



YOUTH HACKATHON

ADAPTATION TO CLIMATE CHANGE

Evidence-based Innovative
Solutions for South Asian Cities

2025



Knowledge and Outreach Partners



Eco-Network |
Bangladesh



Gross International
Nature | Bhutan



Nepalese Youth for
Climate Action | Nepal



Nepal Youth Council |
Nepal



WORLD FOOD FORUM
Bhutan



Young Leaders for Active
Citizenship | India



YouthNet Global |
Bangladesh



Youth 4 NDCs |
Bangladesh



Youth Ki Awaaz | India



YUVA | India



YOUTH HACKATHON

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Acknowledgements

We sincerely thank all youth participants for their creativity, effort, and commitment in submitting solutions for the Youth for Climate Hackathon organized by ICLEI South Asia. Each entry reflects the innovative spirit and dedication of young changemakers working towards climate-resilient and sustainable cities. We also acknowledge the valuable support of jury members, partners and who made this initiative possible.

Design Contribution: Manasa Garikaparthi (ICLEI South Asia)

Disclaimer

The ideas, concepts, and solutions presented in this compilation are the original work of the respective participants. ICLEI South Asia has compiled these entries for documentation and knowledge-sharing purposes only and does not assume responsibility for the accuracy, feasibility, or implementation of the submissions. The views expressed herein are solely those of the participants and do not necessarily represent the views of ICLEI South Asia or its partners.

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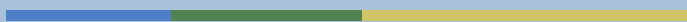
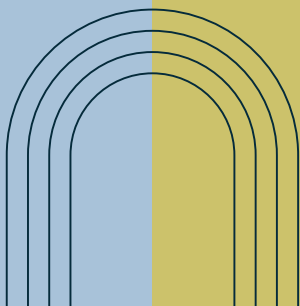


Table of Contents

Knowledge and Outreach Partners Foreword

01	The Hackathon Team	1
02	Hackathon Process	2
03	Webinars	3
04	Top 10 Shortlisted Poster Entries	6



Foreword



**Emani Kumar**

Deputy Secretary-General | ICLEI Global
Executive Director | ICLEI South Asia

It gives me great pleasure to present the shortlisted entries of the Youth for Climate Hackathon, a flagship initiative of ICLEI South Asia under the ARISE Cities Forum. Themed “Adaptation to Climate Change: Evidence-based Innovative Solutions for South Asian Cities,” this hackathon is a testament to the creativity, determination, and leadership of young changemakers across the South Asia region.

As climate challenges intensify across the Global South, the ideas of youth are vital in shaping resilient, equitable, and sustainable urban futures. This hackathon provides a platform for young innovators to propose locally relevant, scalable, and impactful solutions to real-world urban climate challenges. The diversity of ideas presented here, ranging from eco-innovations and spatial interventions to toolkits, dashboards, and platforms, reflects the ingenuity of the next generation of climate leaders. We are particularly proud that this initiative not only sources solutions but also strengthens youth leadership for the future. The most promising ideas will be spotlighted at the ARISE Cities Forum 2025 ensuring that youth ideas from South Asia are heard at the highest levels of international climate dialogue.

On behalf of ICLEI South Asia, I extend my heartfelt appreciation to all the jury members, partners, mentors and participants who have contributed to making this initiative possible. Together, we are embedding youth leadership at the heart of climate action and creating pathways for sustainable, resilient, and inclusive urban futures. ICLEI South Asia is committed to carrying this momentum forward, continuing the Youth initiatives in the years to come and expanding this vibrant community of young climate leaders across the South Asia region.



The Hackathon Team

Final Jury Members

Aditi Agarwal | Dasra, India

Bedoshruti Sadhukhan | ICLEI South Asia, India

Dr. Monalisa Sen | ICLEI South Asia, India

Lovelesh Sharma | National Institute of Urban Affairs (NIUA), India

Roshni Nuggehalli | Yuva India

Partner-led Poster Evaluation Team

Binchy Choden Jayasuriya | World Food Forum, Bhutan

Fyaj Khan Anam | Youth for NDCs, Bangladesh

Gurkirrat Sachdeva | Youth Ki Awaaz, India

Pema Choden | Gross International Nature, Bhutan

Sadia Jahan Rothi | Eco-Network Global, Bangladesh

Sohini Chakrabarti | Young Leaders for Active Citizenship (YLAC), India

Dechen, Dipak, Manju, Manasa, Satarupa | ICLEI South Asia

ICLEI South Asia Team

Sayli Mankikar | Associate Director, India

Dechen Wangmo | City Project Associate, Bhutan

Dipak Bhowmick | Technical Lead, Bangladesh

Manju Adhikari | Project Officer, Nepal

Manasa Garikaparthi | Senior Project Officer, India

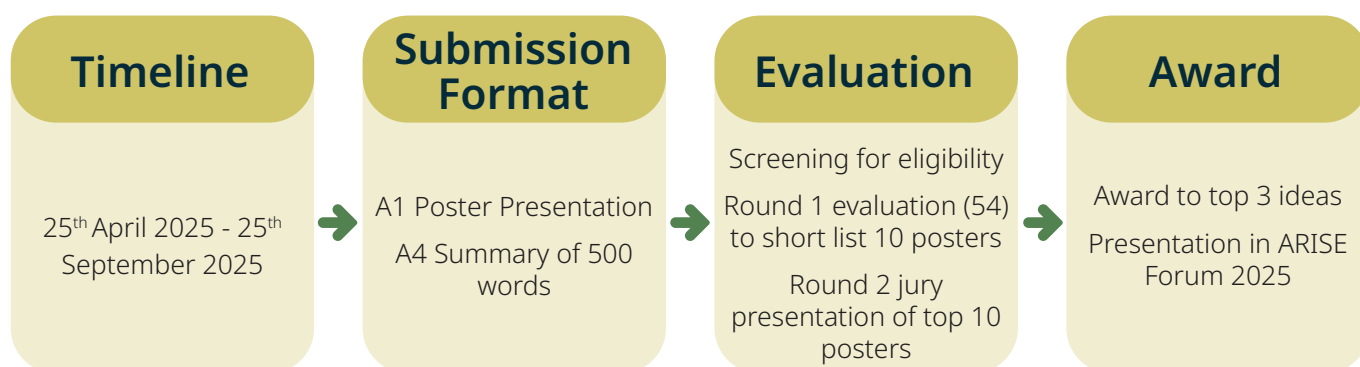
Rick Sarkar | Communications Associate, India

Sankalita Dey | Communications Manager, India

Satarupa Roy | Senior Project Officer, India

Shinjini Saha | Knowledge Management Expert, India

Hackathon Process



Eligibility Criteria:

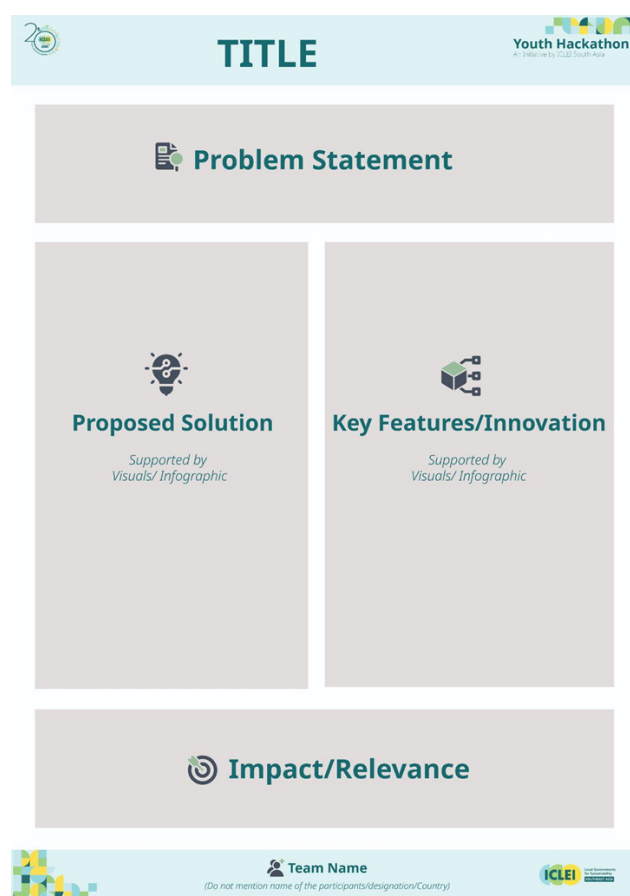
Age Group: Participants aged between 18 to 25 years.

Geographic Eligibility: Open to participants from South Asian countries (Bangladesh, Bhutan, India, Nepal, Sri Lanka)

Team Composition: 1 to 4 members

Evaluation Approach

- Contextualise the Challenge:** Understand the local climate realities of a city, its vulnerabilities, and urban dynamics.
- Data-Driven Solutions:** Design adaptive interventions rooted in science, technology, and verifiable insights
- Ensure Scalability & Feasibility:** Ideas that can grow, work in real-world settings, and be sustained locally.
- Alignment with Hackathon Theme & SDGs:** Contribution to climate resilience and sustainable urban development.
- Uniqueness:** Innovative solution, impactful, and distinct.



The poster template is divided into several sections:

- TITLE** (Header)
- Problem Statement** (Icon: Document with magnifying glass)
- Proposed Solution** (Icon: Lightbulb) *Supported by Visuals/ Infographic*
- Key Features/Innovation** (Icon: Gear and cube) *Supported by Visuals/ Infographic*
- Impact/Relevance** (Icon: Target)
- Team Name** (Footer) *(Do not mention name of the participants/designation/Country)*

Poster Presentation Template



Webinars

Topic	Partner Country	Date
1. Orientation Webinar	ICLEI South Asia, India	08 th July
2. Writing on Climate: How Every Story is a Climate Story	Youth Ki Awaaz, India	3 rd August
3. Translating Climate Advocacy into Real Action: Stories from Nepalese Youth for Climate Action	Nepalese Youth for Climate Action, Nepal	12 th August
4. Youth-Led Civic Action for Inclusive Climate Action: Tools for Changemaking	Young Leaders for Active Citizenship, India	25 th August
5. Women Leading Ambitions: Bringing Meaningfulness in NDCs' Adaptation	Youth 4 NDCs, Bangladesh	16 th September
6. Hack the Climate: Shape the Future	WFF Bhutan Chapter + Gross International Nature	23 rd September

Webinar Coordinators

- Dechen Wangmo
- Rick Sarkar
- Shinjini Saha

2

ADAPTATION TO CLIMATE CHANGE

2025

Webinar Series

CLIMATE STORYTELLING

with Youth Ki Awaaz

A four-pillar storytelling framework to help young people uncover, discuss, and communicate the climate layers hidden in everyday life.

Facilitators:

Nipunika Sachdeva
Community Manager,
Youth Ki Awaaz

Simran Pavecha
Community Lead,
Youth Ki Awaaz

Date: Sunday, 3rd August 2025
Time: 11:00 AM IST

Register Now

3

YOUTH ADAPTATION TO CLIMATE CHANGE

Webinar Series

Translating Climate Advocacy into Real Action

Stories from Nepalese Youth for Climate Action (NYCA)
Youth-led advocacy transforming into practical, real-world action

Facilitators:

Sindhu Sharma Youth Representative NYCA	Nischal Bhatta Chapter Representative, Hetauda NYCA	Aakriti Risal Chapter Representative, Baitadi NYCA
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Date: Tuesday, 12th August 2025
Time: 3:00 PM IST

Register Now

4

YOUTH ADAPTATION TO CLIMATE CHANGE

Webinar Series

Youth-Led Civic Action For Inclusive Climate Action

Tools for Changemaking

Facilitators:

Venika Menon Manager - Civic Policy & Partnerships Young Leaders for Active Citizenship (YLAC)	Sohini Chakrabarti Officer - Programs Young Leaders for Active Citizenship (YLAC)
---	--

Date: Monday, 25th August 2025
Time: 11:00 AM IST

Register Now

5

YOUTH ADAPTATION TO CLIMATE CHANGE

Webinar Series

Women Leading Ambitions: Bringing Meaningfulness in NDCs' Adaptation

A Spotlight Session on the Linkages between NDCs and Women in South Asia

Facilitators:

Fyaj Khan Anam Community Manager Youth4NDCs	Fatema Nur Jarin External Communications Manager Youth4NDCs
--	--

Date: Saturday, 20th September 2025
Time: 11:00 AM IST

Register Now

6

YOUTH ADAPTATION TO CLIMATE CHANGE

Webinar Series

Hack the Climate Shape the Future

Empowering youth to generate solutions and exploring pathways to scale solutions into impactful action.

Facilitators:

Ugyen Yeshi Dorji Chief Operating Officer Gross International Nature (GIN)	Binchy Choden Jayasuriya Chapter Leader WFF Bhutan Youth Chapter
---	---

Date: Tuesday, 23rd September 2025
Time: 11:00 AM IST

Register Now



**YOUTH
HACKATHON**

**ADAPTATION TO
CLIMATE CHANGE**

**Evidence-based Innovative Solutions
for South Asian Cities**

Poster Entries

- Geo tools enabled Localised spatial solutions
- Eco-products
- Climate Action Toolkit and Dashboard

Top 10 Shortlisted Teams

Sr. No	Team Name	Participants	Country
1 	SPAnoators	Tanishka Chhabra Aarul Bhalekar Maitreyi C Gyanesh	India
2 	DHARA	Arigela Sravani Sai Charan	India
3 	Shudhdhojol	Abhijit Dhali	Bangladesh
4	BlueRoots	Marium Khatun Zim	Bangladesh
5	ECOGRUB	Manish Kumar Chaurasiya Amit Gupta Abhinav Thapa Ashirwad Raj Jha	Nepal
6	Eco Sentinels	Md. Rezwanul Islam Shuvo Antora Das Shabbir Ahammad Sadiah Ishrat Nisa	Bangladesh
7	Oasis	Nishitha I Joy Sahaya Varshini Aruna J	India
8	Palamou	Sakif Ahmmed Zarin Tasnim Ikra Momin Abdullah Nadia Binta Aziz	Bangladesh
9	Puri	Ajoy Ghosh	India
10	Zero-Waste Growers	Sayma Siddique Mitu MD. Abdun Nur	Bangladesh

**Please turn over to view the poster entries of the top 10 participants*



HACKATHON 2025

SPANovators

Empowering Chennai Against Urban Warming and Coastal Threats: Innovative, Evidence-Led Approaches

Aim: To develop innovative, evidence-based adaptation strategies that reduce the impacts of **urban heat** and **sea level rise** in Chennai by identifying two climates and proposing nature-based and spatial/innovative planning solutions that align with existing coastal regulations and sustainability goals.

Why Chennai?

India's 4th largest metro
: 8.5 million population

Aligned with Sustainable Development Goals (SDGs)

At COP26, India pledged **50% renewable energy by 2030** and **net-zero emissions; 2070**.
Chennai, a C40 city since 2016, aims to halve emissions by 2030 and achieve carbon neutrality by 2050.

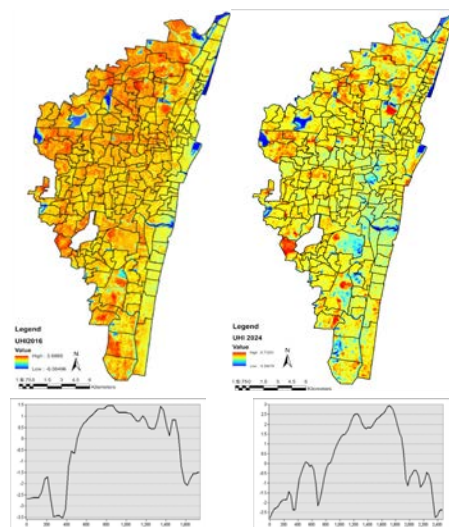
Future Risks of Sea-Level Rise in Chennai

By 2100, Chennai could see a **sea level rise of up to 77.88 cm**
• **Permanent inundation of 71.6 sq. km**, including **1.6 km of coastline** and **16% of the GCC area**

Future Risks Due to Increasing Temperature and Heat Waves

By 2050, Chennai's maximum temperatures are projected to rise by **0.9°C (2020s), 1.9°C (2050s), and 2.9°C (2080s)** compared to the **1970–2000 baseline**

Urban Heat Island Effect



Urban Heat Island: Chennai (2016–2024)

- UHI intensity increased by $\sim 3^\circ\text{C}$.
- Built-up area expanded to 74%, reducing green buffers
- Green cover dropped below 7%, worsening heat retention
- **Hottest zones:** Dump yards, informal settlements, and industrial pockets
- **Nighttime temperatures rose**, increasing heat stress risks
- **Cyclone Vardah (2016)** caused major tree loss, intensifying UHI

UHI Proposals

Green Corridor & Cool Roof Initiative: Identify built-up heat islands → apply cool roof coating program for informal housing
Heat-Sensitive Urban Design: Incorporate microclimate-sensitive planning

Urban Climate Dashboard or City's Digital Twin:

Urban Climate Dashboard: Real-time GIS dashboard with data to **target interventions** and inform ward-level planning.

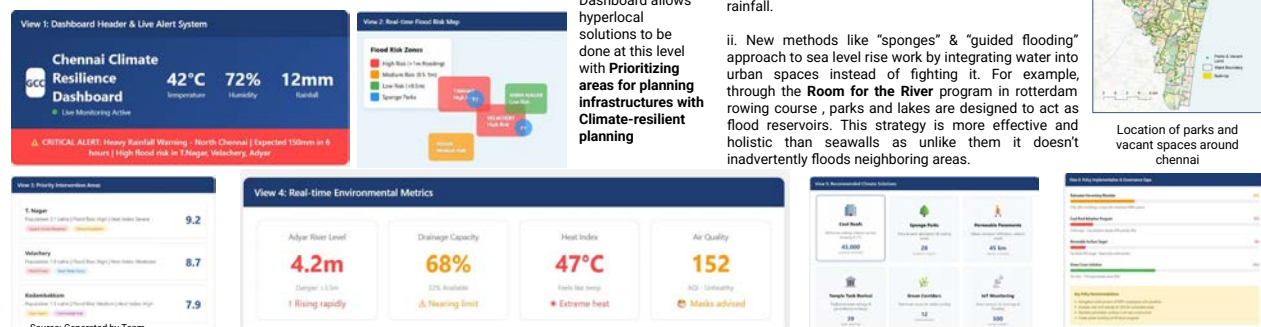
Example: The city of Wellington in New Zealand has created a digital twin, a virtual model of the city, that can show decision-makers and residents how climate impacts like sea level rise will affect it – and crucially, how policy can help.

The dashboard not only strengthens data-driven planning and infrastructure adaptation but also aligns with **SDG 11** by promoting **resilient, inclusive, and sustainable cities**.

Funding Support:

Chennai Metropolitan Development Authority (CMDA) and the Smart Cities Mission.

Dashboard allows hyperlocal solutions to be done at this level with **Prioritizing areas for planning infrastructures with Climate-resilient planning**



Facts	Source
Global average temperature has already risen by 1.1°C above pre-industrial levels.	IPCC AR6, 2022
South Asia is one of the world's most climate-vulnerable regions due to heatwaves, floods, and sea level rise.	IPCC AR6 Ch. 10
At 2°C warming, 1.5 billion people in South Asia may be exposed to extreme heatwaves every year.	IPCC AR6 Ch. 10
\$4 billion/year is the current economic loss due to urban flooding in Indian cities. Projected to rise to \$30 billion/year by 2070 without action.	World Bank, 2021
Urban areas in India can experience 2–6°C higher surface temperatures than nearby rural areas due to the urban heat island effect	IMD + ISRO + UN-Habitat

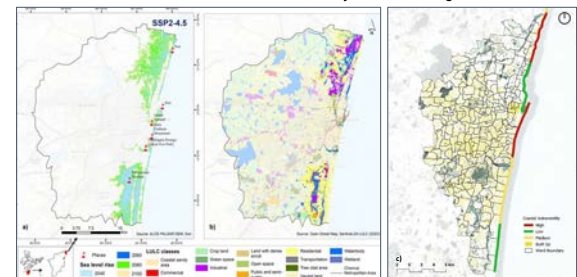


Climate Change Risk Index

Chennai has the **highest climate change risk index (0.76)** among Tamil Nadu cities, indicating it is the **most vulnerable** to climate impacts, risking heat deaths, blackouts, and displacement of over a million by 2050 if unchecked.

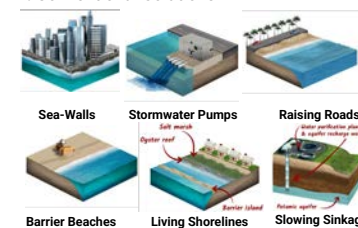
Sea Level Rise

Tide-gauge data show a **0.679 cm rise (0.066 cm yr⁻¹)** along **Chennai coast** between **1987 and 2021**—slower than Mumbai yet accelerating.

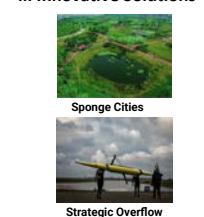


a) Inundation area for projected SLR in Chennai, Tamil Nadu; The City could see a loss of **86 & 207 sq. km** of area due to SLR by 2040–2100 respectively (under SSP2-4.5 Projections). **c) Furthermore**, studies on coastal vulnerability have indicated that **almost 32% of Chennai's coast comes under high vulnerability**.

i. Conventional Solutions

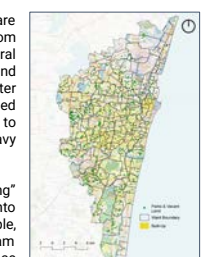


ii. Innovative Solutions



i. Traditional techniques of mitigating sea level rise are sea walls and barrier beaches to defend coasts from wave action, constructing living shorelines from natural materials to minimize erosion, slowing down land subsidence through the regulation of groundwater pumping, elevating roads to stay above anticipated flood levels, and the placement of stormwater pumps to drain hastily deposited water during high tide or heavy rainfall.

ii. New methods like "sponges" & "guided flooding" approach to sea level rise work by integrating water into urban spaces instead of fighting it. For example, through the **Room for the River** program in rotterdam rowing course, parks and lakes are designed to act as flood reservoirs. This strategy is more effective and holistic than seawalls as unlike them it doesn't inadvertently floods neighboring areas.



Location of parks and vacant spaces around Chennai

MITIGATING URBAN HEAT THROUGH COOLING STRATEGIES IN NEIGHBOURHOOD OF VIJAYAWADA



Why VIJAYAWADA?

Andhra Pradesh

Vijayawada, a rapidly urbanizing city in southern India, facing extreme heat events due to its tropical climate and urbanization, leading to elevated temperatures and risks to public health and infrastructure.



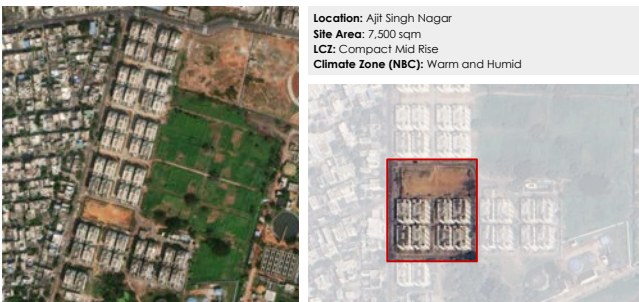
Alignment with SDGs

SDGs: SDG 11 (Sustainable Cities) and SDG 13 (Climate Action) by mitigating urban heat, enhancing resilience, improving energy efficiency and green urban spaces. It also supports SDGs 3, 7, 9, and 12 by promoting health, reducing energy demand, minimizing waste, and upgrading infrastructure sustainably.



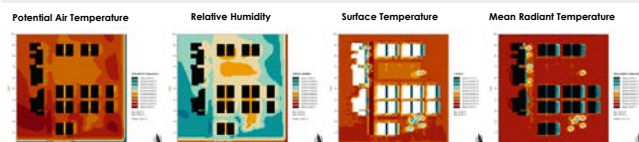
SITE location and Selected CLUSTER for study

Vijayawada has 111 notified slums, with around 26% of the city's population living in these areas. Aji Singh Nagar is one of the rehabilitated low-income housing settlements. JNNURM Housing Complex, which was part of a broader effort to improve living conditions for low-income families.

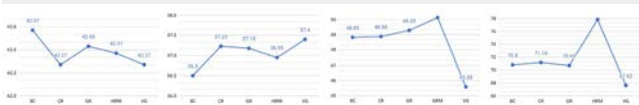


ENVI MET SIMULATION RESULTS

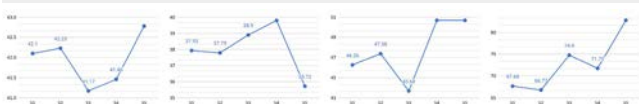
BASE CASE Simulation at 2PM (14:00)



Individual Scenarios Temperature Graphs at 2PM (14:00) for 4 Parameters



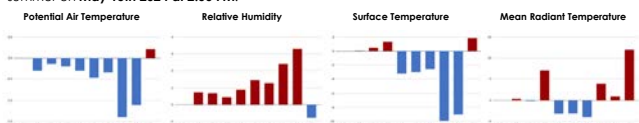
Combined Scenarios Temperature Graphs at 2PM (14:00) for 4 Parameters



IMPACT - Change in MICROCLIMATIC PARAMETERS compared to Base case

The bar graphs represent the variation in four key microclimatic parameters at 1.4m pedestrian height across both individual and combined retrofit strategies.

The values are compared against the base case (BC) and were simulated using ENVI-met for peak summer on May 15th 2024 at 2:00 PM.



Individual: Vegetation was most effective, reducing surface temperature and MRT through shading and evapotranspiration.

Combined: S1 (Cool Roof + Vegetation) performed best overall; S5 showed poor results due to high reflectivity.

PROBLEM?

01 URBANIZATION: As cities continue to expand and urbanization intensifies, the transformation of natural landscapes into built environments has led to a range of environmental challenges.

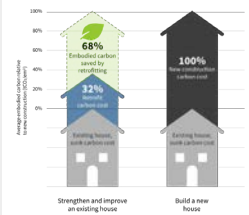
02 URBAN HEAT ISLAND (UHI): One of the biggest challenges cities face is the Urban Heat Island (UHI) effect, where urban areas are much hotter than nearby rural areas. This happens because cities have more heat-absorbing materials like concrete and asphalt, Land Use Change, fewer plants, and a lot of human activities that generate heat.



FOCUS ON RETROFITTING, WHY?

Existing Residential Buildings/Neighbourhoods

Existing residential buildings/Neighbourhoods are a major portion of the urban fabric, so they are a critical focus for retrofitting. These buildings in various Local Climate Zones (LCZs), play a major role in shaping local microclimates.



SOLUTION: Micro Scale UHI FOCUS - Building Level, Streets and Neighbourhoods

Practical and Scalability Focus: Reflectivity and greenery are among the most effective and implementable strategies.

Envi-MET 5 Software used to analyse the effects and impact of selected strategies.

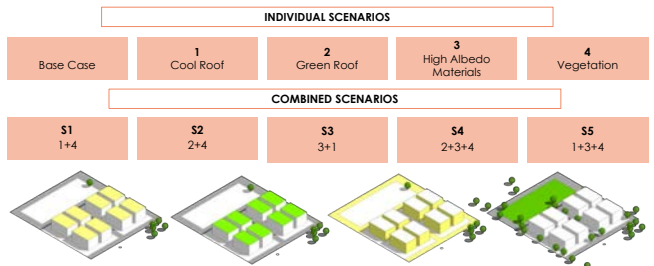
Conditions Considered for ENVI MET Simulations

TIME FRAME FOR SIMULATION - 24 hours (a day) has been carried out for every iteration to maintain uniformity. Which corresponds to the date 15th MAY (peak summer month).

Evaluation Process: SIMPLE SCENARIOS - COMPREHENSIVE SCENARIOS

APPROACH used for analysis

- Base Case to benchmark the site.
- Test each Individual Scenarios to understand the isolated impact of each strategy and Progress through the Combined Scenarios.



Parameters Considered for Simulations to Analyze

Microclimatic: Air Temperature (Ta), Surface Temperature (Ts), Relative Humidity (RH), Mean Radiant Temperature (MRT, Thermal Comfort: PET (Physiological Equivalent Temperature).

Strategies EFFECTIVENESS based on Microclimatic Parameters

Strategy	Effectiveness	Conclusion
Cool Roof (CR)		Minor cooling; limited MRT benefit in narrow streets
Green Roof (GR)		Helps roof insulation; minimal impact on street-level microclimate
High Reflective Material (HRM)		Increases MRT due to canyon reflections
Vegetation (VG)		Best performer: improves all parameters
S1 (CR + VG)		Balanced and effective; combines surface cooling and vegetation
S2 (GR + VG)		MRT and RH improvements; strong overall strategy
S4 (GR + HRM + VG)		Effective for surface temp, but MRT rise requires caution
S5 (CR + HRM + VG)		MRT and RH issues; HRM offsets vegetation benefit

Change in PET Compared to Base Case at Pedestrian Level (1.4m)



Despite implementing cooling strategies, all scenarios resulted in increased PET values relative to the base case. The dense built form and limited ventilation restricted the effectiveness of passive cooling, with vegetation-based (VG) and combined strategies (S1, S2) showing the least PET rise (+0.31°C to +0.33°C). Highly reflective strategies (HRM, S5) significantly increased heat stress, underlining the importance of shade and vegetative cover in compact zones.

TEAM Dhara



ShudhdhoJol: Smart Water Access for Climate-Resilient Coastal Bangladesh

Problem Statement

Coastal communities in Bangladesh face a growing water crisis driven by saltwater intrusion, brackish contamination and recurring climate disasters. Existing technologies, like Pond Sand Filters, are often ineffective in high-salinity areas, while off-grid regions lack the infrastructure and electricity needed for modern water systems. Most families cannot afford high-cost RO units and are forced to rely on unsafe sources. Furthermore, policy-level support is limited, localized R&D is insufficient and coordination among government, NGOs and communities remains weak—leaving millions without reliable access to clean water.

Proposed Solution

ShudhdhoJol introduces a decentralized, climate-smart water system that combines two water sources and a community-driven incentive platform to ensure safe, year-round access to clean water in off-grid, coastal or disaster-prone areas.

1. ShudhdhoJol Tank

A pedal-powered desalination unit operated by trained local youth or women (Jol Pilots) that transforms brackish or saline water into clean drinking water using RO membranes—entirely off-grid and low-cost. Built from recycled bicycles, each unit generates 30–50 liters/day, stored in community tanks for distribution.



Water delivery and pilot earnings are tracked via a QR/app-based system, with community scheduling supported through SMS. The model creates local livelihoods while ensuring water access during dry seasons or post-disasters.

2. MeghDhara Tank

A smart rainwater harvesting system that collects rooftop rainwater into low-cost at household or school level. Equipped with IoT water-level sensors, it monitors tank volume, detects leaks and tracks daily usage.

Water undergoes basic sedimentation and ceramic filtration, ensuring safe quality for non-potable or limited potable uses.

SMS/App alerts notify users when tanks are full, low, or leaking.

The system is maintained through Youth Water Watchers who conduct monthly audits and overseen by a local Water Co-op that handles usage rules and conflict resolution.



3. Jol Rewards Platform

A gamified mobile app + manual logbook hybrid system that rewards actions supporting clean water access and sustainability. Earn Jol Points (also called Water Taka) by engaging in meaningful water-related behaviors.

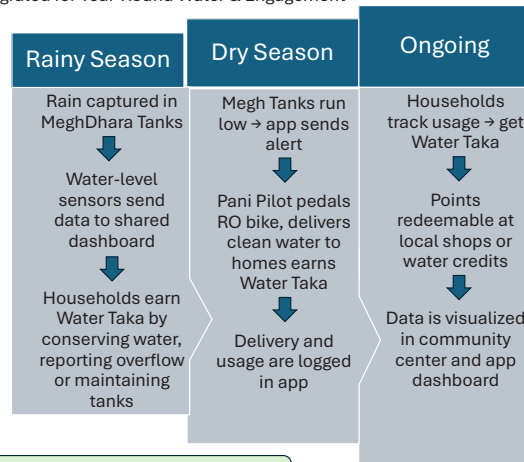
Action	Points	Redeem Jol Points For:
Pedaling the RO bike	+10 pts per 10L of clean water produced	• Soap, hygiene kits • School supplies • Water credit or discounts at local shops
Using less than average water/month	+10 pts	
Hosting cleanups or awareness events	+10 pts	
Reporting leaks or performing audits	+10 pts	

Community Role:

- Youth Volunteers: Assist with logging activities for non-app users.
- Local Shops: Act as Redemption Hubs for Jol Points.
- Schools/Clubs: Use Leaderboards to foster healthy competition, pride, and awareness.

The Flowchart of ShudhdhoJol:

Integrated for Year-Round Water & Engagement-



Key Features / Innovation

Dual-Source Clean Water Access: Combines desalination and rainwater harvesting with one year-round availability.

Off-Grid, Human-Powered Technology: Fedal-powered RO operations without electricity

IoT-Enabled Rainwater Management: Megh Tanks monitored with sensors and alerts

Gamified Incentive System – Jol Rewards: Water-saving actions rewarded with redeemable points

Youth-Driven Livelihood Creation: Micro-entrepreneurship for trained youth and women

Scalable, Modular & Circular: Made from recycled bicycles and locally sourced parts

Impact / Relevance

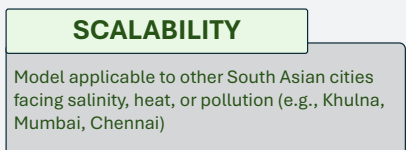
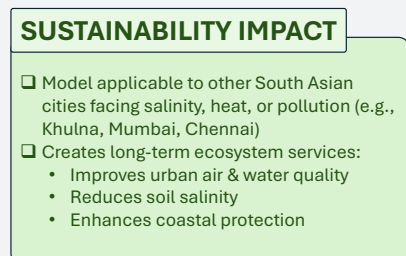
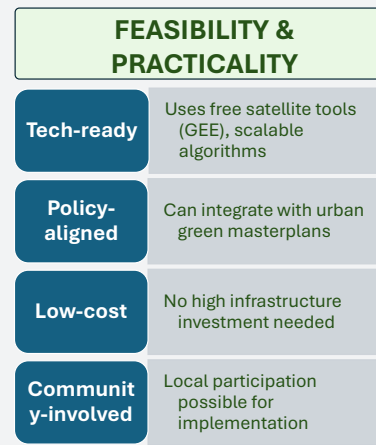
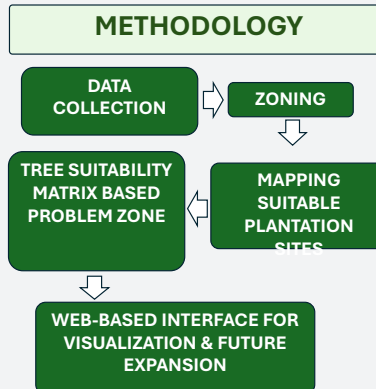
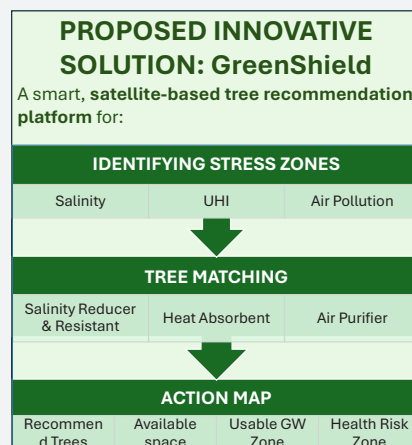
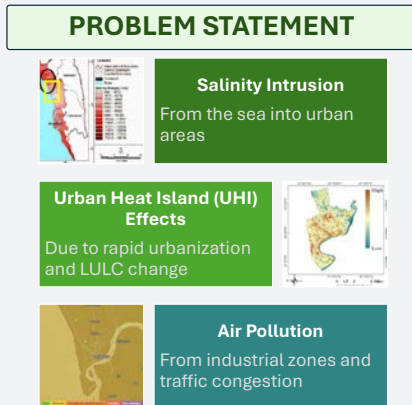
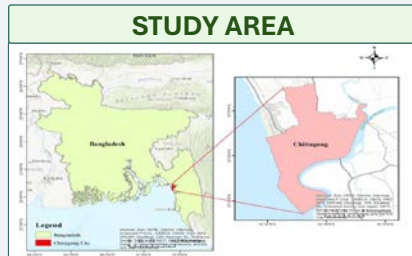
The ShudhdhoJol System delivers year-round water security to climate-vulnerable coastal communities by combining pedal-powered desalination with smart rainwater harvesting. Through decentralization and off-grid functionality, it ensures access to safe drinking water even during floods or power outages. The system empowers local youth as "Jol Pilots" and "Water Watchers," creating ownership and encouraging behavioral change via a gamified Jol Rewards Platform. Its modular, low-cost design makes it resilient and scalable across South Asia, adaptable for schools, cyclone shelters, and remote areas. Aligned with the UN SDGs—notably SDG 6 (Clean Water), SDG 13 (Climate Action), SDG 11 (Sustainable Communities), SDG 12 (Responsible Consumption) and SDG 8 (Decent Work)—the project offers an inclusive, innovative solution for water justice and climate resilience.



GreenShield: Smart Tree Zoning for Climate-Resilient Chittagong

"A Nature-based Solution to Urban Salinity, Heat, and Air Pollution"

Presented by BlueRoots.



Tree Suitability Table			
Zone Type	Issue	Tree Species	Benefit
Coastal/ Southwest	Salinity	Coconut, Sundari	Salt-tolerant, erosion control
Urban Core	UHI	Rain Tree, Neem	Shade, cooling
Industrial Belt	Air Pollution	Banyan, Neem	Air purifier, CO ₂ absorption
Hillside	Erosion	Bamboo, Vetiver	Slope stabilization

REFERENCES:

- Fig 1- created using ArcGIS by Team BlueRoots.
- Fig 2- <http://dx.doi.org/10.13140/RG.2.2.28090.62405>
- Fig 3- <https://doi.org/10.1016/j.envc.2021.100107>
- Fig 4- Live Animated Air Quality Map (AQI, PM2.5...) | IQAir



EcoGrub: Smart BSF Farming A Digital Circular Solution for Kathmandu's Organic Waste

Team Members:

Abhinav Thapa, Ashirwad Raj Jha,
Manish Kumar Chaurasiya, Amit Gupta

The Challenge

- 1,200 t/day of municipal waste, over 60 % organic, ends up in open landfills.
- Leachate contaminates soil & water; methane emissions accelerate climate change.
- Livestock feed imports (soybean, fishmeal) drive high costs and degrade soils via chemical fertilizers.
- Women, youth & informal waste-collectors lack access to green-economy opportunities.

2. Innovative Concept

Our Digital Circular Model (Refined)

1. Decentralized Micro-Hubs
 - Community-level BSF farms processing food scraps, market waste & farm residues.
 2. 10–15 Day Bioconversion
 - BSF larvae → 50–55 % protein feed
 - Frass → organic fertilizer
 3. IoT-Enabled Optimization
 - Sensors track temperature, humidity & substrate health
 - Mobile/Web app connects generators
 - ► collectors ► hubs ► farmers
 4. Traceability & Planning
 - Real-time dashboard for municipal waste-flow management
- (Insert schematic: waste pickup → hub → larvae feed → farm → frass)

3. Potential Impacts & Outcomes

- Waste Diverted: 50 % of Kathmandu's organic waste by Year 3
- Feed Produced: 2,000 t BSF larvae/year
- Fertilizer Generated: 3,000 t frass/year
- Emissions Cut: Equivalent of 1,500 t CO₂-eq/yr
- Jobs & Inclusion: ≥ 150 new green-jobs for under-represented groups

4. Market & Recognition

- Global BSF market: 33.3 % CAGR → USD 1.5 b by 2029
- Nepal Poultry sector: ~NPR 160 b
- 2nd place, Wageningen Food Systems Innovation Challenge 2024
- FAO Youth Food Lab, Rome attendee (Oct 2025)



Problems addressed by EcoGrub



Alignment with National Pathway

Action Track 1: Ensuring Safe and Nutritious Food for All

By providing a sustainable, high-protein poultry feed, EcoGrub boosts agricultural productivity and offers a nutritious, affordable diet, contributing to improved nutrition and zero hunger.

Action Track 2: Shifting to Sustainable Consumption Patterns

EcoGrub supports sustainable consumption by converting organic waste into feed, reducing food waste, and promoting a circular economy through eco-friendly practices.

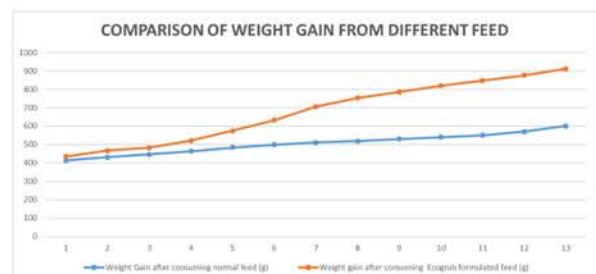
Action Track 4: Advancing Equitable Livelihoods

EcoGrub creates jobs and enhances incomes by developing a new value chain in the feed industry, fostering inclusive food systems, and addressing food insecurity through innovation and entrepreneurship.

Activities by EcoGrub



Results from experiment



Impacts of Project



Testimonials



Dev Shrestha

Rajdevi Agrofarm

"We observed no negative effect in our poultry farm. Chicken feeding on EcoGrub formulated feed had gained more weight than chicken feeding on normal feed simultaneously."



Kamala Shah

K&K Agrofarm

"We discovered that this product, initially designed for poultry feed, not only enhances poultry growth and health due to its high protein and fat content but also significantly reduces feed costs."



Sanjog Gurung

Gurung Poultry farm

"I have decided to use this product in my own farm. We highly hope that EcoGrub will bring this product in the market very soon."

References

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- Nguyen, T. T. X., et al. (2015). "Insect consumption as a protein source for livestock and humans in Thailand." *Journal of Asia-Pacific Entomology*.

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Team Members: Manish Kumar Chaurasiya, Amit Gupta, Abhinav Thapa, Ashirwad Raj Jha | Nepal

Sowing Resilience in Peri-Urban Salem: Linking Climate-Resilient Agriculture and Urban Nutrition

Background of the study:

Peri-urban areas are transitional zones between rural and urban landscapes. In Tamil Nadu, the concept of **Composite Local Planning Areas (CLPAs)** under the **AMRUT 2.0 Master Plan** integrates municipalities or municipal corporations with surrounding villages and Nagar Panchayats to promote balanced and inclusive growth. These peri-urban zones exhibit mixed land use, with agriculture often continuing as a dominant economic activity despite urban pressures.

However, the emergence of **climate change**, irregular rainfall patterns, prolonged droughts, and increasing temperatures have led to **declining agricultural productivity** in these regions. Coupled with this, the **over-extraction of groundwater** often the primary source of irrigation has resulted in aquifer depletion and soil degradation, further undermining farming sustainability.

As cities expand into rural hinterlands, there is an urgent need to reimagine peri-urban agriculture not only as a livelihood source but also as a critical component of **urban resilience, food security, and climate adaptation.**

This research situates itself at the intersection of climate adaptation planning and peri-urban development, aiming to explore how sustainable strategies can be integrated into CLPA level planning in Tamil Nadu to support the dual goals of regional growth and environmental sustainability.

Problem Statement

The growing climate change impacts, peri-urban agriculture is increasingly threatened by declining crop productivity, unsustainable groundwater extraction, and a lack of diversified livelihood options, posing significant risks to both environmental sustainability and socio-economic resilience in these transitional zones.

Existing gaps and situation

Study area: Salem CLPA

Salem CLPA , The Existing context

Diverse Agricultural Landscape in cropped in the case area

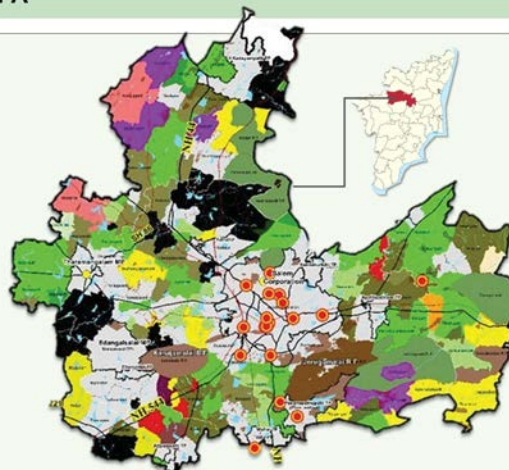
Dominant Crops are Paddy, Maize, Tapioca, Coconut, Sugarcane etc.

The "Urban Area" (grey) is primarily centered around Salem Corporation, with significant agricultural activity surrounding it.

Sago Industry Distribution

Inferences:

1. Economic Reliance on Agriculture.
2. Importance of Tapioca and Sago is seen
3. Food crops like paddy and Cash Crops are both equally predominant.
4. Agro-Climatic Suitability, imply varying agro climatic conditions (soil types, rainfall, temperature) across the Salem CLPA.

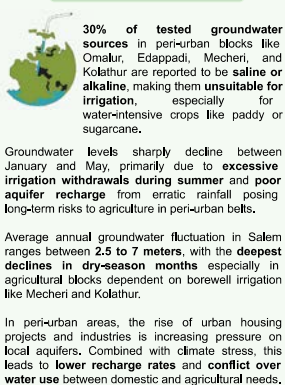


There is a need for Solution that offers Inclusive Growth. Enduring Impact. Aligned with the Global Goals !

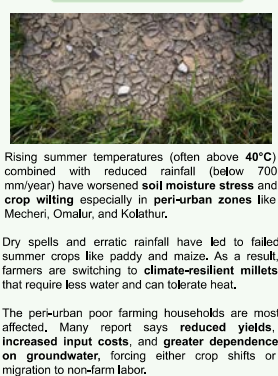
Water consumption



Groundwater Fluctuation



Summer impacts



Rainfall patterns



Proposals / Key solutions:

1. Millets in Urban School Lunches via Peri-Urban Linkages

Connect peri urban millet farmers directly with urban school mid-day meal programs. This creates a stable demand for climate resilient crops, improves child nutrition, and supports peri-urban livelihoods.

2. Peri-Urban Farms as Carbon Credit Generators for city

Turn peri urban farmlands into carbon sinks by promoting sustainable, low-input farming (like millets, agroforestry), and then measure and monetize the carbon they sequester. Cities (especially Smart Cities) can buy these credits as part of their net-zero targets.

3. City Adopted Peri-Urban Farms Using Digital Tokens

Each city adopts its surrounding peri-urban region's farms. Citizens or corporations can co-own "shares" in peri-urban farms via digital tokens (blockchain-based, but user-friendly). The returns could be in the form of produce, carbon credits, or even tourism rights.

Impacts of solutions:

How It Works

NUTRITION	REDUCED GHG	FARM LINKS
City municipal corporations or education departments commit to sourcing a percentage of mid-day meal grains as millets. Peri-urban farmer cooperatives are identified and trained to supply these in bulk. Millets are introduced into menus in taste friendly ways (upma, dosa, snacks). Nutritional data is tracked to show benefits to children's health.	Farmers shift from water intensive, chemical-heavy crops to climate-resilient ones (e.g., millets, mixed cropping, trees). With help from local institutions, the soil carbon levels, reduced emissions, and green cover are quantified. These savings are certified (using standard methods like Verro or Gold Standard). Cities, corporations, or government bodies buy these carbon credits to offset their emissions, creating a new income stream for farmers.	A digital platform is created where peri-urban farmers list their land and crops. Urban citizens, RWAs (Resident Welfare Associations), or companies can invest these farms through micro-investments (tokenized shares). The farm outputs like millet product, compost or even eco-tourism slots are distributed accordingly. Farmers get predictable income; urbanites get farm-fresh food, carbon neutrality, or wellness experiences.
Powerful features		
Creates demand-side security for millet farmers. Tackles urban malnutrition and obesity with traditional, wholesome foods. Integrates peri-urban regions into urban service delivery systems.	Links peri-urban agriculture directly to climate finance. Gives cities a local, ethical way to offset emissions. Empowers farmers financially to protect green cover and agriculture (groundwater, yield).	Builds urban-rural empathy and investment, encourages community-supported agriculture. Introduces transparency and traceability into the food system. Can bring tech-based startups.

Team Oasis

Team Members: Nishitha I, Joy Sahaya Varshini, Aruna J | India

Moringa : The Green Catalyst Turning Carbon into Cure

BACKGROUND

- Climate change continues to accelerate, with global CO₂ emissions surpassing 39.8 gigatonnes in 2023.
- Nature-based solutions like afforestation and carbon farming are gaining traction in global climate strategies.
- Moringa oleifera, known as the "Miracle Tree," grows rapidly, thrives in arid lands, and captures significant amounts of CO₂.
- Beyond carbon sequestration, moringa supports nutrition, income generation, and land restoration in vulnerable communities.

OBJECTIVE

To promote moringa-based nature-based solutions (NbS) as a viable strategy for climate resilience in South Asia

METHODOLOGY

Location: Semi-arid zone trial plot

Soil: Degraded loamy

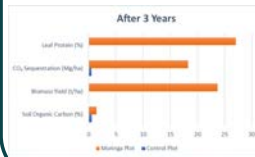
Irrigation: Drip + Rainfed



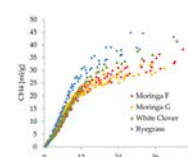
Control vs. Moringa plots monitored for CO₂ uptake, moisture, and soil health

RESULTS

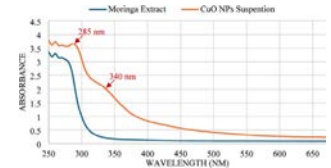
The Moringa plot significantly outperformed the control plot in soil organic carbon, biomass yield, CO₂ sequestration, and leaf protein content after three years



Moringa F and Moringa G produced significantly higher CH₄ emissions compared to white clover and ryegrass over 48 hours



The Moringa extract and CuO NPs suspension show distinct absorbance peaks, with the highest absorption occurring around 350 nm for the Moringa extract



VALUE CHAIN



SCALABILITY & IMPACT

- 1 Million ha of Moringa = ~20 Mt CO₂ offset/year
- Integratable with agroforestry and existing cropping systems.
- Promoted in India, Bangladesh, Sub-Saharan Africa and Egypt.
- Ideal for climate-smart agriculture in vulnerable regions specially drought areas.

CONCLUSION

- Moringa oleifera emerges as a low-cost, high-impact nature-based solution to climate change.
- Its ability to sequester carbon, restore degraded soils, and enhance rural livelihoods makes it a multipurpose climate ally.
- Integrating moringa cultivation into climate adaptation and agroforestry programs can significantly advance sustainability goals in vulnerable regions.
- With the right policy support, awareness, and investment, moringa can help us grow not just trees – but a resilient, greener future.

ALIGNMENT WITH SDG

- 2 (Zero Hunger):** Promoting moringa cultivation to improve food security through nutrient-rich leaves and sustainable income for smallholder farmers.
- 13 (Climate Action):** Deploying Moringa oleifera agroforestry to sequester carbon, rehabilitate degraded land, and build climate resilience in vulnerable regions
- 12 (Responsible Consumption and Production):** Creating a circular, zero-waste value chain by using every part of the moringa tree for food, fuel, water purification, and bio-based products.
- 16 (Life on Land):** Restoring biodiversity and regenerating degraded ecosystems through community-based land reclamation and tree-based farming systems.

REFERENCES



TEAM PALAMOU

Team Members: Sakif Ahmmed, Zarin Tasnim Ikra, Momin Abdullah, Nadia Binta Aziz | Bangladesh



Analysis of Anthropogenic Influences on Climate Change: A Case Study of Puri, Odisha



Ajoy Ghosh, Team Name: Ajoy_IITKgp_CC_Puri

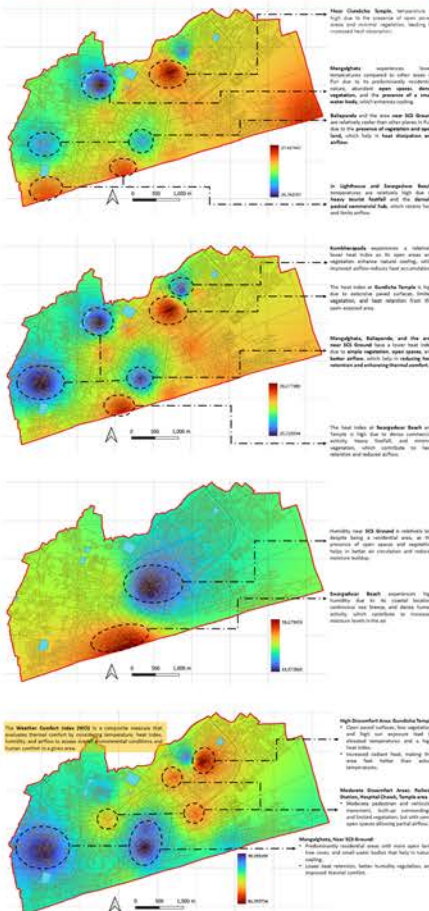
Project Introduction

Climate change is a growing global concern, with anthropogenic activities significantly altering environmental patterns. Rapid urbanization, tourism-related activities, and infrastructure expansion contribute to greenhouse gases (GHG) emissions, land-use changes, and resource depletion, exacerbating climate change impacts. Coastal cities like Puri, Odisha, which attract millions of tourists annually, are particularly vulnerable to these changes. The uncontrolled expansion of tourism infrastructure, vehicular emissions, and rising energy consumption have intensified local climate impacts, including temperature rise, coastal erosion, and air pollution.

Study Area



Microclimate Analysis Using Kestrel 5200 Env. Meter & GIS



Proposal and Recommendations



Aim

To analyze the spatial impact of anthropogenic activities on climate change in Puri, Odisha, using geospatial techniques, and to develop sustainable urban planning strategies that mitigate environmental risks.

Objectives



Comprehensive Emission Analysis:
Insufficient quantification of emissions from all tourism sub-sectors, including transportation, accommodations, and local tourist activities, especially during peak seasons.



Microclimatic & Ecosystem Effects:
Limited research on how tourism alters local climate patterns, such as urban heat islands, and long-term effects on ecosystems like coastal erosion and biodiversity loss.



Geospatial Analysis of Tourism Impacts:
Utilize advanced geospatial tools to map and analyze the spatial distribution of tourism-related activities, their environmental impacts, and contribution to climate change mitigation.



Policy and Adaptive Strategies:
Lack of integration between tourism-specific emissions and existing climate policies, with minimal research on effective adaptation strategies tailored for tourism-reliant regions.

Field Survey Analysis



Kestrel 5200 Environmental Meter & Software Used

The Kestrel 5200 measures temperature, humidity, wind speed, and WBGT, helping analyze heat stress, ventilation, and climatic impact.



Correlation Matrix : Relationship Between Tourism, Climate Change Concerns, and Infrastructure Factors

This correlation matrix presents the relationship between various tourism-related and environmental factors, such as climate change concern, infrastructure preparedness, energy consumption awareness, transportation frequency, and accommodation preferences.

	Climate Change Concern	Infrastructure Preparedness	Energy Consumption Awareness	Transportation Frequency	Accommodation Preferences
Climate Change Concern	1.00	0.75	0.60	0.50	0.40
Infrastructure Preparedness	0.75	1.00	0.80	0.70	0.60
Energy Consumption Awareness	0.60	0.80	1.00	0.90	0.80
Transportation Frequency	0.50	0.70	0.90	1.00	0.90
Accommodation Preferences	0.40	0.60	0.80	0.90	1.00

Impact/Relevance

No.	Issue/Study	Time	Real	Impact	Relevance	Climate Change	Infrastructure	Energy	Transportation	Accommodation
1	Heatmap	10/10/2023	✓	✓	✓	✓	✓	✓	✓	✓
2	Air Quality	10/10/2023	✓	✓	✓	✓	✓	✓	✓	✓
3	Noise	10/10/2023	✓	✓	✓	✓	✓	✓	✓	✓
4	Wind Speed	10/10/2023	✓	✓	✓	✓	✓	✓	✓	✓
5	Field Survey	10/10/2023	✓	✓	✓	✓	✓	✓	✓	✓
6	Correlation Matrix	10/10/2023	✓	✓	✓	✓	✓	✓	✓	✓
7	Proposal and Recommendations	10/10/2023	✓	✓	✓	✓	✓	✓	✓	✓
8	Impact/Relevance	10/10/2023	✓	✓	✓	✓	✓	✓	✓	✓
9	References	10/10/2023	✓	✓	✓	✓	✓	✓	✓	✓
10	Field Survey	10/10/2023	✓	✓	✓	✓	✓	✓	✓	✓

Alignment with Sustainable Development Goals

- This study aligns with SDG 13 (Climate Action) by quantifying tourism-related CO₂ emissions and proposing low-carbon solutions.
- It supports SDG 11 (Sustainable Cities) through green infrastructure, decentralization, and microclimate-based planning.
- SDG 12 (Responsible Consumption) is addressed by promoting eco-certified accommodations and energy-efficient mobility.
- Public amenities and heat resilience strategies contribute to SDG 3 (Good Health and Well-being).
- Solar power and energy-saving proposals further align with SDG 7 (Affordable and Clean Energy).

Conclusion

Tourism and Climate Stress

- Excessive energy consumption from transportation and accommodations significantly contributes to CO₂ emissions.

Policy Gaps

- Existing policies, such as the Heat Action Plan, fail to recognize and address tourism's role in climate change.

- Tourism planning and infrastructure development lack climate resilience.

Sustainability Challenges

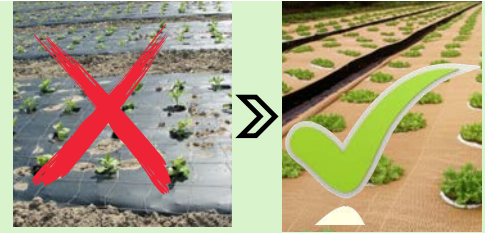
- Limited adoption of renewable energy sources in accommodations and public facilities increases tourism's environmental impact.
- Limited vegetation and inadequate ventilation in dense tourist zones increase heat retention and thermal discomfort.

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Smart Soil Health Blanket

A Climate-Resilient Agro-Textile Innovation for Urban and Peri-Urban Farming



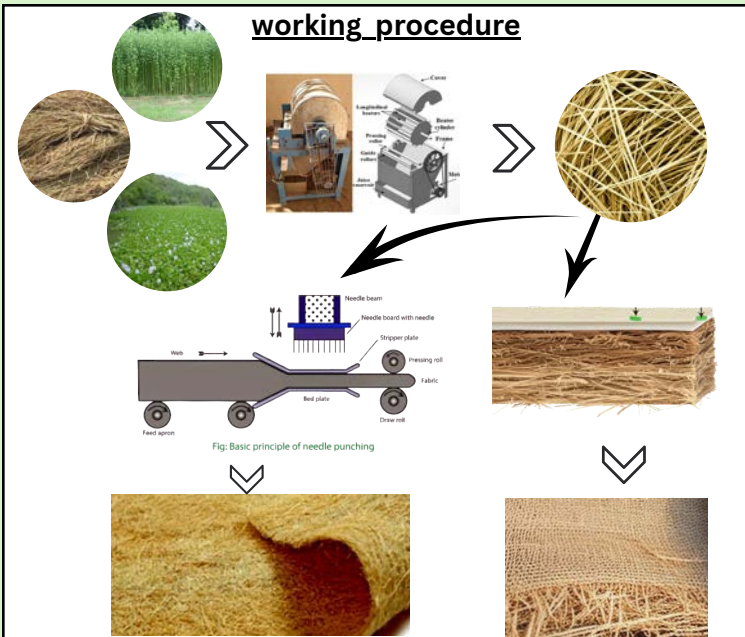
Problem Statement:

Over 30,000 tonnes of plastic mulch are used yearly in South Asia alone, covering millions of hectares worldwide [Kasirajan & Ngouajio, 2012]. The absence of biodegradable substitutes in Bangladesh results in costly removal procedures and long-term soil damage. Agro-fibers like water hyacinth and jute, which are underutilised, may hold the secret to more environmentally friendly farming.

Methods:

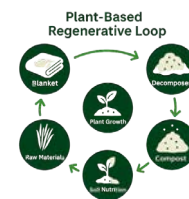
1. Fiber Collection (Jute/rice straw/Water Hyacinth)
2. Nonwoven Preparation (Needle punching / air-laid)
3. Binder Coating (PLA or starch)
4. Drying & Cutting

working procedure



RESULTS & DISCUSSION:

- Retains soil moisture 30–35% longer than plastic mulch (simulated trials).
- Fully decomposes in 6–10 months, enriching soil organically.



- Made from agro-waste: jute, banana fiber, rice straw, water hyacinth.
- Production cost: affordable and accessible.
- Cottage-industry ready – supports rural employment and women/youth empowerment.
- Scalable for rooftop gardens, nurseries, and rice fields.
- Reduces plastic pollution and aligns with SDGs :



- Future upgrades: moisture sensor integration & slow-release fertilizer concept.

References:

1. Kasirajan & Ngouajio, *Agron. Sustain. Dev.*, 2012
2. Sintim & Flury, *Environ. Sci. Technol.*, 2017
3. Liu et al., *Waste Manag.*, 2021
4. Sangamithirai & Vasugi, *J. Appl. Hort.*, 2020
5. de Sadeleer & Woodhouse, *Int. J. Life Cycle Assess.*, 2023
6. FAO, *Agroecology & Climate*, 2021



Conclusion:

The Smart Soil Health Blanket offers a climate-smart alternative to plastic mulch, rooted in local materials and circular design. It addresses both environmental pollution and resource equity, especially in underfunded farming regions. Early-stage trials suggest a 15–18% increase in soil microbial activity. With further R&D and field validation, this innovation could reshape Bangladesh's sustainable farming toolkit.

Team: Zero-waste Growers



Digital Edition on the Website

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