

# Portfolio Remote Sensing and GIS

Transforming spatial data into actionable insights  
for sustainable development



By  
Jyoti

# Overview

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  - Mumbai
  - Bengaluru
  - Chhatrapati Sambhajinagar
- Growth Hub Analysis
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- Social Media Outreach
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# Professional Summary

**Detail-oriented and results-driven GIS and Remote Sensing Specialist with over 5 years of experience in geospatial analysis, climate data processing, and project coordination across environmental, urban planning, and market strategy domains.**

**Proven expertise in leveraging tools such as Google Earth Engine, ArcGIS, QGIS, and Python to deliver high-impact spatial insights.**

**Demonstrated ability to work with cross-functional teams, mentor interns and junior analysts, and support strategic decision-making through data-driven geospatial solutions.**

# Mumbai Climate Action Plan

- Organization: World Resources Institute, India
- Role: Consultant
- Tools Used: Google Earth Engine, ArcGIS Pro, QGIS, Python
- Key Contributions:
  - Performed Urban Heat Island (UHI) analysis using Land Surface Temperature (LST) data to identify heat-prone zones across Mumbai.
  - Analyzed the spatial relationship between LST and vegetation cover to support green infrastructure planning.
  - Conducted accessibility analysis of fire stations using real-time traffic data to evaluate emergency response efficiency.
- Impact Summary:
  - The analysis informed Mumbai's Climate Action Plan by identifying vulnerable areas with high heat exposure and limited emergency access. The findings supported policy recommendations for urban greening and infrastructure planning.
- Public report available at [this link](#).

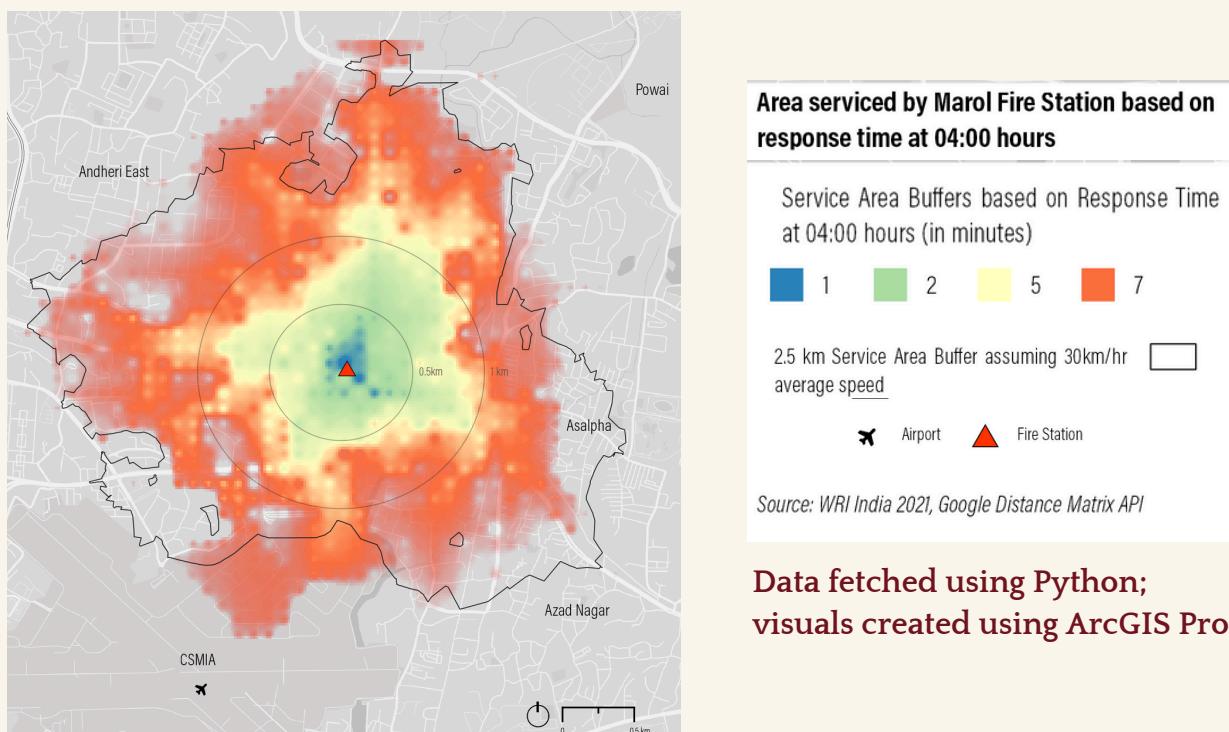


Figure 1: Accessibility map of Marol fire station based on traffic data from Google Distance Matrix API fetched using Python and visualization using ArcGIS Pro

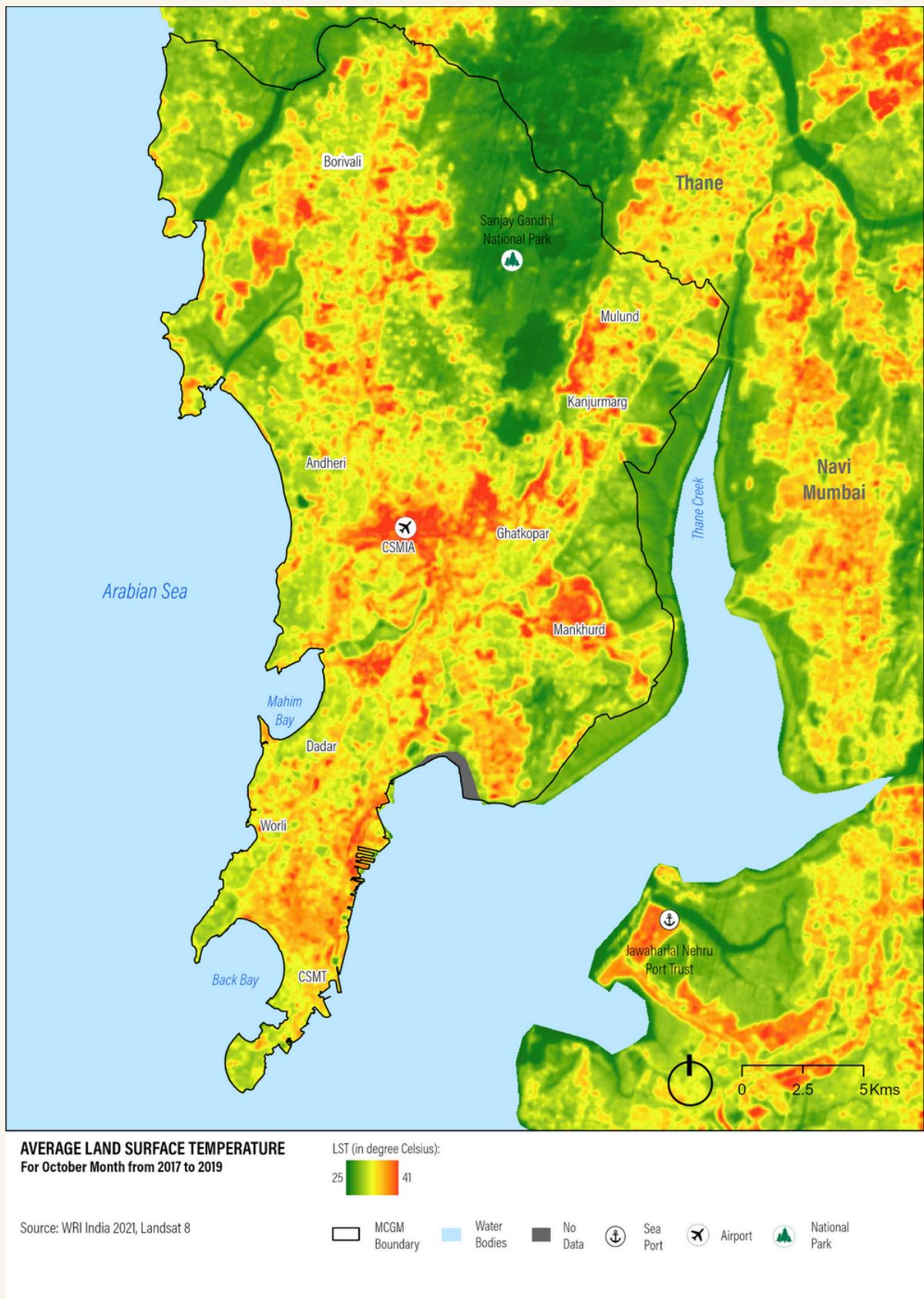


Figure 2: Urban Heat Island (UHI) map of Mumbai, India using processed Landsat 8 imagery in Google Earth Engine and visualization in ArcGIS Pro

# Bengaluru Climate Action Plan

- Organization: World Resources Institute, India
- Role: Program Associate
- Tools Used: Google Earth Engine, QGIS, Python
- Key Contributions:
  - Analyzed climate projections from CMIP5 datasets to assess future temperature and precipitation trends across Bengaluru.
  - Integrated demographic and infrastructure data to assess the exposure and vulnerability of populations and critical services.
  - Contributed to the creation of data-driven maps and graphics used in stakeholder consultations and public outreach.
- Impact Summary:
  - This work provided the scientific foundation for Bengaluru's Climate Action Plan, enabling the city to prioritize climate adaptation strategies and resilience-building efforts. The spatial insights supported evidence-based policymaking, informed infrastructure planning, and enhanced community awareness of climate risks.
- Public report available at [this link](#)

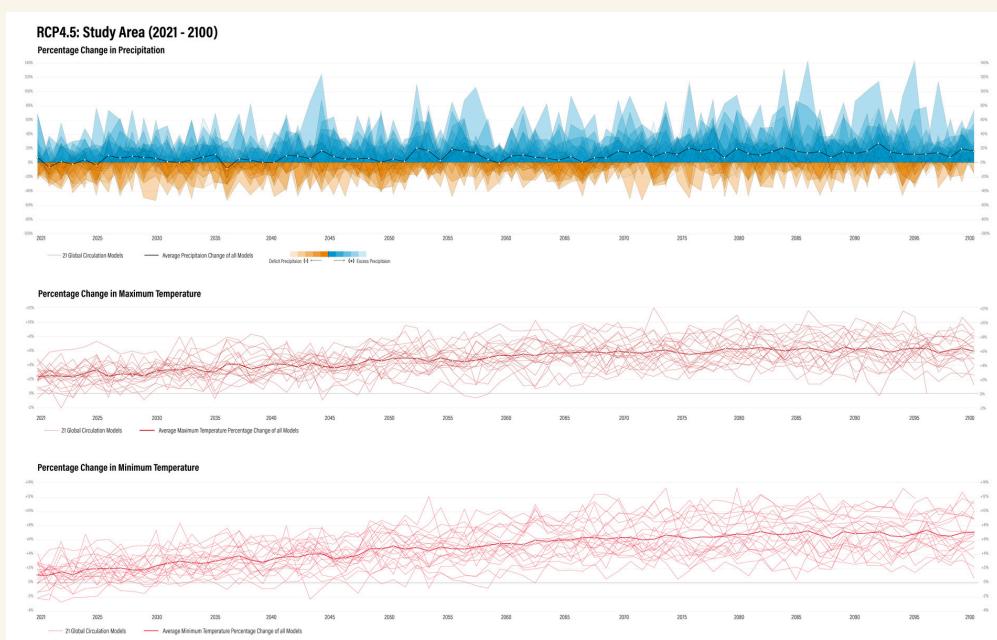
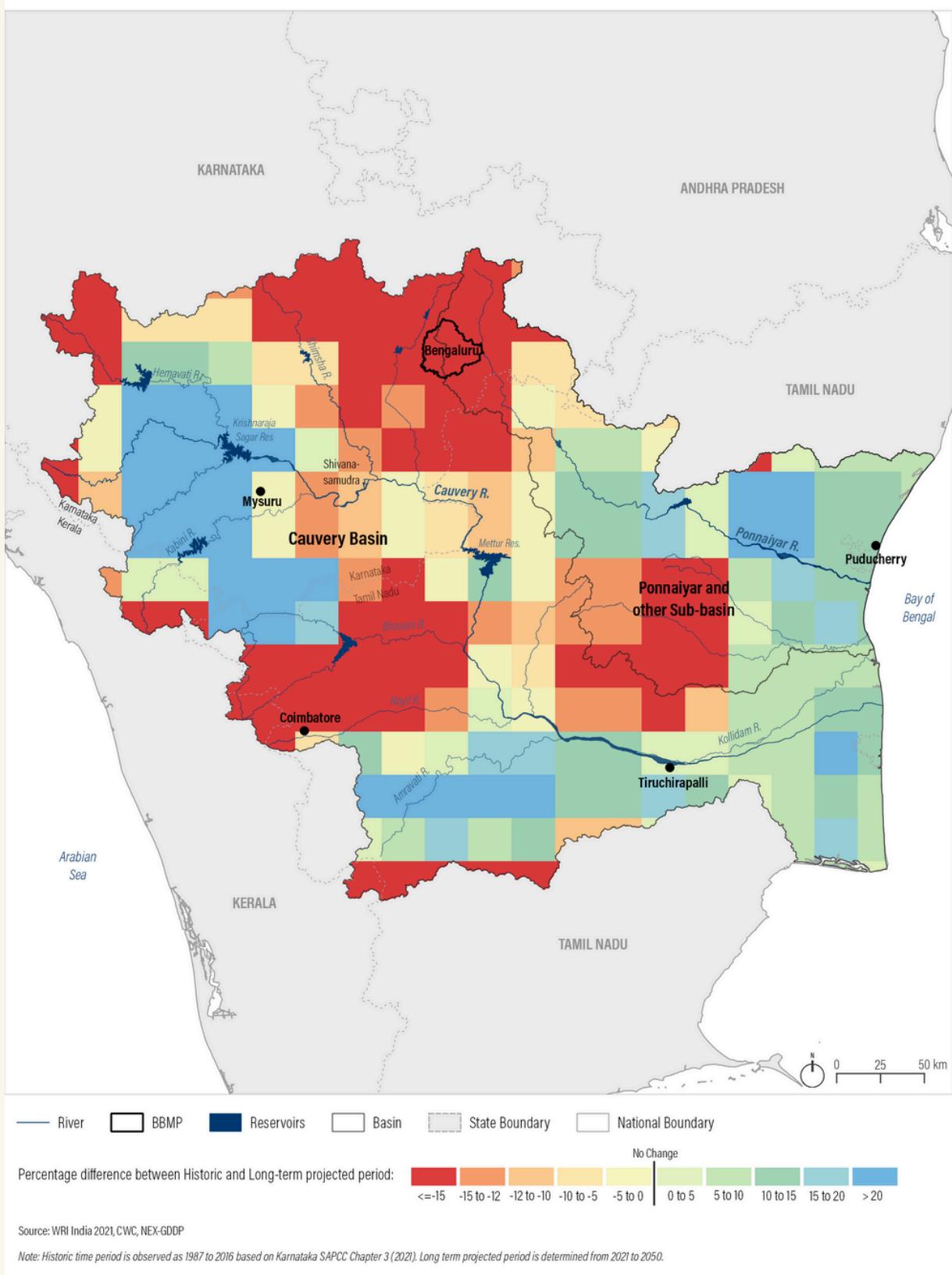


Figure 3: Time-series of changes in projected precipitation and temperature in Bengaluru, India; CMIP5 data processed using Google Earth Engine and visualized using Python

### Percentage difference in precipitation between long term and historic period for RCP 4.5

Model: GFDL-ESM2M



**Figure 4: Percentage difference in precipitation between long term and historic period for RCP 4.5 processed using Google Earth Engine and visualization using QGIS**

# Chhatrapati Sambhajinagar (Aurangabad) Climate Action Plan

- Organization: World Resources Institute, India
- Role: Program Associate
- Tools Used: Google Earth Engine, QGIS, Python
- Key Contributions:
  - Conducted detailed Urban Heat Island (UHI) analysis using Land Surface Temperature (LST) data to identify heat-vulnerable zones across the city.
  - Analyzed climate projections from CMIP5 datasets to assess future temperature trends and inform long-term adaptation strategies.
  - Authored the Urban Heat Analysis section of the Climate Action Plan, integrating geospatial insights into actionable policy recommendations.
  - Supported the development of spatial datasets and visualizations to communicate climate risks to stakeholders and city officials.
- Impact Summary:
  - This work provided critical spatial intelligence for Chhatrapati Sambhajinagar's Climate Action Plan, enabling the city to prioritize heat mitigation strategies, urban greening, and infrastructure resilience. The analysis helped shape targeted interventions for vulnerable communities and supported evidence-based climate governance.
- Public report available at [this link](#)

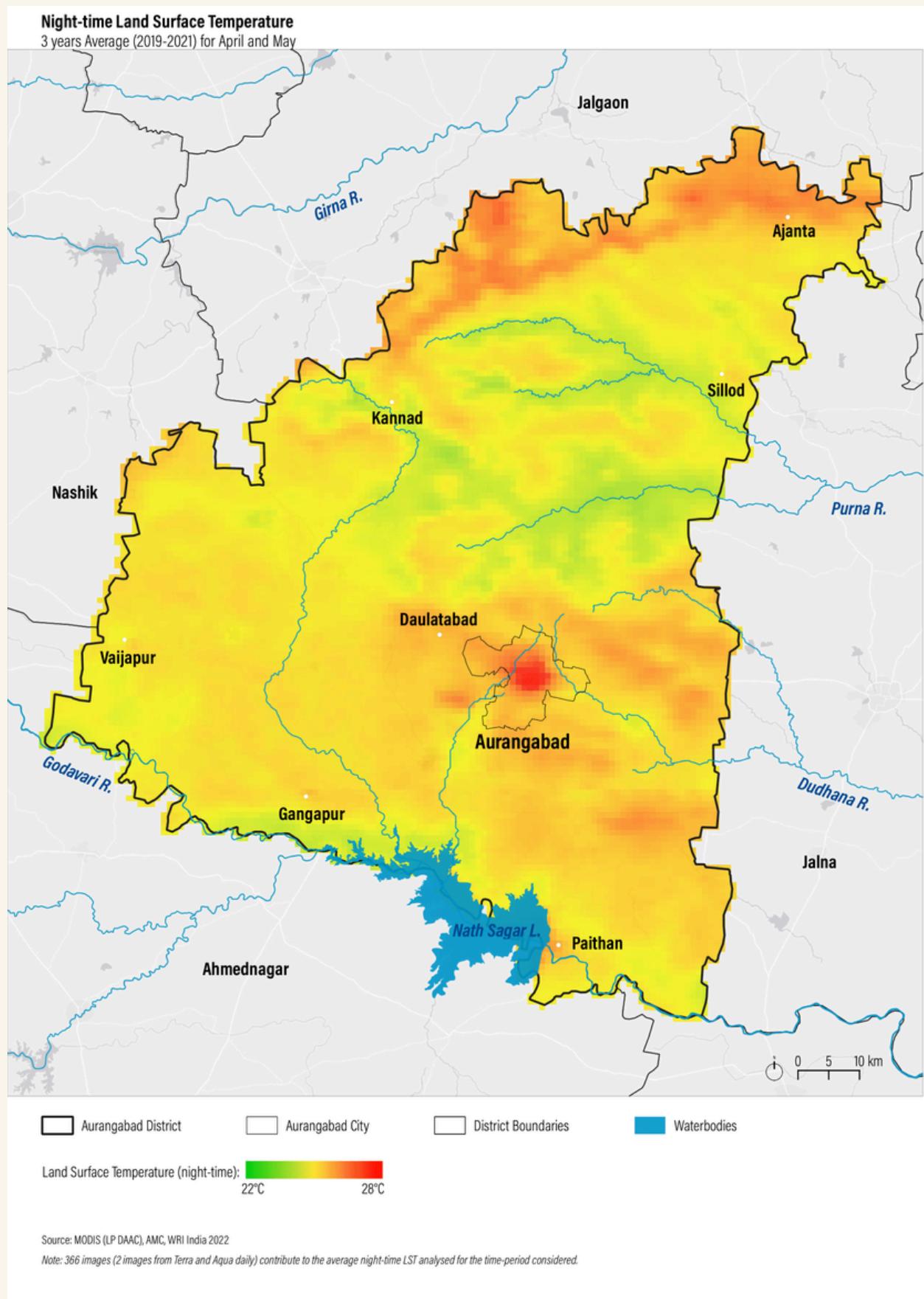
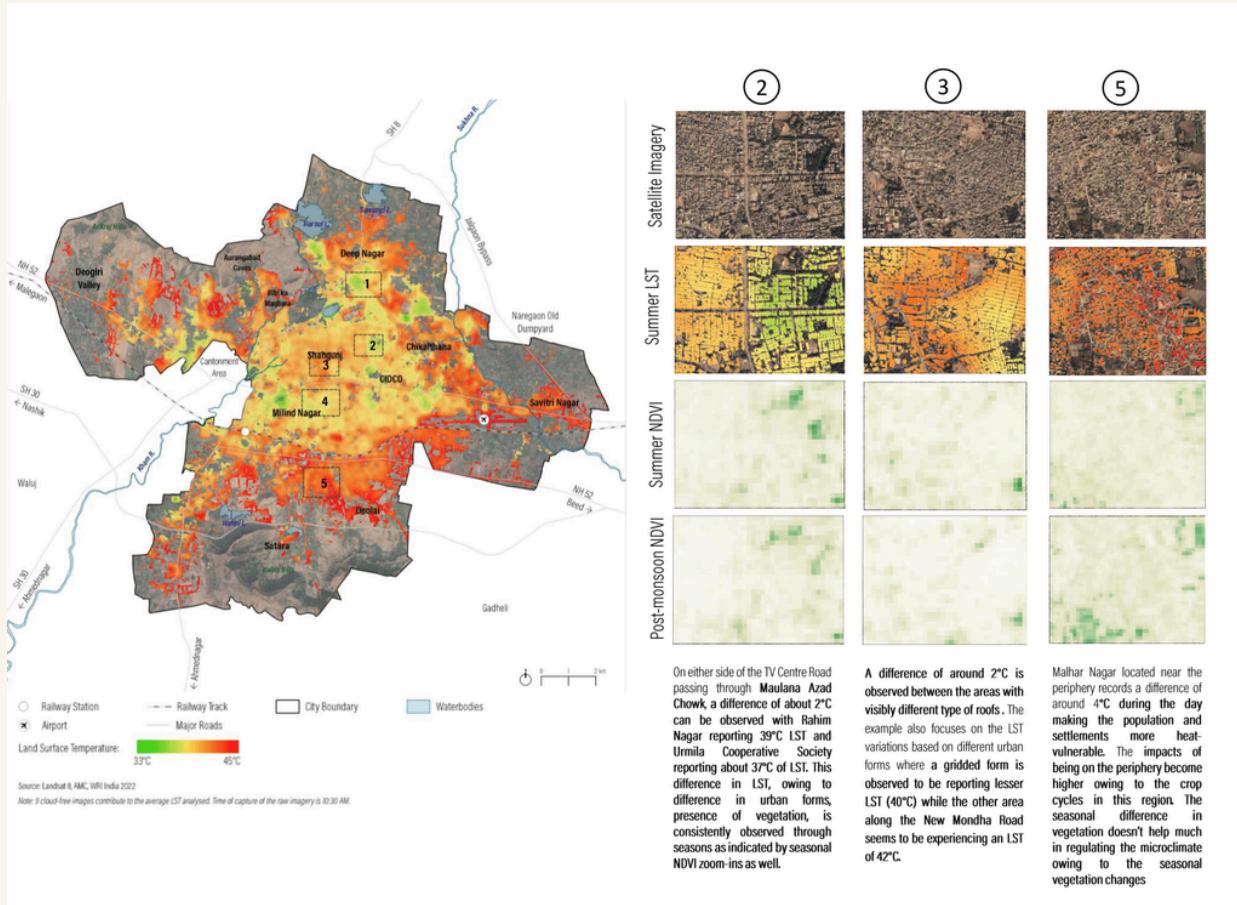


Figure 5: Night-time land surface temperature in Chhatrapati Sambhajinagar (Aurangabad) district processed using MODIS night-time LST in Google Earth Engine and visualization produced using QGIS



**Figure 6: Relationship between land surface temperature and vegetation in Chhatrapati Sambhajinagar (Aurangabad) using Landsat8 processed in Google Earth Engine and visualization using QGIS and MS Powerpoint**

# Growth-hub Analysis - Surat Economic Region

- Organization: World Resources Institute, India
- Role: Program Associate
- Tools Used: Google Earth Engine, QGIS
- **Key Contributions:**
  - Conducted spatial analysis of land use and land cover (LULC) to assess urban expansion trends and identify potential growth corridors in the Surat region.
  - Mapped infrastructure accessibility, including transport networks and public services, to support integrated planning for the growth hub.
  - Analyzed environmental constraints such as flood-prone zones, vegetation cover, and water bodies to guide sustainable development.
  - Supported the creation of data-driven maps and visualizations for stakeholder presentations and planning workshops.
- **Impact Summary:**
  - This work contributed to the strategic planning of Surat's Growth Hub Region by providing evidence-based spatial insights. The analysis supported balanced urban development, helped identify priority investment zones, and informed infrastructure and environmental planning aligned with long-term sustainability goals.
- Public report available at [this link](#).

### Surat Growth Hub Region



**Figure 7: Growth hub region of Surat (Gujarat state), India using data from municipal corporations, remote sensing datasets such as World Settlement Footprint (WSF) and visualizations using QGIS**

# Tamil Nadu Heat Mitigation Strategy

- Organization: World Resources Institute, India
- Role: Program Associate
- Tools Used: Google Earth Engine, QGIS
- **Key Contributions:**
  - Developed a comprehensive heat hazard profile for Tamil Nadu using multi-source datasets including Land Surface Temperature (LST), air temperature, and projected climate data.
  - Calculated Universal Thermal Climate Index (UTCI) to assess thermal stress across urban and rural regions, supporting climate-resilient planning.
  - Conducted spatiotemporal analysis of vegetation change over the past 20 years using Normalized Difference Vegetation Index (NDVI) trends to understand the role of green cover in heat mitigation.
  - Identified vulnerable populations by integrating demographic data with heat exposure layers, highlighting high-risk zones for targeted interventions.
- **Impact Summary:**
  - This work formed the scientific foundation for Tamil Nadu's state-wide heat mitigation strategy, enabling data-driven decision-making for urban planning, public health, and climate adaptation. The outputs were used to inform policy briefs, stakeholder workshops, and inter-departmental coordination.
- Public report available at [this link](#).

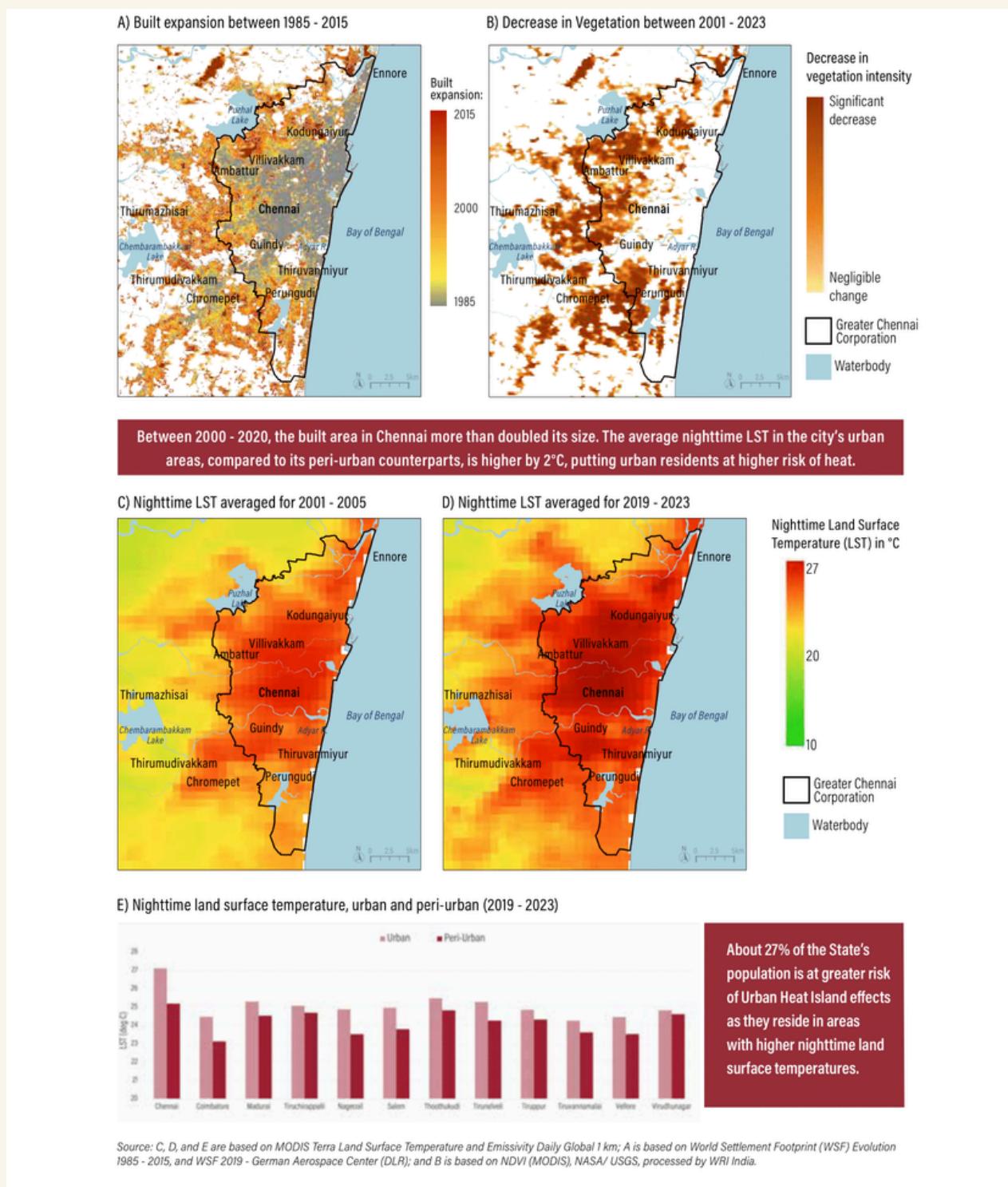
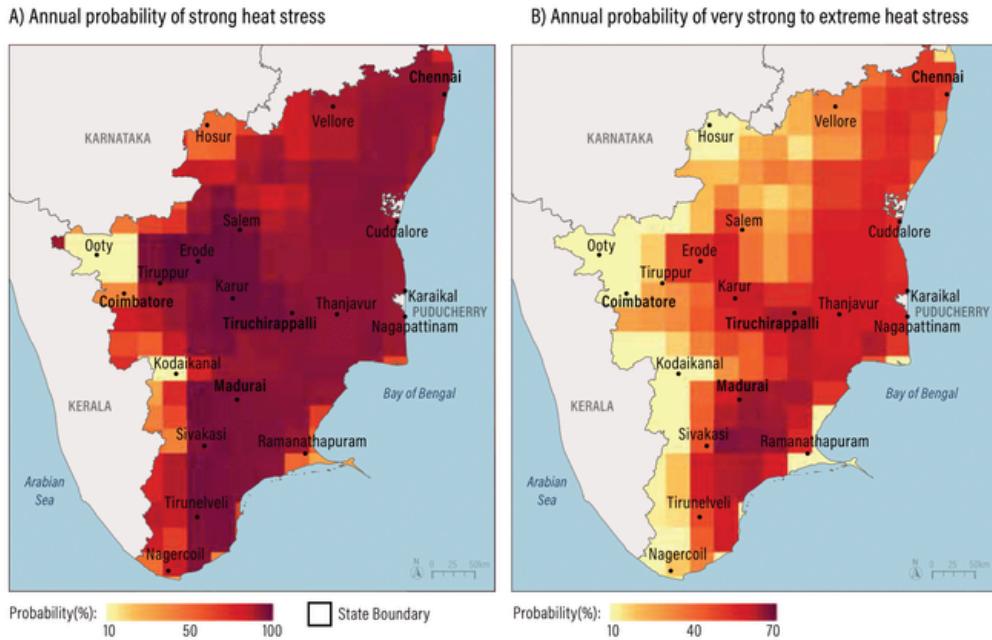
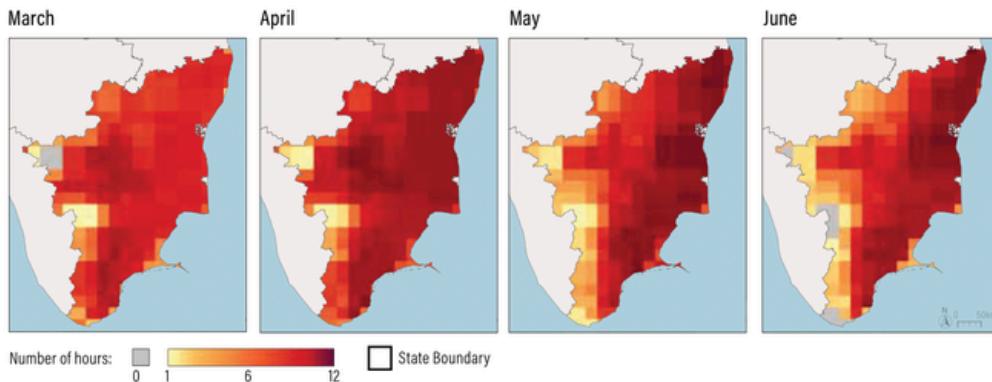


Figure 8: Land surface temperature patterns across Chennai and other major cities in Tamil Nadu, India analyzed and processed using MODIS NDVI and LST in Google Earth Engine and visualizations produced using QGIS



- More than half of Tamil Nadu's population resides in areas at risk of facing Very Strong heat stress or worse.
- 68% of Tamil Nadu's population experiences prolonged exposure of 8-9 hours to Strong heat stress from March to June. Strong heat stress is attributed to increased risk of heat-related disorders such as dehydration and sunstroke, and excess morbidity and mortality.

C) Daily average number of hours spent in heat stress conditions from March to June, 2022

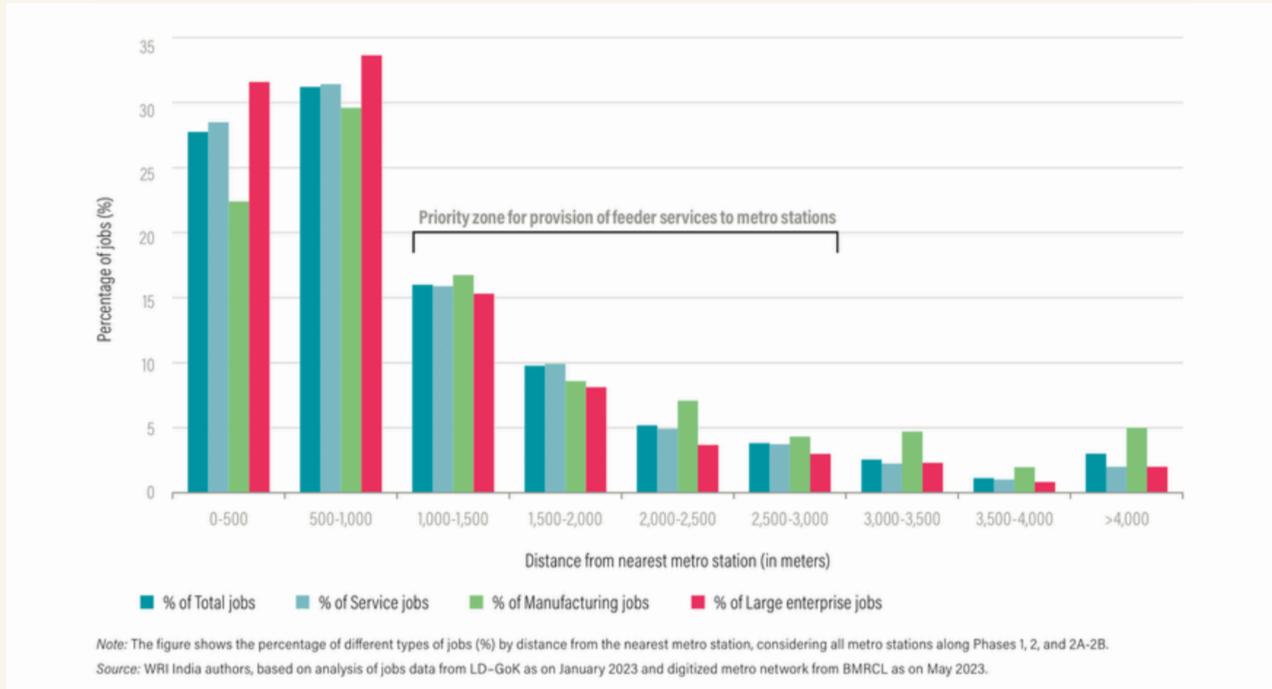


Note: A, B, and C are derived using hourly UTCI data, categorised as Strong, Very Strong, and Extreme heat stress, between 1981 and 2022.  
Source: Universal Thermal Comfort Index (UTCI), Climate Data Store (CDS), Copernicus EU; 1981 - 2022. Refer to Annexure A1 for details.

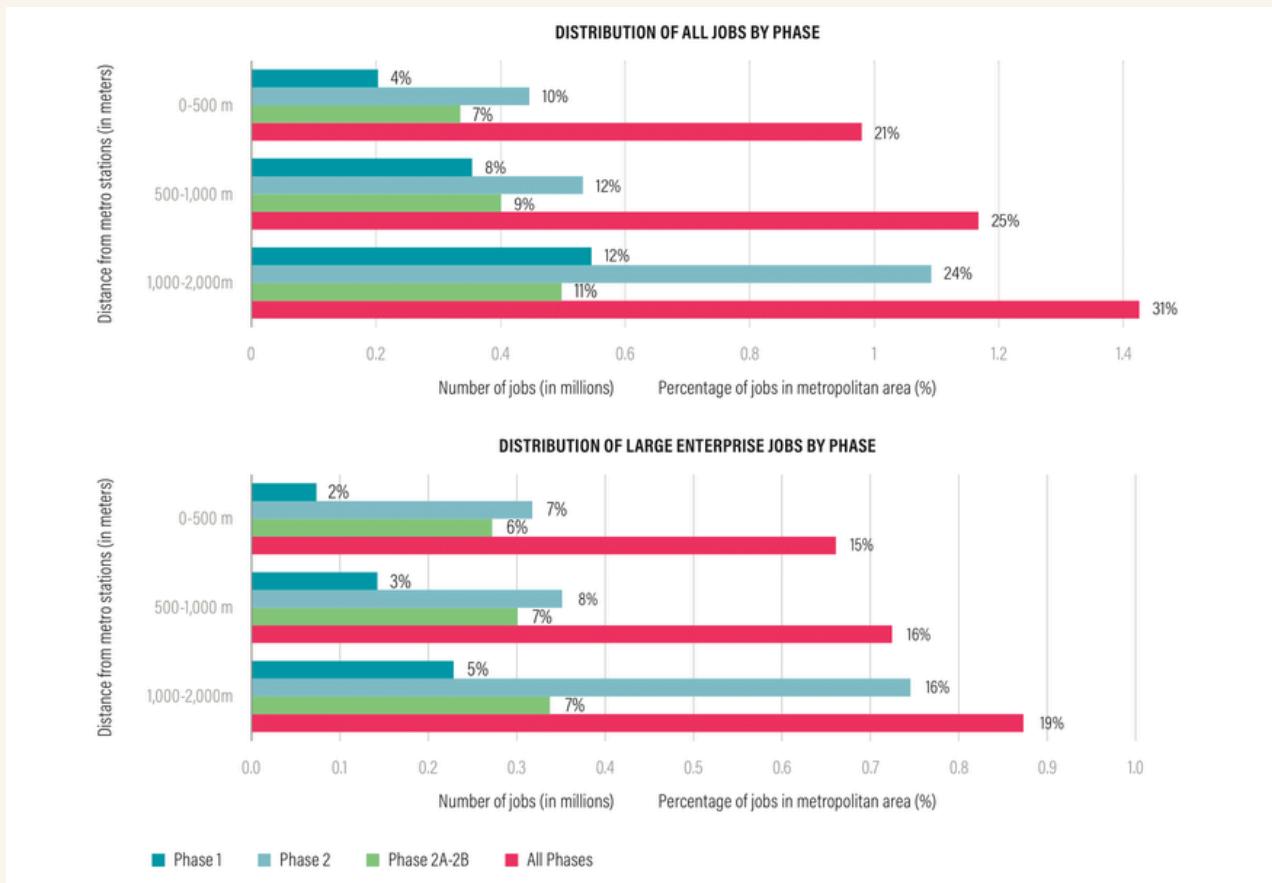
**Figure 9: Spatio-temporal patterns in heat stress across Chennai and other major cities in Tamil Nadu, India using Universal Thermal Comfort Index (UTCI) processed using Google Earth Engine and visualization using QGIS**

# Jobs near Metro Rail Transit in Bengaluru

- Organization: World Resources Institute, India
- Role: Program Associate
- Tools Used: Google Earth Engine, QGIS, Python
- **Key Contributions:**
  - Conducted quality assessment of geocoded employment addresses, ensuring spatial accuracy and consistency for downstream analysis.
  - Mapped the spatial distribution and density of jobs around metro stations using buffer and proximity analysis techniques.
  - Performed comparative analysis of job concentration across multiple metro stations to identify high-accessibility employment hubs.
  - Supported the development of maps to communicate findings to urban planners and transit authorities.
- **Impact Summary:**
  - This analysis provided critical insights into the spatial relationship between public transit infrastructure and employment accessibility in Bengaluru. The findings supported evidence-based recommendations for transit-oriented development (TOD) and last-mile connectivity planning, contributing to a more inclusive and productive urban environment.
- Published paper available at [this link](#).



**Figure 10: Distribution of category of jobs by distance from nearest metro station in Bengaluru, India processed using Google Earth Engine and visualization using MS Excel**



**Figure 11: Job distribution within 2000 m of metro stations in Bengaluru by phase processed using Google Earth Engine and visualization using MS Excel**

### Distribution of Jobs around all Metro Stations in Bengaluru Urban District

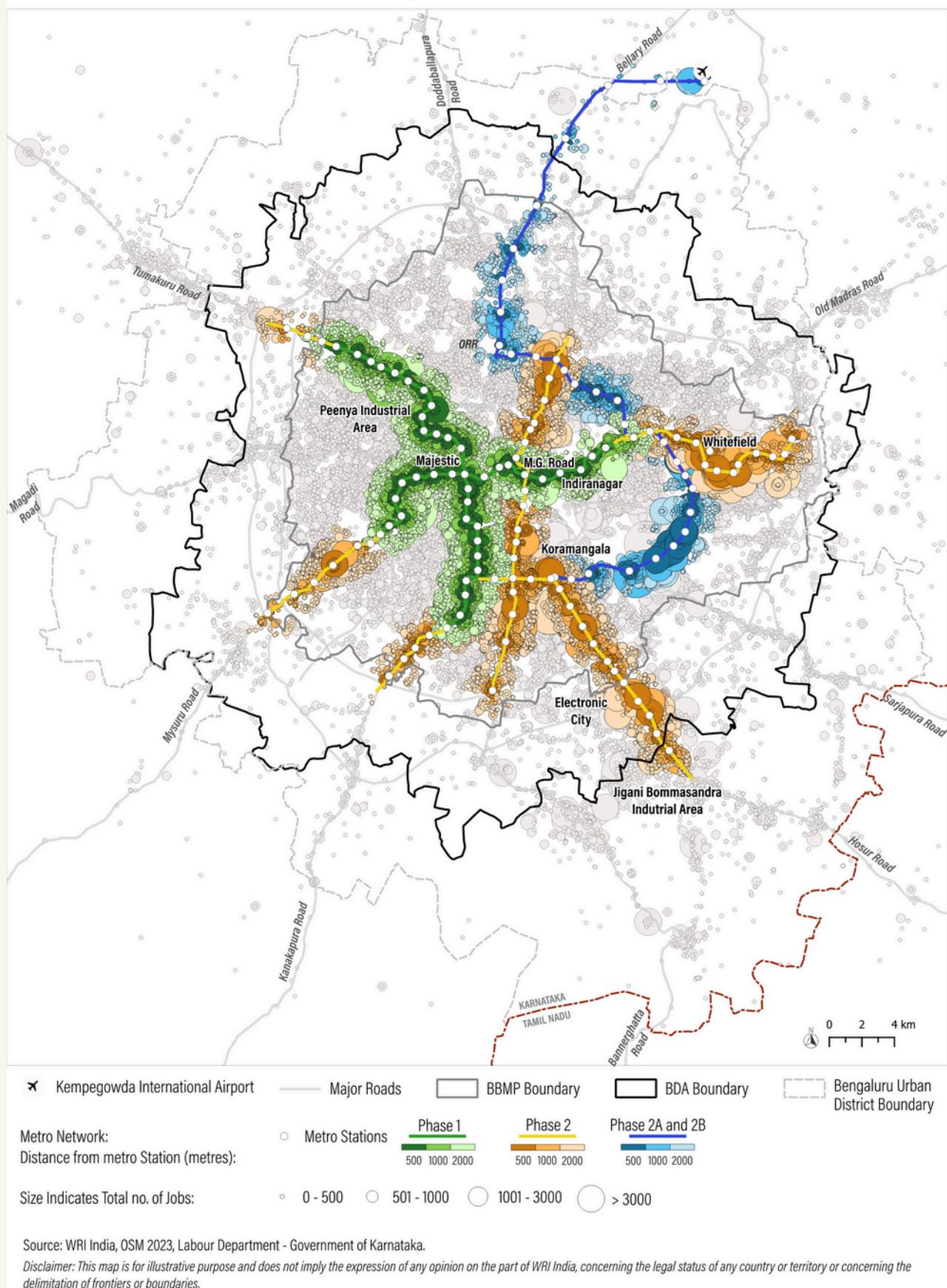


Figure 11: Distribution of jobs by employment across all metro stations in Bengaluru, India processed using geocoded data using Google API and visualization using QGIS

## Job Density around Metro Stations in Bengaluru

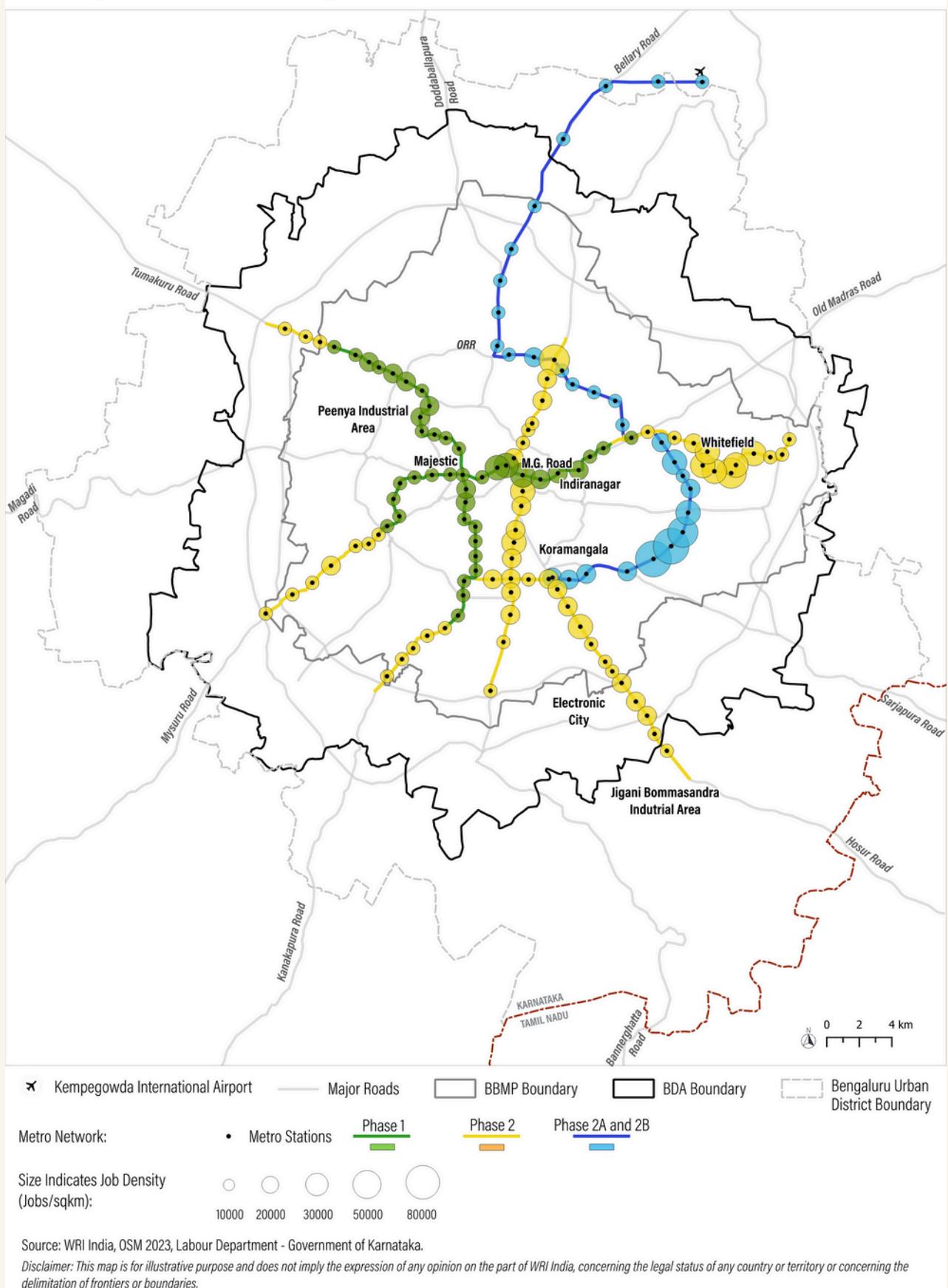


Figure 12: Job density around metro station in Bengaluru, India using geocoded jobs processed using Google Earth Engine and visualization using QGIS

# Social Media Outreach

- Organization: World Resources Institute, India
- Role: Program Associate and Senior Program Associate
- Tools Used: Google Earth Engine, QGIS, Python
- **Key Contributions:**
  - Created and shared engaging visual content on climate change topics such as urban heat islands, flooding, and climate vulnerability.
  - Developed data-driven maps to communicate the impacts of extreme heat and flood events on people, jobs, and ecosystems.
  - Highlighted the intersection of climate risks and social equity, focusing on vulnerable populations and communities.
  - Actively contributed to awareness campaigns on global observances like World Earth Day, World Rivers Day, and World Habitat Day.
  - Fostered community dialogue by simplifying complex climate data into accessible narratives for the general public.
- **Impact Summary:**
  - These outreach efforts have helped build public understanding of climate risks and the importance of resilience planning. By translating technical insights into relatable content, the initiative has supported climate literacy, encouraged community engagement, and amplified the visibility of climate adaptation strategies.
- **Selected visuals:**
  - [Exposure to heat stress in India](#) (animation)
  - [Built-up growth in flood prone areas in Kashmir, India](#) (animation)
  - [Charting 15 days of heat - India](#) (animation)
  - [Job growth, migration and climate risks in Tamil Nadu, India](#) (static maps)

# Maps and visualizations

- Type: Self-initiative as GIS and visualization enthusiast
- Tools Used: Google Earth Engine, QGIS, Python, OpenStreetMap
- **Key Contributions:**
  - Participated in the global 30 Day Map Challenge 2023, creating a new map each day based on daily themes such as elevation, population, movement, and climate.
  - Explored and utilized open-source spatial datasets and platforms to craft visually compelling and analytically rich maps.
  - Focused on enhancing data storytelling and cartographic design, experimenting with color theory, symbology, and layout techniques.
  - Developed a diverse portfolio of maps that demonstrate the ability to translate complex geospatial data into accessible visual narratives.
  - One of the visualizations was featured in Boineelo Moyo's "Favourite Maps from the Map Challenge 2023", highlighting the creativity and impact of the work.
- **Impact Summary:**
  - This challenge significantly sharpened my visualization and analytical skills, expanded my familiarity with open data platforms, and deepened my understanding of effective geospatial communication. It also helped build a global network of mapmakers and fostered a deeper appreciation for the art and science of cartography.

- **Selected visuals:**

- [India's population in comparison with other countries of the world](#) (static map)
- [Long-term Fire Weather Index - Australia](#) (animation)
- [Wealth distribution - Africa](#) (static map)
- [World Heritage sites - Europe](#) (static map)
- [Particulate matter 2.5 concentrations - India](#) (animation)
- [Uncovering the bedrock beneath Antarctica's icesheet](#) (animation)

## Feature in Deccan Herald

I was [featured in Deccan Herald](#), a prominent English daily newspaper based in Karnataka, India. The article highlighted the significant contributions of geospatial analysts and experts, including my work, during the 30 Day Map Challenge. It was an honor to be recognized for my efforts in enhancing visualization skills and utilizing open-source data to create impactful maps.

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### City in focus

This year, prompts ranged from geometrical shapes to continents and vague themes like 'North is not always up' and 'A bad map'. Though Bengaluru is not among the listed prompts, it has been the focus of some maps the participants have created.

Inspired by the prompt 'Black & white', Jyoti decided to visualise the average radiance over Bengaluru during night time a year before and after Covid-19 lockdown in 2020. The GIS (Geographic information system) analyst said, "In April 2021, the average radiance was higher than in April 2020 and that was obvious. But it was still not at par with the 2019 levels."

Figure 13: Screenshot from the Deccan Herald highlighting my contribution

Thank you for taking the time to review my portfolio.  
Please feel free to reach out if you have any further  
questions, suggestions, or concerns—I'd be happy to  
discuss them.

## Let's connect

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