MINISTRY OF ECONOMY
DEPARTMENT OF STATISTICS MALAYSIA

USING GEOSPATIAL DATA FOR SUSTAINABILITY ANALYSIS

10TH MALAYSIA STATISTICS CONFERENCE

"Looking Beyond GDP: Towards Social Well-being and Environmental Sustainability"

25TH-26TH SEPTEMBER 2023

MyStats 2023

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MINISTRY OF ECONOMY
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LAND SURFACE TEMPERATURE IS ON THE RISE

BREAKING NEWS

Australian Government
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Bureau Home > Climate > State of the Climate > 2022 – Future climate

State of the Climate 2022

Report at a glance | Australia's changing climate | Oceans | Cry

Future climate

New research in Australia and around the world, together with the IPCC's Sixth Asses
decades, Australia is projected to experience:

- Continued warming, with more extremely hot days and fewer extremely cool days.
- A further decrease in cool season rainfall across many regions of the south and east.
- Continued drying in the south-west of Western Australia, especially during winter and spring.
- Longer periods of drought on average in the south and east.
- A longer fire season for the south and east, and an increase in the number of dangerous fire weather days.
- More intense short-duration heavy rainfall events, even in regions where the average rainfall decreases or stays the same. This will lead to a complex mix of effects on streamflow, and associated flood and erosion risks, including increased risk of small-scale flash flooding.
- Fewer tropical cyclones projected to be of high i variations from year to y associated with tropical to increase and, combir is likely to amplify the in cyclones that do occur.
- Fewer east coast lows during the cooler month
- Ongoing sea level rise beyond, at a rate that v research on potential ic sheet suggests that a s rapid sea level rise can'
- More frequent extreme inundation and coastal Australian coast, extren probability of occurring

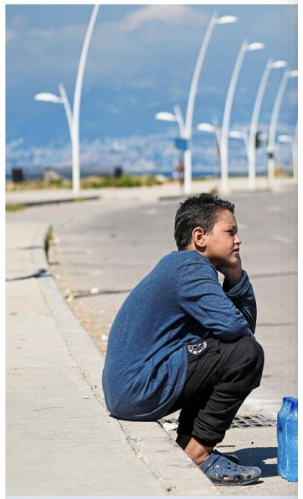
National and global temperature rise

TheStar Billions sufferingin a 'global boiling'

Billions sufferingin a 'global boiling'

FOCUS

Monday, 04 Sep 2023



A young street vendor sitting next to a p
sweltering day on the Mediterranean Se
warming made July hotter for four out o
Aug 2 by Climate Central. — AP

TURN on the news during scorchin
hear warnings that average global t

Home / Earth / Earth Sciences
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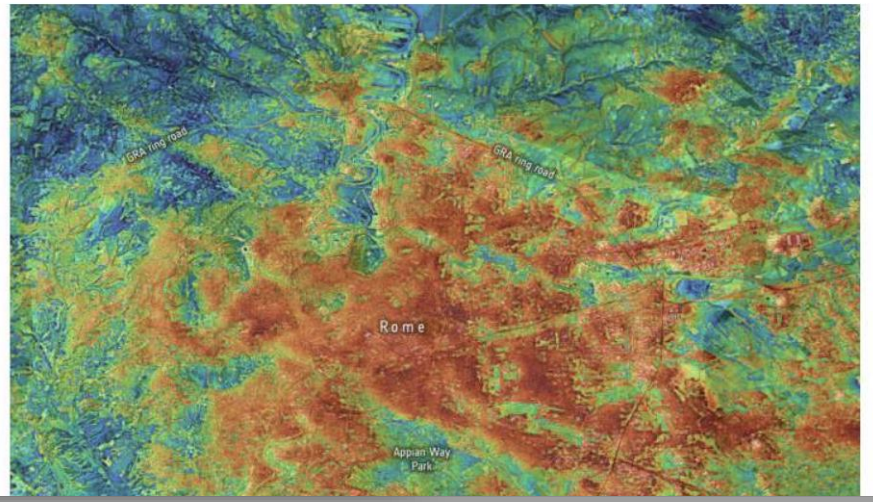
AUGUST 25, 2023 | Editors' notes

Sensing city night heat from space

by European Space Agency



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WHAT IS THE IMPACT?

Urban climate dynamics

Driving ecological shifts

Affecting vegetation cycles

PLACES OF INTEREST

Selangor

Kuala Lumpur

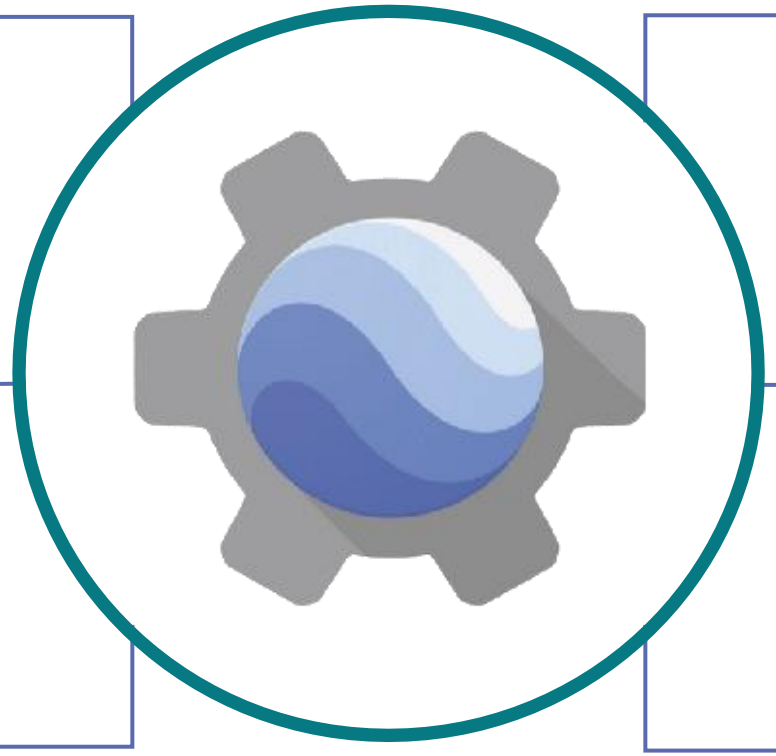
Putrajaya

DATA SOURCES

Land Surface Temperature (LST)
Landsat 4-9
B6, B10

Urban Expansion
Landsat 4-9
B2, B3, B4, B5, B6

Precipitation
CHIRPS
precipitation



Ozone
TOMS and OMI
ozone

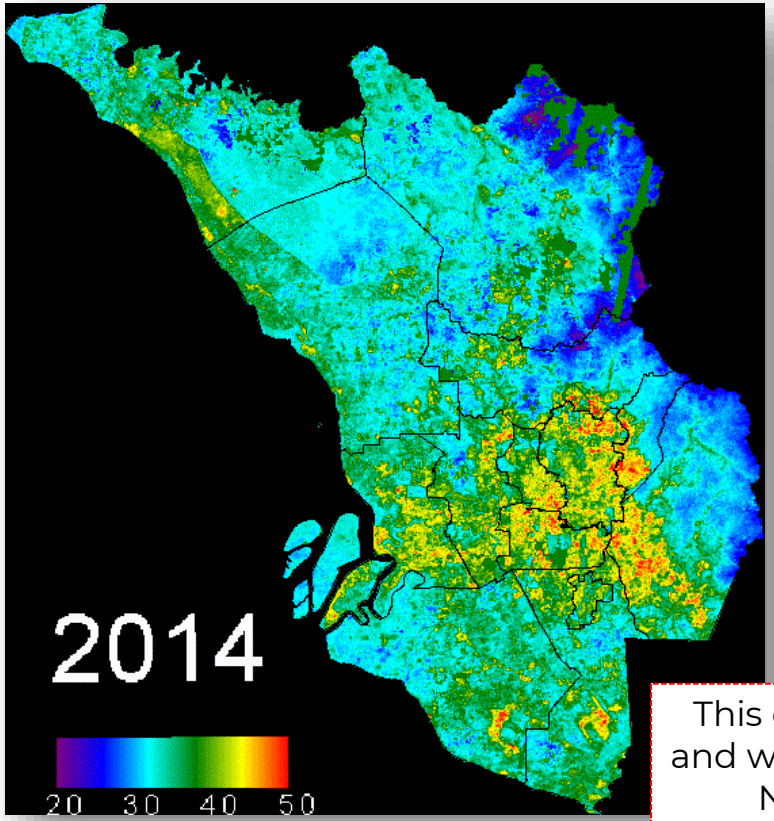
Enhanced Vegetation Index (EVI)
MODIS
EVI

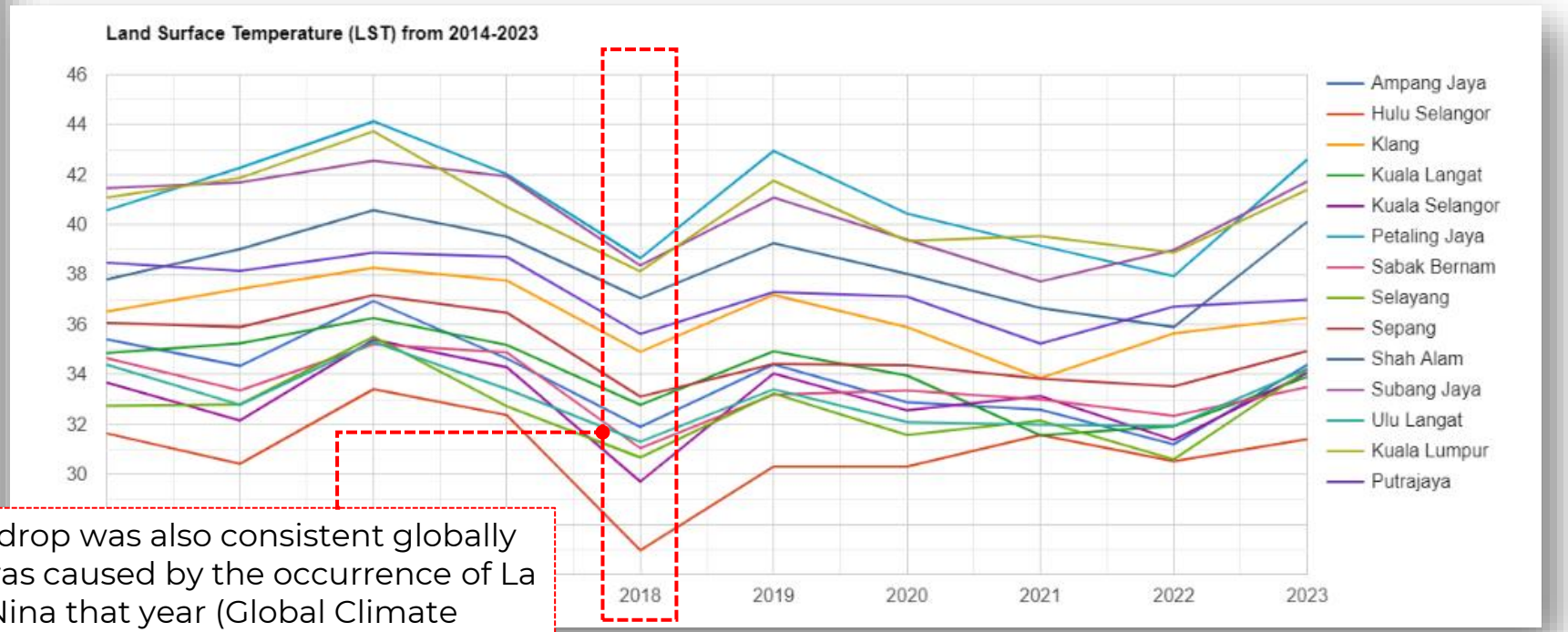
Forest Change
Hansen Global Forest Change v1.10
treecover2000, loss

Google Earth Engine

LAND SURFACE TEMPERATURE

During the height of the **COVID-19 pandemic**, a slight temperature **decrease** was observed, which correlated with the global trend attributed to **reduced human activities**. However, it's noteworthy that recent observations also indicate the **temperature is on the rise**.





This drop was also consistent globally and was caused by the occurrence of La Nina that year (Global Climate Highlights - Globe in 2022, 2022)

Agriculture

Rain
Precipitation

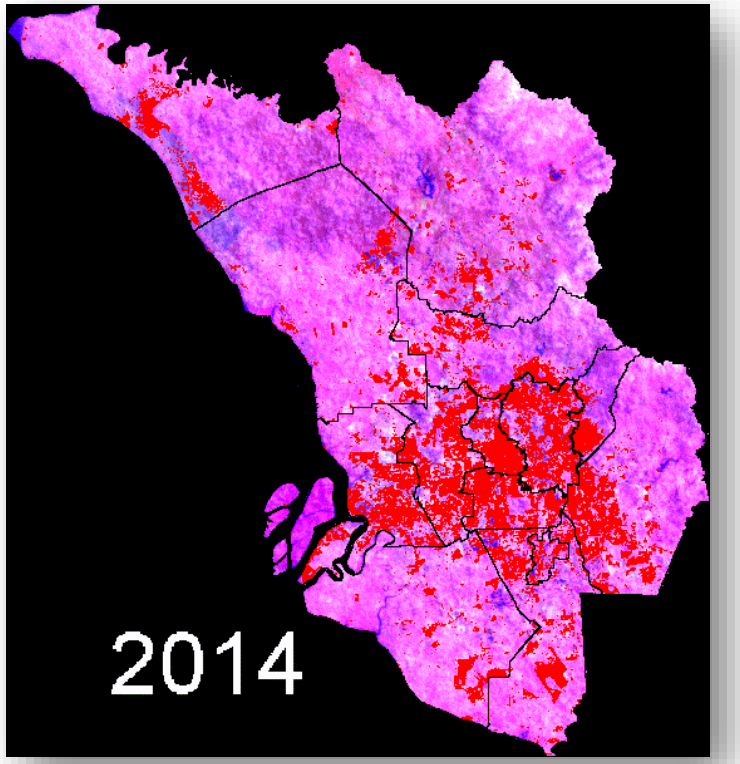
Deforestation

POTENTIAL CAUSES

Urbanisation

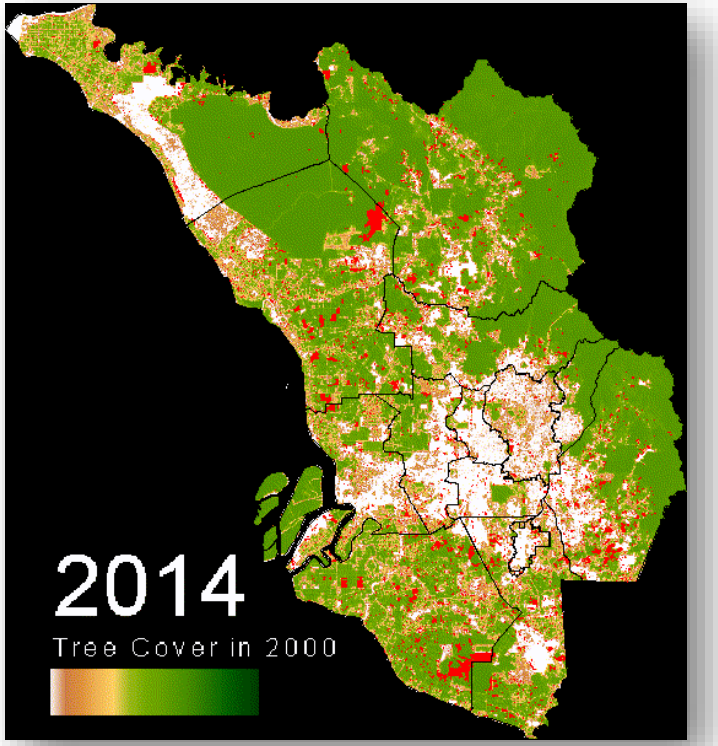
Ozone
Depletion

RESULTS



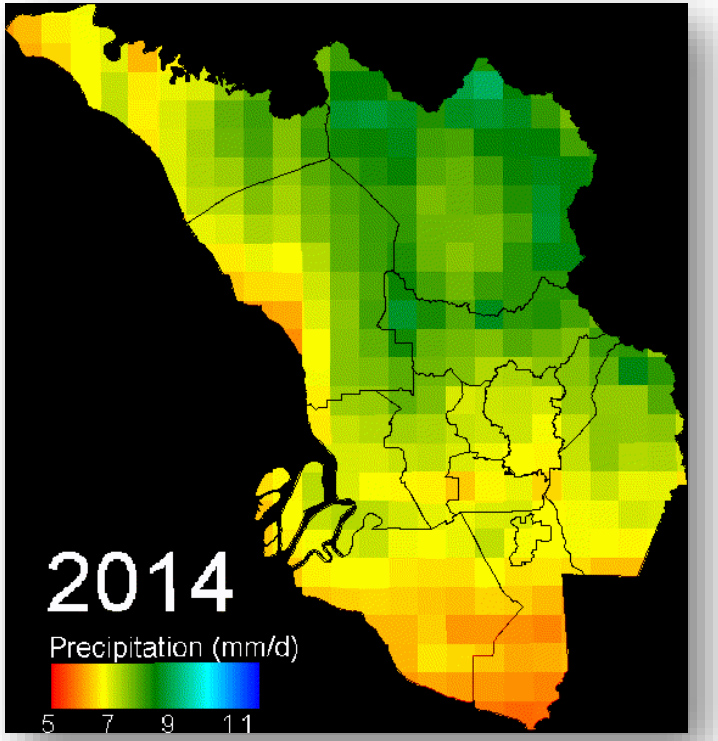
Urbanisation

Urban expansion peaked in the 1990s-2000s, remained stable from 2014-2023, except in Sabak Bernam.



Forest Change

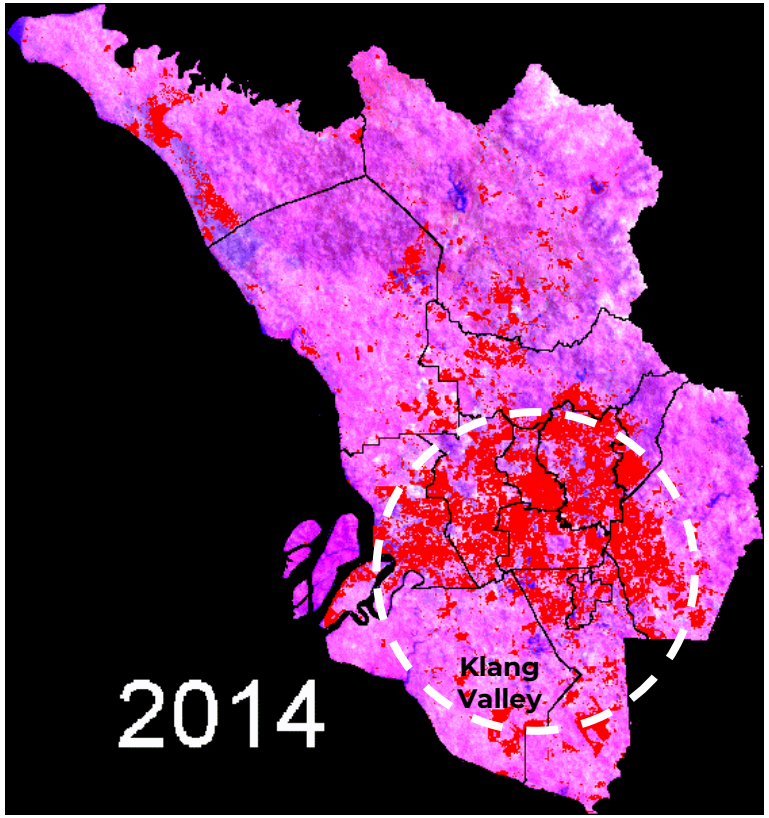
A continual decrease in forest loss occurrences over the study period, with 2022 total loss area measuring at 50.87km^2.



Precipitation

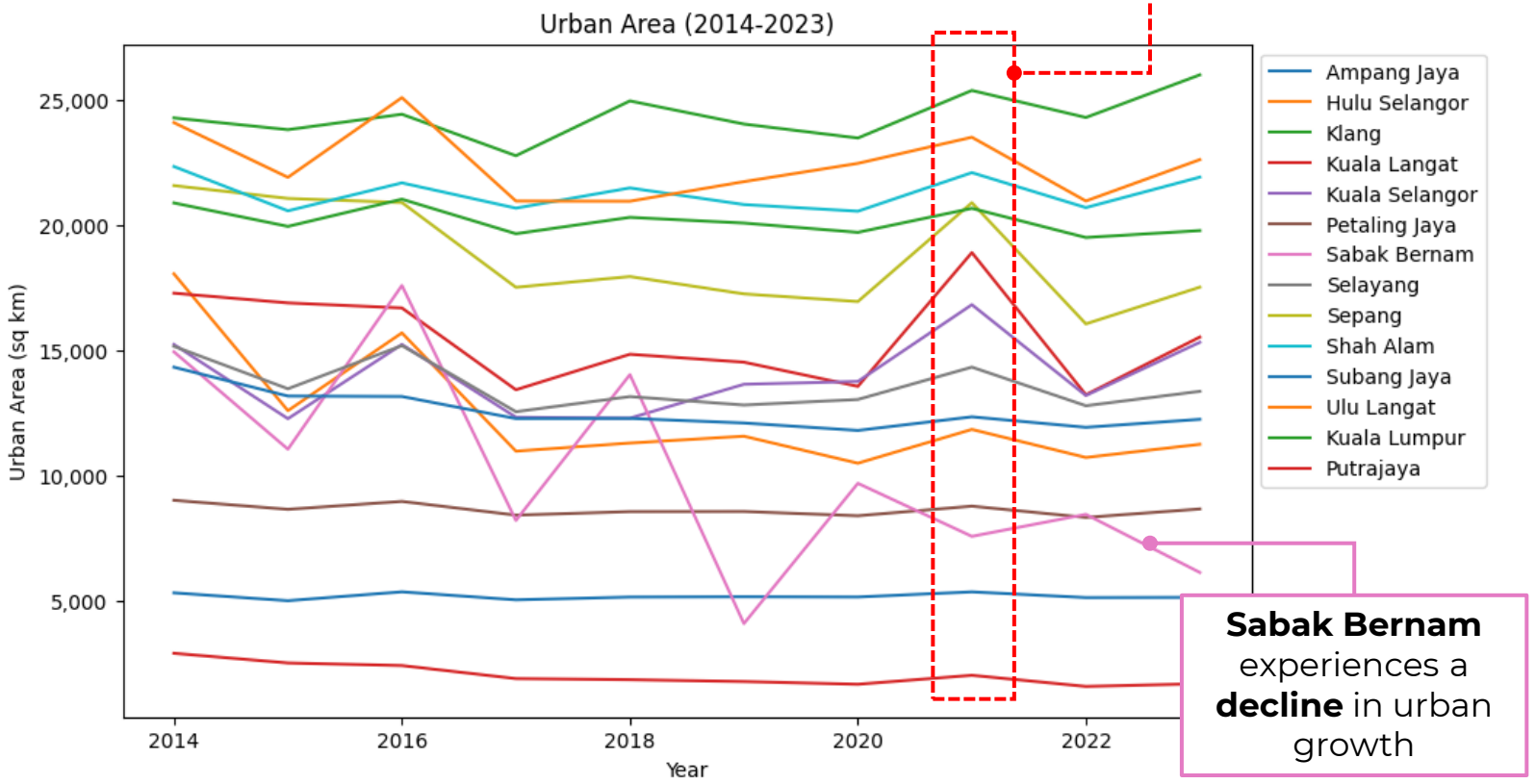
Increased rainfall in the Titiwangsa range in 2022, particularly in northeastern Selangor.

URBANISATION



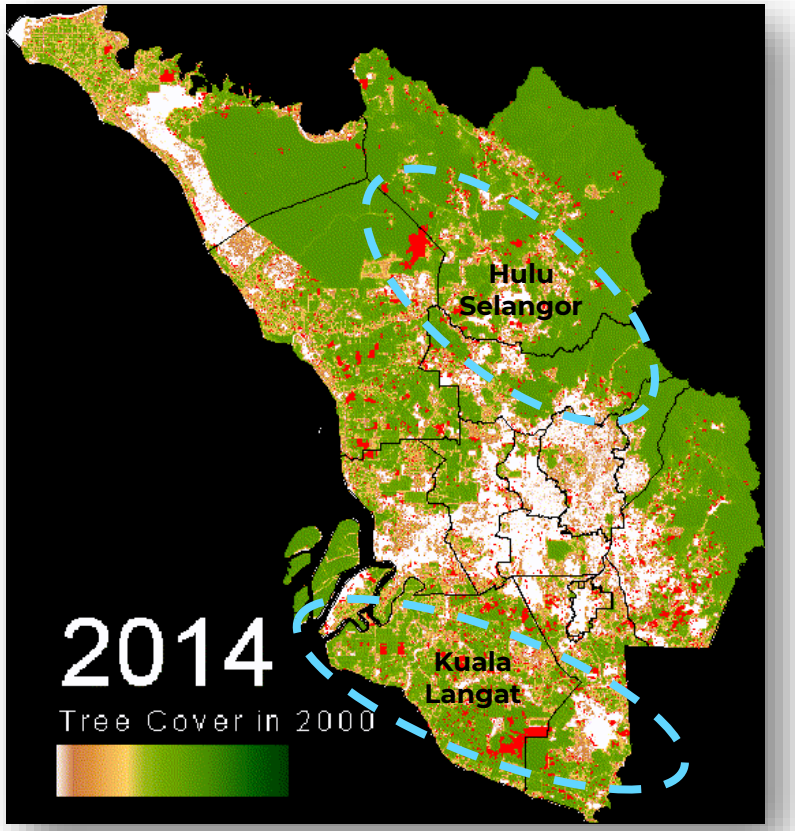
Most of the major areas in **Klang Valley** experience **stagnation** in urban growth

The **pandemic** saw interesting **shifts** in urban area alterations, implying an intricate interplay involving regulatory actions, economic dynamics, and land utilization effects.



Sabak Bernam experiences a **decline** in urban growth

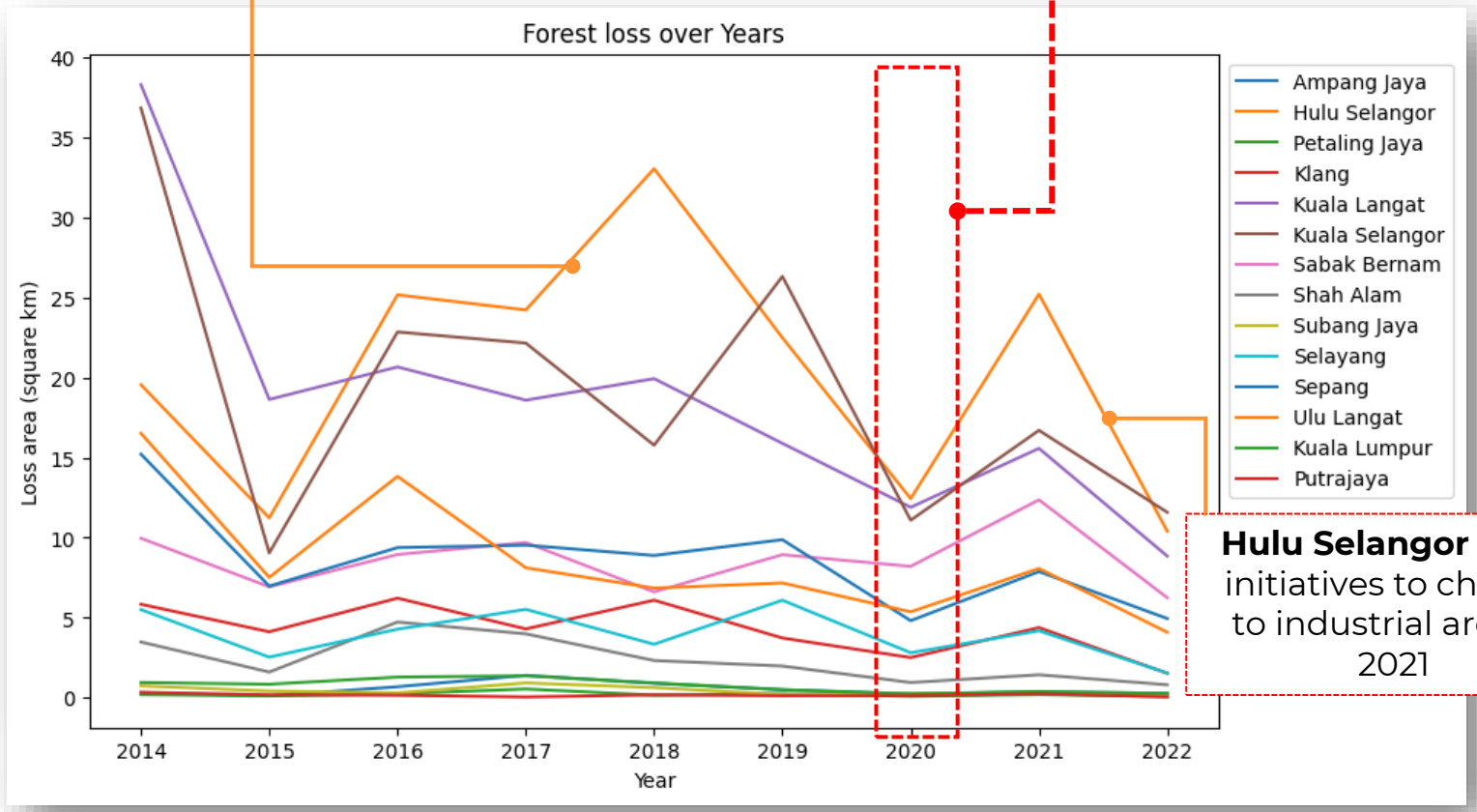
DEFORESTATION



Eastern and northern areas are the highest tree covers due to the mountainous area and palm plantation area respectively

Hulu Selangor – biggest unused forest area in Selangor

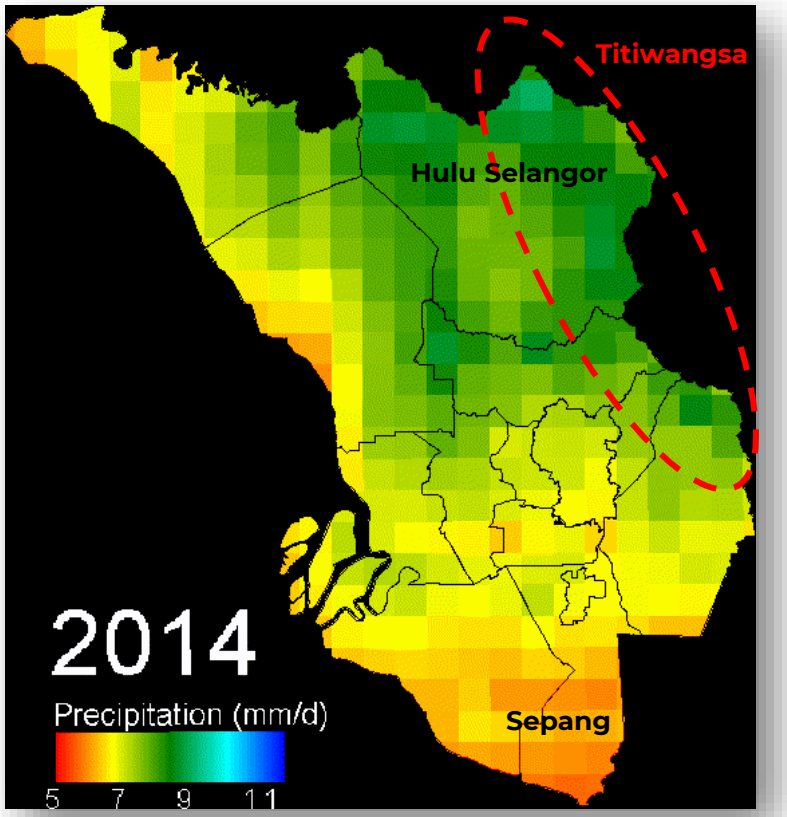
Logging decrease in **pandemic** due to movement restriction order making only essential economics activities viable during the time



Hulu Selangor – gov initiatives to change to industrial area in 2021

Hulu Selangor: Tiada lagi istilah The Sleeping Hollow – PORTAL SINARHARIAN

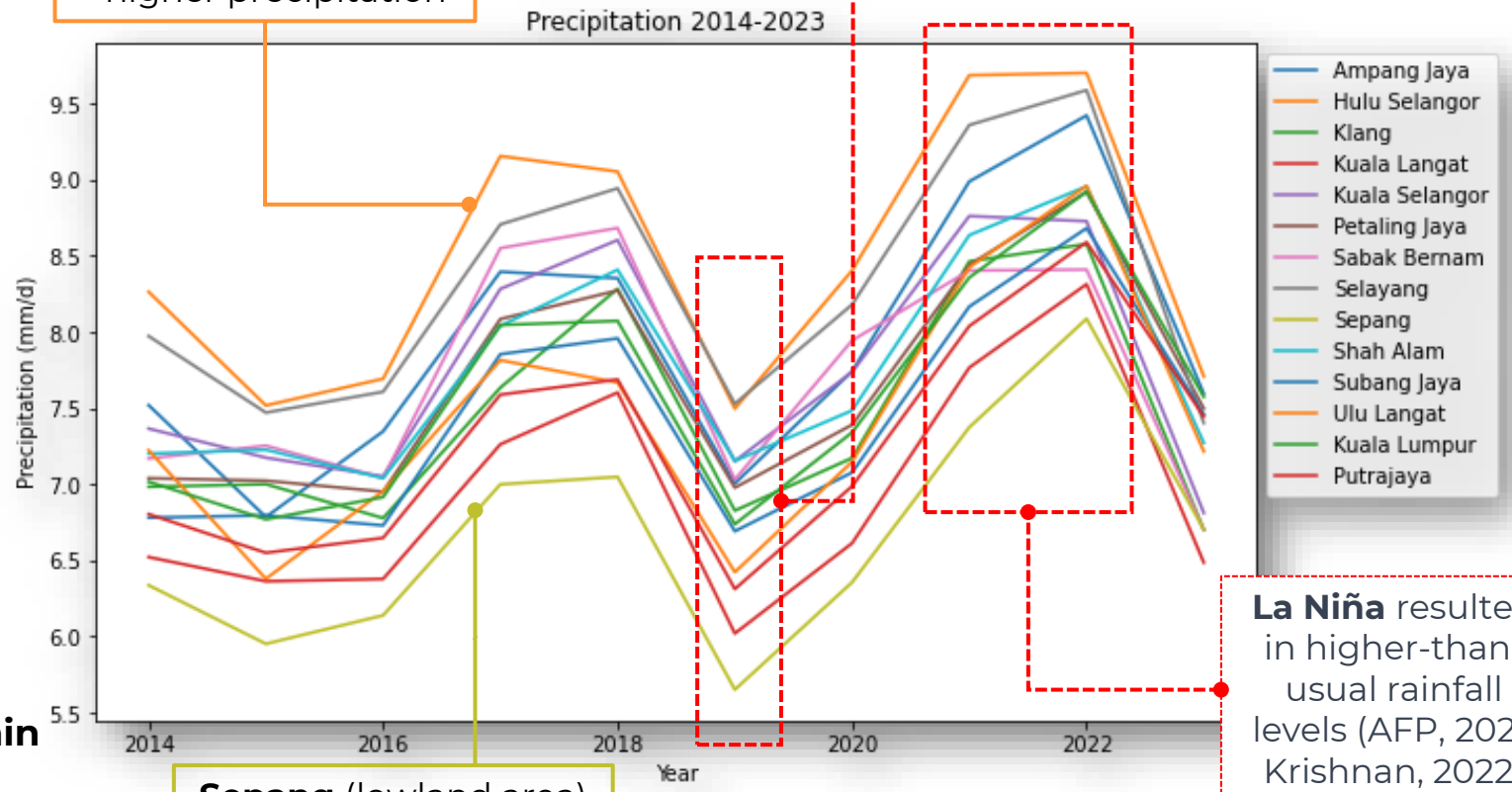
PRECIPITATION



- Greater rainfall within the **Titiwangsa mountain** range (higher elevation)
- **Negative correlation** due to high cooling effect

Hulu Selangor (highland area) - higher precipitation

Substantial drop in 2019, significant increase in LST

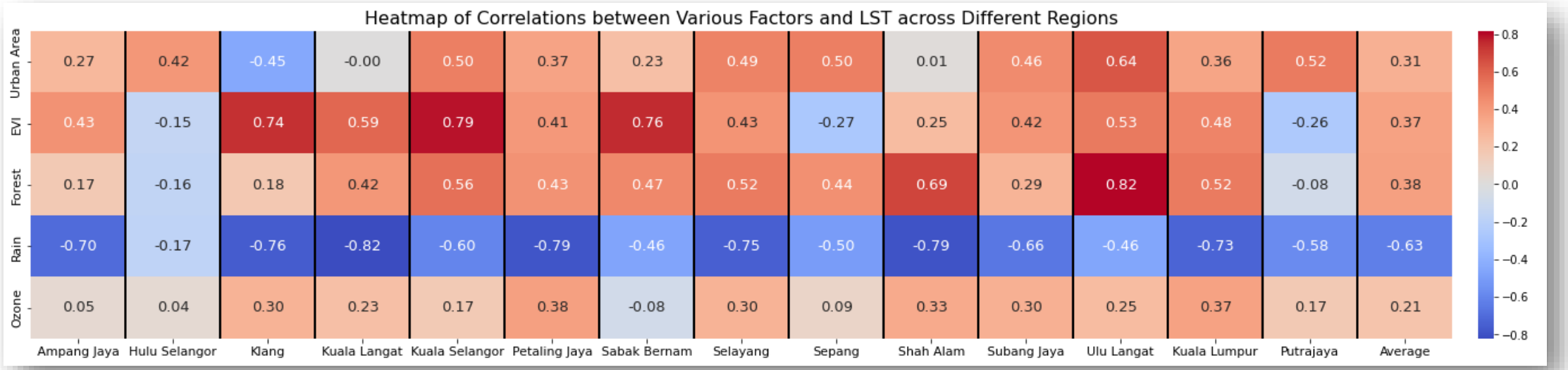


La Niña resulted in higher-than-usual rainfall levels (AFP, 2021; Krishnan, 2022)

Sepang (lowland area) – lower precipitation

Source:
AFP. (2021, September 2021). La Nina climate cycle may reemerge in 2021: UN. New Straits Times. Retrieved from https://www.nst.com.my/world/world/2021/09/725917/la-nina-climate-cycle-may-reemerge-2021-un
Krishnan, D. B. (2022, June 21). MetMalaysia: La Nina to persist until year end. New Straits Times. Retrieved from https://www.nst.com.my/news/nation/2022/06/806774/metmalaysia-la-nina-persist-until-year-end

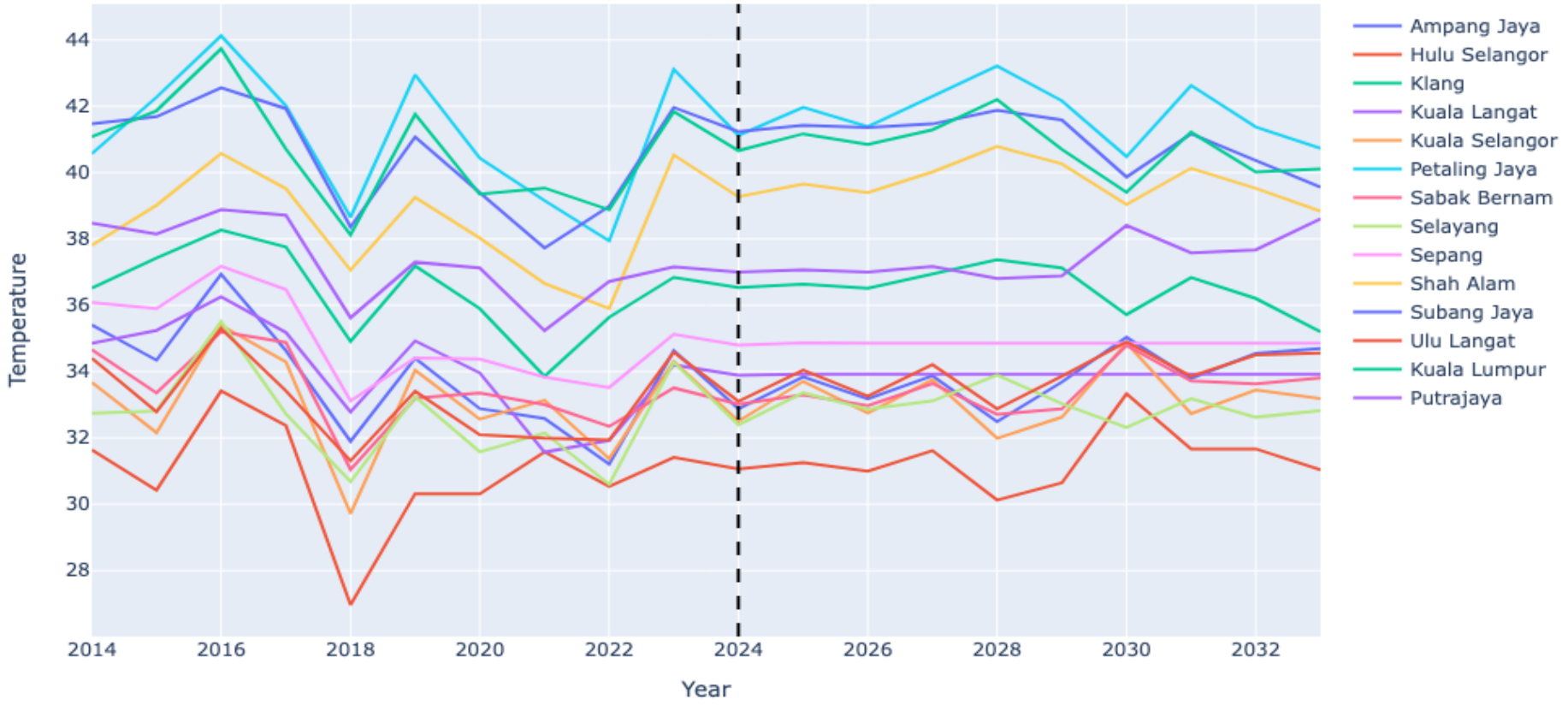
CORRELATION ANALYSIS



Urbanisation is **positively correlated** with higher LST, mainly due to the urban heat island effect, particularly pronounced in **growing** cities. **Deforestation** and **forest change** also contribute to **elevated LST** due to reduced shading and transpiration. Conversely, **rain precipitation** exhibits a **strong negative** correlation with LST, as it provides cooling through surface wetting and evaporation. Ozone concentration's influence on LST varies depending on local conditions. These **complex interplays** of factors highlight the importance of understanding how **human activities** and **environmental changes** impact **local temperatures** and **climate**.

FUTURE PREDICTION OF LAND SURFACE

LST in the next 10 years appear to be **stable** with the **occasional fluctuations** in different areas over Klang Valley in 2030.



LIMITATIONS

- Linear assumptions
- Stationary requirement
- Limited incorporation of external factors

HOWEVER,

- Our **actions** today impacts our tomorrow
- Investments in **improved data** collection and **monitoring** systems
- **LST predictions** are valuable for **assessing local climate conditions**




Geospatial analysis is crucial for **understanding LST variations** and their **impacts** on the environment. Concerted effort across **various sectors** is **crucial** in putting a halt to the **increasing temperature trend**. Climate action and sustainability efforts should focus on **sustainable urban planning, responsible land use**, and **effective policies** to mitigate urban heat islands and promote overall sustainability.

CONCLUSION

THANK YOU

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