

How space technology applications contributed to combatting Covid-19 pandemic: Development of LAPAN Hub Covid-19

Orbita Roswintiarti
Deputy Chairman for Remote Sensing Affairs

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Background

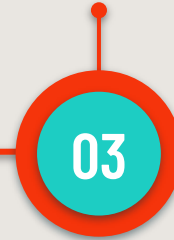
2 March 2020
First case of Covid-19 in
Indonesia was announced
by President Jokowi



16 March 2020
Min. Health's Circular
Letter No. 02/2020 of Self
Isolation Protocol



April 2020
Look for the data and
brainstorm the method



Week-4 April 2020
Development of LAPAN
Hub Covid-19



Methodology development

$$\text{Risk} = \text{Hazard} * (\text{Vulnerability}/\text{Capacity})$$

Hazard

Taken from daily:

POS: Positive case

PIM: Patient In Monitoring

PUS: People Under Surveillance

in village/district levels.

Capacity

Taken from the large-scale social restriction policy.

Vulnerability

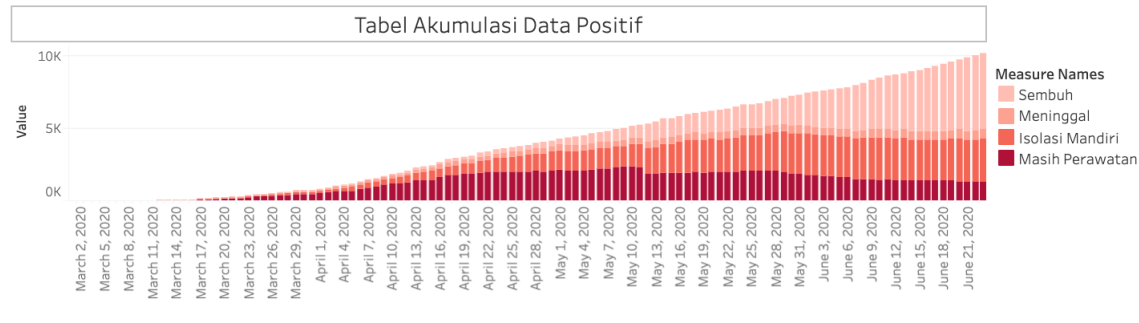
Taken from the latest Landsat-8, SPOT-6/7, and Pleiades data mosaic and related statistical/ground-based data to update distribution of settlement (BUI=NDVI-NDBI), population density, road access condition, and strategic locations.

BUI: Build-Up Index

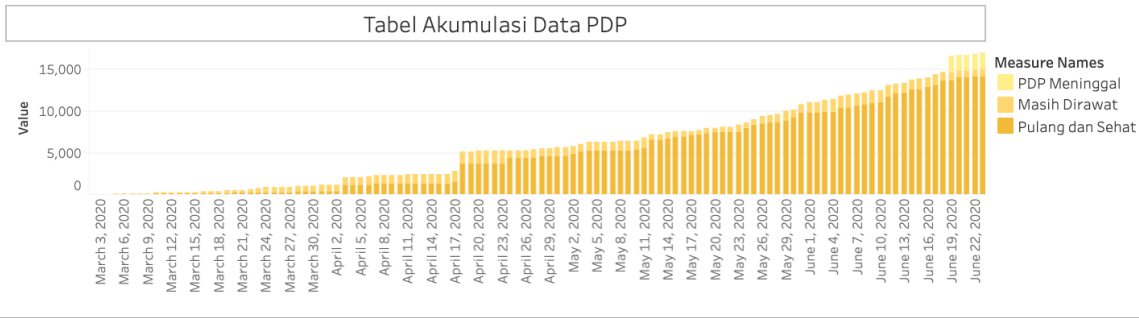
NDVI: Normalized Difference Vegetation Index

NDBI: Normalized Difference Build-Up Index

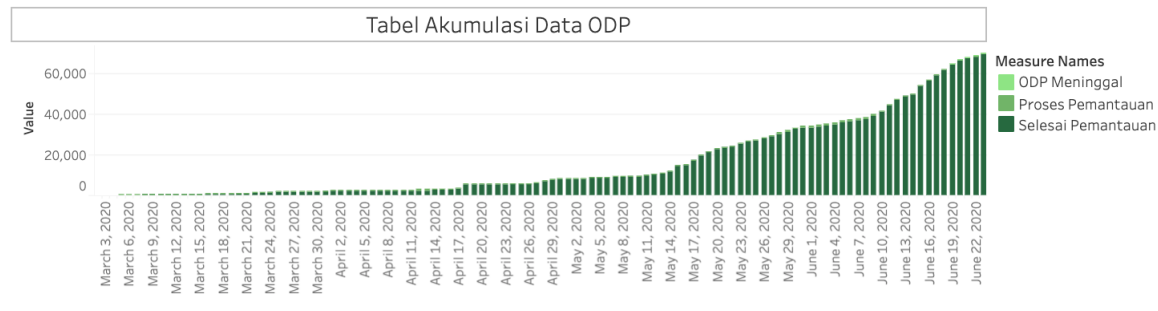




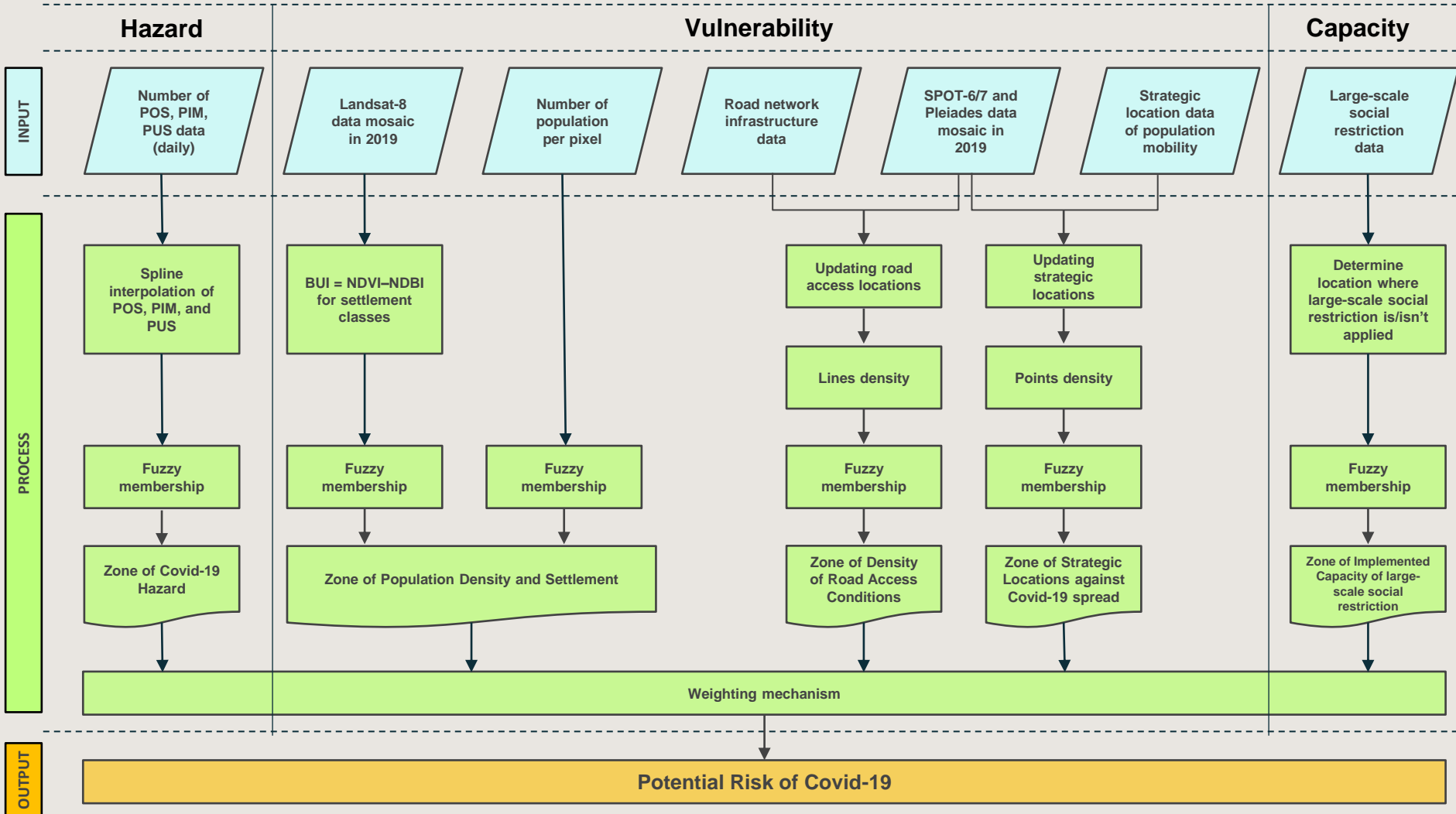
POS
Positive
case



PIM
Patient in
Monitoring

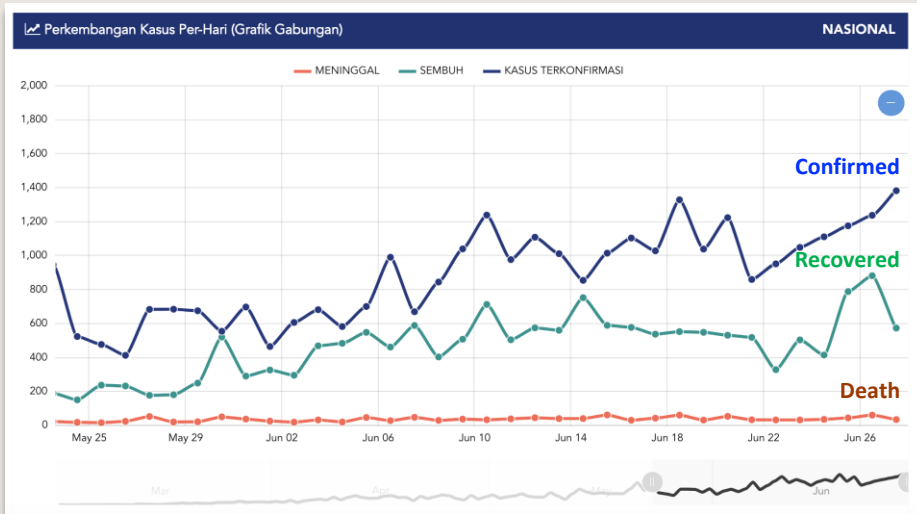


PUS
Patient
Under
Surveillance

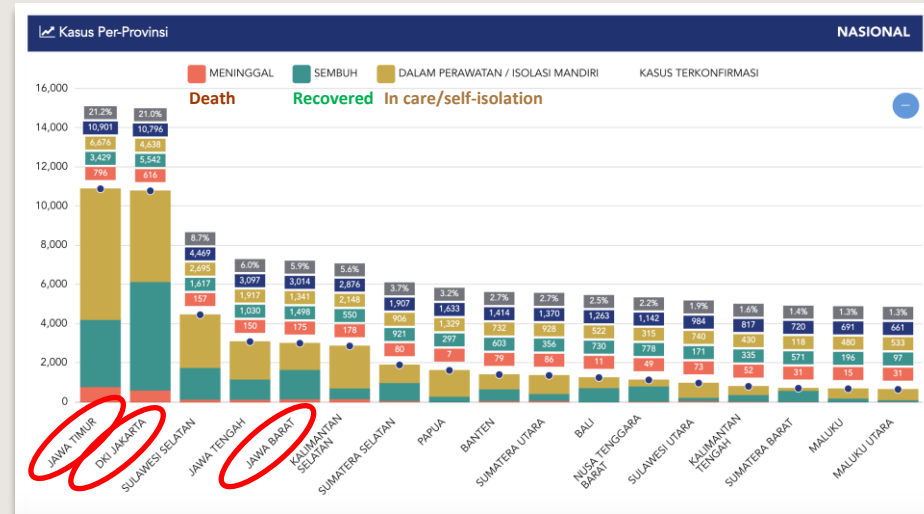


Reported cases (27 June 2020)

National



Provinces



Jakarta: 263 villages (out of 267 villages)
Bandung (W. Java): 30 districts
Surabaya (E Java): 154 villages

Optical and SAR data received currently in LAPAN Ground Stations



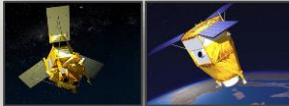
Optical low res. data (≥ 250 m)

- Terra/Aqua
- S-NPP
- NOAA-18/19/20
- MetOp-A
- Himawari-8
- FY-3B/C



Optical medium res. data (15 - 30 m)

- Landsat-7
- Landsat-8



Optical high res. data (1,5 m)

SPOT-6/7



Data optik resolusi sangat tinggi (50 cm)

Pleiades-1A/B

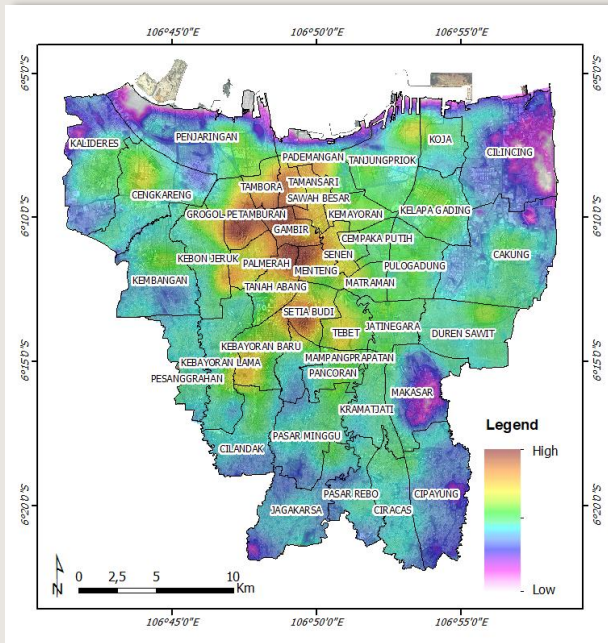


SAR data (3 m)

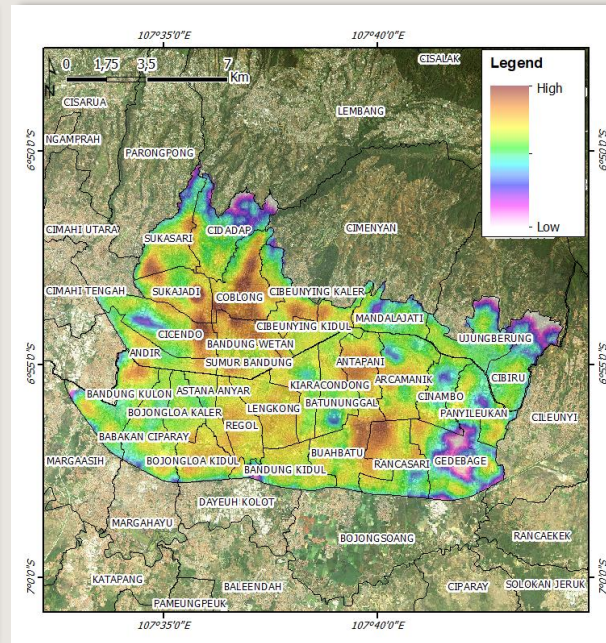
TerraSAR-X/TanDEM-X

Vulnerability levels

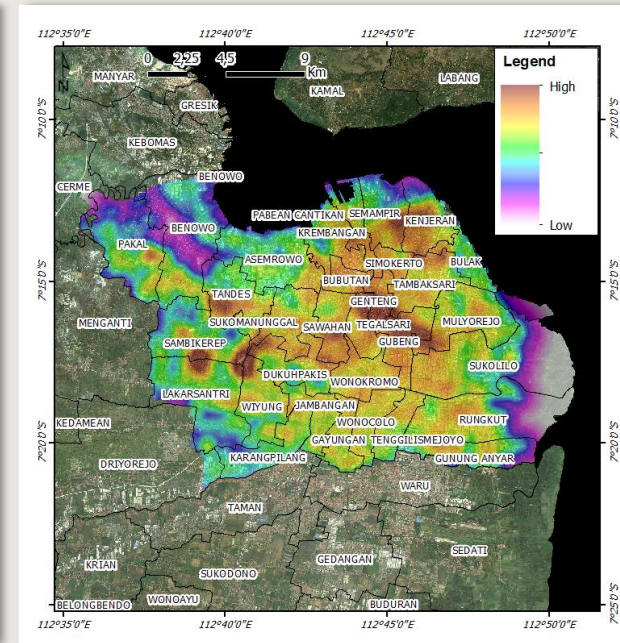
JAKARTA



BANDUNG



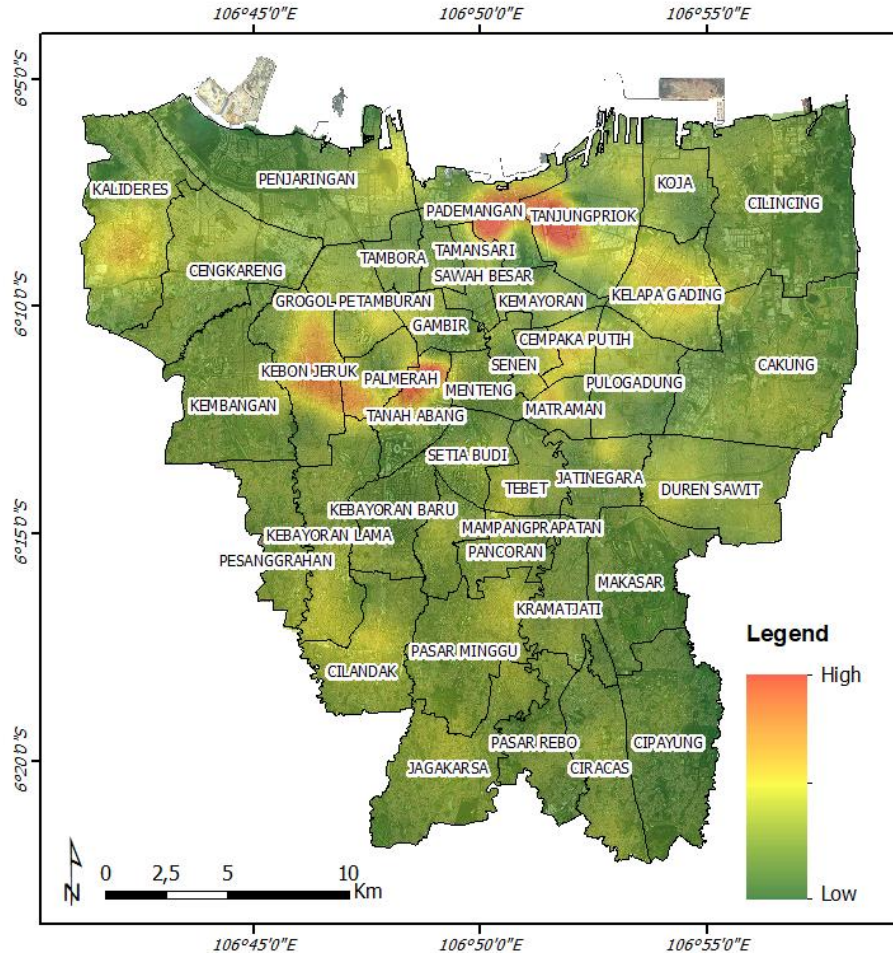
SURABAYA



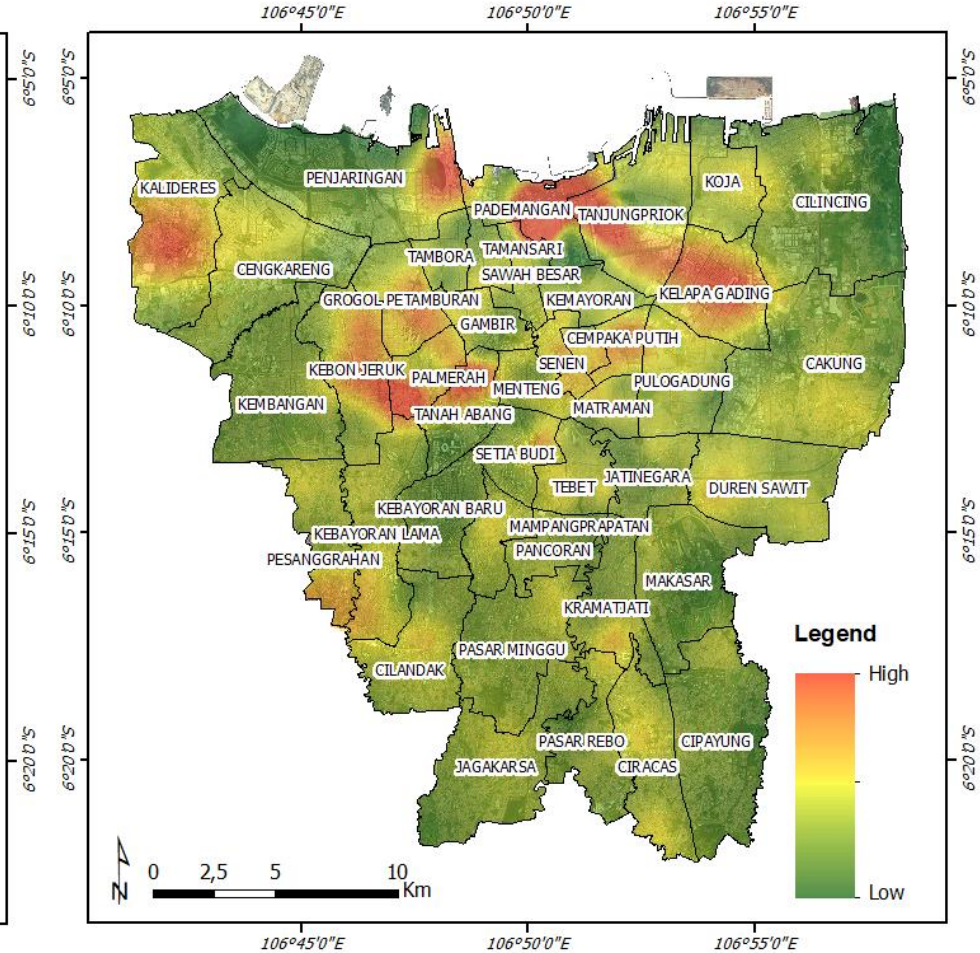
Vulnerability levels = Zone of Population Density and Settlement + Zone of Density of Road Access Conditions + Zone of Strategic Locations against Covid-19 spread

JAKARTA

Risk based on POS+PIM+PUS (20 May 2020)



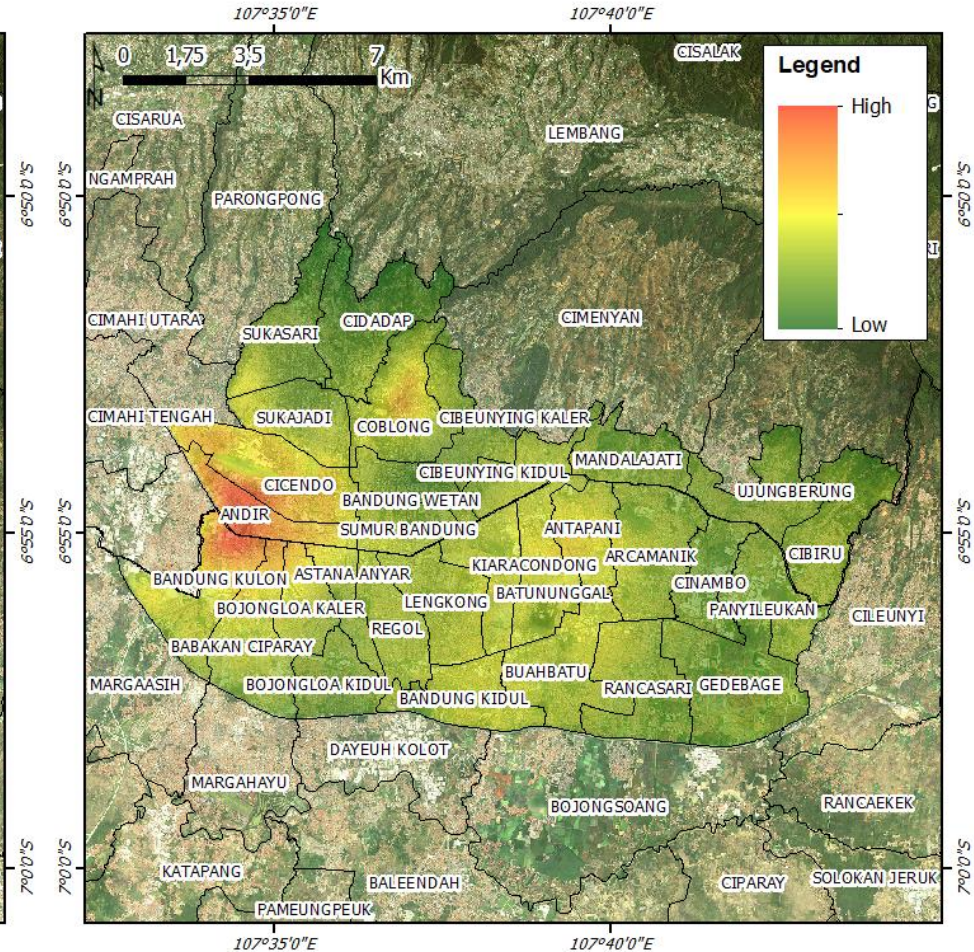
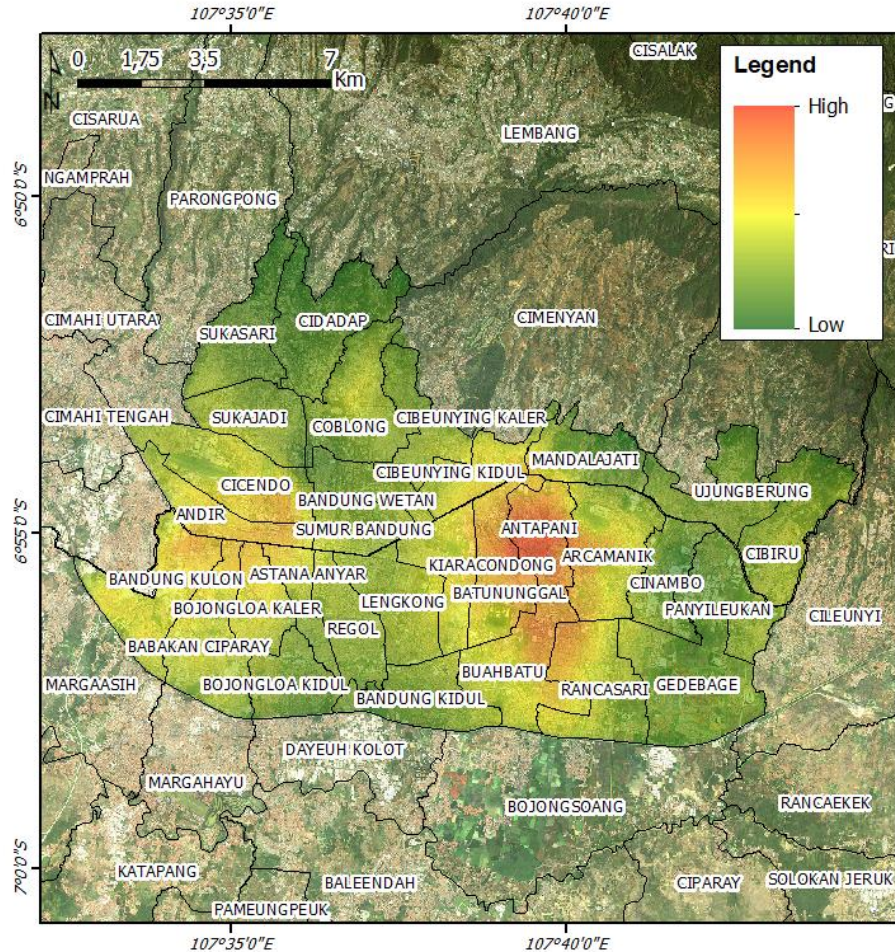
Risk based on POS+PIM+PUS (20 June 2020)



Risk based on POS+PIM+PUS (20 May 2020)

BANDUNG

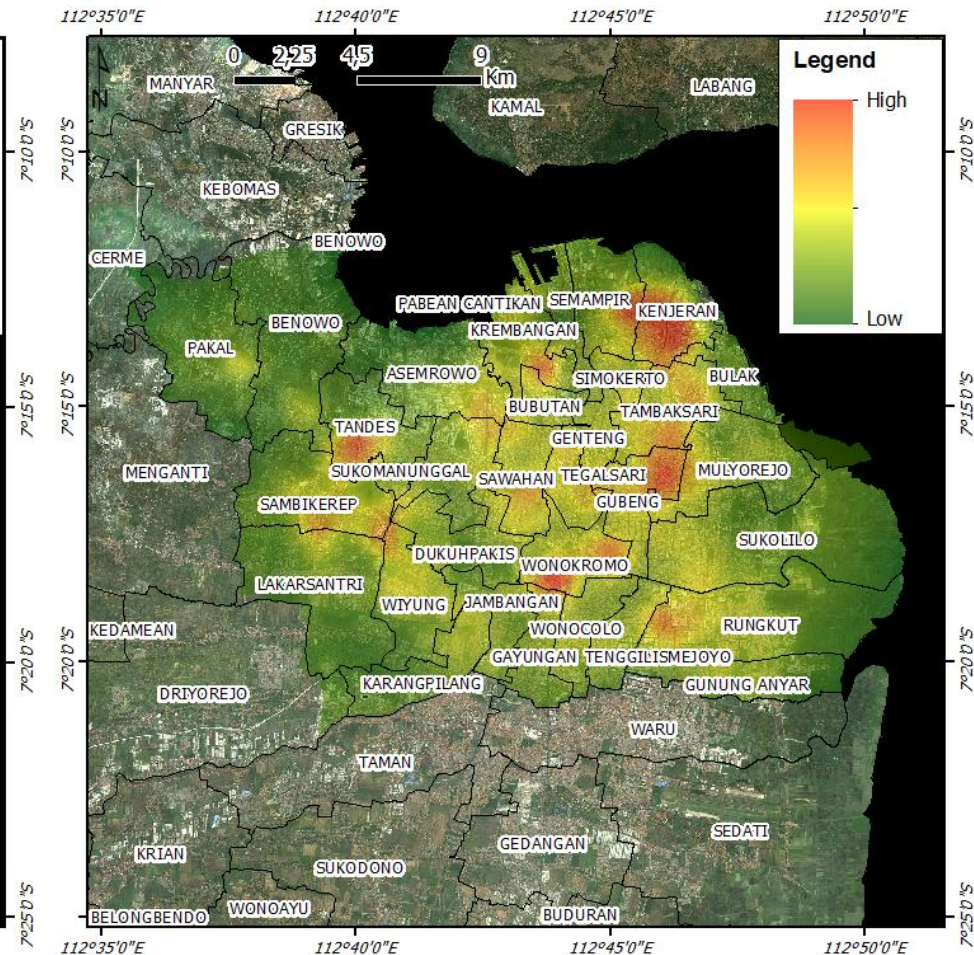
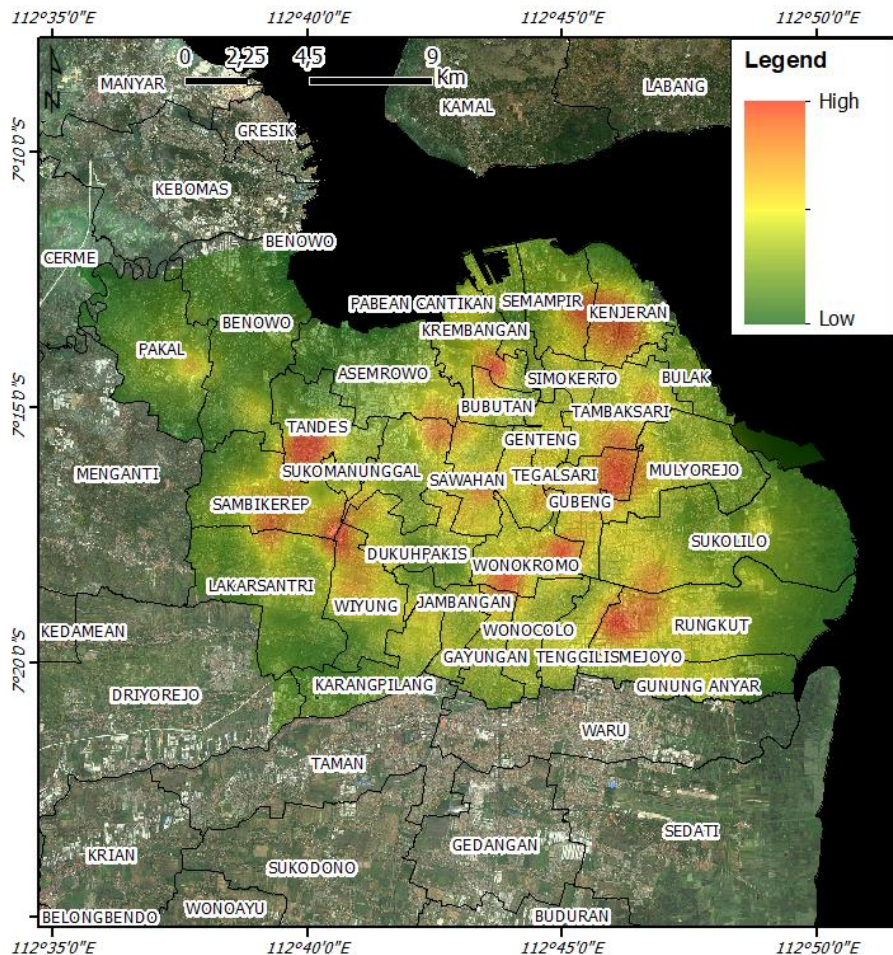
Risk based on POS+PIM+PUS (20 June 2020)



Risk based on POS+PIM+PUS (20 May 2020)

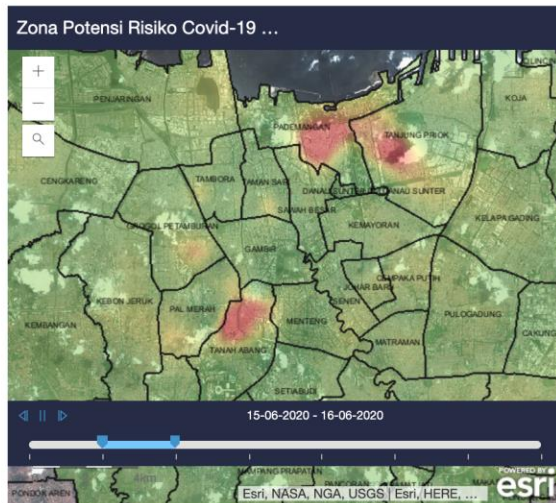
SURABAYA

Risk based on POS+PIM+PUS (20 June 2020)



Zona Potensi Risiko Covid-19 Harian per Kelurahan

Untuk Wilayah DKI Jakarta
(Berdasarkan Data Pasien Positif)



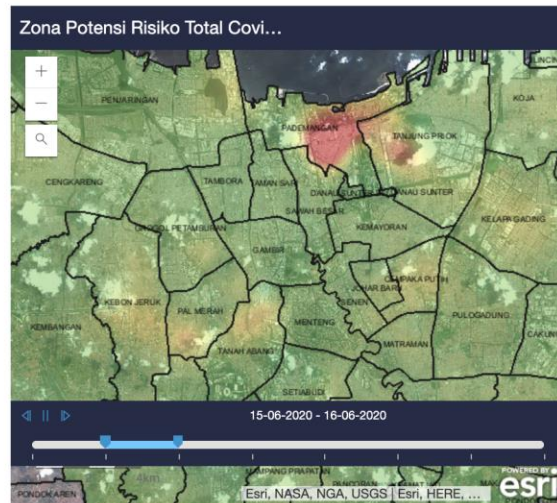
LEGENDA

Batas Administrasi
— Batas Kecamatan
— Batas Desa

Zona Potensi Risiko Covid-19
Rendah Tinggi

Zona Potensi Risiko Total Covid-19 Harian per Kelurahan

Untuk Wilayah DKI Jakarta
(Berdasarkan Data Pasien Positif+PDP+ODP)



Closing remarks (1)

- **Challenges:**

- Obtaining the daily (POS, PIM, PUS) Covid-19 statistical data automatically in digital format.
- Available statistical data are only for district and village levels.
[Administrative divisions: Country > Province > Regency/City > District > Village > Sub-village]

- **Tools:**

- LAPAN Hub Covid-19 has been developed using ESRI's ArcGIS Hub Coronavirus Response template.
- LAPAN Hub Covid-19 has been linked to the Covid-19 National Task Force managed by the National Disaster Management.

- **Innovative technology applications:**

- Remote sensing data have been used mainly for updating settlement distribution, density of road access, and strategic locations of Covid-19 spreading.
- Some indices derived from remote sensing data have been used to determined zone of settlement.
- Air pollution information derived from remote sensing data have been used among others to investigate the impact of large-scale social restriction.



Closing remarks (2)

- **Issues need to be further addressed:**

- Adding locations to be analyzed.
- Conducting the accuracy assessment: Increases (POS, PIM, PUS) data have been resulted from more massive (rapid and PCR) tests.

- **Recommendation for the regional cooperation:**

Focus Group Discussion and capacity building on:

- Sharing experience on good practice in the Asia-Pacific region.
- More data/information could be used in the analysis.
- Exchanging methods, particularly those which could be derived from remote sensing data.

Appreciation for the work team of LAPAN Hub Covid-19



THANK YOU
FOR
YOUR ATTENTION