



Strengthening Flood Risk Information Management

Case Study of “Last Mile” Investment : Jakarta, Indonesia



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Disaster Management Agency, Jakarta, Indonesia

Presented by Iwan Gunawan, Sr. DRM Specialist, the World Bank - Jakarta

Outline

- Jakarta flood risk and impacts to the communities
- Flood risk information management and system
- What the “Last-mile” means to Jakarta
- Challenges and Opportunities



Jakarta & Flood



Jakarta Overview

662 km²
wide

Passed by
13 rivers

40 % land
below sea level

Extreme rain fall
360 mm/day



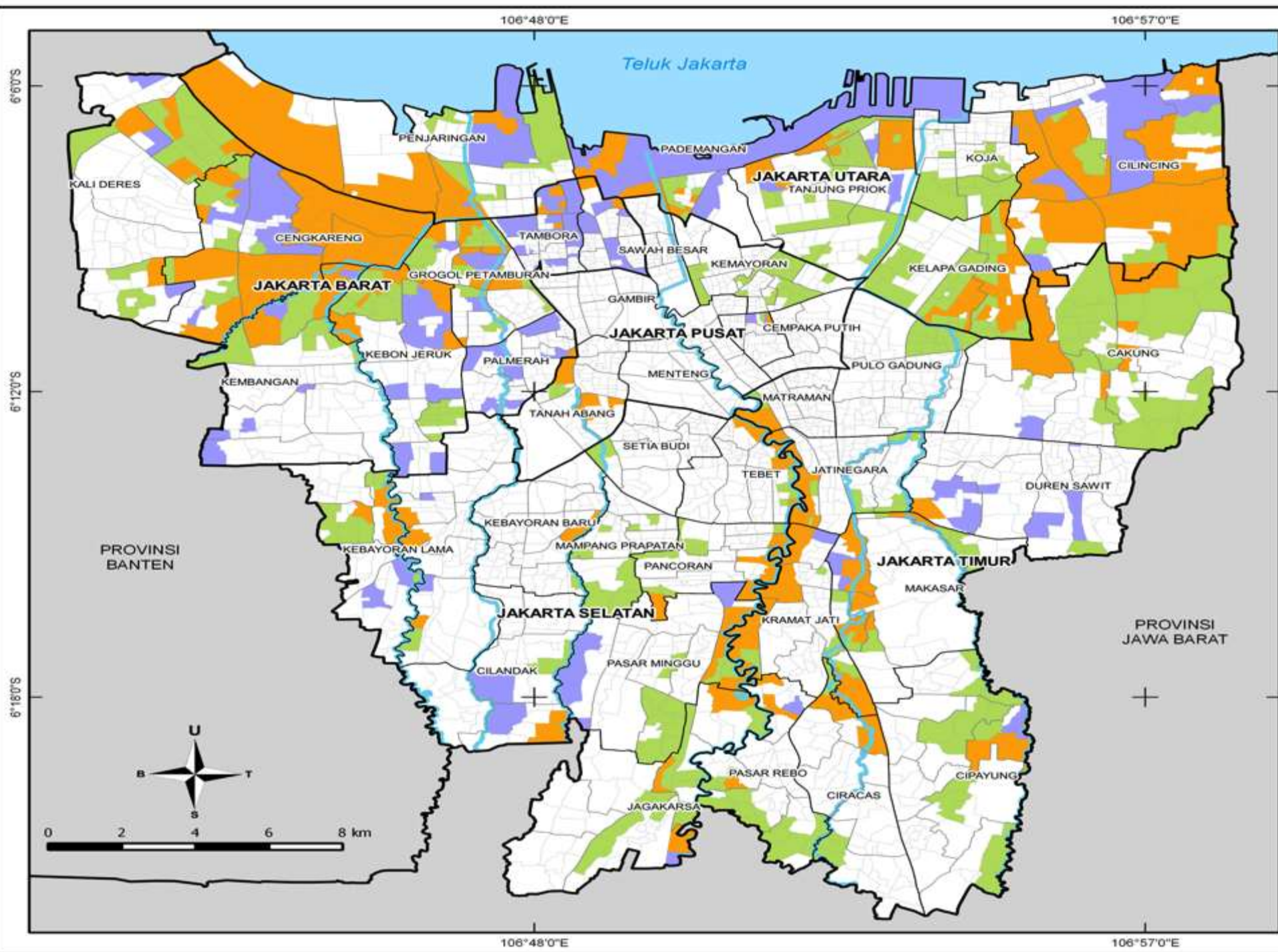
Land Subsidence
0,5-17 cm/y


Density
16.000/km²

Low Awareness
(waste mgmt,
informal settlement)

10%
Green Open Space

Flood Comparison 2013 vs 2014





PEMERINTAH PROVINSI DKI JAKARTA
BADAN PENANGGULANGAN BENCANA DAERAH

LAPORAN DAERAH BANJIR

**BERDASARKAN PERBANDINGAN KEJADIAN
BANJIR TANGGAL 16 - 29 JANUARI 2013
DENGAN 12 JANUARI - 10 FEBRUARI 2014**

Nomor Peta: **BANJIR-JANUARI-2013-2014**
Skala: **1:110.000**
Datum: **WGS 84**

Legenda


- Sungai
- Wilayah terdampak 2013, bebas banjir 2014
- Wilayah terdampak 2014, bebas banjir 2013
- Wilayah terdampak banjir 2013 dan 2014

Perbandingan 2013 dan 2014	Terdampak Banjir 2014	Bebas Banjir 2014	Total RW
Terdampak Banjir 2013	305	188	493
Bebas Banjir 2013	336	1868	2204
Total RW	641	2056	2697

Keterangan:
Peta ini menggunakan unit analisis batas RW (diperoleh berdasarkan program pemetaan partisipatif dengan OpenStreetMap pada tahun 2012) sebagai daerah terdampak banjir.

Informasi lebih lanjut hubungi:
Badan Penanggulangan Bencana Daerah (BPBD)
Provinsi DKI Jakarta
Jl. Medan Merdeka Selatan, No. 8-9 Blok F Lantai 3,
Telpn (021) 164 atau 3521623

Didukung oleh:

Why it becomes problem?

Kelapa Gading Jakarta



Flood Impacts

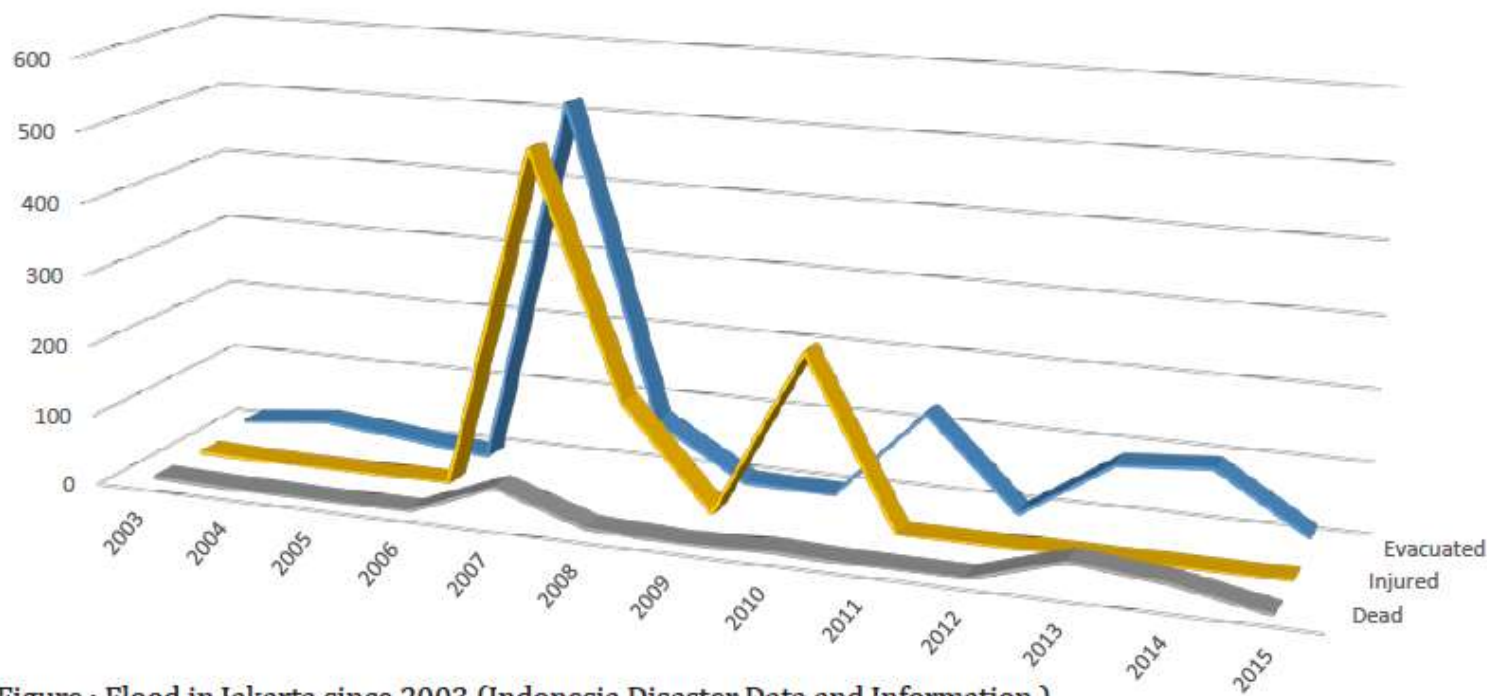


Figure : Flood in Jakarta since 2003 (Indonesia Disaster Data and Information)

- ~\$500 million in 2007 following 2 days of torrential rains
- ~\$600 million in 2013 following 3 days of rains and failed embankments



The city and its residents need to adapt to more frequent and severe flooding

The System



Detailed Mapping of Administrative Boundary to facilitate accurate inundation report

Hierarchy of Administrative unit

(~response mechanism)

DKI Jakarta province

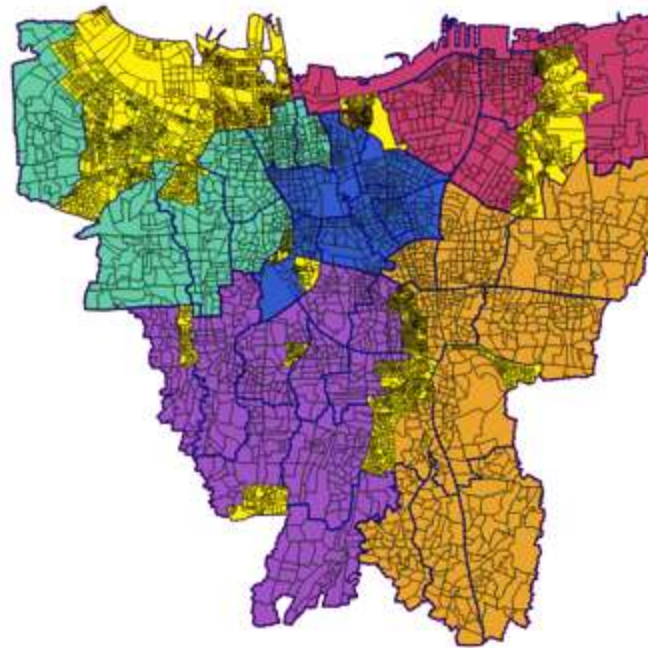
6 Cities

44 Sub Districts

267 Villages

2,707 RW

30,300 RT



Mapping Series of Events

Training of 70 mapping assistants

Creation of baseline map for the Village Head to gather initial data

Workshop for Mapping Assistants & Village Head to digitize the information spatially

Data Clean-up

Final Presentation and deliver printed maps back to Village Head

Disaster Information Management System (DIMS)

Sistem Manajemen Informasi Bencana

Menu Utama: Kerangka Kerja, Tanggapan Darurat, Pencegahan Bencana

18/02/2014 (Selasa) 23:40

Info Pengguna: SPMO Administrator Logout

Menu Utama Kerangka Kerja Tanggapan Darurat Pencegahan Bencana

Home > Manajemen Bencana > Tanggapan Darurat > Data Data Tinggi Muka Air

Data Data Tinggi Muka Air

Tanggal dan Waktu Observasi: 30/01/2014 00:00:00

Download Export Semua Tambah

Tanggal	Jam	Bendung Kahlutampa (cm)	Pos Depok (cm)	PA Manggarai (cm)	PA Karet (cm)	Pos Kapuk Hutan (cm)	Pos Pansanggahan (cm)	Pos Angkor Hutan (cm)	Waduk Ploet (cm)	Pasar Ikan (cm)	Pos Ciptaning Hutan (cm)	Pos Sumbat Hutan (cm)	PA Pulo Gadung (cm)
30/01/2014	0	160 - 180	270 - 340	450 - 540	550 - 630	200 - 280	250 - 340	250 - 280	0 - 30	200 - 240	200 - 240	200 - 240	100 - 150
30/01/2014	8	80 - 140	200 - 240	750 - 840	450 - 540	150 - 240	150 - 240	150 - 240	40 - 1	170 - 190	150 - 190	140 - 190	550 - 630
30/01/2014	16	< 80	< 200	< 750	< 450	< 150	< 150	< 150	< 40	< 170	< 150	< 140	< 550
30/01/2014	23:00	100.0	180.1	543.871	543.871	90.801	90.801	183.2	130.1	133.1	100.1	90.1	320.1
30/01/2014	22:00	100.0	180.1	543.2	543.2	90.801	90.801	180.2	130.1	133.1	100.801	90.1	320.1
30/01/2014	21:00	100.0	180.1	540.801	540.1	90.801	90.801	180.2	130.1	132.1	100.801	90.1	320.1
30/01/2014	20:00	100.801	180.1	539.801	540.1	90.801	90.801	200.1	130.1	130.1	100.801	90.1	320.1
30/01/2014	19:00	100.0	180.1	539.871	540.1	90.801	90.1	200.1	130.1	130.1	100.1	90.1	320.1
30/01/2014	18:00	100.0	180.1	539.871	540.1	90.1	90.1	200.1	130.1	132.1	100.801	90.1	320.801
30/01/2014	17:00	100.0	180.801	539.871	540.1	90.1	90.801	200.801	130.1	130.1	100.801	90.801	320.801
30/01/2014	16:00	100.0	180.1	539.801	540.1	90.1	90.801	200.1	130.1	130.1	100.1	90.1	320.1
30/01/2014	15:00	100.1	180.1	490.1	540.1	90.801	90.801	200.1	130.1	130.1	100.1	90.1	320.1
30/01/2014	14:00	100.1	200.1	540.1	540.1	90.1	90.801	210.1	130.1	130.801	100.1	90.1	320.1
30/01/2014	13:00	100.801	200.801	540.1	540.1	90.1	90.801	210.801	130.801	130.1	100.801	90.801	320.801
30/01/2014	12:55			490.1									

100%

Search: Masukkan Nama

Info: 100%

Informasi

Layers

- ☒ Banjir
- ☐ Jalan
- ☐ Perumahan
- ☐ Industri Logam
- ☐ Industri Perikanan
- ☐ Tinggi Muka Air
- ☐ Sungai

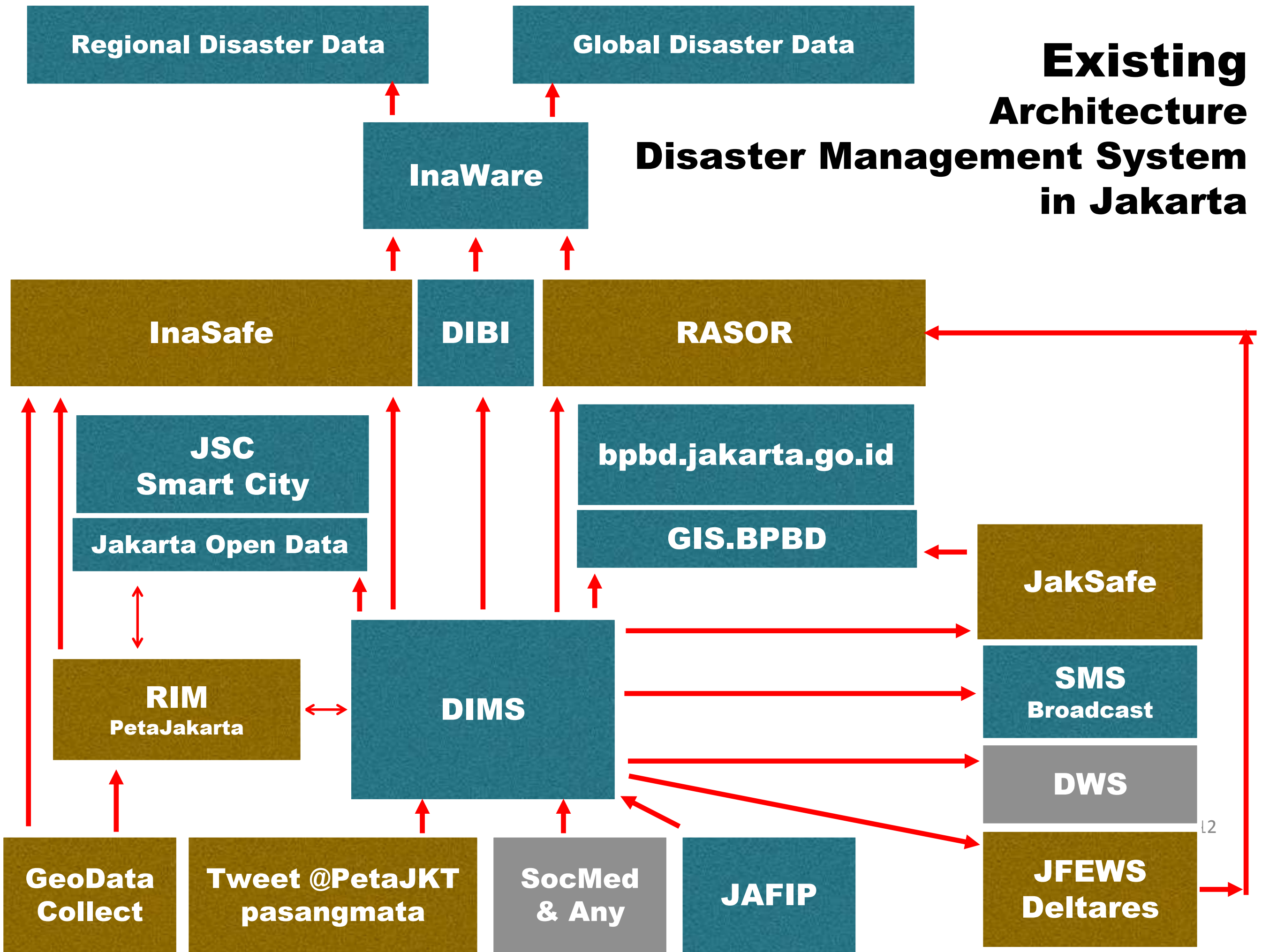
Legenda

- Peta Air
- Banjir
- Step 1
- Step 2
- Step 3
- Step 4
- Step Tinggi Muka Air antara 50 - 100 cm
- Kawasan
- Step Tinggi Muka Air antara 101 - 200 cm

Emergency Operation Centre

- Controlled by BPBD
- Operation : 24/7
- Integrated with Related Agency : Fire Dept, Water Management, Social, Health, Sanitation, Transportation, Industry and Commerce, Safety and Security





System Collaboration for Better Result



Planning



Flood 2015

banjir-1502

106°44'24.0"E

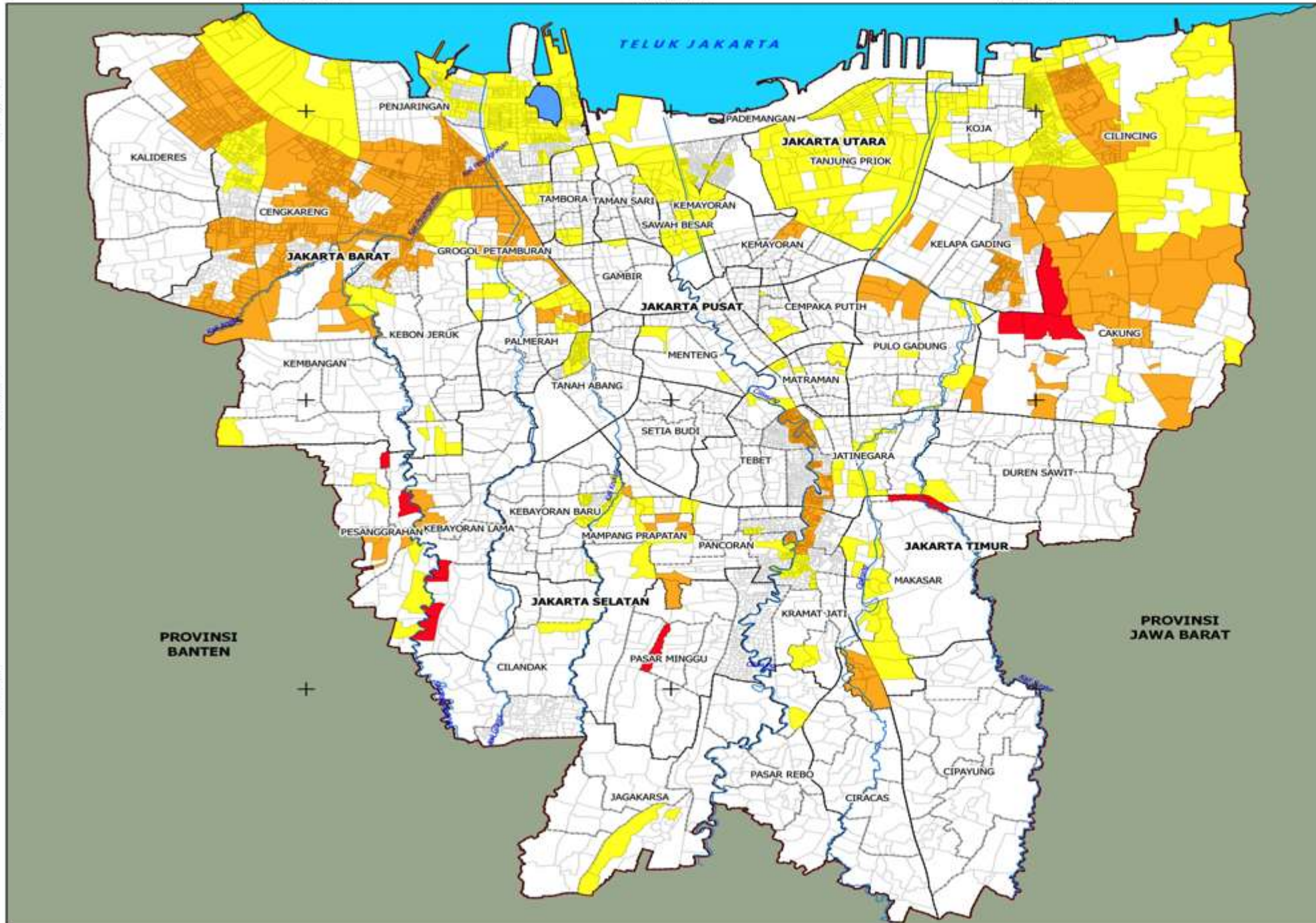
106°49'48.0"E

106°55'12.0"E

6°7'12.0"S

6°12'36.0"S

6°0'0.0"S



106°44'24.0"E

106°49'48.0"E

106°55'12.0"E



PEMERINTAH PROVINSI DKI JAKARTA
BADAN PENANGGULANGAN BENCANA DAERAH

LAPORAN DAERAH BANJIR BERDASARKAN KEJADIAN BANJIR BULAN FEBRUARI 2015



SKALA : 1:110.000

0 2.5 5 7.5 km

Legenda

- Sungai
- Waduk
- Tinggi Genangan Air Rata-rata
 - 10 - 70 cm
 - 71 - 150 cm
 - > 150 cm
 - Belum Ada Data
- Total Terdampak :
 - Kecamatan : 38 Kecamatan
 - Kelurahan : 133 Kelurahan

Keterangan :
Peta ini menggunakan unit analisis batas RW & RT (Diperoleh berdasarkan program pemetaan partisipatif dengan OpenStreetMap pada tahun 2014) sebagai daerah terdampak banjir dan informasi wilayah terdampak banjir diperoleh dari PUSDALOPS BPBD DKI Jakarta.

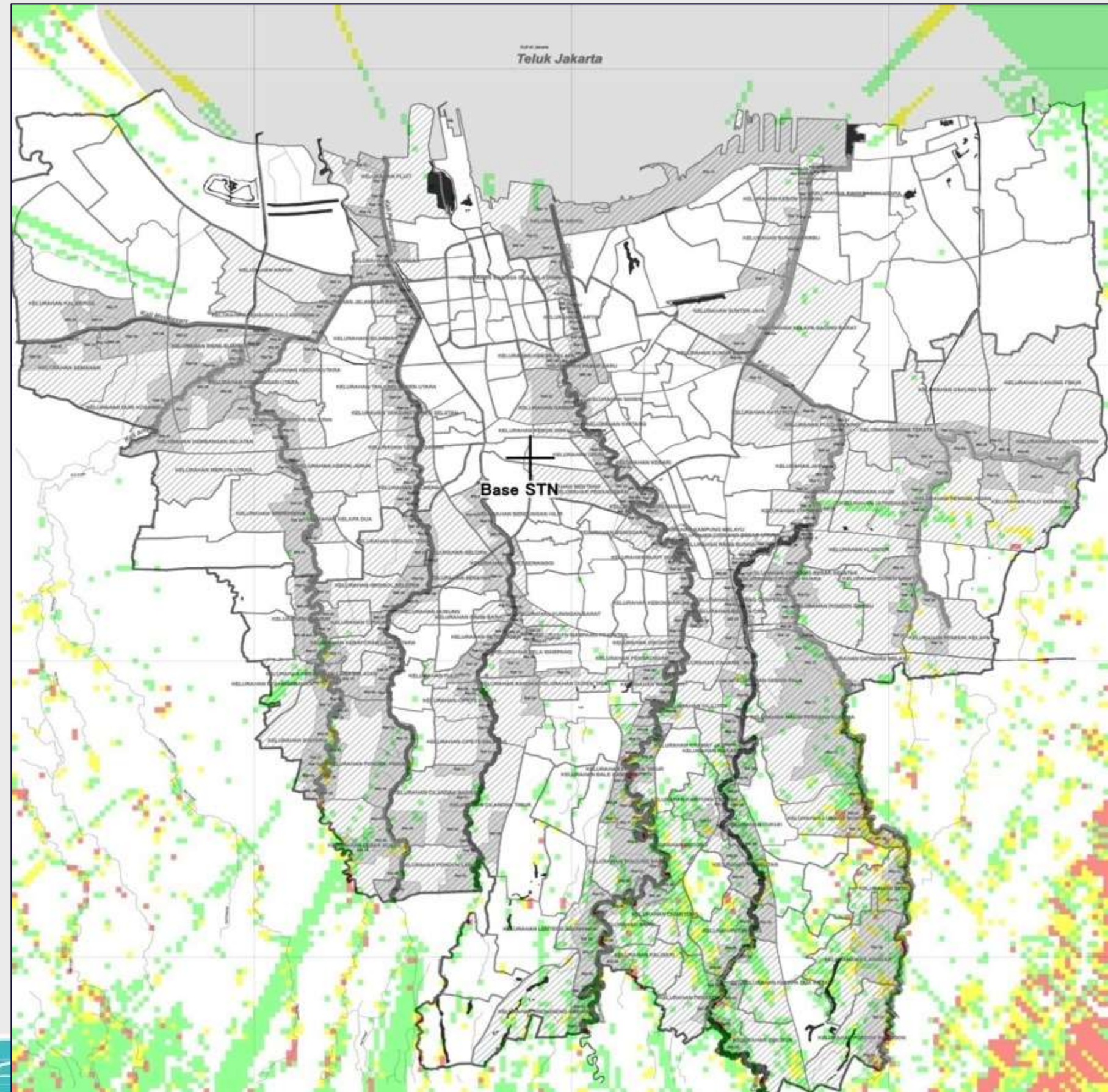
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Pusat Pengendalian dan Operasi (PUSDALOPS) BPBD Provinsi DKI Jakarta
Jl. Medan Merdeka Selatan No.8-9 Blok F Lantai 3.
Telp (021) 164 atau 3521623

Didukung oleh :



PETA-SO2-06

Prediction based on Hystorical Flood Events

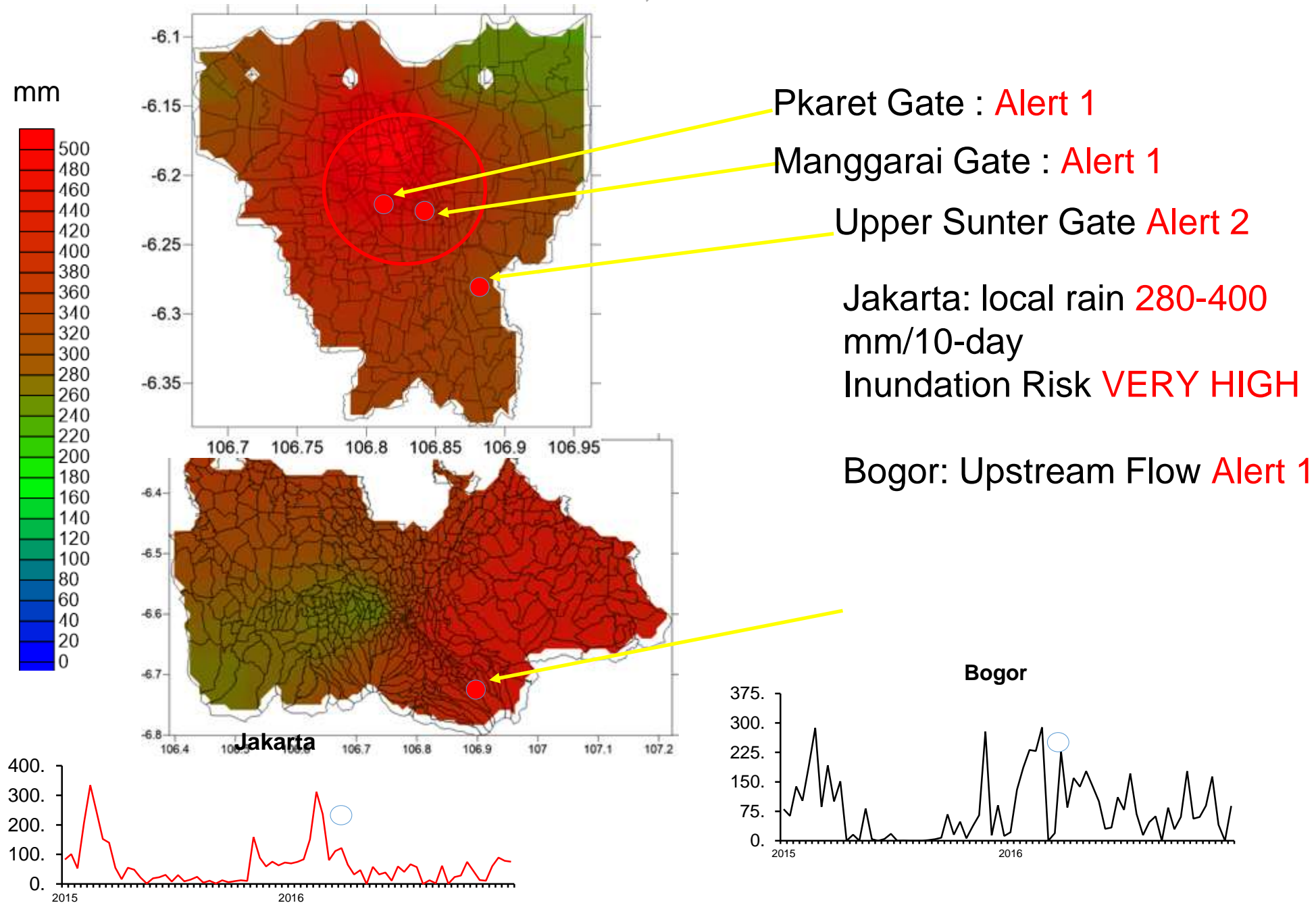


Associating Rainfall-Runoff to Impacts

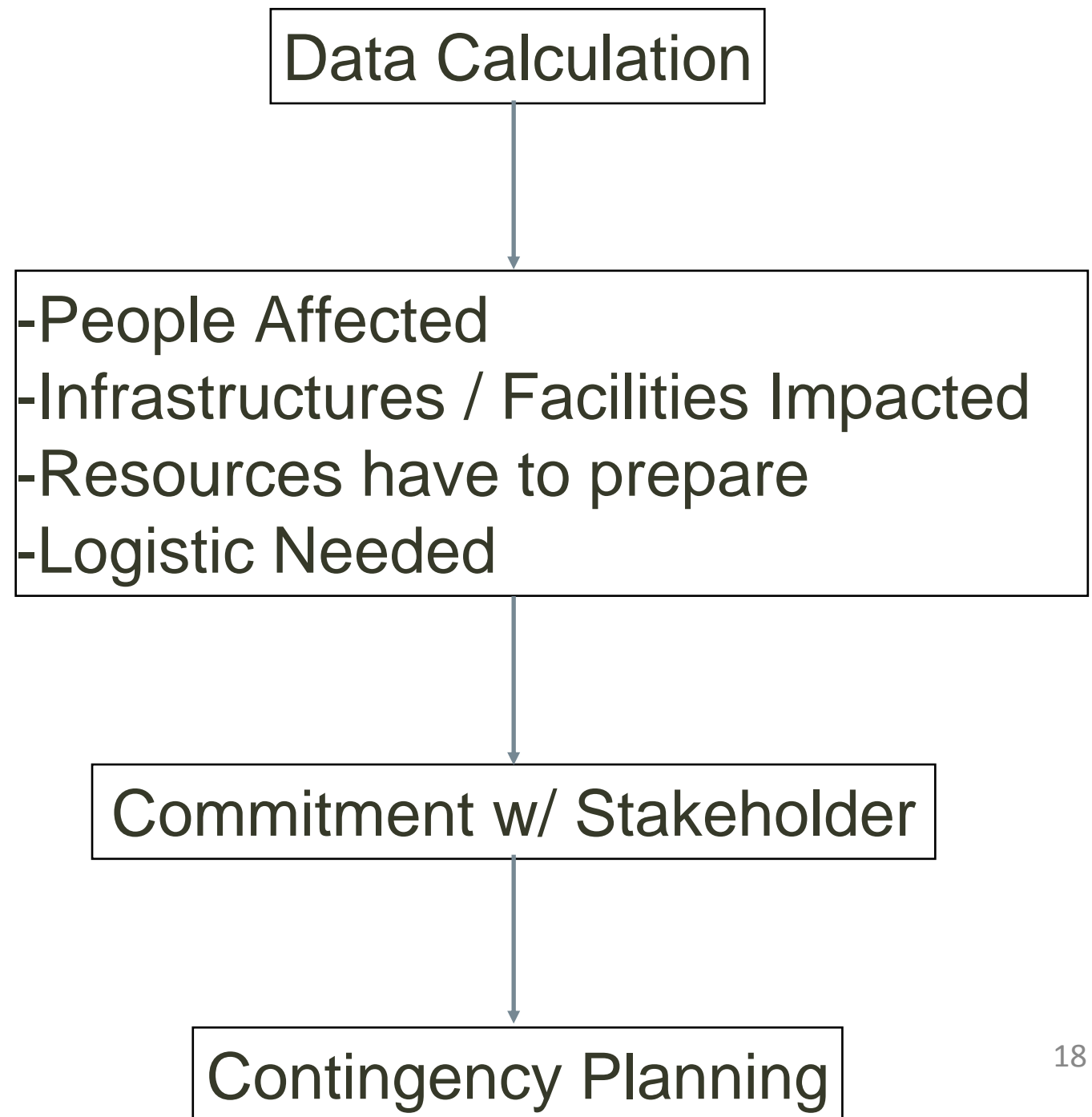
..but dynamic could change with rapid land use changes and uncoordinated measures...

Prediksi Curah Hujan Dasarian di Wilayah Jakarta dan Bogor

Dasarian 3, Februari 2016



Contingency Planning Process



Powered by



InaSAFE

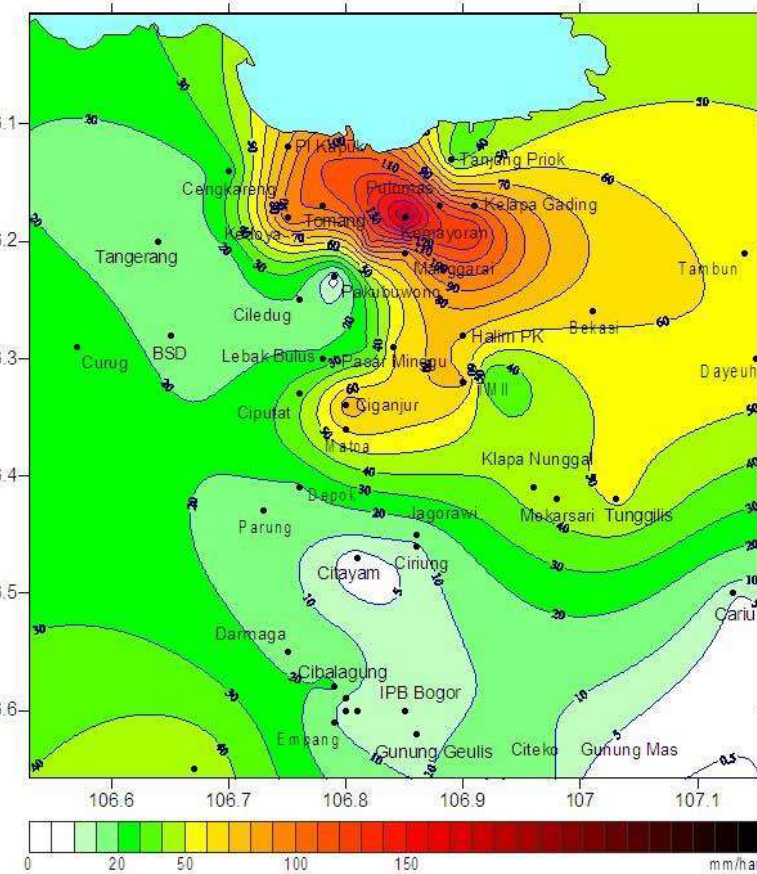
Monitoring



Extreme Rainfall in Jakarta Jan-Feb 2015

PETA SEBARAN HUJAN JABODETABEK

(08 Februari 2015 pukul 07.00 WIB - 09 Februari 2015 pukul 07.00 WIB)



Analisis :

- Umumnya hujan ringan hingga hujan sangat lebat.
- Konsentrasi sangat lebat di Jabodetabek bagian Utara.
- Konsentrasi hujan sangat lebat di Kemayoran = 177 mm.

Keterangan :

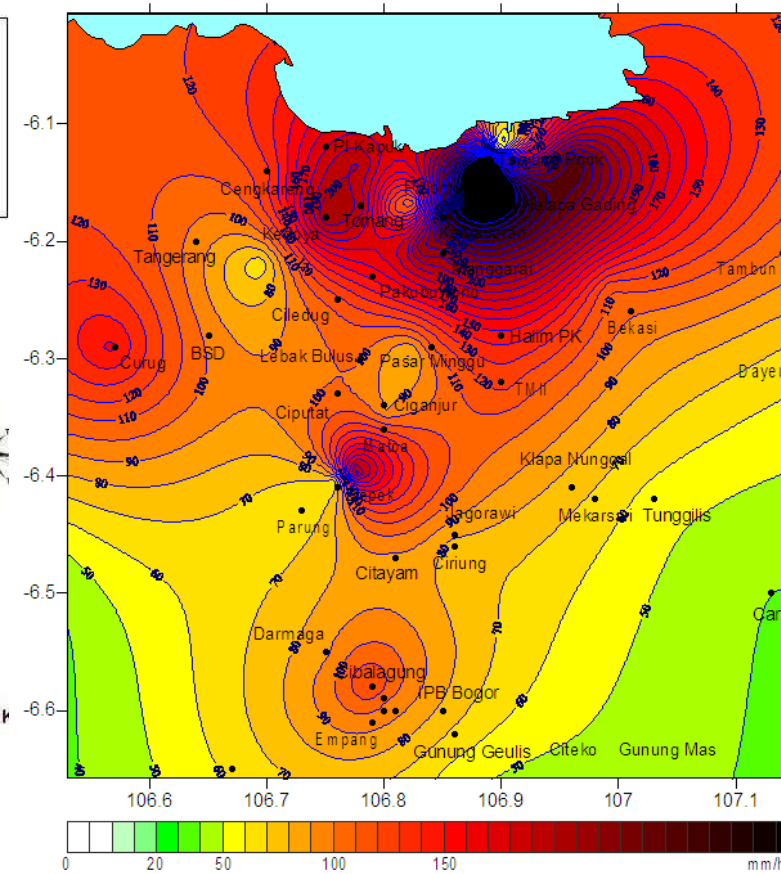
- Hujan ringan : 5 - 20 mm/hari atau 0.1 - 5 mm/jam.
- Hujan sedang : 20 - 50 mm/hari atau 5 - 10 mm/jam.
- Hujan lebat : 50 - 100 mm/hari atau 10 - 20 mm/jam.
- Hujan sangat lebat : > 100 mm/hari atau > 20 mm/jam.



BADAN METEOROLOGI KLIMATOLOGI DAN GEOFISIKA
DEPUTI BIDANG METEOROLOGI
Jl. Angkasa I No. 2 Kemayoran, Jakarta Pusat

PETA SEBARAN HUJAN JABODETABEK

(09 Februari 2015 pukul 07.00 WIB - 10 Februari 2015 pukul 07.00 WIB)



Analisis :

- Umumnya hujan sedang hingga sangat lebat
- Konsentrasi hujan sangat lebat di Jabodetabek bagian utara & tengah
- Konsentrasi hujan tertinggi di Tanjung Priok = 361 mm.

Keterangan :

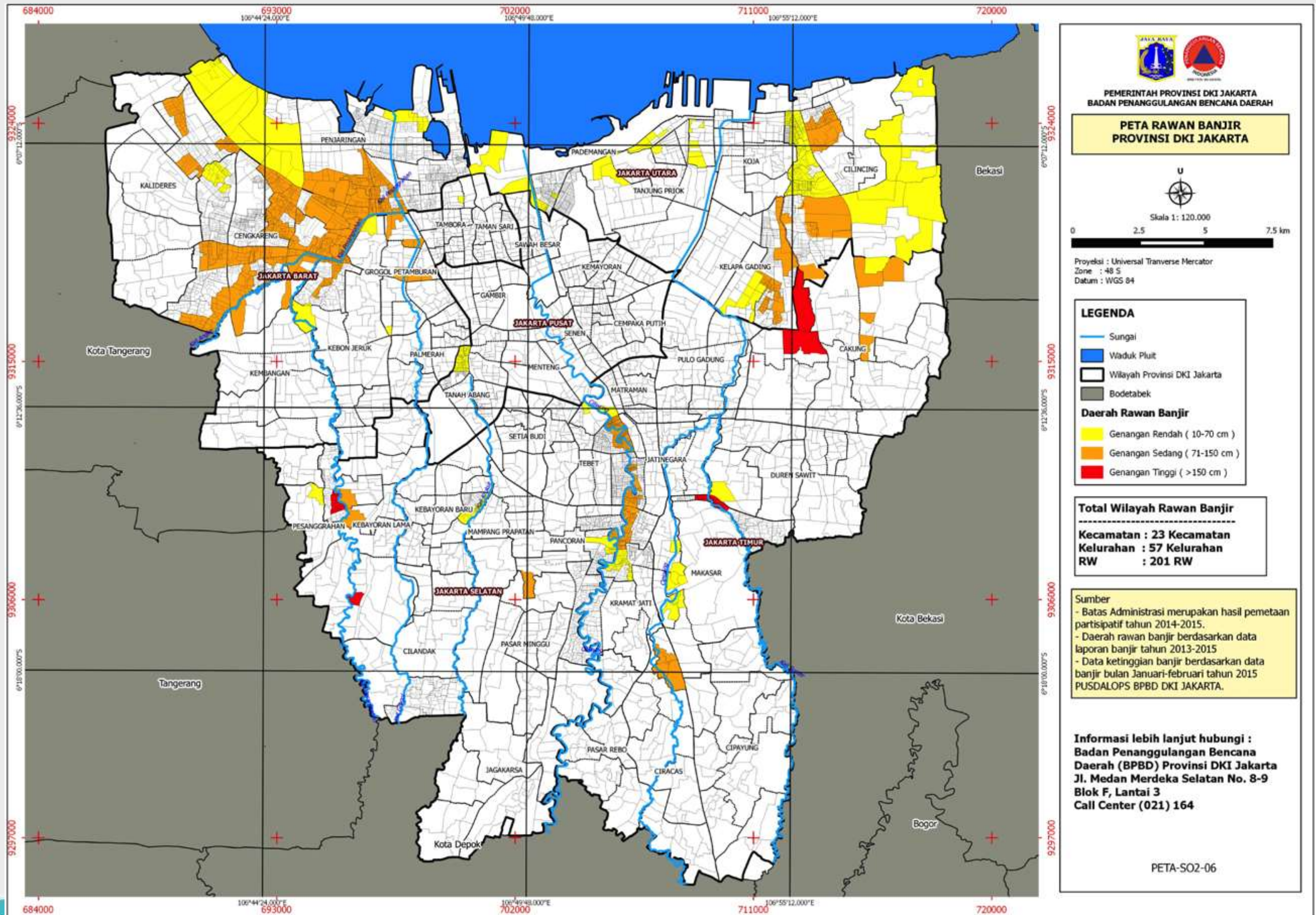
- Hujan ringan : 5 - 20 mm/hari atau 0.1 - 5 mm/jam.
- Hujan sedang : 20 - 50 mm/hari atau 5 - 10 mm/jam.
- Hujan lebat : 50 - 100 mm/hari atau 10 - 20 mm/jam.
- Hujan sangat lebat : > 100 mm/hari atau > 20 mm/jam.



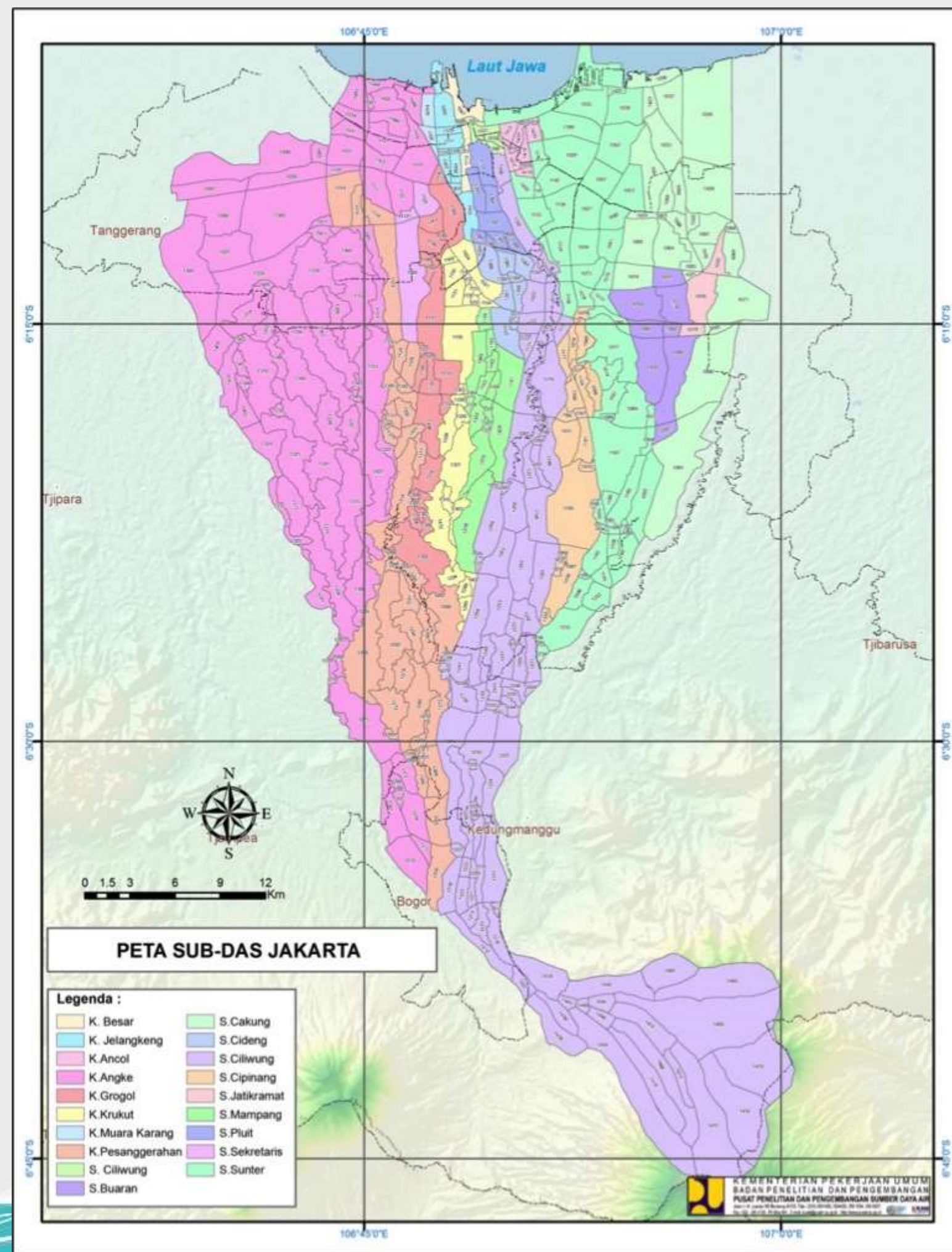
BADAN METEOROLOGI KLIMATOLOGI DAN GEOFISIKA
DEPUTI BIDANG METEOROLOGI
Jl. Angkasa I No. 2 Kemayoran, Jakarta Pusat

RainFall Over 340mm / day . Drainage Capacity only 60mm/day

Focus on Most Flood Prone Area



Looking at Greater Jakarta River Basin



Hourly Water Level Information

Tinggi Muka Air

Hari/Tanggal : Selasa, 1 Maret 2016

Pintu Air	Batas Siaga				Waktu						
	Siaga III	Siaga II	Siaga I		01:00	02:00	03:00	04:00	05:00	06:00	07:00
Bendung Katulampa	80 – 149	150 – 199	≥ 200	2	40 G	40 G	40 G	40 G	40 M	40 M	40 M
Pos Depok	200 – 269	270 – 349	≥ 350	1	155 MT	155 MT	155 MT	150 M	150 M	150 M	150 M
PA Manggarai	750 – 849	850 – 949	≥ 950	4	700 H	700 H	700 H	700 H	700 H	700 H	730 G
PA Karet	450 – 549	550 – 599	≥ 600	3	450 G	450 M	450 M	460 M	460 M	470 G	470 M
Pos Krukut Hulu	150 – 249	250 – 299	≥ 300	1T	140 MT	140 MT	140 MT	140 MT	140 MT	140 MT	140 MT
Pos Pesanggrahan	150 – 249	250 – 349	≥ 350	1	140 MT	140 MT	140 MT	140 MT	115 MT	110 MT	110 MT
Pos Angke Hulu	150 – 249	250 – 299	≥ 300	1	275 G	275 G	275 M	270 M	270 M	265 M	265 G
Waduk Pluit	-40 – -1	0 – 39	≥ 40	4	-205 G	-205 G	-205 M	-205 M	-205 M	-205 G	-205 M
Pasar Ikan	170 – 199	200 – 249	≥ 250	3	171 MT	170 G	175 MT	175 MT	168 MT	175 H	163 M
Pos Cipinang Hulu	150 – 199	200 – 249	≥ 250	1	110 M	110 M	110 M	110 M	110 M	110 M	110
Pos Sunter Hulu	140 – 199	200 – 249	≥ 250	1	60 M	60 M	60 M	60 M	60 M	70 M	70
PA Pulo Gadung	550 – 699	700 – 769	≥ 770	3	420 G	420 G	420 G	420 G	370 M	370 H	370

Siaga I ■ Bencana Siaga II ■ Kritis Siaga III ■ Waspada Siaga IV ■ Aman
 T: Terang MT: Mendung Tipis M: Mendung G: Gerimis H: Hujan

- Manually informed by Radio Communication from Monitoring Post
- Traditional but most reliable and proven
- Now combine digital sensor (AWLR), CCTV and manual report

Integrate Different Sources



Dissemination & Warning



Public Dissemination & Use of Information

<http://bpbd.jakarta.go.id/flood>

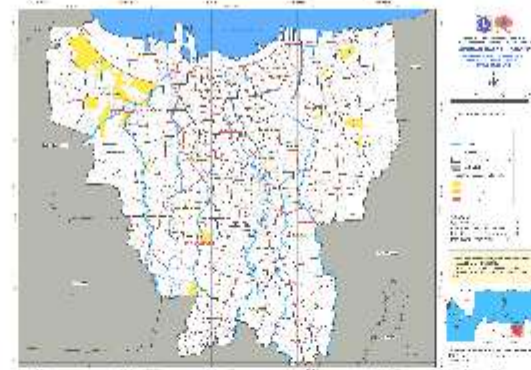
<http://gis.bpbd.jakarta.go.id/>

*Produced Hourly,
but published 6-hourly*

Peta Banjir



Peta Banjir 26/02/16 pkl 00.00



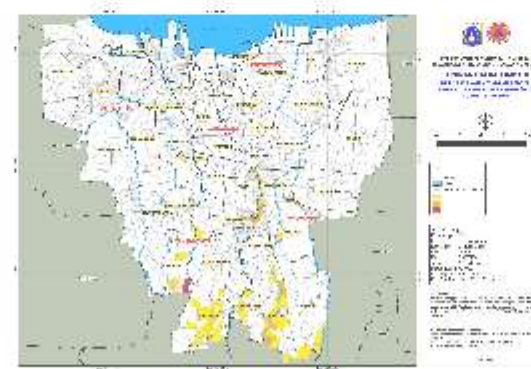
Peta Banjir 26/02/16 pkl 18.00



Peta Banjir 26/02/16 pkl 12.00



Peta Banjir 26/02/16 pkl 06.00



Peta Banjir 12/02/16 pkl 18.00



Peta Banjir 13/02/16 pkl 06.00

SMS Broadcast for FEWS

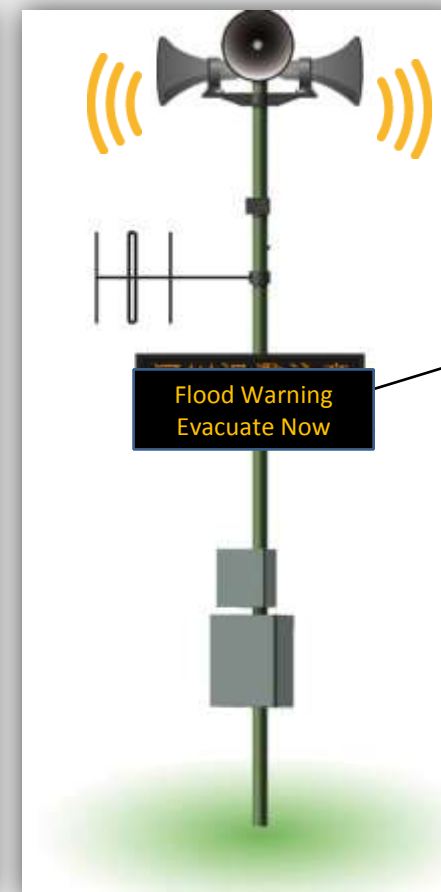


Disaster Warning System

**Early
Warning
Alert**

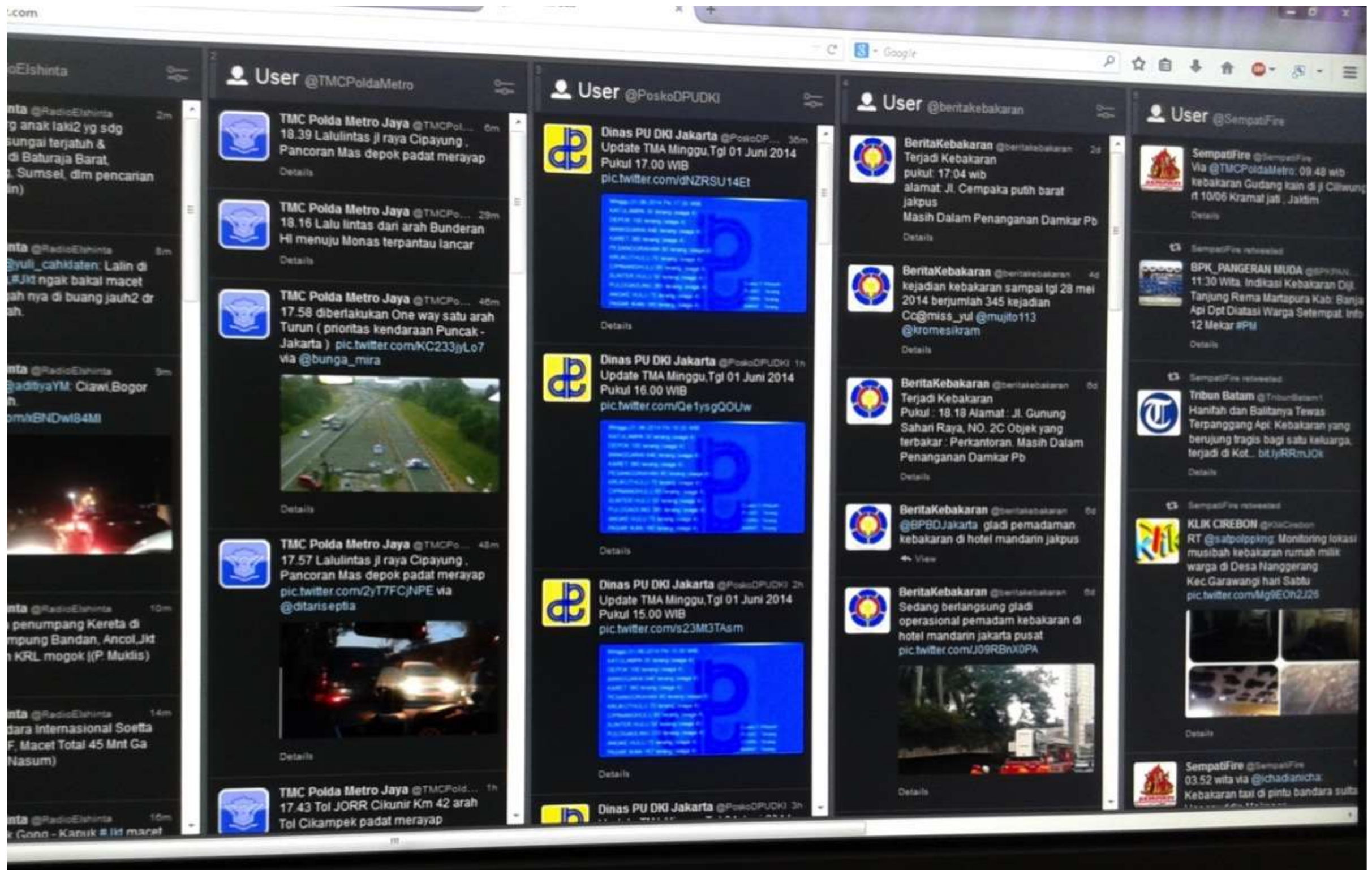


Emergency broadcast,
Voice & Sirene



Large character
display panel

Social Media



Peta Jakarta (Jakarta Map)

Life Censors

Crowd Sourcing Data
(using twitter, Qlue,
pasangmata.com)

Embed in BPBD Portal

Flood Map from Citizen

Risk Evaluation Matrix

Validation from Disaster
Agency (BPBD)



What “Last Mile” means for Jakarta



Closing the Loop of Gov't-Citizen Engagement

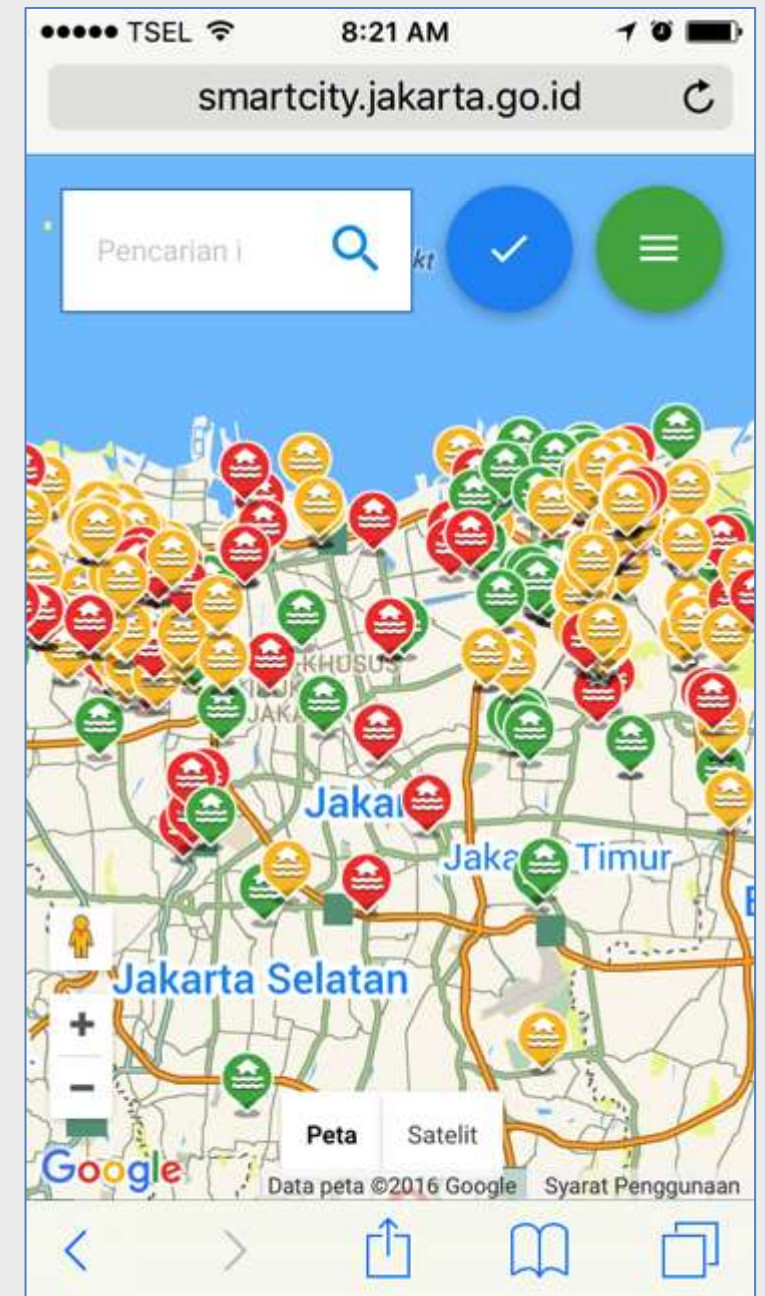
Jakarta's Flood Management System can be linked to Citizen's Reports from QLUE and SmartCity



Flood Mapping



Free Apps for Citizens' report



Maps of Citizens' Report w/ Status

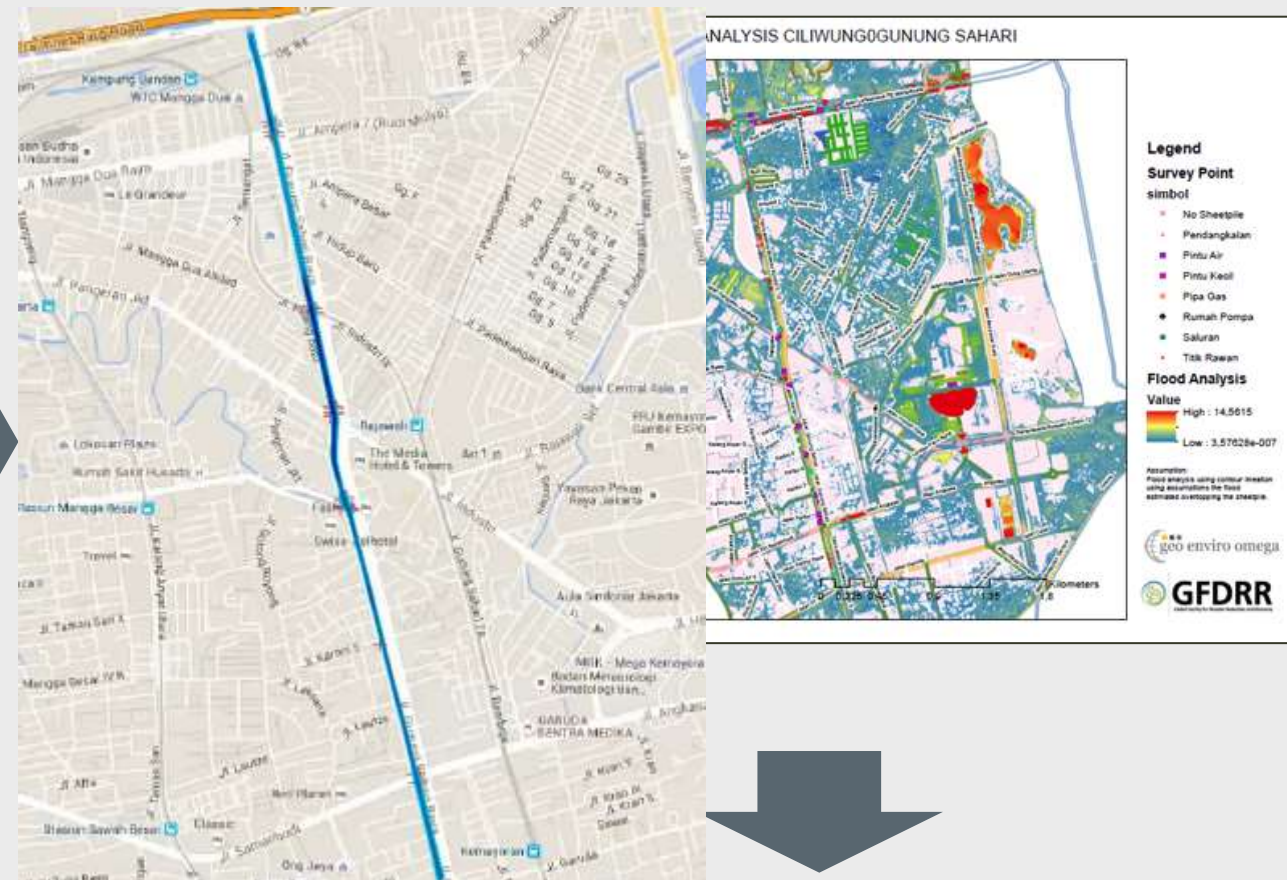


Report used by City Gov't
to dispatch crew

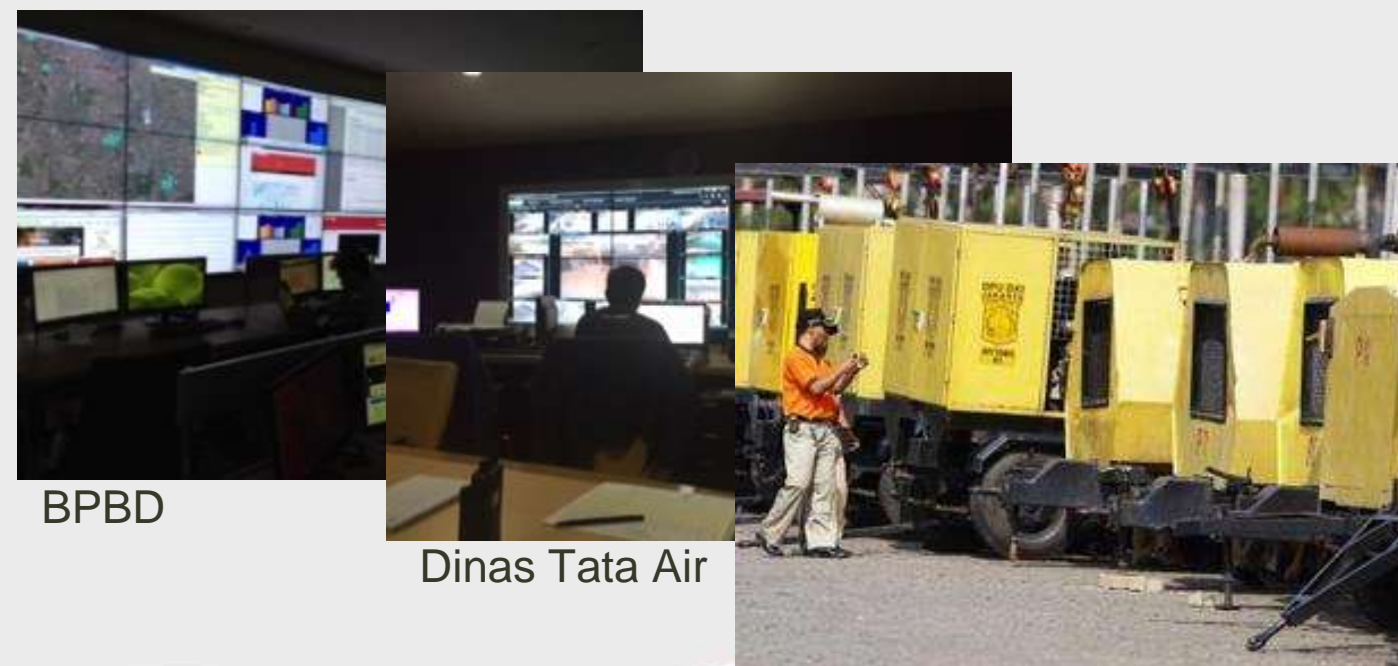
Functional Review of Flood Mitigation Measures

The data and tools are used to assess existing gaps in flood mitigation in Ciliwung-Gn Sahari

October 26, 2015 – Field Inspection – 12 gaps identified November 3, 2015 – Rapid Assessment Completed



Recommendation: anticipate, monitor, act early



BPBD

Dinas Tata Air



December 21, 2015 – Recommendations Presented

Yet measures are not always “risk informed”



23 April 2016



13 May 2016

Uninformed Decision Caused Worse Disaster

Designated Shelter in Neighboring Municipality Severely Flooded




Challenges and Opportunities

Challenges

- ◆ Update of sectoral & thematic data is slow and complex
- ◆ Higher quality information (map resolution, weather prediction, flood model) is “expensive”
- ◆ Real-time accurate data (duration and intensity of events) is insufficient
- ◆ Encouraging public to actively contribute information is a long process
- ◆ Predictive Models for better Scenario constrained by updated hydraulic data

Opportunities

- ◆ Use of satellite, weather radar and sensor data for timely validation
 - ◆ Update field geospatial information using citizens' reports and collaborative mapping and linked to actions
 - ◆ Build adaptive culture and system for citizens' mobility during flood season
- 

THANK YOU

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