WRI INDIA

# Annual Report

## 2023-24

# FOR PEOPLE. NATURE. CLIMATE


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**WRITING AND EDITING**

Aditi Sundan, Anisha Lalwani, Shalini Singh

**COMPILATION AND SUPPORT**

Rama Thoopal, Ankita Rajeshwari, Shweta Prajapati, Steffi Olickal, Ahona Datta Gupta, Shivani Shah

**CONTENT MANAGEMENT**

Bodhisattva Sen Roy

**DESIGN**

Karthikeyan Shanmugam, Tahani Khan

**CURATION AND PRODUCTION**

Communications Team, WRI India





LGF, AADI, 2 Balbir Saxena Marg, Hauz Khas,
New Delhi 110016, India
Phone +91 11 40550776

Email: info@wri.org



**APRIL 2024**

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**MADHAV PAI**
CEO, WRI India

# Letter from the CEO

**Greetings!**

India, according to several projections, is expected to double its economy in absolute GDP terms by 2030. This will happen in the context of rapidly growing climate vulnerability and will severely challenge equitable development for our 1.42 billion citizens.

However, we also see an emerging undercurrent that can shift the world in a different direction. For instance, the growing adoption of renewable energy and electric vehicles, efforts to minimize food loss and food waste, and the progress we are making to create vibrant, low-carbon cities. Moreover, we see a massive increase in financial flows that support sustainability. At WRI India, we are focused on mainstreaming these undercurrents to enable meaningful transitions across three human-centered systems – Food, Land and Water; Energy Systems: and Cities – and bring tangible benefits to people, nature and climate.

As I reflect on the last year, I am proud of all we have achieved across our key pillars. This annual report aims to share a few key highlights from the last year. We launched an Accelerator for Clean Air Actions (ACAAS) that provides technical support to 10 Indian cities in designing and implementing clean air solutions. As part of the Resilient, Inclusive and Sustainable Enterprises (RISE) initiative, our team is building the resilience and competitiveness of MSMEs in the automotive and textile clusters in Tamil Nadu and Gujarat, respectively, as they prepare for a low-carbon transition. Under the Harit Bharat Fund collaborative, we are working to support local organizations to restore India's landscapes. Our team also supported India's Ministry of Housing and Urban Affairs (MoHUA) in developing the PM e-Bus Sewa Scheme, which will bring 10,000 electric buses to underserved cities around the country, benefiting more than 170 million residents.

The 2023 G20 Declaration under India's leadership included the framing of a "Green Development Pact for a Sustainable Future," to accelerate action towards development that is sustainable, inclusive and just.

As part of this, WRI India was proud to support India's G20 presidency and ThinkTank20 (T20), Urban20 (U20) engagement groups with research support.

As part of our State Energy Transitions initiative, we are enabling states in becoming leaders in providing affordable, reliable and clean electricity to all its citizens. As part of its efforts to decarbonize healthcare in rural areas, WRI India equipped seven not-for-profit health facilities with improved electricity solutions. It further explored the role of decentralized renewable energy (DRE) systems in rural health facilities in the report, "A Spoonful of Solar."

We continue to reflect on our learnings through our publications and reports. Over the past year, we have published 29 knowledge products, including reports, working papers, conference proceedings, a guidebook, a practice note and a technical note across the domains of our work.

We understand the challenges facing our world are complex, and urgent ambitious action is needed. More than ever before, this is the time to come together in a spirit of collaboration. We are inspired and grateful to partner with an exceptional array of diverse associations, including policymakers, civil society organizations, researchers and the philanthropist community to work towards solving these challenges. I am also personally humbled to work with our incredibly talented and mission-driven team that uses their diverse backgrounds, skill sets and subject matter expertise to bring a holistic perspective to finding solutions that improve our world. And finally, I would like to thank all our board members and donors for their constant support, valuable input and insights that have strengthened and enabled our work.

# BOARD OF DIRECTORS


## Jamshyd Godrej

**CHAIRMAN AND MANAGING DIRECTOR - GODREJ & BOYCE MFG. CO. LTD.**

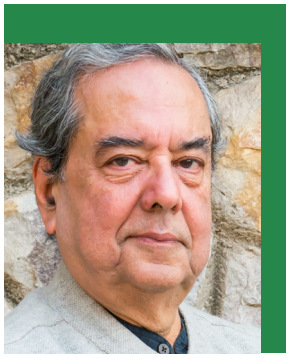
*"For India to translate its climate commitments into action will require a transformation of many systems. At WRI India, we are committed to support the government, businesses and other partner organizations with the data, research and analysis needed to inform this change. I am immensely proud of our work this year. Seeing the direct benefit of our work on improving lives and livelihoods of people is hugely inspiring.*

*I feel honored to have supported India's G20 presidency. It is exciting to see WRI India's data and research informing key national and state level policies in the domains of cities, land restoration, renewable energy and more.*

*The problems we need to address are urgent and extensive, it's important for the team to continue to work collaboratively, with diligence and humility to make meaningful progress as we deal with the complex challenges India faces.*

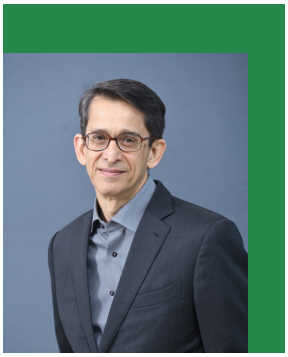
## Kiran Pasricha

**FORMER CEO, ANANTA ASPEN CENTRE; FORMER DEPUTY DIRECTOR GENERAL, CONFEDERATION OF INDIAN INDUSTRY (CII)**



## Ashok Khosla

**CHAIRMAN - DEVELOPMENT ALTERNATIVES GROUP**



## Shashishekhar Pandit

**CO-FOUNDER; CHAIRMAN & GROUP CEO - KPIT TECHNOLOGIES LTD.**

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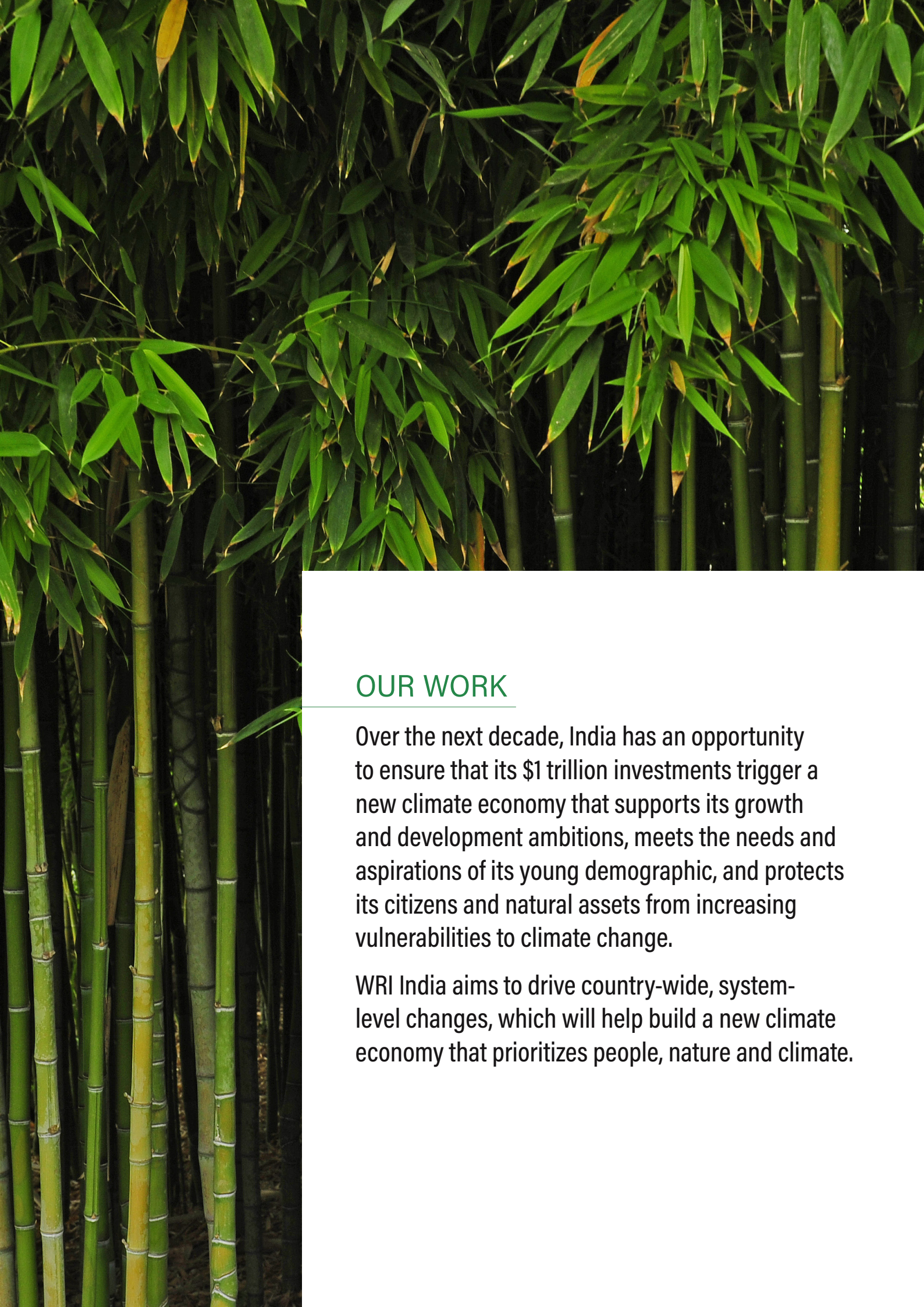
# About WRI India

WRI India, an independent charity legally registered as the India Resources Trust, offers thought leadership for the sustainable use of resources towards India's low-carbon, resilient and equitable development. We develop evidence-backed, contextual solutions that inform India's transition toward sustainable and resilient land use, clean energy and energy access, and inclusive, low-carbon, nature-focused urban centers, while ensuring equity and alignment with the country's growth aspirations.

Our approach combines research, analysis and tools, partnerships with key stakeholders and engagement with decision-makers to demonstrate scalable alternatives for change. We are inspired by and associated with World Resources Institute (WRI), a global research organization.



## OUR WORK

Over the next decade, India has an opportunity to ensure that its $1 trillion investments trigger a new climate economy that supports its growth and development ambitions, meets the needs and aspirations of its young demographic, and protects its citizens and natural assets from increasing vulnerabilities to climate change.

WRI India aims to drive country-wide, system-level changes, which will help build a new climate economy that prioritizes people, nature and climate.

## FOOD, LAND AND WATER

Despite being one of the largest producers and consumers of several agricultural commodities, India faces the dual challenge of obesity and undernutrition within its growing population. Climate change has exacerbated these risks, with small and marginal farmers facing disproportionate impacts.

This program provides innovative tools and strategies to inform India's transition towards sustainable and resilient food and land-use systems. It focuses on developing interdisciplinary nature-based solutions, like agroforestry and sustainable agriculture, to mitigate climate impacts, enhance jobs and livelihoods, and improve nutritional security. We aim to catalyze change for circular food systems by developing equitable strategies to reduce food loss and waste, and mitigate climate impacts.

## CITIES AND TRANSPORT


By 2030, cities are expected to contribute more than 70% of the national GDP, with 220 million more urban residents than in 2010. Current growth patterns remain resource-inefficient when utilizing land and deploying core services, with scant provisions for environmental protection and climate resilience.

Our work supports Indian cities in their journey to be low carbon, resilient and inclusive through research and data-backed solutions on integrated mobility, people-centered development and access to services, development planning, clean air interventions, building resilience to climate impacts and driving access to finance. We collaborate with city administrations, urban stakeholders and partners across 46 cities through targeted engagements.

## ENERGY TRANSITION

Driven by falling renewable energy prices, rapid transformation in the energy technology landscape and climate change considerations, India's energy sector is transitioning towards increased reliance on renewable energy. However, the challenges and impacts of the technology shifts and decarbonization efforts in the energy sector are complex and multi-dimensional.

WRI India's work under this pillar focuses on increasing reliable and affordable energy access, decarbonization and an equitable transition to low-carbon energy pathways. We work at the national and subnational levels to inform policy change and enable the shift towards energy-efficient and renewable solutions.

## ENABLING SYSTEMS

To support our efforts within the three systems, WRI India also works to:

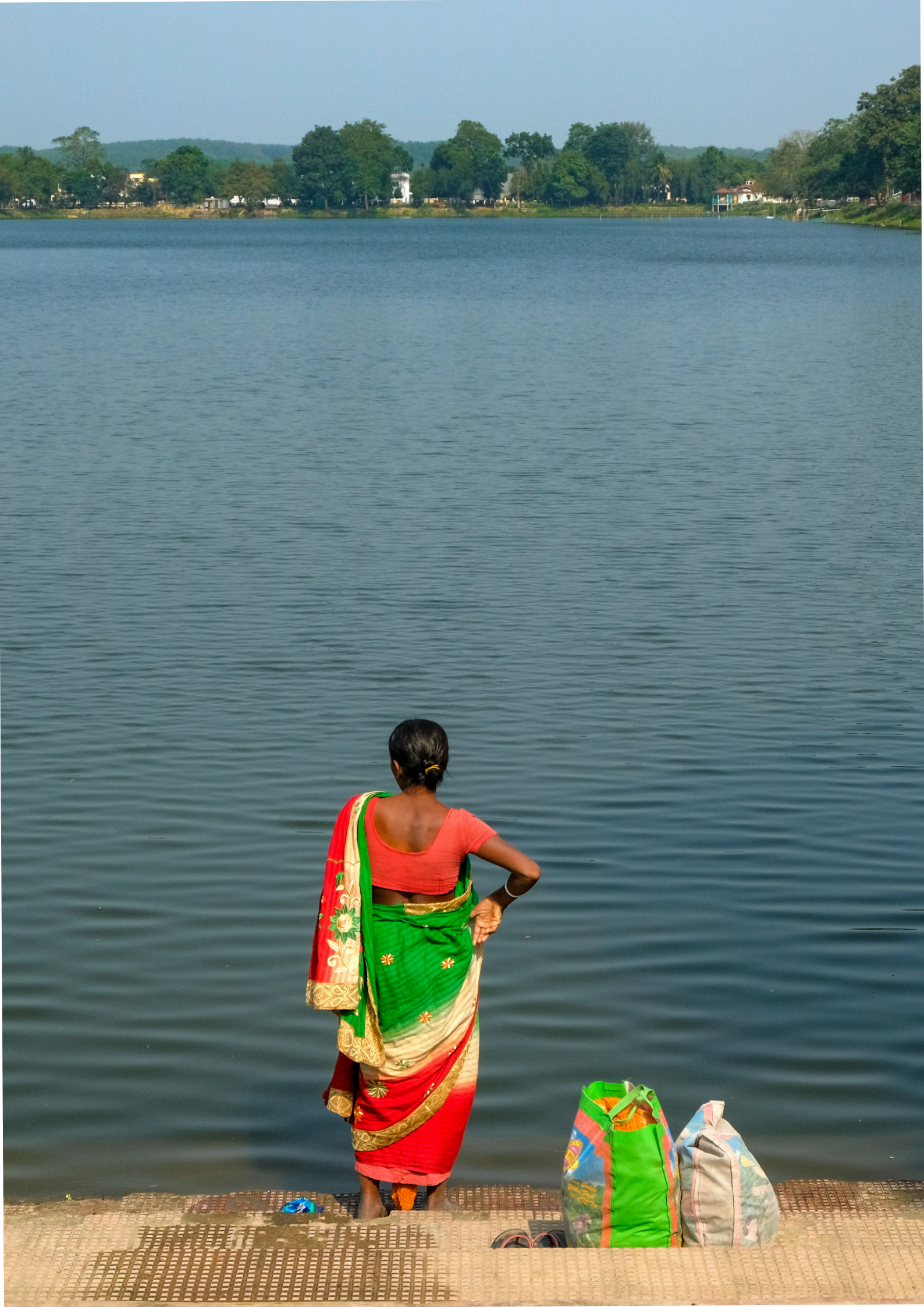
Create **economy-wide models and analysis at the national and state levels** to identify and develop pathways and policy levers that will support climate ambition, better livelihoods and economic growth, while ensuring an equitable and just transition.

**Mainstream climate action in Indian businesses**, driving just, resilient and science-aligned deep decarbonization via tools, capacity building and policy engagement.

**Mainstream locally led adaptation and resilience** by prioritizing these principles in state and city climate action plans, facilitating climate budget tagging and enabling access to finance for resilience measures.

Ultimately, all impact is local. Our approach within each city, state, district and region is tailored to their specific economic drivers and development indices. WRI India shares its successes and learnings to build the understanding of our teams and partners, expand on proven solutions and accelerate impact.


**Build capacity, partnerships and coalitions** to strengthen governance and institutions and scale our impact.



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# Institutional Highlights

Over the past year, our teams have worked towards developing and contributing evidence-based solutions to address India's environmental and development challenges. We're thrilled to showcase some of the key moments and initiatives that have emerged from these efforts towards fostering equitable, resilient and sustainable development for all. Through collaboration and knowledge sharing with a diverse set of stakeholders, we've been able to inform decision-making to enable change on the ground. From electrification of hospitals through renewable energy initiatives to promoting landscape restoration while empowering communities, and working towards climate-resilient cities and livelihoods, each highlight represents a significant step towards a greener, more equitable and resilient future.

# G20 ENGAGEMENTS AND COLLABORATIONS

India's G20 presidency and the Urban 20 (U20) Engagement Group gave WRI India the opportunity to demonstrate how the policies and practices adopted by cities and nations can help combat climate change and foster equal opportunities for all. WRI India attended the U20 Engagement Group inception meeting in Ahmedabad. We also partnered with NITI Aayog to organize a conference on "Policy Support & Enablers to Accelerate India's Electric Mobility." The G20 event deliberated on key opportunities and challenges associated with the e-mobility transition in different states of India. The conference, held in Goa, witnessed 200+ participation, and saw a wide range of dignitaries, including Mr. Amitabh Kant, Sherpa for India's Presidency at G20, Mr. Pramod Sawant, Chief Minister of Goa and Mr. Suman Bery, Vice Chairman, NITI Aayog.

WRI India also participated as the knowledge partner in the "Green Hydrogen – Accelerating Net-Zero Pathways" event, under G20, in April 2023. The conference, held in Ahmedabad, was conducted on the sidelines of the G20's 2nd Energy Transition Working Group (ETWG) meeting by the Ministry of New and Renewable Energy (MNRE) in partnership with Solar Energy Corporation of India Limited (SECI) and International Solar Alliance (ISA).

Ulka Kelkar, Executive Program Director, WRI India, served as the co-chair to Think20 (T20) Task Force 4 on "Refuelling Growth: Clean Energy and Green Transitions." The Task Force deliberated on mainstreaming the green transition, accelerating the energy transition and making the financing for the transition more urgent and inclusive.




# MICRO, SMALL AND MEDIUM ENTERPRISES

As the demands for sustainability and low-carbon transitions increase, MSMEs need to adopt climate-friendly practices or change business operations to stay competitive and protect livelihoods. This requires reskilling of workers and institutional support.

Our work with MSMEs aims to build their resilience and competitiveness in the Chennai and Coimbatore automotive clusters in Tamil Nadu, and the Surat textile cluster in Gujarat. Through energy efficiency trainings, lean management tools and reskilling boiler operators, our efforts are focused on enabling a just and inclusive transition to a low-carbon future.

**RISE VIDEO**

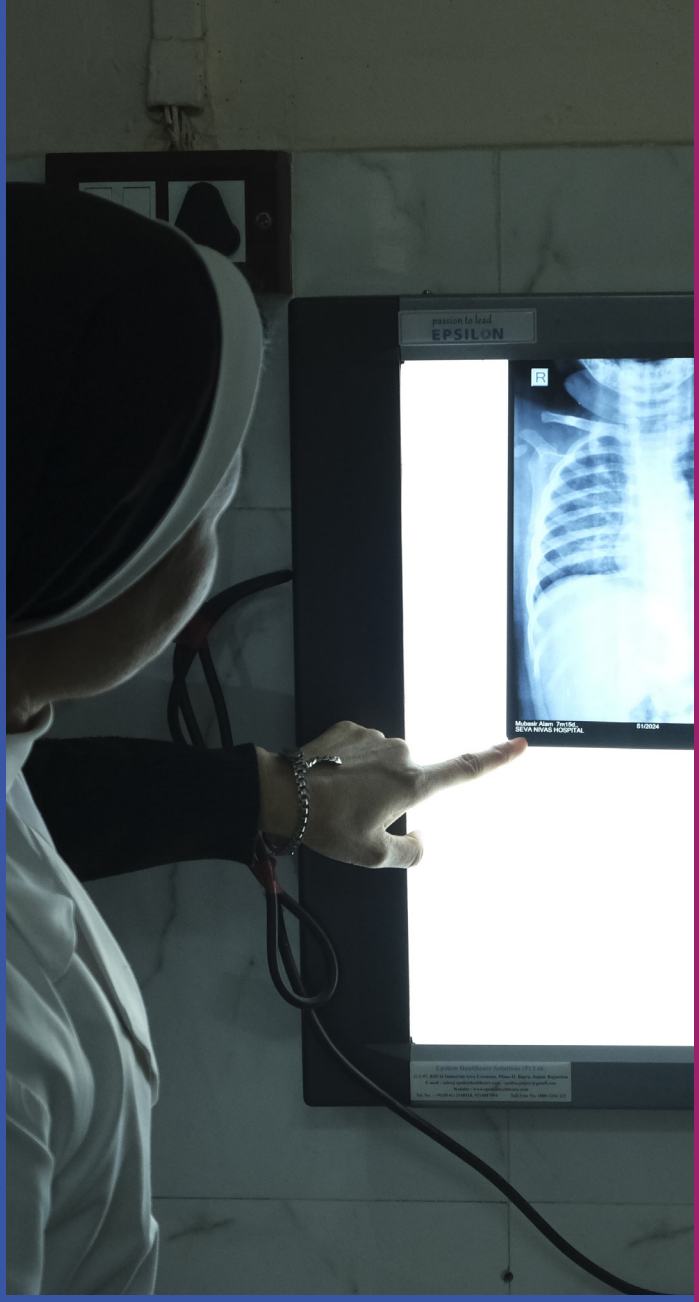

**SCAN THIS QR CODE**
**TO WATCH THE VIDEO**

# ENERGY ACCESS FOR EQUITABLE DEVELOPMENT

WRI India's Energy Program supports energy access for development in underserved areas of Jharkhand, Assam, Rajasthan, Maharashtra, Nagaland, Meghalaya and Mizoram.

In areas with high climate vulnerability, we look at including extreme weather aspects into energy infrastructure planning and explore how reliable energy can build resilience by improving adaptive capacities of vulnerable communities. We work on the following to co-develop programs and take evidence-based decisions to achieve impact at scale:

- Demonstrate the potential of clean energy technologies through pilot projects run by our partners by assessing energy needs, identifying solutions, supporting implementation and evaluating impacts.
- Work with stakeholders to build an ecosystem for financing energy solutions by mapping the right funding sources and accessing low-cost finance.
- Document and share our learning and observations through case studies and other knowledge sharing products for stakeholders.
- Work towards the UN's Sustainable Development Goals by creating awareness about the role of energy in achieving goals like health, education, work and climate action.




**Seven** health facilities across Assam adopted decentralized renewable energy to power medical services

**80 kWp** of solar PV capacity installed in the health facilities

Over **3,21,132** people have access to improved health services

About **49.53 tons of carbon emissions avoided** by switching to renewables

Around **₹ 5.09 lakhs saved**. This can be invested in more medical services, future operations and maintenance of energy systems

**221 individuals** trained in health facility electrification maintenance, including health medical staff, electricians and technology providers

# TOWARDS SUSTAINABLE FOOD AND LAND SYSTEMS

**LASA 2023,** co-organized by WRI India and AIC Sangam and supported by Startup India and Government of India's Manthan platform, offered 22 entrepreneurs technical assistance and networking opportunities for scaling up.

WRI India's **landscape restoration project in Sidhi** district, Madhya Pradesh (MP) was conducted in collaboration with Department of Panchayat and Rural Development, Government of MP under the Climate Solutions Partnership. The Steering Committee meeting recognized integrated landscape approach as a proof of concept for landscape restoration, which is scientifically designed, participatory in its approach and people centric at its core. The Annual General Meeting of Gopadbanas Farmer Producer Group discussed the Farmer Producer Organization (FPO) revenue model and received support from Sidhi district administration.

WRI India kicked off a new initiative on **'catalyzing engagement and action on food loss and food waste reduction to mitigate climate impacts, strengthen nutritional security and enhance livelihoods'** in Maharashtra and MP with two multi-stakeholder inception workshops in Mumbai and Bhopal. Building a collaborative network of partners, the Friends of Champions 12.3 India, led by WRI India added eight new members. A scoping study to assess postharvest losses in the tomato supply chain in MP along with two business cases for reducing food loss and food waste have also been undertaken by the team.


SCAN THIS QR CODE
TO WATCH THE VIDEO

# THE LAUNCH OF BENGALURU'S CLIMATE ACTION PLAN AND CLIMATE ACTION CELL

As part of its C40 Cities commitment, Bengaluru – with WRI India as its knowledge partner – has been preparing a data-driven and collaborative climate action plan focused on reducing GHG emissions and building healthy, equitable and resilient communities. The city municipality, Bruhat Bengaluru Mahanagara Palike (BBMP), launched the Bengaluru Climate Action and Resilience Plan (BCAP) in November last year. They also announced supporting initiatives: Bengaluru Climate Action Cell to drive coordinated BCAP action, Climate Fellows Program, Friends of the Climate Action Cell and the #BluGreenUru initiative for enhancing the city's blue and green infrastructure. The launch event featured a pledge by adults and children to reduce their carbon footprint and a panel discussion with environmental experts.

**WHAT CAN COMMUNITY- BASED ORGANIZATIONS AND NGOs DO?**

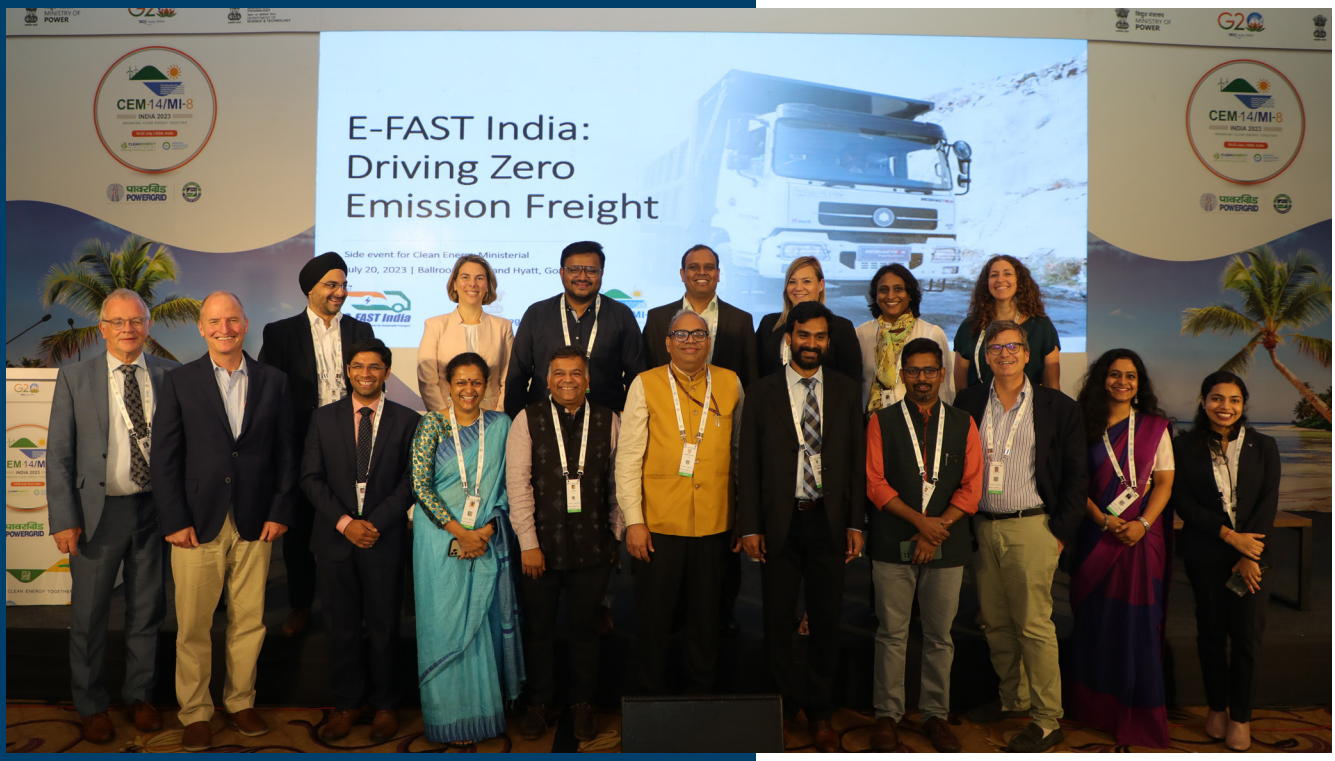
- Facilitate communication of early warnings and health advisories in local mediums and languages
- Build capacity of health workers on identifying and treating climate-induced risks and illnesses
- Conduct trainings for, and support, waste pickers and self-help groups
- Develop low-cost, nature-based solutions – like cool roofs and greening – to reduce heat stress in high-risk neighborhoods
- Facilitate provision of electricity, water, sanitation facilities and waste management for urban poor communities
- Raise awareness and support distribution of energy-efficient appliances in low-income communities
- Push for reforms to overcome regulatory barriers that hinder equitable service distribution in vulnerable localities

# ELECTRIC FREIGHT ACCELERATOR FOR SUSTAINABLE TRANSPORT (E-FAST)

E-FAST (Electric Freight Accelerator for Sustainable Transport) is India's first electric freight platform, spearheaded by the national think tank NITI Aayog, and supported by WRI India. It was born from the recognition of the urgent need to decarbonize road-based freight transportation in India to realize its 2070 net-zero commitments.

The platform unites stakeholders from across the freight ecosystem to drive innovative freight electrification solutions, conduct on-ground pilot demonstrations, strengthen partnerships and support evidence-based research. E-Fast was showcased at the 14th Clean Energy Ministerial (CEM), held in Goa. During the event, 16 companies expressed demand for 7,750 e-trucks, giving the necessary demand signal to the industry for amplifying the momentum towards freight electrification. Three e-freight pilots were also declared at CEM, which will be critical in identifying on-ground opportunities and challenges in freight electrification.





# NDC TRANSPORT INITIATIVE FOR ASIA

The NDC Transport Initiative for Asia (NDC-TIA) seeks to facilitate a paradigm shift to zero-emission transport. The platform works to formulate pathways for transport decarbonization and provides technical assistance to improve policies and procurement frameworks for EVs and charging infrastructure.

As a part of NDC-TIA, NITI Aayog and WRI India created the Forum for Decarbonising Transport to catalyze and sustain stakeholder engagements to support policymaking for more ambitious transport action.

Under the Forum, WRI India hosted a conclave titled "Towards Low-Carbon Pathways for India's Mobility" at the 3rd E-Mobility India Forum in August 2023. This event brought together national and subnational policymakers and industry leaders to explore a policy roadmap for low-carbon mobility. WRI India also co-organized the session on "Implementation Pathways for Low Carbon Transport: Policy Frameworks and Financing Mechanisms" at the Asia-Pacific Climate Week in November 2023. The event assessed the progress on transport decarbonization targets and identified challenges and opportunities for impactful action, with a specific focus on electrifying public transport. The key outcomes from this discussion informed the Global Stocktake (GST) and other transport policy dialogues at COP28.

# NATIONAL CONVENING OF ACAAS CITIES

Launched in July 2023 by WRI India, the Accelerator for Clean Air Actions (ACAAS) is supporting 10 Indian cities in achieving their clean air targets. The ACAAS National Convening showcased the ongoing efforts of the 10 cities – Agra, Ahmedabad, Chennai, Gorakhpur, Gurugram, Indore, Mumbai, Pune, Surat and Vadodara – allowing city officials to learn from each other and interact with attending experts. The convening included a session with the California Air Resources Board (CARB), an agency that has pioneered stringent air quality interventions in the United States.

# CLIMATE

As a rapidly developing economy, India faces the challenge of ensuring that its growth is not only socially just and inclusive but also environmentally sustainable. WRI India's Climate Program aims to help decouple India's economic development by adopting evidence-based low-carbon pathways for a sustainable future. We focus on building resilience of vulnerable groups and industries, furthering economy-wide decarbonization and informing pathways for a just and inclusive transition. Rooted in modeling, capacity building, policy analysis and climate action planning, our approaches engage businesses, policymakers and the civil society at various levels to mitigate climate change and help communities adapt to its impacts.

WRI India's Climate Resilience Practice Program focuses on mainstreaming adaptation and resilience at the subnational level. The three central pillars of our mainstreaming work are (i) climate proofing of district development plans (ii) training and capacity building for various stakeholders, including the line department officials and (iii) creating access to climate finance for state and local agencies.

*Farmers engaged in a paddy field.*
*Photo from Palakkad, Kerala, by Bineesh Kollan Kandiyil/WRI India.*

# KEY INITIATIVES

## RESILIENT, INCLUSIVE AND SUSTAINABLE ENTERPRISES (RISE) INITIATIVE

Under RISE, WRI India's Climate Program is engaging with MSMEs and local communities, industry associations and experts, skilling and financing agencies, and local and national governments. By 2026, it aims to support at least 1000 workers in 100 MSMEs in managing climate impacts. By identifying climate-related vulnerabilities that may affect MSMEs and workers in the automotive clusters of Chennai and Coimbatore and the Surat textile cluster, we will work toward helping them implement climate actions and acquire skills for better livelihoods.

## ALIGNING INDIA'S CLIMATE ACTION WITH ITS LONG-TERM CLIMATE AND DEVELOPMENT GOALS

India's Long-Term Low-Carbon Development Strategy (LTS) focuses on adopting low-carbon development pathways towards net-zero emissions and strengthening adaptation. However, translating the LTS into action at the national and subnational levels is a challenge. Our work under the initiative aims to produce new research and evidence, strengthen capacity, and inform low-carbon and climate-resilient development in India. By engaging with relevant stakeholders at the national and subnational levels, we are exploring opportunities and alternative pathways for India's low-carbon development, including considerations for a just transition.

## CLIMATE-RESILIENT AND LOW-CARBON DEVELOPMENT PATHWAYS STRATEGY FOR BIHAR

The development pathways chosen by states and cities will greatly shape India's future energy consumption, emissions trajectory and environmental sustainability. Recognizing the urgency of addressing this, we support the development of long-term climate-resilient and low-carbon development strategies at the state and city levels.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# ENERGY

The objective of WRI India's Energy Program is to inform and guide India's transition to cleaner energy. Our strategy puts three interconnected goals for people, nature and climate at the center of all we do. Addressing these goals in tandem can help create lasting impact and reduce the risk of negative trade-offs. The program also focuses on energy consumption in India, which has almost doubled in the past decade due to urbanization and industrialization. However, many parts of the country, particularly rural and peri-urban areas, still lack access to reliable energy supply. Electricity access is crucial for human well-being, education, safety, security and economic growth. Additionally, the increase in the number and intensity of extreme weather events, like floods, heatwaves, cyclones and outbreak of diseases, including the COVID-19 pandemic, highlights the need for a resilient energy sector.

India has made significant progress on household electrification over the last two decades. However, despite the increase in electrification of homes, reliable supply continues to be a challenge – especially for rural healthcare, education, agricultural and livelihood sectors. Several public schools, public health centers, Anganwaadis, community health clinics, small shops and businesses, and agricultural farms remain unelectrified/ under-electrified. With unreliable supply, end-users are forced to rely on expensive and polluting diesel generators, if they can afford it, severely impacting the possibility of socioeconomic development outcomes.

With the Indian government announcing a target of 500 GW of renewable energy capacity by 2030, there is a great opportunity to link the unmet and under-met electricity demand. Decentralized energy solutions could provide a significant opportunity to power remote/rural schools, healthcare facilities, farms and livelihood facilities.

The program works to fuel the growth of sustainable, affordable and reliable electricity for all through:

## RESEARCH AND ANALYSIS

We are collaborators and our strengths in data, analysis, research and implementation. We identify barriers that limit energy access, solutions to overcome them and enhance the uptake of decentralized renewable energy, integrated with energy efficiency measures, through on-ground research and bottom-up data collection.

## BUILDING THE EVIDENCE

Our end-user demand focus complements the traditional supply side focus of the electricity sector. We develop tools, methods, and frameworks to create enabling conditions to support, measure and track improved access to decentralized renewable energy solutions at scale, especially in underserved areas. We provide evidence from on-ground research to strengthen decision-making, at the national and subnational levels.

## STAKEHOLDER ENGAGEMENT

We invest in bottom-up processes to complement top-down efforts to engage with stakeholders. We work with development institutions, local, state and national governments, energy enterprises, investors and the civil society to support sustainable, affordable and reliable energy access solutions that alleviate poverty and promote development.

# FOOD, LAND AND WATER

WRI India's Food, Land and Water (FLW) program aims to inform India's transition towards sustainable and resilient food and land use systems through interdisciplinary nature-based solutions, such as landscape restoration and sustainable agriculture.

The program also works towards developing collaborative strategies for reducing food loss and food waste, with a focus on circular food systems in India.

Through a systems-change approach, the program works with equitable strategies that can help India achieve its climate and development goals. Benefitting people, nature and climate, a land-based restoration economy can mitigate climate impacts, conserve biodiversity, provide resilient jobs/livelihoods, and improve food and nutritional security.

The FLW program envisions healthier landscapes and resilient communities by following its "inform, enable and invest" strategy:

Inform equitable land-use strategies based on robust evidence and analysis at national, subnational and landscape levels.

Enable action by bridging capacity gaps, reducing barriers, monitoring progress and mobilizing collective action with stakeholders.

Unlock finance for landscape restoration and sustainable agriculture through public funding convergence and private investments.

With an interdisciplinary and intersectional lens, the program works with diverse stakeholders, including governments, businesses, civil society partners and local community groups, for building a land-based restoration economy for people, nature and climate in India.

Stewarding WRI India's commitment to people-centered solutions, the program's work is structured into the following interacting three pillars:

### PRODUCE

Focused on restoring agricultural lands across India, the "Produce" team works towards informing a transition to sustainable and resilient food production systems. This can improve farm productivity, meet the country's increasing food and nutritional requirements as well as secure incomes and livelihoods for communities dependent on forests, farmlands and common lands across India.

### PROTECT & RESTORE

Striving to build a land-based restoration economy by catalyzing locally led restoration action, the "Protect & Restore" team works on protecting open natural ecosystems and harnessing India's restoration potential through a systems-change approach to ensure that India's landscapes are governed fairly and managed well.

### REDUCE

Envisioning a resilient and sustainable food system for India, the "Reduce" team works on developing equitable strategies to minimize food loss and food waste across the food supply chain. Reducing loss and waste holds enormous potential to improve food and nutrition security for people, ease pressure on our land and water ecosystems, prevent economic losses, improve incomes and reduce emissions from intensive food production.

# SUSTAINABLE CITIES

We live in a rapidly urbanizing world, with 7 out of 10 people projected to live in urban areas by 2050. Almost 90% of this projected growth will take place in the Global South, with a significant section taking place in India. Current estimates suggest 36% or 400 million of India's population is urban. By 2050, this number will double to 800 million. Cities are at the forefront of climate change and can drive innovation in sustainable transportation and green infrastructure to reduce congestion, improve air quality and enhance access to services.

The WRI India Sustainable Cities program is dedicated to shaping a future where cities work better for everyone. We work across three main pillars: integrated mobility, livable neighborhoods, and urban water and climate resilience. Our aim is to bring about an impact through a combination of local expertise, on-ground pilot programs, scaling up initiatives and informing policy not only at the national level but also at the level of the city and state.

Our intervention encompasses over 46 cities at different levels. We also work to strengthen relevant discourse through evidence-based research and scientific inputs. We work to strengthen the practices and inform the policy-level interventions that lead to sustainable and safe transport, healthy and equitable public spaces, and resilient communities. Our cross-cutting verticals of planning, governance and finance are the key enablers for achieving this transformation at scale.

We believe urban transformation can only emerge when systems of decision-making, planning and investment are aligned towards a more sustainable development path. To this end, we work closely with city administrations, government stakeholders, citizens, academia and other partners to address critical urban challenges.

# KEY INITIATIVES

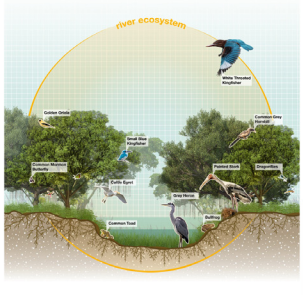
## TOWARD INCLUSIVE PUBLIC SPACES: THE NURTURING NEIGHBOURHOODS CHALLENGE

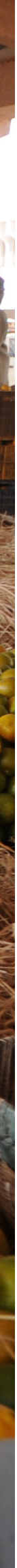
The Nurturing Neighbourhoods Challenge, hosted by the Smart Cities Mission, Ministry of Housing and Urban Affairs (MoHUA), Government of India, with the technical support of WRI India, incorporates a focus on early childhood development (0-5 year-old children) in the planning and management of Indian cities. The Challenge enabled the development of 180+ public spaces and is estimated to have benefitted 2,30,000+ young children and 2.3 million residents in their immediate surroundings. Celebrating these achievements, a compendium **"Stories from Nurturing Neighbourhoods Challenge"** was launched by Shri Hardeep Singh Puri from the MoHUA, Smart Cities Mission earlier this year. It highlights the efforts undertaken by the 10 winning cities towards scaling up neighborhood-level interventions across the city by seeking convergence with existing programs, strengthening institutional capacity, shaping conducive policies and fostering partnerships with local communities.


SCAN THIS QR CODE
TO VIEW THE COMPENDIUM

## NATURE-BASED SOLUTIONS (NBS)

Nature-based Solutions (NbS) focus on addressing localized climate risks, enhancing adaptive capacities, prioritizing blue-green infrastructure, improving access to healthy spaces, and reducing loss and damage to life, livelihoods and ecosystems. WRI India has been working across Mumbai, Kochi and Jaipur to build community stewardship and strengthen innovative financing and institutional capacity-building to implement NbS. Over 30 NbS projects, across different typologies and scales, have been implemented over the past three years, inspiring cities to establish virtuous cycles via partnerships, good governance and budgeting. The Mumbai Climate Action Cell, the inclusion of the Kawaki greening mission in Kochi's municipal budget and the expansion of an urban farm addressing socio-climate inequities in Jaipur are some of the noteworthy instances of our NbS work. WRI India also helped launch the country's first forum for urban NbS – a consortium of over six partners – to climate-proof 100 million residents and infrastructure worth $100 billion by 2030.



03

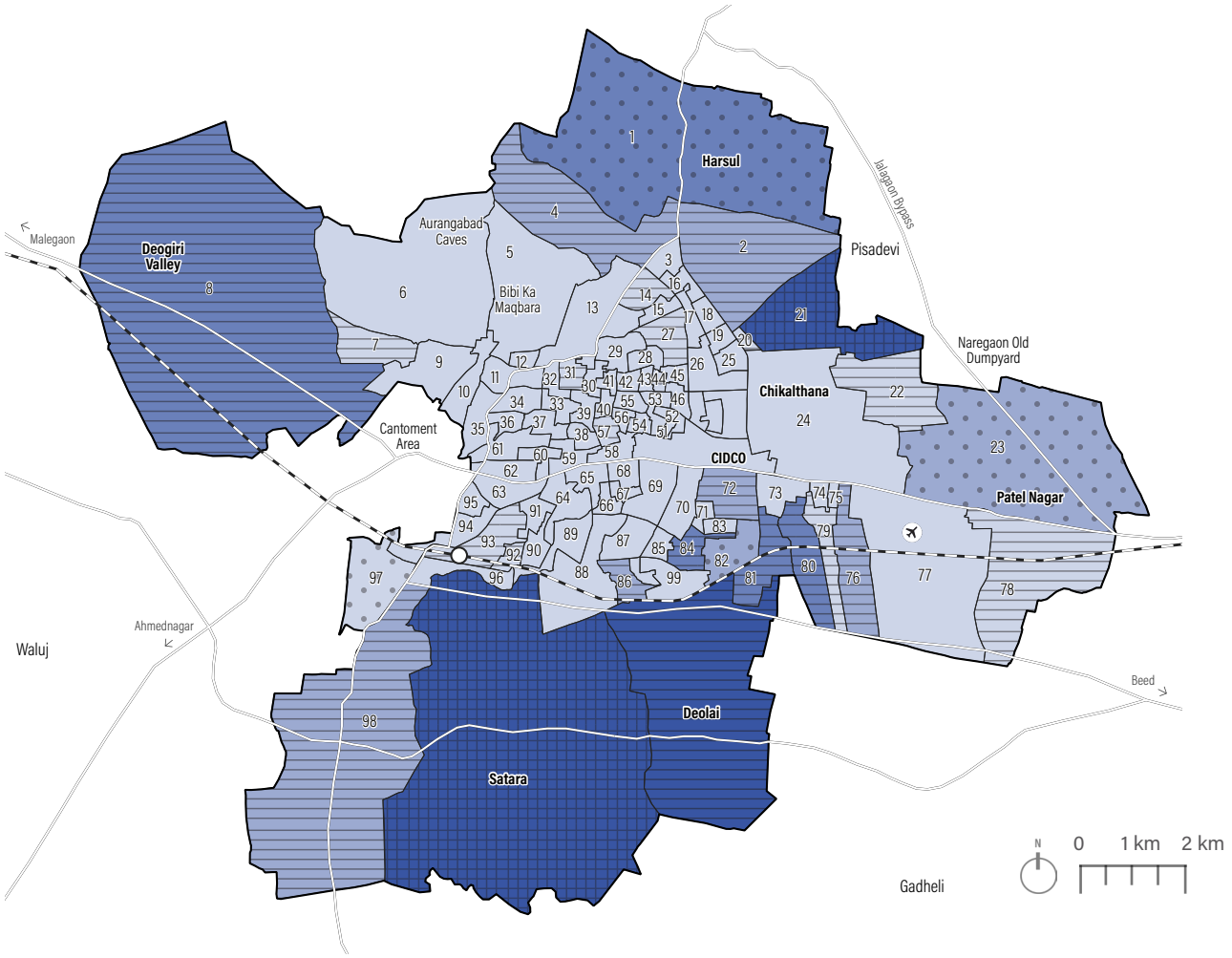
# DATA

At WRI India, we believe in the potential of data-driven decision-making. Our GeoAnalytics team uses data science and technology, leveraging diverse data sources to tackle complex sustainability challenges across India. We collaborate with programs to produce geospatial data and analytical solutions that provide an improved understanding of developmental issues, from analyzing long-term spatial and temporal trends to prioritizing targeted localized interventions. With this integrated approach, we seek to provide actionable insights that can help initiate policy dialogue and inform key decision-makers and stakeholders to drive transformative change.

# SOCIAL VULNERABILITY

Spatializing social vulnerability helps highlight differential vulnerability that manifests in the form of socioeconomic inefficiencies and lack of equitable access to amenities. These maps enable better integration of equity into climate action planning and aid in prioritizing vulnerable and marginalized urban residents in the assessment process. The map below, created for the Chhatrapati Sambhajinagar Climate Action Plan 2023, shows the percentage of households for each ward that lack adequate access to essential household-level services. The assessment concluded that peripheral wards largely lack access as nearly 43% of the city households do not have drinking water facilities within their premises, according to Census of India 2011 data. The assessment can help highlight the need for assessing groundwater dependency in the city and address the need for resilient infrastructure.

Ward-wise access to household-level water supply in Chhatrapati Sambhajinagar




**Percentage of households without drinking water inside premises:** 0–18 | 18–35 | 35–53 | >53

**Percentage of households without access to treated drinking water:** 0–25 | 25–50 | 50–75 | >75

Airport | Railway station | Railway | Major road | Ward boundary | City boundary

*Notes:*

1. Households without access to treated drinking water include those whose drinking water sources include untreated tap water, covered wells, uncovered wells, hand pumps, tubewells or borewells, springs, rivers or canals, tanks, ponds, lakes, and other sources.
2. Households without drinking water inside the premises include both those with drinking water near and away from the premises.

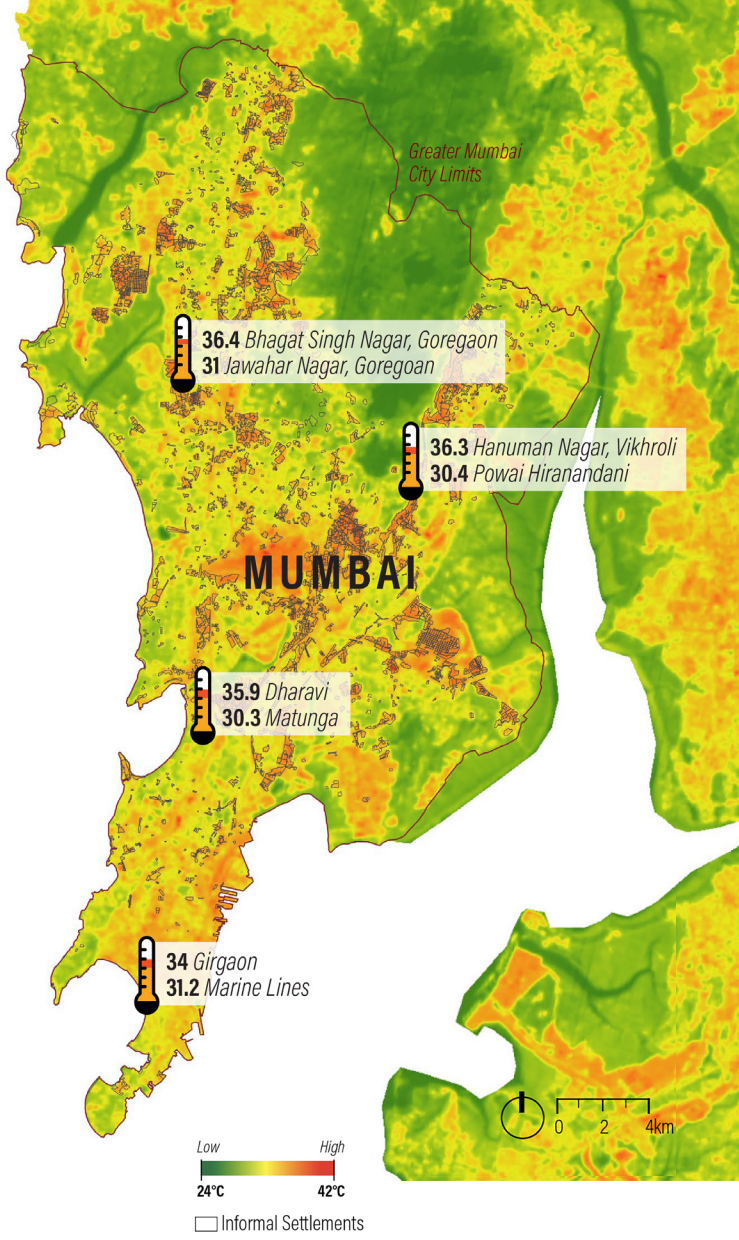
*Source: Prepared for the Chhatrapati Sambhajinagar (Aurangabad) Climate Action Plan for 2023. Derived using Census (2011) data.*

# URBAN HEAT

Indian cities are grappling with increased occurrences of extreme heat. The urban poor, often living in highly dense informal settlements within these cities, are facing an undue burden. Their exposure is amplified by the urban heat island (UHI) effect, where buildings and other concretized infrastructure trap heat. Land Surface Temperature (LST) maps are a useful way to visualize this UHI phenomenon and identify hotspots within the city to allow for area-based interventions. The vulnerability assessment conducted as part of the Mumbai Climate Action Plan highlighted that most of Mumbai's slum settlements are 5°C hotter than their immediate neighborhoods, primarily due to the type of roofing material used and compromised ventilation and green cover. These maps can inform action on the ground and aid in evidence-based planning.

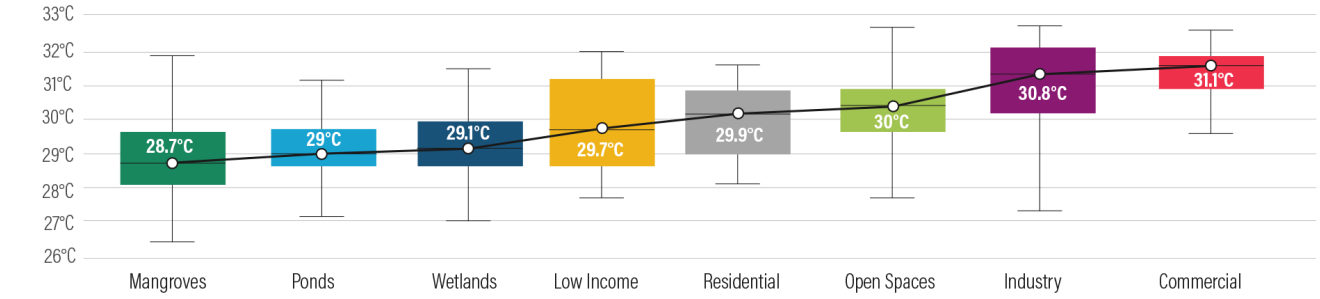
As part of the disaster management guidelines for Kochi, a comparison between different land use land cover categories was made to highlight how blue and green assets of the city can help dampen the effects of UHI. This process of understanding variations in exposure has helped in recognizing the needs of the vulnerable and marginalized populations affected by climate risk hazards.

**MUMBAI - LAND SURFACE TEMPERATURE**




*Source:* Prepared for the Mumbai Climate Action Plan, 2022. Using mean day-time Land Surface Temperature derived from LandSat 8 (USGS) for October (2017-19)

**EVIDENCE OF HEAT STRESS IN KOCHI: MEAN LAND SURFACE TEMPERATURE VERSUS LAND COVER**




***31%** of the city's population is exposed to temperatures above **30°C***

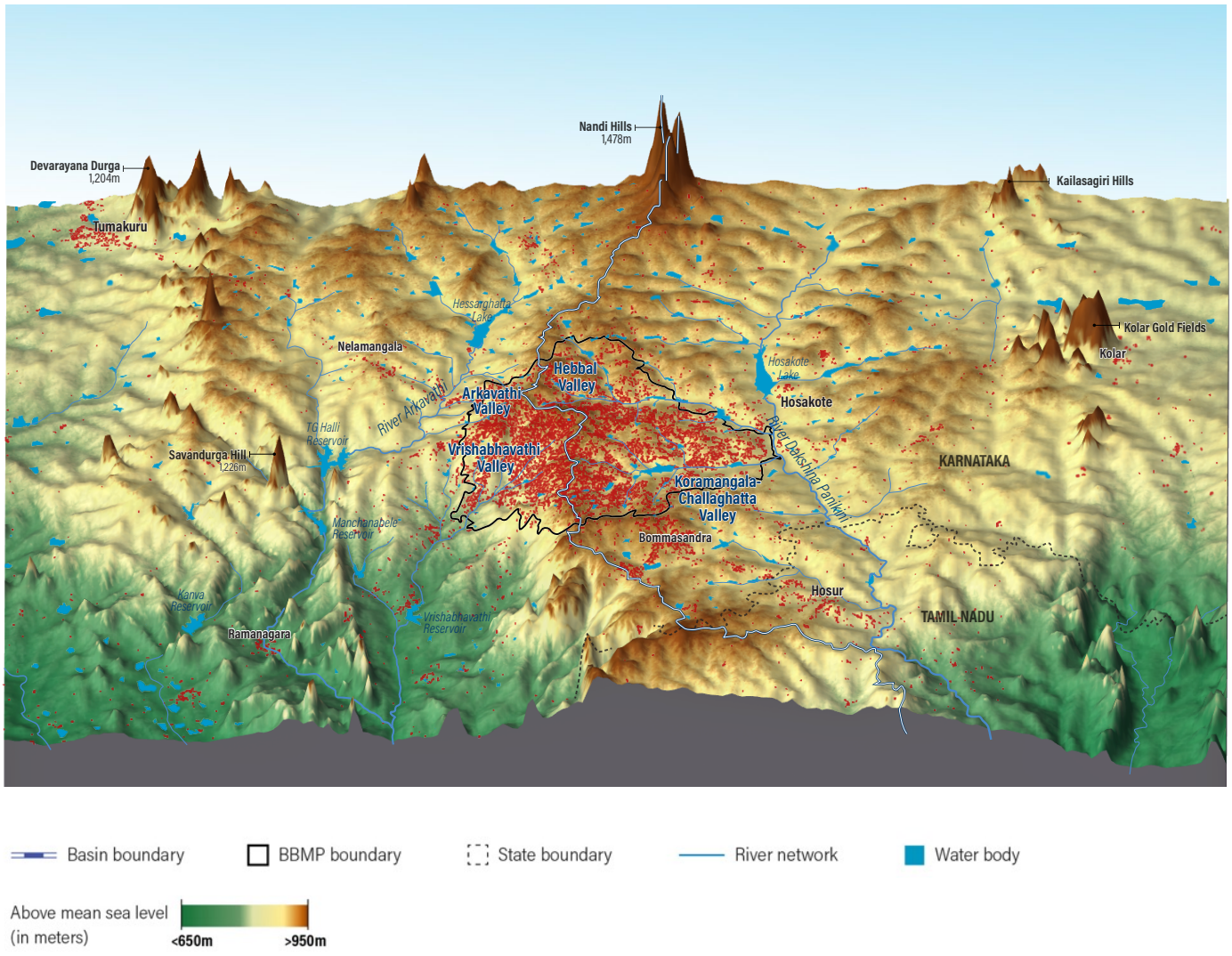
*Source:* Prepared for Shaping a Resilient Kochi, 2022. This shows mean day-time Land Surface Temperature for January-February (2017-20) derived from cloud-free LandSat 8 (USGS) imagery aggregated for the eight land use land cover classes.

# FLOODING

## FLOOD RISK CATEGORIES DERIVED USING FLOOD MODELING FOR BENGALURU

Vulnerability assessments often begin with a detailed city profile that helps assess the differential vulnerabilities to climate hazards from a systems perspective by identifying citywide socioeconomic needs and the potential impact on marginalized groups. As part of Bengaluru's Climate Action Plan, the city's topographical and hydrological assessments helped anchor the drought and flood hazard analysis of the city. Bengaluru's geography is a complex landscape of valleys, ridges, rivers and lakes that works as an interconnected system. The valley system with its lakes generates a cascading effect, ensuring that all the excess runoff eventually flows into the river network and does not cause water stagnation. Changes in this network of natural flows due to indiscriminate, unplanned construction that disregarded the city's hydrology and topography has led to Bengaluru's chronic flood problem, putting 21% of its residents at risk of floods.

### BENGALURU'S TOPOGRAPHY MAP DEPICTING CRITICAL NATURAL FEATURES IN THE REGION



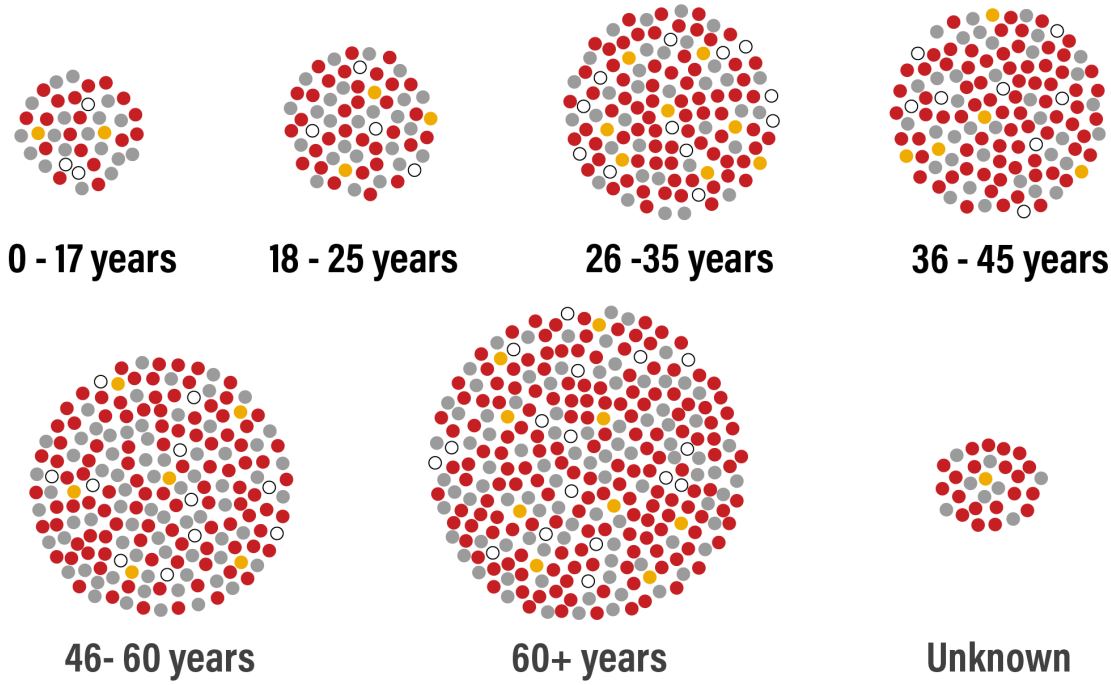

*Source:* Prepared for the Bengaluru Climate Action Plan. Exaggerated relief derived using Shuttle Radar Topography Mission (SRTM).

# ROAD SAFETY

A large number of deaths in traffic crashes occur every year in India, imposing huge social and financial costs, particularly in low- and middle-income households. Nearly half of these fatalities, occurring in cities or suburban areas, affect the working-age populace the most. Children, the elderly and the poor are also very vulnerable. Most of the road traffic crashes in India occur due to speeding.

An infographic highlighting this demographic divide was prepared for Road Safety Week. More than 500 people lost their lives at 100 intersections across Delhi in 2020-21. Of the 907 pedestrian who lost their lives in road traffic crashes between 2017 and 2020 in Bengaluru, 60% died while crossing a road.

**MORE THAN 500 PEOPLE LOST THEIR LIVES WHILE TRYING TO CROSS A ROAD IN BENGALURU (2017-2020**




PEDESTRIAN ACTIVITY AT THE TIME OF THE CRASH:

- Crossing 60%
- Roadside Activity 31%
- Others 3%
- Unknown **6%**

*Source:* Prepared for Road Safety Week Social Media Outreach, 2023. Using First Information Reports (2017 - 2020), Bengaluru Traffic Police.

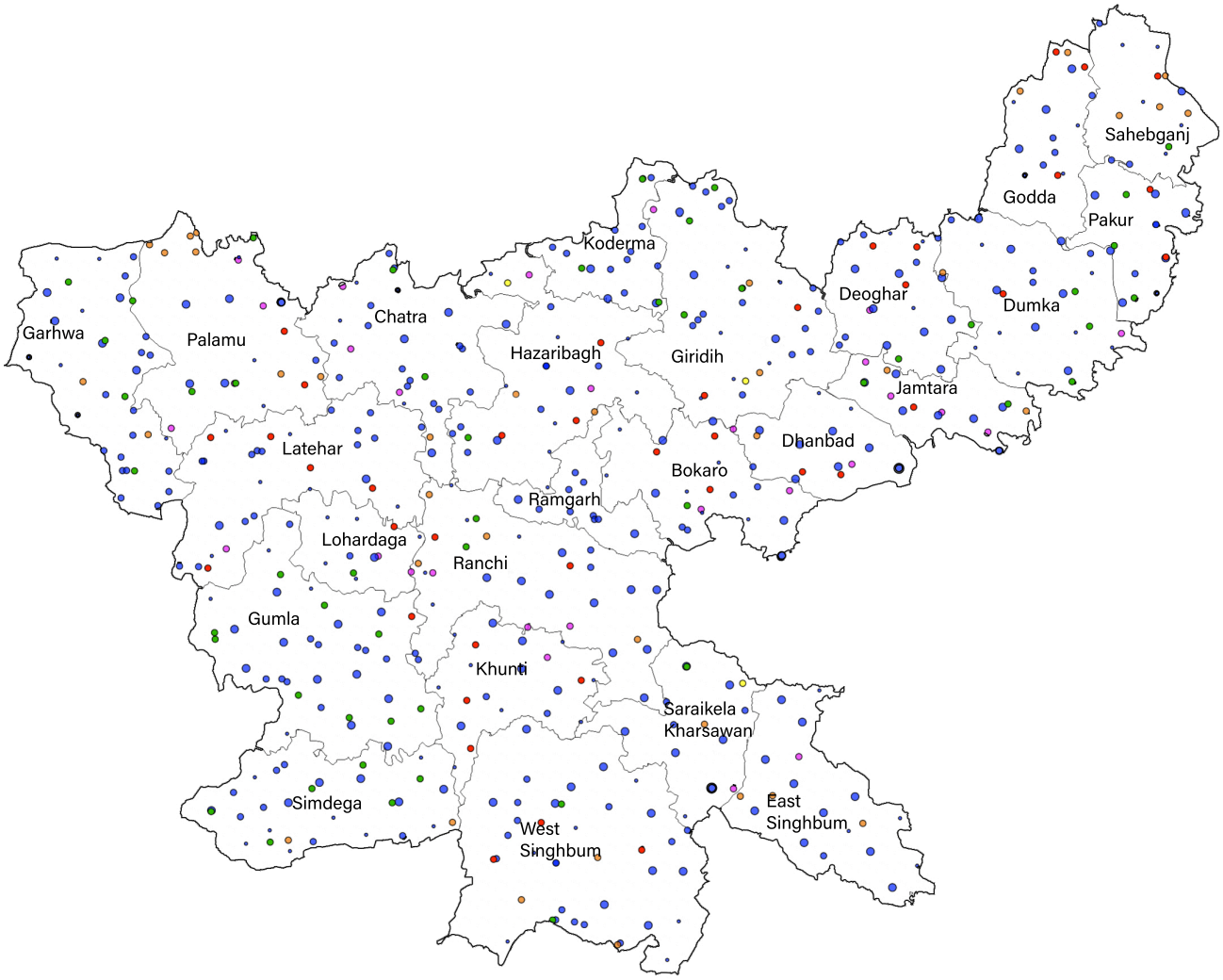
*Note:* Every circle represents an individual person.

# ENERGY ACCESS

Socioeconomic development and human well-being are intrinsically linked to shifts in energy access. Of the 169 targets set under the Sustainable Development Goals (SDGs) framework, 125 are linked to energy access.

The Energy Access Explorer (EAE) is an open-access geospatial tool developed by WRI India and its partners, which provides comprehensive data on various aspects of energy access, such as demand, supply, infrastructure and socioeconomic indicators. Moreover, it allows users to overlay this information with data on climate vulnerability, such as flood risk. EAE can help users identify gaps and opportunities for improving energy access and resilience in different locations.

**THE STATE OF ENERGY ACCESS ACROSS HEALTH CENTRES AT VARIOUS LEVELS IN DISTRICTS OF JHARKHAND**



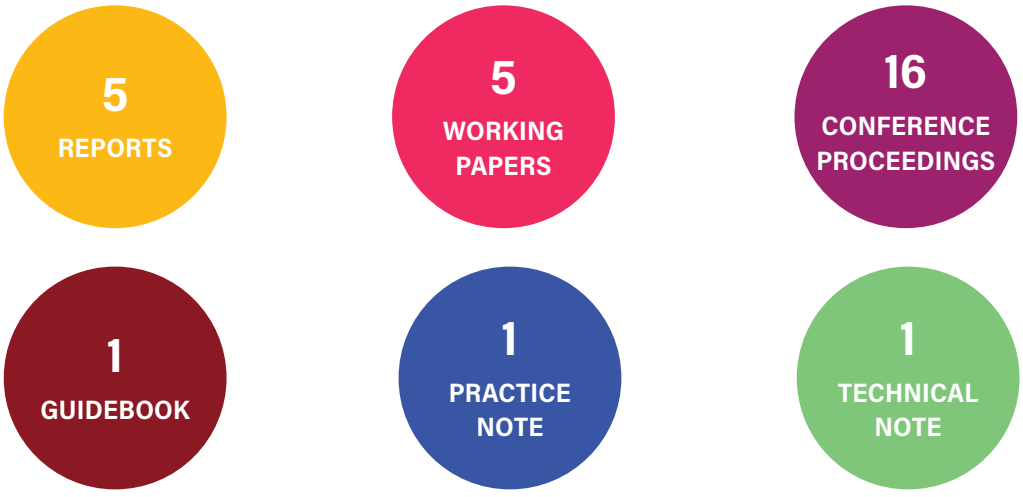

- No regular power supply (Health Sub-center)
- Partially electrified (Primary Health Center)
- Regular power cuts (Community Health Centers)
- Non electrified (Primary Health Center)
- Power cuts only in summer (Community Health Center)
- Occasional power failure (Community Health Center)

*Source:* The Energy Access Explorer.

04

# RESEARCH

WRI India produces and disseminates high-quality, policy-relevant research on a wide range of issues in the domain of development and environmental policy. Our researchers across various programs author reports, issue briefs, working papers, guidebooks, expert notes and more to enable evidence-based decision-making. Our Research, Data and Impact (RDI) team reviews publication plans, publications and large funding proposals. It provides feedback on the substantive content and research design of the publications and manages a peer review process comprising internal and external reviewers. RDI's goal is to ensure that our research meets the highest standards of credibility, adds value, is fit for the audience, is well written and is institutionally coherent.

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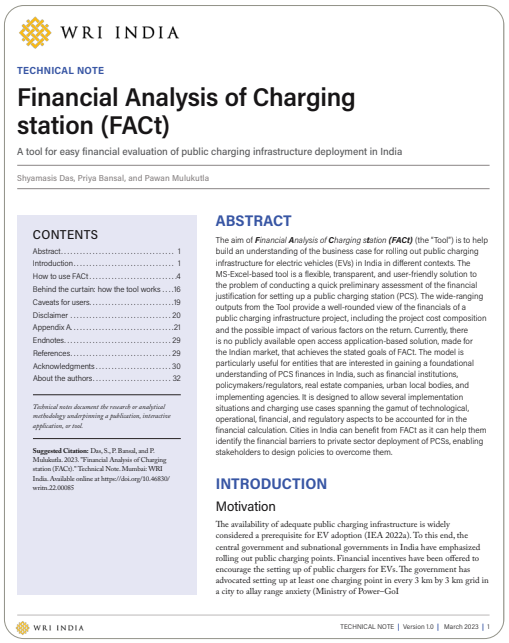
**https://wri-india.org/resources/publications**

## Financial Analysis of Charging station (FACt)

**MARCH 2023**

The MS Excel-based tool "Financial Analysis of Charging station (FACt)" has been developed to help build an understanding of the business case for rolling out public charging infrastructure for electric vehicles (EVs) in the Indian context. It is a flexible, transparent and user-friendly solution to the problem of conducting a quick preliminary assessment of the financial justification for setting up a public charging station. The wide-ranging outputs from the Tool provide a well-rounded view of the financials of a public charging infrastructure project, including the project cost composition and the possible impact of various factors on the return. Currently, there is no publicly available open access application-based solution made for the Indian market, which achieves the stated goals of FACt.



WRI INDIA

TECHNICAL NOTE

Financial Analysis of Charging station (FACt)

A tool for easy financial evaluation of public charging infrastructure deployment in India

Shyamasis Das, Priya Bansal, and Pawan Mulukutla

CONTENTS



*Technical notes document the research or analytical methodology underpinning a publication, interactive application, or tool.*

**Suggested Citation:** Das, S., P. Bansal, and P. Mulukutla. 2023. "Financial Analysis of Charging station (FACt)." Technical Note. Mumbai: WRI India. Available online at https://doi.org/10.46830/wrtn.22.00085

ABSTRACT

The aim of *Financial Analysis of Charging station* **(FACt)** (the "Tool") is to help build an understanding of the business case for rolling out public charging infrastructure for electric vehicles (EVs) in India in different contexts. The MS-Excel-based tool is a flexible, transparent, and user-friendly solution to the problem of conducting a quick preliminary assessment of the financial justification for setting up a public charging station (PCS). The wide-ranging outputs from the Tool provide a well-rounded view of the financials of a public charging infrastructure project, including the project cost composition and the possible impact of various factors on the return. Currently, there is no publicly available open access application-based solution, made for the Indian market, that achieves the stated goals of FACt. The model is particularly useful for entities that are interested in gaining a foundational understanding of PCS finances in India, such as financial institutions, policymakers/regulators, real estate companies, urban local bodies, and implementing agencies. It is designed to allow several implementation situations and charging use cases spanning the gamut of technological, operational, financial, and regulatory aspects to be accounted for in the financial calculation. Cities in India can benefit from FACt as it can help them identify the financial barriers to private sector deployment of PCSs, enabling stakeholders to design policies to overcome them.

INTRODUCTION

Motivation

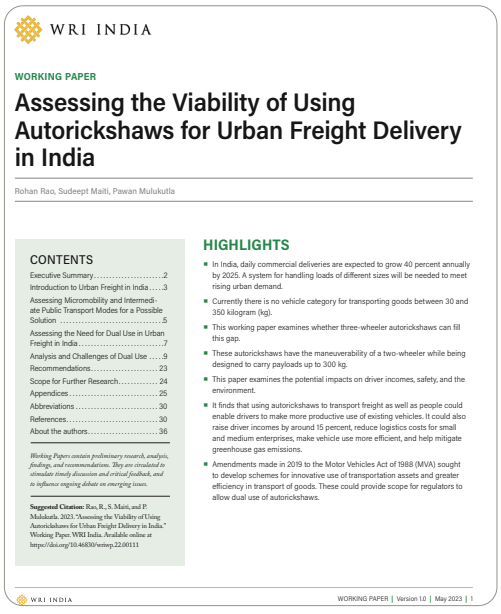
The availability of adequate public charging infrastructure is widely considered a prerequisite for EV adoption (IEA 2022a). To this end, the central government and subnational governments in India have emphasized rolling out public charging points. Financial incentives have been offered to encourage the setting up of public chargers for EVs. The government has advocated setting up at least one charging point in every 3 km by 3 km grid in a city to allay range anxiety (Ministry of Power–GoI

WRI INDIA TECHNICAL NOTE | Version 1.0 | March 2023 | 1

## Assessing the Viability of Using Autorickshaws for Urban Freight Delivery in India

**MAY 2023**

In India, daily commercial deliveries are expected to grow 40% annually by 2025. As demand rises, a system for handling loads of different sizes is required. Currently there is no vehicle category for transporting goods between 30 and 350 kilograms (kg). This working paper examines whether three-wheeler autorickshaws can fill this gap. These autorickshaws have the maneuverability of a two-wheeler while being designed to carry payloads of up to 300 kg. Authors examine the potential impacts of this on driver incomes, safety and the environment. It finds that using autorickshaws to transport freight as well as people could enable more productive use of existing vehicles, raise driver incomes by around 15%, reduce costs for small and medium enterprises, and help mitigate greenhouse gas emissions. The amendments made in 2019 to the Motor Vehicles Act of 1988 (MVA) could provide scope for regulators to allow dual use of autorickshaws.



WRI INDIA

WORKING PAPER

Assessing the Viability of Using Autorickshaws for Urban Freight Delivery in India

Rohan Rao, Sudeept Maiti, Pawan Mulukutla

CONTENTS



*Working Papers contain preliminary research, analysis, findings, and recommendations. They are circulated to stimulate timely discussion and critical feedback, and to influence ongoing debate on emerging issues.*

**Suggested Citation:** Rao, R., S. Maiti, and P. Mulukutla. 2023. "Assessing the Viability of Using Autorickshaws for Urban Freight Delivery in India." Working Paper. WRI India. Available online at https://doi.org/10.46830/wrtwp.22.00111

HIGHLIGHTS

- In India, daily commercial deliveries are expected to grow 40 percent annually by 2025. A system for handling loads of different sizes will be needed to meet rising urban demand.
- Currently there is no vehicle category for transporting goods between 30 and 350 kilogram (kg).
- This working paper examines whether three-wheeler autorickshaws can fill this gap.
- These autorickshaws have the maneuverability of a two-wheeler while being designed to carry payloads up to 300 kg.
- This paper examines the potential impacts on driver incomes, safety, and the environment.
- It finds that using autorickshaws to transport freight as well as people could enable drivers to make more productive use of existing vehicles. It could also raise driver incomes by around 15 percent, reduce logistics costs for small and medium enterprises, make vehicle use more efficient, and help mitigate greenhouse gas emissions.
- Amendments made in 2019 to the Motor Vehicles Act of 1988 (MVA) sought to develop schemes for innovative use of transportation assets and greater efficiency in transport of goods. These could provide scope for regulators to allow dual use of autorickshaws.

WRI INDIA WORKING PAPER | Version 1.0 | May 2023 | 1

# Improving Metro Access in India

**JULY 2023**

Poor access to metro rail systems in India have contributed to lower-than-planned ridership, causing the underutilization of over $25 billion in investments. Policy pushes to improve last-mile connectivity have led to little improvement since the understanding of what metro commuters seek from their last-mile commute is lacking. This paper draws from a three-city survey of 7,200 metro commuters to understand current metro user demographics, last-mile choices and preferences. Authors find that Indian metro systems attract young and middle-income commuters, affluent users are not drawn to it and low-income users get priced out of it. Commuters are highly sensitive to last-mile wait times and costs, with women being especially averse to waiting. High-frequency, low-cost shared services and improved pedestrian infrastructure need to be planned and prioritized around metro stations. While there is no universal approach, robust and periodic data collection and analysis are necessary to plan viable commuter-centric last-mile services.

WRI INDIA

WORKING PAPER

Improving metro access in India: Evidence from three cities

Aloke Mukherjee, Sowmya Muruganantham, Archana Balachandran, Sudeept Maiti, and Prasanna Kumar Ganesh

CONTENTS



*Working Papers contain preliminary research, analysis, findings, and recommendations. They are circulated to stimulate timely discussion and critical feedback, and to influence ongoing debate on emerging issues.*

**Suggested Citation:** Mukherjee et. al. 2023. "Improving Metro Access in India: Evidence from Three Cities" Working Paper. WRI India. Available online at https://doi.org/10.46830/wriwp.23.00009

HIGHLIGHTS

- Poor access (last-mile connectivity) to metro rail systems in India has contributed to lower-than-planned ridership, causing the underutilization of over US$25 billion in investments in the sector.
- There is little understanding of what metro commuters seek from their last-mile commute. Thus, policy pushes to improve last-mile connectivity since 2017 have not brought about meaningful improvement.
- This paper draws from a three-city survey of 7,200 metro commuters to understand current metro user demographics and last-mile choices and preferences.
- Our data show that Indian metro systems attract young (19–35), middle-income commuters. Affluent users are not attracted to the system, and low-income users are priced out of it.
- Indian metro commuters are highly sensitive to last-mile wait times and costs. Women are especially averse to waiting, and may opt for more expensive services to avoid waiting. Planners must prioritize high-frequency, low-cost shared services and improve pedestrian infrastructure around metro stations.
- There is, however, no universal approach to deploying last-mile services at metro stations. Robust, periodic data collection and analysis are required to plan viable commuter-centric last-mile services.



# Public Bicycle Sharing in India: Lessons Learned from Implementation in Three Cities

**JULY 2023**

As city authorities embrace low-carbon transport, public bicycle-sharing (PBS) systems are on the rise. In India, several cities introduced PBS, most of which followed a rental model with almost no bicycle sharing. Mysuru, Bhopal and Pune, the first Indian cities to implement PBS, could not offer large bicycle fleets and coverage. Still, there are important learnings from these. In fact, Bhopal and Pune learned from the Mysuru system and introduced the country's first PBS systems featuring public-private partnerships, smart technology and incentives for quality service. PBS faces several challenges in India, including high dependence on motorized two-wheelers, lack of dedicated cycling infrastructure, limited cross-agency coordination, lack of political understanding and lack of user interest/education. This paper highlights the financial, business and operating models created by these three cities to implement PBS, the common factors that led to their initial success and the challenges in sustaining and expanding them.

WRI INDIA

WORKING PAPER

Public bicycle sharing in India: Lessons learned from implementation in three cities

Azra Khan, Amit Bhatt, Sarika Panda, and Advait Jani

CONTENTS



*Working Papers contain preliminary research, analysis, findings, and recommendations. They are circulated to stimulate timely discussion and critical feedback, and to influence ongoing debate on emerging issues.*

**Suggested Citation:** Khan, A., A.Bhatt, S.Panda, and A.Jani. 2023. "Public bicycle-sharing in India—Lessons from implementation in three Indian cities" Working Paper. WRI India. Available online at https://doi.org/10.46830/wriwp.18.00130

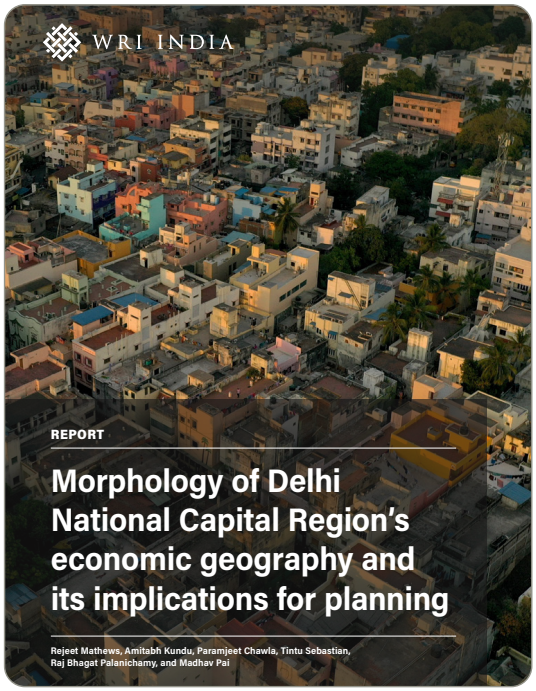
HIGHLIGHTS

- Public bicycle-sharing (PBS) systems are flourishing worldwide as city authorities embrace low-carbon transport.
- In India, several cities introduced PBS, most of which followed a rental model with no, or very limited, bicycle sharing. Mysuru, Bhopal, and Pune were the first Indian cities to implement PBS.[1] These systems, however, could not offer large bicycle fleets and coverage.
- These cities offer important lessons to Indian cities. In fact, Bhopal and Pune learned from the Mysuru system and introduced the country's first PBS systems featuring public-private partnerships, smart technology, and incentives for quality service.
- PBS faces several challenges in India, such as high dependence on motorized two-wheelers, lack of dedicated cycling infrastructure, limited cross-agency coordination, lack of political understanding, and lack of user interest/education.
- This paper highlights the financial, business, and operating models created by these three cities to implement PBS, common factors that led to their initial success, and the challenges to sustaining and expanding their systems.

## Morphology of Delhi National Capital Region's Economic Geography and its Implications for Planning

**JULY 2023**

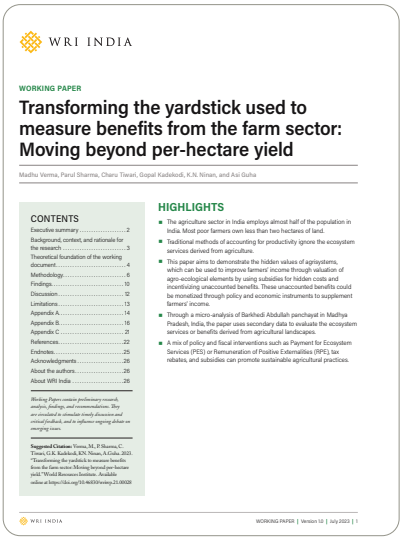
India's leading urban agglomeration economy, located within the Delhi National Capital Region (NCR), cuts across multiple city and state jurisdictions, but functions as one economy and one labor pool. The peripheries are not conventional political backyards either. Gurugram (in Haryana) and Gautam Buddha Nagar (in Uttar Pradesh) districts have the highest per capita incomes in their respective states and attract investment from the state governments. Through an economic geography lens, this report investigates whether Delhi National Capital Region's industrial structure, demography and spatial interdependencies achieved the benefits of efficiency, equity and energy resource conservation after the liberalization in 1991. The authors find that even as rapid urbanization, peripheralization of jobs and migration tripled the region's per capita income and increased consumption levels, declining poverty rates have coexisted with increasing unemployment rates. Employing place-specific, dynamic and targeted economic and infrastructure development strategies could ensure that economic benefits of regional growth are widely distributed to all types of businesses and population segments in comparable mega city-regions.




## Transforming the Yardstick Used to Measure Benefits from the Farm Sector: Moving Beyond Per-hectare Yield

**JULY 2023**

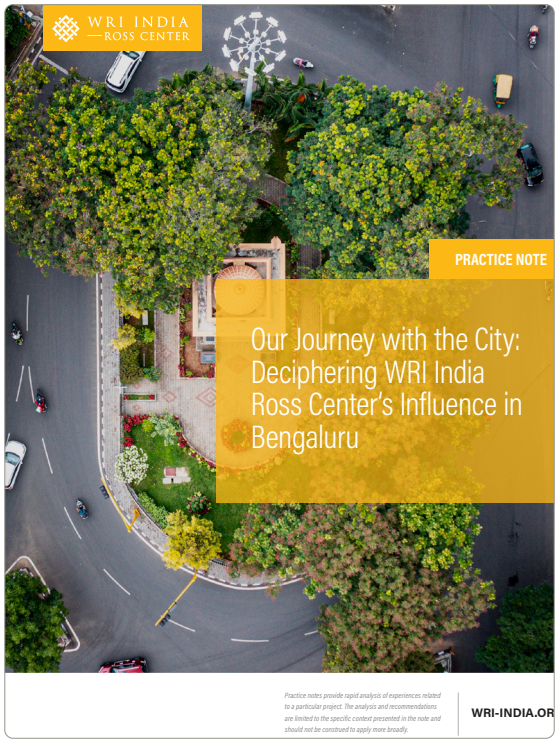
While the agriculture sector employs almost half of India's population, most poor farmers own less than two hectares of land. Traditional methods of accounting for productivity ignore the ecosystem services derived from agriculture. This paper aims to demonstrate the hidden values of agrisystems, which can be used to improve farmers' income through valuation of agro-ecological elements by using subsidies for hidden costs and incentivizing unaccounted benefits. These unaccounted benefits could be monetized through policy and economic instruments to supplement farmers' income. Through a micro-analysis of Barkhedi Abdullah panchayat in Madhya Pradesh, India, the paper uses secondary data to evaluate the ecosystem services or benefits derived from agricultural landscapes. A mix of policy and fiscal interventions, such as Payment for Ecosystem Services (PES) or Remuneration of Positive Externalities (RPE), tax rebates and subsidies can promote sustainable agricultural practices.



## Our Journey with the City: Deciphering WRI India Ross Center's Influence in Bengaluru

**JULY 2023**

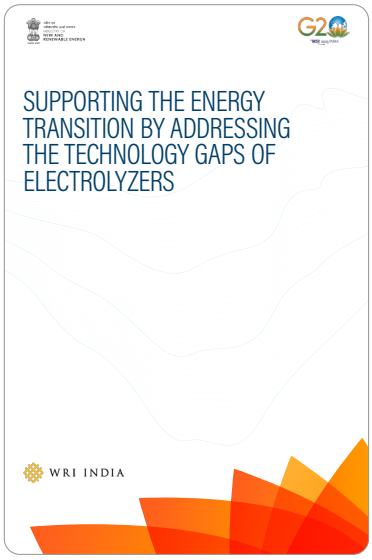
The World Resources Institute's (WRI) Ross Center for Sustainable Cities (starting with its origins as EMBARQ India) has maintained a presence in Bengaluru since 2010. Bengaluru has seen long-term engagement across multiple sectors and scales as one of WRI Ross Center's "deep dive" cities. This study uses a mixed-methods approach to understand the Center's influence in Bengaluru, the effectiveness of its deep dive approach, learn from its experience and analyze its role in catalyzing citywide change. Its data-led approach and strong technical skills, combined with a deep understanding of the local context, have established the Ross Center, and now WRI India, as an independent, knowledgeable and trusted advisor in Bengaluru. The success factors include flexibility and sustained physical presence, demonstration of impact through on-ground projects, innovative and evolving formats for stakeholder engagement, and the ability to leverage relationships and partnerships for ecosystem change. Challenges include a rapidly growing city, political and bureaucratic changes, alignment among stakeholders, and the short time frames of both funders and stakeholders.




## Supporting the Energy Transition By Addressing The Technology Gaps Of Electrolyzers

**JULY 2023**

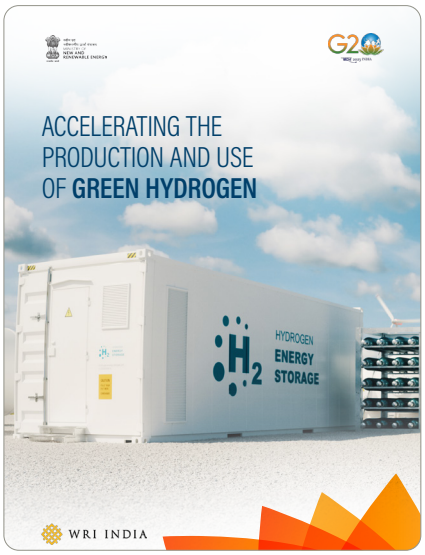
Green hydrogen is recognized as having a crucial role in the energy transition along with renewables-based electrification. There is a need for mass manufacturing of electrolyzers to make green hydrogen accessible, affordable and scalable, and to meet the global market demands. This report reviews the progress and current state of play for hydrogen production and corresponding electrolyzer technologies and proposes recommendations for addressing technology challenges. Rapid upscaling of and improvements in electrolyzer performance would leverage the novel possibilities in product design and enhance the opportunities for collaboration among the G20 nations. The authors also provide insights into facilitating the growth of green hydro-gen by identifying priorities for research and innovation for technol-ogy development, global standards and certification harmonization, and development of a common platform for collaborative analysis.



## Accelerating the Production and Use of Green Hydrogen

**JULY 2023**

This report focuses on three key aspects that G20 nations should prioritize to establish and accelerate the adoption of green hydrogen. The primary focus areas identified in this report include: International supply chains for green hydrogen including production, transport and storage, and end-use applications: establishing consensus on a standardized framework for classification of hydrogen from various production pathways: promoting collaborative research, development, and innovation through on-going multilateral collaboration platforms to drive technological advancements. This report also provides recommendations on the role of intergovernmental cooperation and fostering strategic cooperation among G20 nations across the identified focus areas and achieving scale, standardization and collaborative innovation to advance green hydrogen technology deployment.




## Climate Resilient Cities: Assessing Differential Vulnerability to Climate Hazards in Urban India

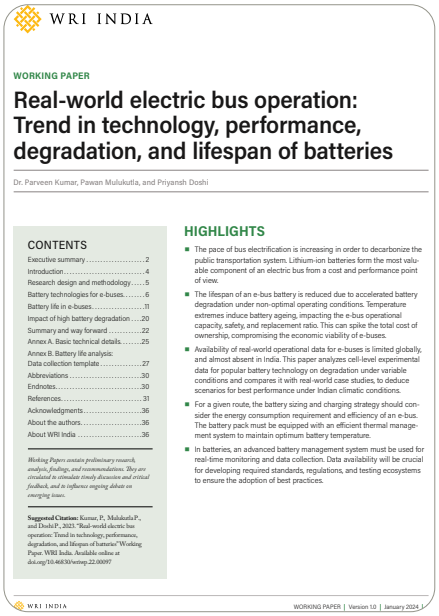
**JANUARY 2024**

India's rapidly growing cities are facing emerging and intensifying climate hazards. These hazards are experienced differently by different people and communities within cities depending on social, economic, political and cultural factors. Unlike existing vulnerability assessments that often fail to capture the forms of sociopolitical and economic inequality that determine the differential nature of climate vulnerability, the Climate Hazard and Vulnerability Assessment (CHVA) can capture the interactions between climate hazards and socioeconomic factors. To analyze differential vulnerability, the CHVA is divided into three parts: Hazard Identification and Assessment, Exposure Analysis and Vulnerability Assessment. Using official city-level data, the CHVA assesses both hazards and the vulnerability of people and critical infrastructure to give a robust and in-depth understanding of urban vulnerability. With this diagnosis in hand, changes in approaches to governance, community participation and planning can bring about transformational adaptation in Indian cities.

# Real-world Electric Bus Operation: Trend in Technology, Performance, Degradation, and Lifespan of Batteries

**JANUARY 2024**

Bus electrification is being accelerated to decarbonize India's public transportation system. Lithium-ion batteries form the most valuable component of an electric bus from a cost and performance point of view. The lifespan of an e-bus battery can be reduced due to accelerated battery degradation under non-optimal operating conditions. This includes temperature extremes that induce battery ageing, impacting the e-bus operational capacity, safety and replacement ratio. This can spike the total cost of ownership, compromising the economic viability of e-buses. Real-world operational data for e-buses is limited globally and almost absent in India. This paper analyzes cell-level experimental data for popular battery technology on degradation under variable conditions and compares it with real-world case studies to deduce scenarios for best performance under Indian climatic conditions. The battery sizing and charging strategies should consider energy consumption requirements and efficiency of an e-bus for a given route. Efficient thermal management systems should be used to maintain optimum battery temperature, and advanced battery management systems must be used for real-time monitoring and data collection. Data availability will be crucial for developing required standards, regulations and testing ecosystems to ensure the adoption of best practices.


WRI INDIA

WORKING PAPER

Real-world electric bus operation: Trend in technology, performance, degradation, and lifespan of batteries

Dr. Parveen Kumar, Pawan Mulukutla, and Priyansh Doshi

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*Working Papers contain preliminary research, analysis, findings, and recommendations. They are circulated to stimulate timely discussion and critical feedback, and to influence ongoing debate on emerging issues.*

**Suggested Citation:** Kumar, P., Mulukutla P., and Doshi P., 2023. "Real-world electric bus operation: Trend in technology, performance, degradation, and lifespan of batteries" Working Paper. WRI India. Available online at doi.org/10.46830/wrirep.22.00097

HIGHLIGHTS

- The pace of bus electrification is increasing in order to decarbonize the public transportation system. Lithium-ion batteries form the most valuable component of an electric bus from a cost and performance point of view.
- The lifespan of an e-bus battery is reduced due to accelerated battery degradation under non-optimal operating conditions. Temperature extremes induce battery ageing, impacting the e-bus operational capacity, safety, and replacement ratio. This can spike the total cost of ownership, compromising the economic viability of e-buses.
- Availability of real-world operational data for e-buses is limited globally, and almost absent in India. This paper analyzes cell-level experimental data for popular battery technology on degradation under variable conditions and compares it with real-world case studies, to deduce scenarios for best performance under Indian climatic conditions.
- For a given route, the battery sizing and charging strategy should consider the energy consumption requirement and efficiency of an e-bus. The battery pack must be equipped with an efficient thermal management system to maintain optimum battery temperature.
- In batteries, an advanced battery management system must be used for real-time monitoring and data collection. Data availability will be crucial for developing required standards, regulations, and testing ecosystems to ensure the adoption of best practices.

WRI INDIA | WORKING PAPER | Version 1.0 | January 2024

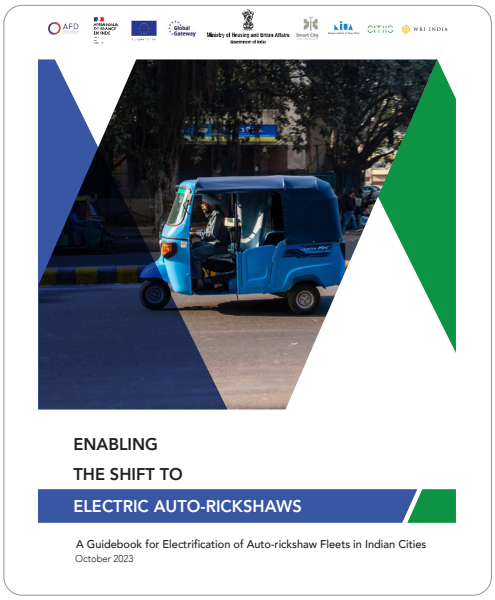
# A Spoonful of Solar to Help the Medicine Go Down

**OCTOBER 2023**

Many Indian rural and peri-urban health facilities function without electricity or with unreliable grid electricity, which affects their ability to provide quality health services. Decentralized solar energy has emerged as a solution for powering such health facilities. This study looks at 22 decentralized solar interventions across six states to understand the role of decentralized solar energy solutions in rural health facilities under different financing, ownership and operating modes. The authors find that solar energy, in most cases, acted as a complementary energy solution, rather than displacing the grid or diesel generators. Although positive impacts in terms of enhancement of reliability and affordability exist, they have not been quantitatively tracked in terms of energy consumption, energy savings and emissions reduction. Developing decentralized energy solutions requires an analysis of the energy needs of health facilities. Energy-efficiency measures need to be incorporated during the project design stage to optimize energy demand, and energy system procurement policies need to look beyond the economics and prioritize technological compliance, modularity and sustainability.

## Enabling the Shift to Electric Auto-rickshaws: A Guidebook for Electrification of Auto-rickshaw Fleets in Indian Cities

**OCTOBER 2023**




This guidebook provides a roadmap for governing authorities and policymakers to create an enabling policy and regulatory framework for an accelerated transition to electric auto-rickshaws. Auto-rickshaws (autos) are an important mode for shared mobilityand first and last-mile connectivity in cities, with about 7.1 million vehicles across India contributing to a quarter of urban trips.

Electric auto-rickshaws (e-autos) have significant environmental and socioeconomic benefits, the potential to reduce carbon emissions, improve air quality and reduce vehicle operating costs for drivers. While the central and state governments have notified policies to promote electric vehicles (EVs), barriers such as restrictive permit regulations, limited choice of e-auto models, high upfront costs, lack of charging infrastructure and poor access to financing remain.

The guidebook provides direction to states and local bodies to work with relevant government authorities and private enterprises to implement a robust support ecosystem towards reducing entry barriers, installing efficient charging infrastructure network and improving access to affordable EV financing. We discuss three cases of auto-rickshaw electrification initiatives in Indian cities to highlight the challenges in enabling an effective transition to e-autos as well as the policy and regulatory measures and the stakeholder participation needed for an equitable transition.

## All Publications

1. **Building an Ecosystem for Gender-Responsive and Climate-Resilient MSMEs in India**
April 2024 | Conference Proceedings| Compiled by: Ananya Chakraborty, Ashwini Hingne, Bhawna Ahuja and Steffi Olickal

2. **Roadmap for Alternative Batteries and Financing Ecosystem for E-Rickshaws in India**
April 2024 | Conference Proceedings | Compiled by: Garima Agrawal, Aprajita Verma and Chaitanya Kanuri

3. **Maintenance Models for Nature-based Solutions (NbS) in Public Spaces for Mumbai's Vulnerable Neighborhoods**
April 2024 | Conference Proceedings | Shruti Maliwar, Deepti Talpade and Neha Shigwan

4. **Climate Resilient Cities: Assessing Differential Vulnerability to Climate Hazards in Urban India**
January 2024 | Report | Lubaina Rangwala, Sudeshna Chatterjee, Avni Agarwal, Bhanu Khanna, Ike Uri, Bina Shetty, Raj Bhagat Palanichamy and Ananya Ramesh

5. **Real-World Electric Bus Operation: Trend in Technology, Performance, Degradation, and Lifespan of Batteries**
January 2024 | Working Paper | Dr. Parveen Kumar, Pawan Mulukutla and Priyansh Doshi

6. **Accelerating Freight Electrification in India**
November 2023| Conference Proceedings | Chandana K, Pravin Cherukuthota, Anshika Singh, Sharvari Patki and Pawan Mulukutla

7. **Strengthening Climate Action and Resilience Planning for Bengaluru**
November 2023 | Conference Proceedings | Shrimoyee Bhattacharya, Sruthi Subbanna, Praseeda Mukundan, Chetan Venkataramana Naika and Nanduri Prashanti

8. **Safety Management for EV Battery Reuse and Recycling in India**
November 2023 | Conference Proceedings | Dr. Parveen Kumar and Pawan Mulukutla

9. **A Spoonful of Solar to Help the Medicine Go Down: Exploring Synergies Between Health Care and Energy**

October 2023 | Report | Lanvin Concessao, Harsha Meenawat, Namrata Ginoya, Masfick Hazarika, Vandita Sahay and Dheeraj Kumar Gupta

10. Enabling the Shift to Electric Auto-Rickshaws
October 2023 | Guidebook | Chaitanya Kanuri, Kanika Gounder, Bibek Jot Singh Sandhu and Akanksha Laroiya

11. Pathways Toward Gender-Inclusive Mobility Systems in India
September 2023 | Conference Proceedings | Aravinda Devaraj, Harshita Jamba, Chaitanya Kanuri and Pawan Mulukutla

12. Restoration Dialogues
August 2023 | Conference Proceedings | Srishti Kochhar, Shweta Prajapati, Siddharth Edake and Ruchika Singh

13. Enabling EV Battery Reuse and Recycling in India
August 2023 | Conference Proceedings | Dr. Parveen Kumar, Pawan Mulukutla and Madhav Pai

14. Peeling the Onion: Monitoring and Evaluation and other Acronyms for Assessment and Learning in Energy Access
July 2023 | Conference Proceedings | Anamika Dutt and Vandita Sahay

15. Women Workers in Indian MSMEs: Challenges for a Just Transition
July 2023 | Conference Proceedings | Ananya Chakraborty, Ashwini Hingne, Niyati Gupta and Steffi Olickal

16. Enabling a Just Transition for MSMEs and Workers in the Indian Automotive Industry
July 2023 | Conference Proceedings | Shubhangi Gupta, Supratheesh T, Ashwini Hingne, Priyal Shah, Avani Dubey, Devadathan Biju and Aarushi Rai

17. Accelerating the Production and Use of Green Hydrogen
July 2023 | Report | Anuraag Nallapaneni, Dr. Guncha Munjal, Pawan Mulukutla and Jatin Saxena

18. Supporting the Energy Transition by Addressing Technology Gaps of Electrolyzers
July 2023 | Report | Dr. Guncha Munjal, Anuraag Nallapaneni, Pawan Mulukutla, Dr. Garima Dwivedi and Shubham Mishra

19. Transforming the Yardstick Used to Measure Benefits From the Farm Sector
July 2023 | Working Paper | Madhu Verma, Parul Sharma, Charu Tiwari, Gopal Kadekodi, K.N. Ninan and Asi Guha

20. Our Journey with the City: Deciphering WRI India Ross Center's Influence in Bengaluru
July 2023 | Practice Note | Radha Chanchani, Jaya Dhindaw, Robin King and Madhav Pai

21. Morphology of Delhi National Capital Region's economic geography and its implications forplanning
July 2023 | Report | Rejeet Mathews, Amitabh Kundu, Paramjeet Chawla, Tintu Sebastian, Raj Bhagat Palanichamy and Madhav Pai

22. Public Bicycle Sharing in India: Lessons Learned From Implementation in Three Cities
July 2023 | Working Paper | Azra Khan, Amit Bhatt, Sarika Panda and Advait Jani

23. Improving Metro Access in India: Evidence from Three Cities
July 2023 | Working Paper | Aloke Mukherjee, Sowmya Muruganantham, Archana Balachandran, Sudeept Maiti and Prasanna Kumar Ganesh

24. Understanding Global Hydrogen Strategies: Strengthening Clean Hydrogen Opportunities
July 2023 | Conference Proceedings | Soham Kshirsagar, Shubham Mishra, Anuraag Nallapaneni, Anindita Bhattacharjee and Pawan Mulukutla

25. Nurturing Vegetation in Mumbai:Greening in Vulnerable Neighborhoods
May 2023 | Conference Proceedings | Deepti Talpade, Shruti Maliwar and Lubaina Rangwala

26. Assessing the Viability of Using Autorickshaws for Urban Freight Delivery in India
May 2023 | Working Paper | Rohan Rao, Sudeept Maiti and Pawan Mulukutla

27. The Status of Mini-grids in Rural India
April 2023 | Conference Proceedings | Lanvin Concessao and Dheeraj Kumar Gupta

28. A Summary of Expert Perspectives on Viable Financing Pathways for Electrifying India's Public Transport
April 2023 | Conference Proceedings | Avinash Dubedi, Aparna Vijaykumar and K. P. Aswathy

29. Financial Analysis of Charging station (FACt)
March 2023 | Technical Note | Shyamasis Das, Priya Bansal and Pawan Mulukutla

05

# ENGAGEMENTS

For WRI India, events are a great way to connect with our stakeholders, donors and partner organizations. Throughout the last year, we organized over 120 events, while our experts and thought leaders participated in numerous external engagements, plenaries and multi-stakeholder consultations. These engagements take place across the length and breadth of the nation and provide lively, dialogic space where ministers, administrators, policy makers, investors, philanthropists, business leaders and journalists deliberate with sectoral experts, practitioners and researchers to reach an evidence-based understanding of complex, sectoral issues and seek nuanced, contextualized solutions to some of the most urgent challenges of our times.

# CONNECT KARO 2023

for People, Nature & Climate

Since 2013, WRI India's annual flagship event, Connect Karo, has served as a meaningful platform for facilitating dialogue between policymakers, experts and stakeholders to drive sustainable change and progress, particularly on issues of urban development and climate change.

In the 10th year since its inception, Connect Karo 2023 saw the launch of some of WRI India's major publications, and initiatives like the Clean Air Accelerator and the second iteration of TheCityFix Labs: Accelerating Nature-based Solutions, were also launched.



2 Days

1000+ Participants

200+ Speakers

34 Sessions




It was held as an on-ground event in July 2023, with convening plenaries on subjects like Transformative Urbanization and Green Development, Climate Action, Responsible Energy, Clean Energy Transition, Energy for Health, Financing Clean Energy, Carbon Markets, Green Hydrogen Technologies, Food Loss and Waste, Healthy Public Spaces, Water Security, Water Resilience, Ecocity Regions, Transit-Oriented Development and Transport Efficiencies in E-Bus Initiatives.

With an overarching theme of "For People, Nature and Climate" Connect Karo 2023 created platform for multiple stakeholders from India and abroad to share their knowledge, perspectives, and experiences as well as to ease collaborations toward finding meaningful responses to critical environmental and sustainability challenges.

**SCAN THIS QR CODE TO WATCH CONNECTKARO FILM**

# ace

*Accelerating Clean Energy in India*

The fourth edition of Accelerating Clean Energy (ACE), hosted by WRI India's Energy Program, brought fresh insights into ongoing research on global energy transitions, their implications for India and how India is progressing on its ambitious renewable energy and development goals.

The two-day annual event, ACE 2023, saw participation from senior government officials (center and state), academics, researchers and energy experts. The event emphasized the need to enhance India's clean energy pathways while ensuring a just energy transition. The event took place against the backdrop of India's submission of its Long-term Low Emissions and Development Strategies at COP27 at Sharm-el Sheikh, Egypt, and India's G20 Presidency, where multiple themes on energy transition were discussed.


The sessions at the event explored:

**LEADERSHIP ON CLEAN ENERGY TRANSITION BY INDIAN CITIES**

India's net-zero ambitions will need cities to be at the forefront. This would necessitate the ratcheting-up of energy efficiency and renewable energy deployment across cities. The panel deliberated on the multiple barriers cities face, their participation and empowerment in energy transition.

Another panel focused on the challenges in **state energy transitions**, given how different Indian states are in terms of their energy mix, resources, industrialization, etc. The panel included senior representatives from industrial states like Tamil Nadu, mineral-rich states like Jharkhand, energy importers like Kerala and the rapidly developing states like Assam. Given the difference in their renewable energy trajectories and their unique demand patterns and supply portfolios, the session explored how states are approaching decarbonization goals while sharing their experiences and learnings.



A third panel focused on the scope of **Just and Clean Energy Transition in Micro, Small and Medium Enterprises (MSMEs)** and delved into challenges faced by MSMEs including high energy costs, limited access to finance and need for capacity building programs and technology improvements to enhance their sustainability. MSMEs – critical to India's industrial growth as well as its net-zero ambitions – remain vulnerable to the changes that come with an accelerated transition.

The panel on **Critical Minerals for India's Clean Energy Transition** explored significant challenges of India's critical mineral supply, strained by a rapid increase in demand for minerals across sectors, geopolitics at play, and potential solutions in alignment with the country's energy transition objectives.

The high-level plenary reflected on **Sectoral Energy Transition Issues in India** and achieving a successful clean energy transition, which hinges on an economy-wide collaboration of stakeholders, spanning industry leaders, policymakers, innovators and the youth.

उद्देश्य
UDDESHYA

# TOWARDS GENDER RESPONSIVE URBAN MOBILITY SYSTEMS

To ensure social equity of transport systems while mitigating their environmental impacts, it is critical that we recognize the diverse mobility needs of all genders and communities, and foster accessibility. To this end, WRI India hosted the second edition of its annual gender and mobility convention, Uddeshya: Towards Gender Responsive Urban Mobility Systems, in March 2024. Women's mobility patterns impact their autonomy, access to education, work and social participation. Uddeshya focused on addressing this gap by fostering a vibrant exchange of ideas and knowledge. The event also supported and recognized the critical initiatives and changemakers who are working to strengthen gender-responsive mobility in our cities.



At the event, WRI India launched the EquiMobility Champions Program that will select 10 changemakers from across India. The selected candidates will be trained in furthering gender-responsive mobility planning through mentorship from experts and stakeholder networks. The program seeks to enable them in turning their ideas into impactful initiatives. Uddeshya 2024 also hosted Moving in Their Shoes, an interactive walk-through exhibition of different initiatives that integrate equity considerations into urban mobility and public space development. More than 25 town planners from across the country also attended the masterclass on Gender Mainstreaming in Urban Transport Systems. Capping off the event, the Uddeshya Awards felicitated organizations and individuals contributing to more equitable and livelihood-enhancing mobility systems.


The winners of the Uddeshya Awards included a loco pilot from Bengaluru Metro Rail Corporation Limited (BMRCL), a conductor from Brihanmumbai Electric Supply and Transport, Mumbai, and a bus driver from Delhi Transport Corporation (DTC). World Bank's toolkit for gender-responsive mobility, Namma Yatri and BluSmart were also awarded for their initiatives focused on improving women's livelihoods.

# CLIMATE

## BIHAR CLIMATE ACTION CONCLAVE AND EXPO

**MARCH 4, 2024**

WRI India, in collaboration with the Government of Bihar, organized the "Bihar Climate Action Conclave and Expo" to discuss strategies for achieving carbon neutrality in Bihar by 2070. The conclave highlighted key initiatives, such as the launch of the draft report "Climate-Resilient and Low-Carbon Development Pathways for Bihar" and the introduction of the Bihar Declaration on Climate Action.

Under the theme "Empowering Change for a Greener Tomorrow," the conclave saw experts, stakeholders, policymakers and practitioners discuss the state's ambitious climate actions, including the strategies to move towards net-zero, mainstreaming climate-friendly development, exploring climate finance opportunities and initiating a new transformational climate governance structure.


## POLICY APPRAISAL TOOLS FOR LOW-CARBON INNOVATION AND SYSTEM TRANSITION

**OCTOBER 3, 2023**

WRI India and TERI organized a workshop series on "Policy Appraisal Tools for Low-Carbon Innovation and System Transition". The workshops were part of the Economics of Energy Innovation and System Transition (EEIST) research consortium that works on developing and applying new economics tools to support decision-making around low-carbon innovation and technological change. The workshop introduced some of these tools to Indian academics, researchers and policymakers and demonstrated the benefits of moving beyond conventional economic analysis for policy decisions in situations of transformational change.

## CLIMATE PROGRAM AT COP 28

**NOVEMBER 30, 2023**

A delegation of senior colleagues from the Climate Program participated in several side events on issues of climate finance, just transition, Global Stocktake, carbon markets, long-term low-carbon pathways, business climate action, loss and damage, subnational climate action and Article 6 at the 28th Conference of Parties (COP).


## PATHWAYS FOR INDIA'S LOW-CARBON AND CLIMATE-RESILIENT DEVELOPMENT: MULTI-STAKEHOLDER DIALOGUE

**FEBRUARY 14, 2024**

Organized in collaboration with Indian Institute of Management (IIM) Ahmedabad and Institute for Sustainable Development and International Relations (IDDRI), this multi-stakeholder dialogue facilitated discussions on the strategic transitions outlined in India's long-term low-emission development pathways and development priorities (LT-LEDS). It worked on identifying short-term research and capacity building needs to strengthen and support climate planning and implementa-tion in India. Through group visioning exercises on low-carbon development of electricity systems, low-emission industrial systems, sustainable urbanization, low-carbon transport systems, and agriculture, land use and carbon dioxide removal, stakeholders representing the national and subnational governments, research institutions, think tanks and the industry deliberated on alternative pathways for India's low-carbon development.

# ENERGY

## ENERGY ACCESS EXPLORER LAUNCH

**AUGUST 22, 2023**

WRI India launched its flagship geospatial platform the Energy Access Explorer (EAE) for Nagaland last year. EAE is an open-source, online and interactive platform that enables energy planners, clean energy entrepreneurs, and development institutions identify high-priority areas for energy access interventions. EAE analyzes more than 50 geographic data sets on both energy supply and demand and runs multi-criteria analysis that uses location-specific resource availability and infrastructure data to represent energy supply. It incorporates demographic data and data on social (health, education, etc) and productive (livelihoods, agriculture) uses to visualize demand for energy services. Together, these indicators enable more comprehensive energy planning that prioritizes least cost and sustainable energy access solutions for unserved and underserved communities. EAE was launched by senior representatives from the Nagaland government. WRI India will work with the state agencies to build the platform. The Nagaland government is keen to use EAE to address energy access gaps and achieve broader economic development in the state.


## REPORT LAUNCH: A SPOONFUL OF SOLAR

**OCTOBER 26, 2023**

WRI India launched a study titled "A Spoonful of Solar to Help the Medicine Go Down: Exploring Synergies between Health Care and Energy" in Delhi. The report highlights the critical role decentralized renewable energy plays in meeting the energy needs in rural and peri-urban health facilities in India. The report analyzes 22 decentralized solar energy interventions implemented in health facilities across six states: Assam, Chhattisgarh, Jharkhand, Karnataka, Meghalaya and Odisha. It discusses how multiple healthcare facilities located in remote areas have benefitted greatly from the renewable energy. The report has been widely received in India and abroad.

# FOOD, LAND AND WATER

## LEARNING AND PLANNING WORKSHOP UNDER MADHYA PRADESH SUSTAINABLE AGRICULTURE PROGRAM: SYNERGIZING POLICIES AND ACTIONS

**AUGUST 22-24, 2023**

As part of the ongoing Madhya Pradesh Sustainable Agriculture Program initiated in 2022, WRI India and Food and Land Use India along with Farmer Welfare and Agriculture Development Department (FW&ADD), Government of Madhya Pradesh co-organized a national level "Learning and Planning Workshop" in Bhopal, Madhya Pradesh (MP). This three-day workshop focused on learning from successful models of sustainable agriculture. During the workshop, 16 organizations (including civil society organizations and private companies in food and agriculture sectors) working on production landscape, water conservation, capacity building, knowledge support and governance and financing presented their models to 130 block and village level government officials.


## RESTORATION DIALOGUES

**AUGUST 11, 2023**

Anchored by the Department of Panchayat and Rural Development (DP&RD), Government of MP, Restoration Dialogues 2023 were co-organized by WRI India and Transform Rural India. Focusing on "Restoring landscapes in Madhya Pradesh for Climate and Communities", the dialogues brought together over 45 representatives from the State Rural Livelihood Mission, the State Rural Employment Guarantee Council (which administers Mahatma Gandhi National Rural Employment Guarantee Scheme), the Watershed Mission and Directorate Panchayats. In addition, representatives of other departments including FW&ADD, Green India Mission and Department of Horticulture & Food Processing participated along with the CSO representatives who play an active role in the restoration of degraded lands. The event included a presentation by CEO Zilla Panchayat, Sidhi district administration, on Sidhi's land restoration project.

## DIALOGUE ON STRATEGIES TO REDUCE FOOD WASTE IN INDORE CITY

**MARCH 12, 2024**

WRI India in collaboration with Indore Municipal Corporation co-organized a multi-stakeholder dialogue on "Strategies to Reduce Food Waste in Indore City" at Indore, MP. Geared towards opportunities to integrate food waste into Indore's advanced waste management practices, the dialogue aimed to examine existing food waste management practices in the city and identify key strategies to reduce food waste generation. With over 100 participants, the workshop included a special address by Harshika Singh, IAS municipal commissioner, about Indore's efforts towards food waste management and critical insights from experts and representatives from the government, restaurants and residential associations.


## MoU SIGNING WITH ICAR-CENTRAL AGROFORESTRY RESEARCH INSTITUTE

**FEBRUARY 20, 2024**

Unlocking multiple climate and developmental opportunities for local communities through landscape restoration, WRI India signed a Memorandum of Understanding (MoU) with ICAR-Central Agroforestry Research Institute to bolster scaling of landscape restoration interventions such as agroforestry in India, with a focus on Madhya Pradesh, Chhattisgarh, Maharashtra and select regions of Uttar Pradesh. These joint efforts include focused attention on nursery development, procurement of quality planting material, development of agroforestry models for different agroclimatic conditions, mapping and monitoring, strengthening market linkages and synergizing institutional arrangements in the three states that can upscale agroforestry. The MoU aims at enhancing knowledge, skills and practices of small and marginal famers, FPOs and entrepreneurs practicing agroforestry, strengthening livelihood opportunities for them.

# SUSTAINABLE CITIES

## ACCELERATING CLIMATE ACTION IN 43 CITIES ACROSS MAHARASHTRA

**MAY 16, 2023**

The Department of Environment and Climate Change, Government of Maharashtra, launched a Climate Accelerator Program with WRI India to initiate dialogues with the 43 AMRUT (Atal Mission for Rejuvenation and Urban Transformation) cities of Maharashtra to scale up climate action. The initiative helps cities align their climate goals with the Government of India's net -zero target by 2070. Envisioned as an accelerator for city authorities, the program has three distinct modules and focuses on the sharing of good practices from existing climate action projects, sectoral planning with a climate-focused lens and demonstration of climate-oriented pilot projects and financing mechanisms.


## JALANDHAR ECO CITY-REGIONS FELLOWSHIP

**AUGUST 1, 2023**

The Jalandhar Eco City-regions Fellowship is a collaboration between the Municipal Corporation of Jalandhar, Smart Cities Jalandhar and WRI India under the Urban Learning Internship Initiative by the MoHUA. The fellowship engages 12 early-career professionals over 11 months, embedding them within live projects under the Jalandhar Smart Cities Office. The Fellows received support and training from WRI India on integrating ecological resilience in urban decision-making, GIS and research tools. They were also supported for work across different verticals, from waste management to non-motorized transport projects. This model of engagement shows promise for future urban leadership initiatives that can help shape low-carbon, resilient cities and city-regions.

## URBANSHIFT ASIA FORUM

**SEPTEMBER 25, 2023**

UrbanShift is working to transform cities for people and planet through sustainable, integrated, zero-carbon urban development. Madhav Pai, CEO of WRI India, participated in the special inaugural session of the opening plenary of the UrbanShift Asia Forum in September last year. Additionally, team members led different capacity building workshops centered around the forum and spoke at key panels at the event.

## MUMBAI'S FIRST GREENING HANDBOOK AND CLIMATE BUDGET REPORT

**DECEMBER 18, 2023**

WRI India has been supporting Brihanmumbai Municipal Corporation (BMC) in developing Mumbai's first climate budget since 2021. This is a key governance intervention towards implementing the Mumbai Climate Action Plan (MCAP), of which WRI India is a core partner. Developed through collaborative effort, the climate budget report provides a list of climate measures aligned to the 24 MCAP action tracks that will be undertaken by the 20 climate-relevant BMC departments. Aligned with the MCAP, the Garden Department of BMC, in collaboration with WRI India, launched Mumbai's first Greening Handbook that offers end-to-end guidance on planting saplings across all scales – from balcony garden boxes to large plots – listing indigenous plant species and governance mechanisms that facilitate small, medium and large-scale plot planting.


**SCAN THIS QR CODE TO DOWNLOAD THE GREENING HANDBOOK**

## BIHAR ELECTRIC VEHICLE (EV CONCLAVE

**JANUARY 11, 2024**

WRI India, in collaboration with the Transport Department, Bihar and the Bihar State Pollution Control Board, hosted the Bihar EV Conclave in January 2024. The event, graced by the Bihar Chief Minister Nitish Kumar, brought together more than 30 speakers and over 250 attendees to deliberate on a strategic roadmap to accelerate e-mobility in Bihar, and discuss best practices for the successful implementation of its recently announced EV Policy. Attendees included policymakers, administrators, researchers, industry practitioners and other stakeholders from the state's transport sector.


## BUS KARO WORKSHOPS

**MAY 24, 2023, GANDHINAGAR - MARCH 13, 2024, LUCKNOW**

Bus Karo is a WRI India led peer-to-peer knowledge sharing platform that equips cities with data-driven decision-making tools, enabling them to deliver predictable, reliable and seamless mobility services. The workshops in Gandhinagar and Lucknow offered hands-on training to State Transport Undertakings (STUs) and operators on various topics, including contracting models, strategies to increase ridership, innovative financing mechanisms, electric bus planning and Intelligent Transit Management System (ITMS).

## INDIA-US EFFORTS TOWARDS CLIMATE ACTION:

**MARCH 06, 2024**

WRI India, in collaboration with the University of California Davis, hosted a roundtable meeting, attended by the US Ambassador to India Eric Garcetti, to align India-US efforts towards climate action. Attendees, including a California Air Resources Board delegation and representatives from NITI Aayog and the state governments of Kerala, Delhi, Uttar Pradesh, Bihar, Goa and Madhya Pradesh, focused on decarbonization initiatives. Technology, financing and knowledge transfer emerged as the three key pillars for successful collaboration.

# LIFE @ WRI

*Sharing joys and marking an anniversary at the Bengaluru office*


*The Mumbai team enjoys a day out, at the Devkund waterfalls*

*Fruitful Thursdays at the Bengaluru office*

*Our Mumbai team displays its skills on the football field*

*Marking seven years of the Bengaluru office with games*

*The Delhi team enjoying their winter picnic*

*A cake cutting ceremony at the Delhi office: Celebrating birthdays and work anniversaries*

*Delhi team at our City Retreat*

*Navrati Celebrations in Mumbai*

# FINANCIAL SUMMARY

WRI India ended 2023-24 in good financial and operational health. WRI India continues to deliver high-impact programmatic results in an operationally efficient and cost-effective manner.

Thanks to the generosity of our donors, we continue to increase our impact while stewarding our growth and with sound financial management. This impact is made possible through the ongoing commitment, involvement and financial contributions of individuals, foundations and corporations who understand the critical importance of protecting and preserving the environment.

Our new strategy includes a greater focus on improving internal systems to facilitate and strengthen financial structures and enhancing people management to attract, retain and motivate world-class talent.

The financial results depicted are derived from WRI India's 2023-2024 audited financial statements. Copies of the complete audited financial statements are available upon request or on the WRI India website.

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WRI INDIA

Lower Ground Floor, AADI 2,
Babir Saxena Marg, Hauz Khas,
New Delhi, Delhi 110016