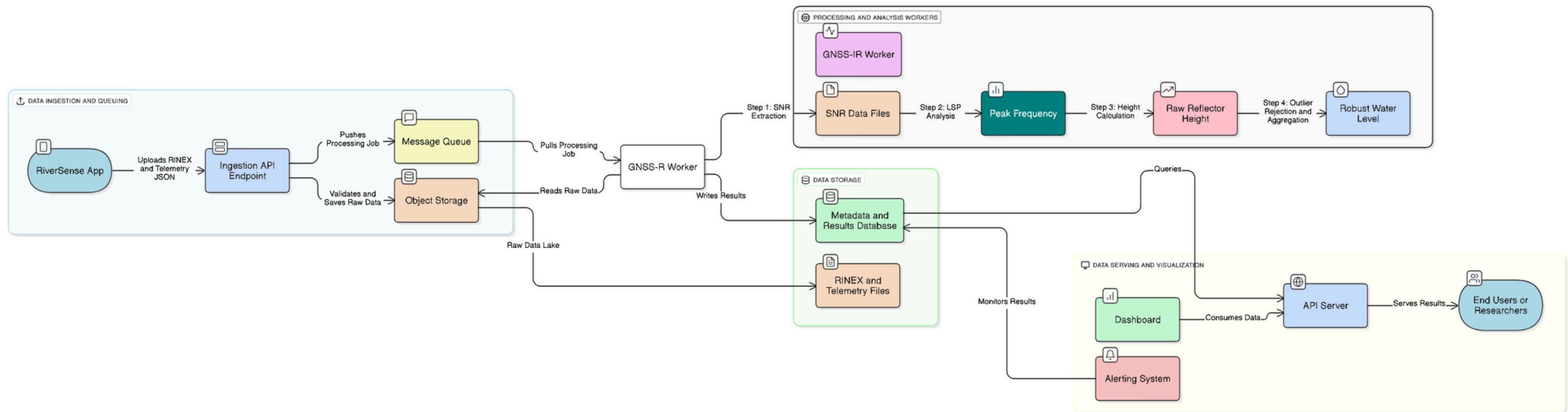
GNSS-IR (Global Navigation Satellite System-Interferometric Reflectometry) provides precise water level measurements by analyzing satellite signals reflected off water surfaces. This innovative approach enhances flood monitoring capabilities, offering real-time data crucial for disaster response and urban planning in Jakarta.

THE PROCESSING DATA FLOW

RAW DATA → PERIODOGRAM → SIGNAL TO NOICE RATIO (SNR)
→ DATA REFLECTOR HEIGHT (RH)



GNSS works like a super-precise ruler from space.
That helps us to observe water level dynamics.



RiverSense

Low Cost River Monitoring

01

GNSS-IR technology provides precise water level measurements for effective flood monitoring.

02

A **community-driven network** empowers locals to participate in water monitoring efforts actively.

03

Transforming **e-waste** into **valuable tools** enhances environmental sustainability while addressing technology waste.

Key Features of RiverSense

The initiative focuses on usability, monitoring, and community involvement in Jakarta.

Near Real-Time Monitoring

Users receive updates on water levels and environmental changes.

Community Engagement

Local users can share data and collaborate for better water management.

Cost Estimation

Component Description Estimated Cost (Rp)

- 📱 Secondhand Android Phone Snapdragon 625+ (e.g., Xiaomi Redmi Note 4, Infinix Note 10) with GNSS raw support 900.000
- 🛠️ Phone Refurbishing Kit Battery replacement, thermal paste, alcohol wipes, silicone case 150.000
- 🔋 LiFePO4 Battery Pack 12V 6Ah or 3.7V 10Ah with BMS (Battery Management System) 400.000
- ☀️ Solar Panel 20W–30W polycrystalline panel with charge controller 500.000
- 📦 Outdoor Enclosure Box IP65-rated plastic box (e.g., Tupperware mod or electrical junction box) 150.000
- 🔌 Cables & Connectors USB OTG, solar-to-battery wiring, waterproof grommets 200.000
- 🔧 Mounting Accessories Brackets, zip ties, velcro, screws, pole clamps 50.000

in total 2.350.000

Get Involved with RiverSense

Join us in making a difference today!

- Volunteer for local community events
- Donate your unused Android devices
- Help spread awareness through social media
- Participate in educational workshops
- Advocate for sustainable e-waste practices