

Kaushik Ravi

Geospatial computation for climate-adaptive cities and ecological systems

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RESEARCH PROFILE

I build geospatial software and environmental models for urban climate adaptation, ecological connectivity, and civic action. My work combines remote sensing, civic records, field and citizen observations, ecological modelling, and full-stack public tools to study heat, water, trees, habitat corridors, and urban infrastructure at neighbourhood scale, with an emphasis on systems that move from analysis to field-ready decisions.

EDUCATION

	National Institute of Technology, Tiruchirappalli	Tiruchirappalli, India
2021 TO 2025	<i>B.Tech in Civil Engineering; minor in Energy and Environmental Engineering</i> - Cumulative GPA: 9.5 / 10.0. - Relevant coursework: Programming and computation: Computer Programming Theory and Lab, Computational Laboratory; mathematical modelling: Probability and Numerical Techniques, Matrices and Calculus, Complex Analysis and Differential Equations; urban and environmental systems: Geodetic Surveying, Advanced Surveying Techniques, Hydrology and Irrigation Engineering, Transportation Planning, Environmental Management and Impact Assessment, Conservation Geography, Forests and Their Management.	

PUBLICATIONS AND RESEARCH OUTPUTS

2025	Ravi, K., and Brück, A. “Citizen Centered Climate Intelligence: Operationalizing Open Tree Data for Urban Cooling and Eco-Routing in Indian Cities.” Book chapter manuscript under review for HackYourDistrict. Preprint: doi.org/10.48550/arXiv.2508.17648 .	
2024	Ravi, K., and Brück, A. “Urban Tree Density and Its Impact on Temperature and Oxygen Production: A Case Study of Berlin.” Technische Universität Berlin. Case study and research output: TU Berlin page .	

RESEARCH AND SYSTEMS EXPERIENCE

	Nature’s Network Atlas	Bengaluru, India
MAY 2026 TO PRESENT	<i>Technology and Outcomes Lead, Consultant; supported by Adavi Trust, Zerodha Rewilding Fund, and Rainmatter Foundation</i> - Designed and built a live ecological decision-support atlas for South Bengaluru, translating neighbourhood ecology into map layers, node panels, corridor dossiers, decision packs, and downloadable reports for funders, implementers, and citizen action groups. - Assembled 278 dataset records spanning climate, ecology, water, terrain, air quality, land cover, infrastructure, governance, and citizen observations; normalised satellite products, civic records, species observations, scanned maps, rasters, vectors, tables, and text into a shared geospatial pipeline. - Rebuilt the study area as 1,640 typed ecological nodes including lakes, drains, parks, scrub, grassland, canopy patches, street avenues, hardscape, productive land, and other urban habitat units, each tagged with geometry, ecological context, functional state, network role, and intervention relevance. - Built 65 place-function models, 9 rule-based decision modules, and 147 intervention pathways, producing 17,272 traceable intervention records and per-place action menus from admissibility gates, restoration sequencing, evidence grades, and source citations. - Modelled habitat suitability and movement potential for six animal guilds using bird-occupancy models, presence-only species-distribution models, Keeley-style resistance surfaces, least-cost patch graphs, and Omniscape circuit-theory pinch layers. - Built the relationship knowledge graph behind the atlas: 277 ecological variables and groups, 1,016 signed relationships, and 478 source papers and reports covering nature, land, water, climate, infrastructure, and human pressure.	

JUN TO AUG 2024	Technische Universität Berlin, LABOR K / K LAB <i>DAAD WISE Scholar and Summer Research Intern</i>	Berlin, Germany
	- Quantified Berlin's urban forest of 885,825 trees and analysed the relationship between tree density, surface temperature, and oxygen production. - Estimated a mean temperature reduction of 1.48°C in high-density areas, using geospatial analysis and allometric equations for species-specific ecological benefit. - Built interactive maps and analysis workflows using QGIS, Google Earth Engine, Python, GeoPandas, Rasterio, and remote-sensing data.	
2023 TO PRESENT	Roots Initiative and Treefolio <i>Founder, product builder, and urban-forest researcher</i>	India
	- Founded and built a city-tree intelligence system: Roots measures a tree from a phone photo, and Treefolio turns tree records into a live urban-forest dashboard. - Built Treefolio to explore 1.79 million Pune trees in the browser, estimate 288,772 tonnes of CO2 storage, and compare canopy, ward performance, cooling, and species patterns. - Built the Roots capture pipeline using SAM segmentation, photogrammetry, PlantNet species identification, wood-density lookup, and Chave-style allometry for biomass and carbon estimates. - Tested the workflow through field mapping, mapathons, workshops, guest lectures, and a funded Change-maker Fund project with Reap Benefit.	
2026	SamaajData <i>Civic technology engineer and designer, with Reap Benefit</i>	Bengaluru, India
	- Designed and built a live civic-intelligence dashboard that connects residents, changemakers, and operators to place-level civic evidence and actions. - Rebuilt the map back end as a custom in-memory vector-tile engine holding 1.17 million points, returning viewport counts in under 60 ms with zero database queries per view. - Integrated 4,795 field actions, 707 changemakers, 33 organisations, city records, neighbourhood comparison, Area Intelligence APIs, and a civic action layer. - Created a civic behaviour framework that maps awareness and action into product pathways, then connects each audience to a different view of the same spatial index.	

SELECTED APPLIED RESEARCH SYSTEMS

2025	StreetLens VLM Vision-language system for auditing street-view imagery across road, waste, lighting, and public-realm defects, with spatial deduplication of repeated detections.	
2025	EcoPath Navigator Greener-route walking system that uses tree-cover data for route scoring and turns a walk into timed mindful narration with tree-by-tree guidance.	
2025	JP Nagar 3D Urban Twin Real-time 3D neighbourhood model built from survey data, drone imagery, LiDAR terrain, municipal maps, and machine-detected tree crowns.	
2025	Automated Wildlife Monitoring Biodiversity-monitoring pipeline that detects animals in video, combines visual and audio species cues, tracks movement, and logs sightings to a spatial database.	

TALKS AND PRESENTATIONS

2025	IndiaFOSS 2025, FOSS United Lightning talk, "Empowering Pune with Open Tree Data," on open tree data, satellite LST, and FOSS tools for climate-resilient urban planning.	Bengaluru, India
2026	BMS School of Architecture Guest lecture and public conversation on civic, urban, and climate technology.	Bengaluru, India
2026	NIT Tiruchirappalli, Civil Engineering Department Guest lecture on geospatial and civic-environmental technology.	Tiruchirappalli, India
2026	OoruLabs Podcast Conversation on building civic and environmental technology as a young changemaker.	Bengaluru, India

HONORS AND AWARDS

2025	Ranga Class of 1974 Award Awarded for academic excellence.	NIT Tiruchirappalli
2025	Henry Gissenbier Memorial Award Recognised for contributions to water and soil conservation and sustainable land management.	Junior Chamber International, India

2025	Millennium Fellowship and Campus Director	UN Academic Impact and Millennium Campus Network
	Selected from 52,000+ applicants and appointed to lead the campus cohort.	
2026	Changemaker Fund	Reap Benefit
	Selected for funding and field support for Roots Initiative tree-mapping and civic-environmental action.	
2025	Selected research exchange opportunity	MIT Senseable City Lab
	Selected for a research exchange opportunity.	
2024	DAAD WISE Scholarship and Summer Research Internship	German Academic Exchange Service
	One of 150 scholars selected nationally for a funded research internship in Germany.	
2023 AND 2024	Seetharaman Narayanan 1984 Trust Scholarship	NIT Tiruchirappalli
	Awarded in two consecutive years for academic excellence.	
2022	Avery Dennison InvEnt Scholarship	Avery Dennison Foundation
	One of 10 selected from 500+ applicants across five national institutes, for innovation against climate change.	

LEADERSHIP AND SERVICE

2023 TO PRESENT	Youth Advisor, Climate Thematic Group	World Bank Solutions for Youth Employment
	Advises on youth-led climate action and brings a youth perspective to global climate-policy discussions.	
2024 TO 2025	Youth Board Member	Reap Benefit, Bengaluru
	Advised a Bengaluru civic-action nonprofit on youth engagement, local action, and environmental technology.	
2025	Campus Director and Fellow	Millennium Fellowship
	Led the campus cohort for a leadership program run by UN Academic Impact and the Millennium Campus Network.	