

**YOUTH
FOR CLIMATE
HACKATHON 2.0**

Action- Oriented Transition:

Translating Resilient, Scalable,
and Inclusive Solutions for
Circular Cities



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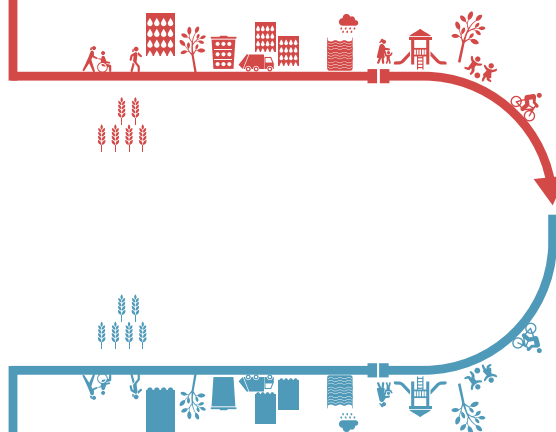
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Acknowledgements

We sincerely thank all youth participants for their creativity, effort, and commitment in submitting solutions for the Youth for Climate Hackathon organised 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 all those who contributed to making this initiative possible.



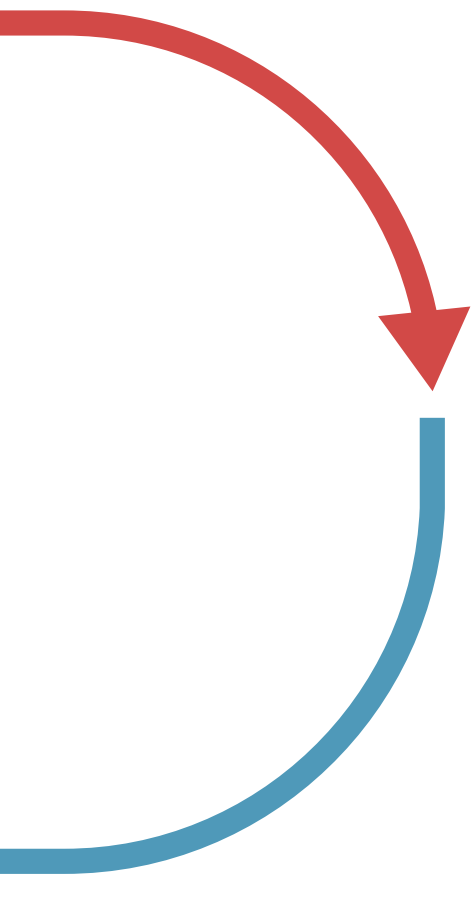
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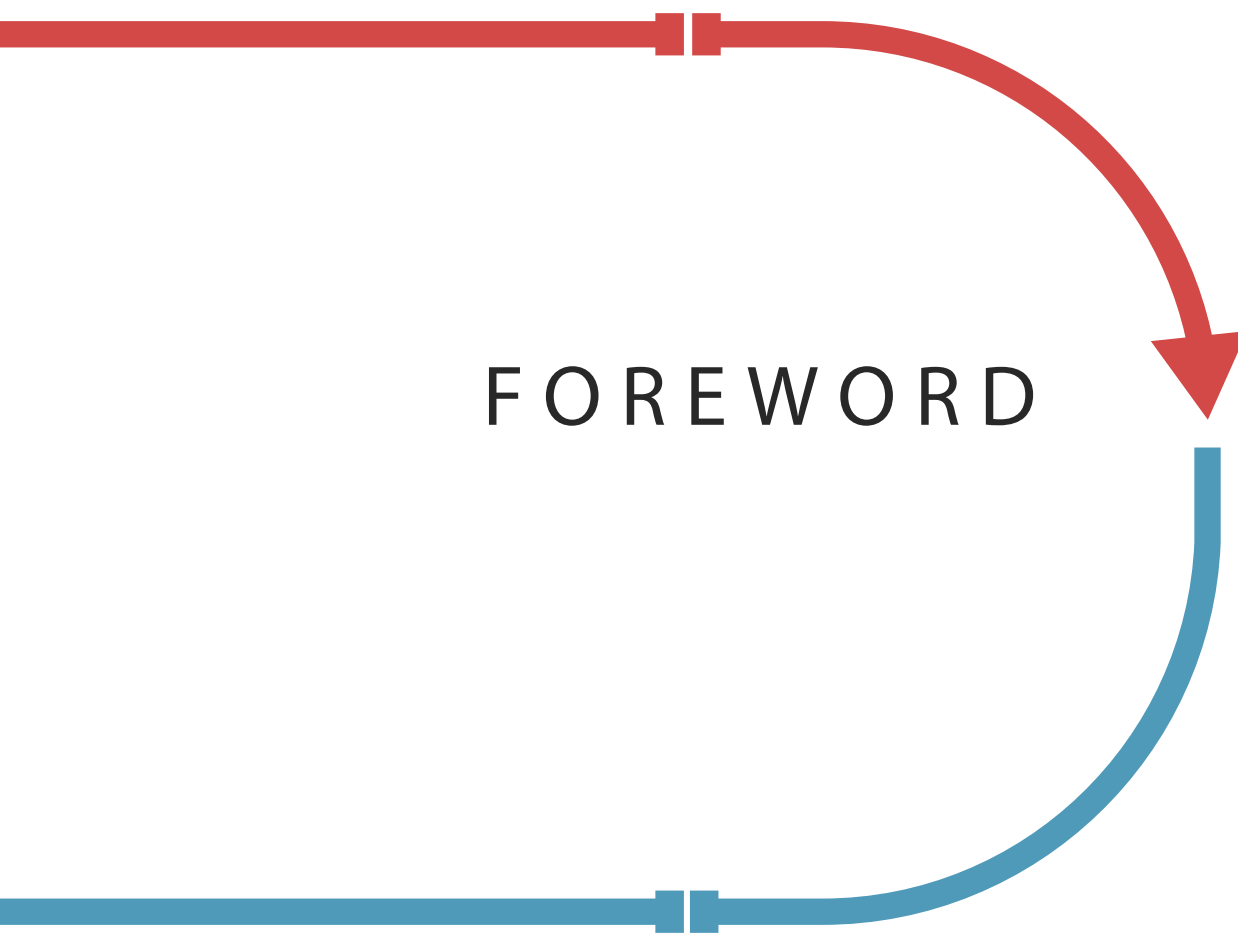
KNOWLEDGE AND OUTREACH PARTNERS





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FOREWORD



Emani Kumar

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

Building on the momentum of the inaugural edition in 2025, the Youth for Climate Hackathon 2026, themed 'Action-Oriented Transition: Translating Resilient, Scalable, and Inclusive Solutions for Circular Cities', has brought forward some stellar examples of youth-led innovation in advancing climate action across South Asia. It is my honour to present the shortlisted entries of the Youth for Climate Hackathon 2026, an initiative of ICLEI South Asia under the ARISE Cities Forum 2026.

As cities across the Global South face increasingly complex climate challenges, we must turn to the youth to gain fresh perspectives. I am glad that so many young climate enthusiasts took part in the hackathon and shared their ideas for locally relevant, scalable, and impactful circular solutions. I am particularly impressed by the diversity of entries, which span across sectors of zero waste, integrated water management, and urban and peri-urban food systems.

The youth hold immense potential to strengthen urban resilience. Beyond identifying promising solutions, the Hackathon seeks to nurture youth leadership, encourage collaboration, and create opportunities for young innovators to contribute meaningfully to the climate agenda. The selected entries you see in this booklet will also be featured in ICLEI South Asia's Youth Hackathon publication, including the COP31 Youth Booklet. I hope this initiative amplifies their voices and opens up opportunities for them to exchange knowledge, participate in dialogue, and initiate action on ground.

On behalf of ICLEI South Asia, I extend my sincere appreciation to all the participants, jury members, partners, and mentors whose time, expertise, and commitment contributed to the success of this initiative. Their collective efforts reinforce the importance of placing youth leadership at the centre of climate action enabling them to play a part in shaping their futures. As we move forward, ICLEI South Asia remains committed to strengthening youth engagement, supporting emerging climate leaders, and expanding opportunities for young people.

THE HACKATHON TEAM

Final Jury Members

Sameer Unhale

*State Joint Commissioner, Directorate of
Municipal Administration, Government of
Maharashtra*

Rajeev Kumar

*Programme Specialist (Risk and Resilience),
UNICEF India*

Monalisa Sen

Associate Director, ICLEI South Asia

Paramita Datta Dey

*Team Lead, SBM-U KMU and SRO, National
Institute of Urban Affairs (NIUA), India*

Dulari Parmar

Project Lead - Climate Justice, YUVA India

Partner-led Evaluation Team

Carly Leung

Climate Incubator

Suchismita Nayak

School of Planning and Architecture, Bhopal

Fyaj Khan Anam

Youth4NDCs

Hemant Kandel

Youth Action for Sustainable and Eco Nepal

Muskan Lodhi

Bring Back Green Foundation

Nabina Tiwari

YUWA Nepal

Niyafa Naufal

NOSPlan

Pahani Fernando

FLSGA Sri Lanka

Prarthana Bordoloi

YUVA India

Sirathan Kitthananithikul

Young Good Governance

Sneha Uprety

Nepalese Youth for Climate Action

Tenzin Choden

WFF Bhutan Chapter

ICLEI South Asia Team

Sayli Mankikar

Associate Director

Aditi Guha Thakurta

Policy and Research Associate

Bijay Banstola

Project Officer

Dechen Wangmo

City Project Associate

Dipak Bhowmick

Technical Lead

Manasa Garikaparthi

Senior Project Officer

Manju Adhikari

Project Officer

Pitchaporn Likitpanjamonon

GIS Expert

Sankalita Dey

Communications Manager

Satarupa Roy

Senior Project Officer

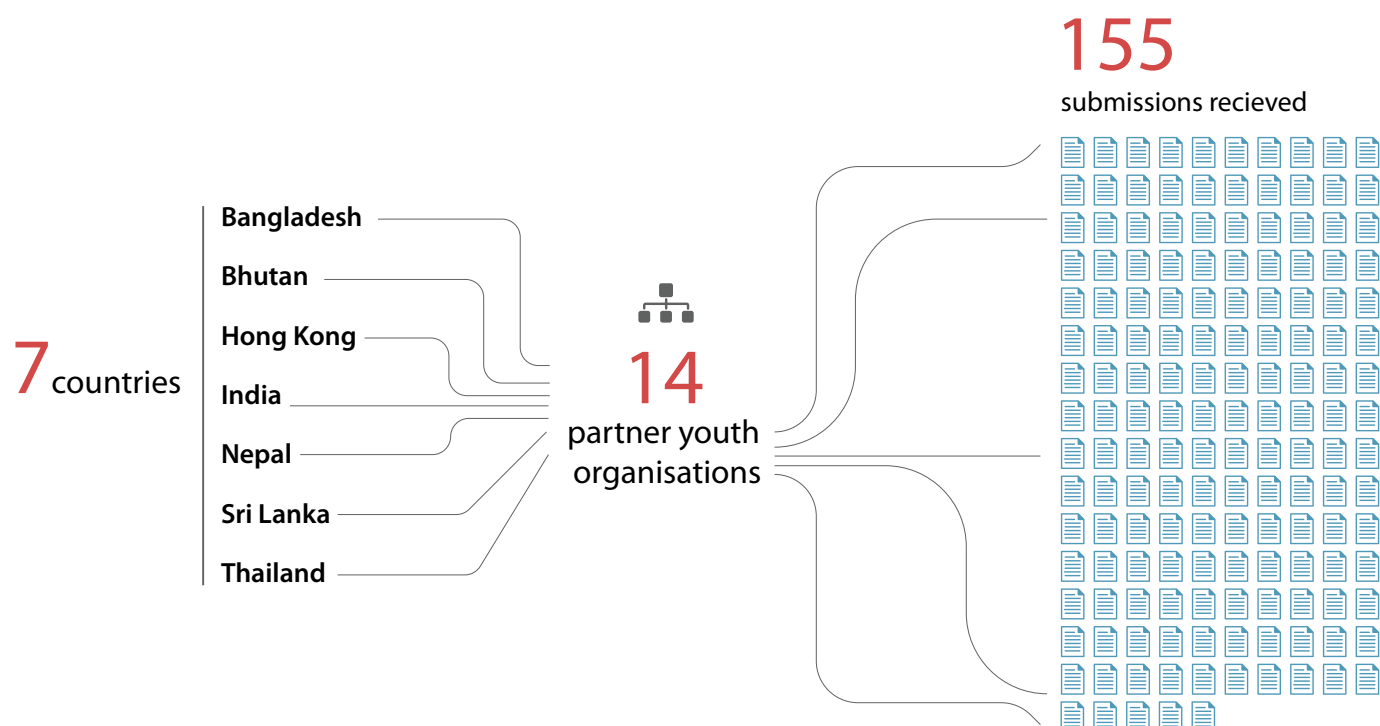
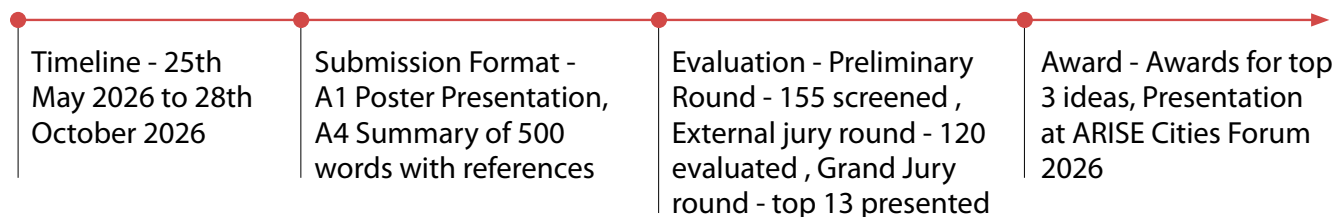
Shinjini Saha

Senior Project Officer

Yada Ponchamni

Junior Transport Planner

HACKATHON PROCESS



Age Group:

Participants aged 18-25 years

Geographic Eligibility:

Open to participants from South Asian countries (Bangladesh, Bhutan, India, Nepal, Sri Lanka, Thailand, Hong Kong)

Team Composition: 1-3 members

Evaluation Approach

Contextualising the Challenge:

Does the solution understand the city's local climate realities, vulnerabilities, and urban dynamics?

Data-Driven Solutions:

Are they adaptive interventions rooted in science, technology, and verifiable insights?

Scalability and Feasibility:

Can the ideas grow, work in real-world settings, and be sustained locally?

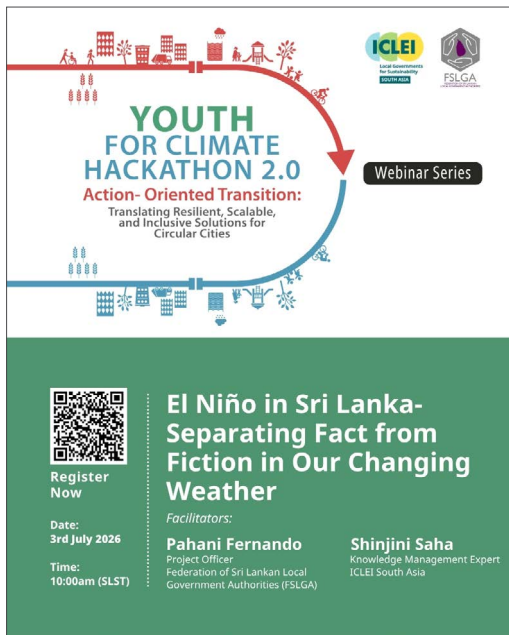
Alignment with Hackathon Theme and SDGs:

How would they contribute to climate resilience and sustainable urban development?

Uniqueness:

How innovative, impactful and distinct are the solutions?

KNOWLEDGE SHARING WEBINARS



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and Inclusive Solutions for
Circular Cities

ICLEI
Local Governments
for Sustainability
South Asia

FSLGA
Federation of Sri Lankan
Local Government Authorities

Webinar Series

**El Niño in Sri Lanka-
Separating Fact from
Fiction in Our Changing
Weather**

Register
Now

Date:
3rd July 2026

Time:
10:00am (SLST)

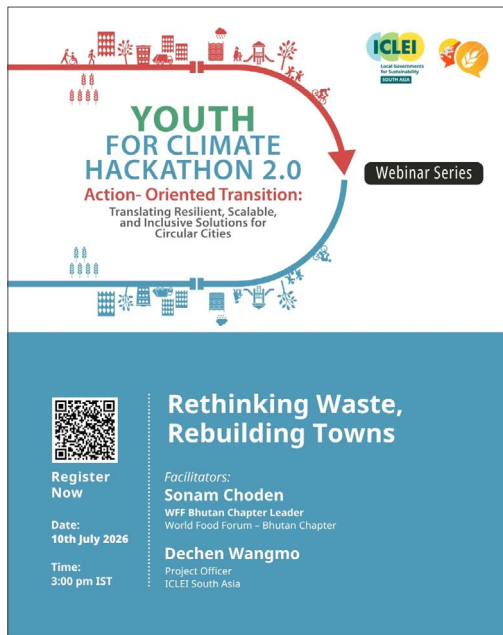
Facilitators:
Pahani Fernando
Project Officer
Federation of Sri Lankan Local
Government Authorities (FSLGA)

Shinjini Saha
Knowledge Management Expert
ICLEI South Asia

3rd July | 10:00 am IST

**El Niño in Sri Lanka-
Separating Fact from Fiction
in Our Changing Weather**

by FSLGA, Sri Lanka



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ICLEI
Local Governments
for Sustainability
South Asia

WFF
World Food Forum
South Asia

Webinar Series

**Rethinking Waste,
Rebuilding Towns**

Register
Now

Date:
10th July 2026

Time:
3:00 pm IST

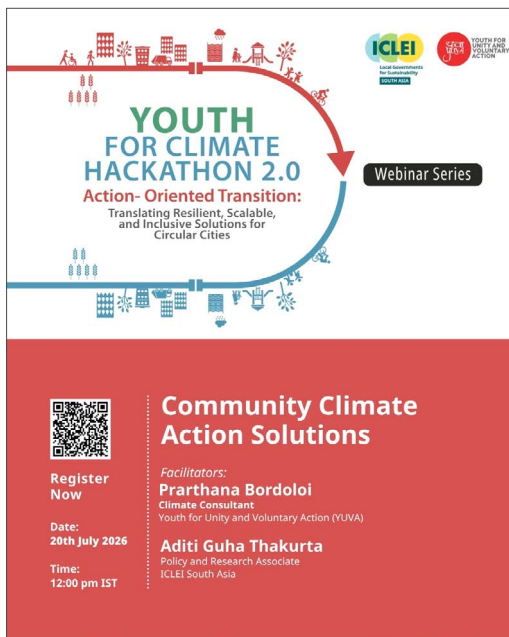
Facilitators:
Sonam Choden
WFF Bhutan Chapter Leader
World Food Forum - Bhutan Chapter

Dechen Wangmo
Project Officer
ICLEI South Asia

10th July | 3:00 pm IST

Rethinking Waste, Rebuilding Towns

by WFF Bhutan Chapter



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YUVA
Youth for Unity and
Voluntary Action

Webinar Series

**Community Climate
Action Solutions**

Register
Now

Date:
20th July 2026

Time:
12:00 pm IST

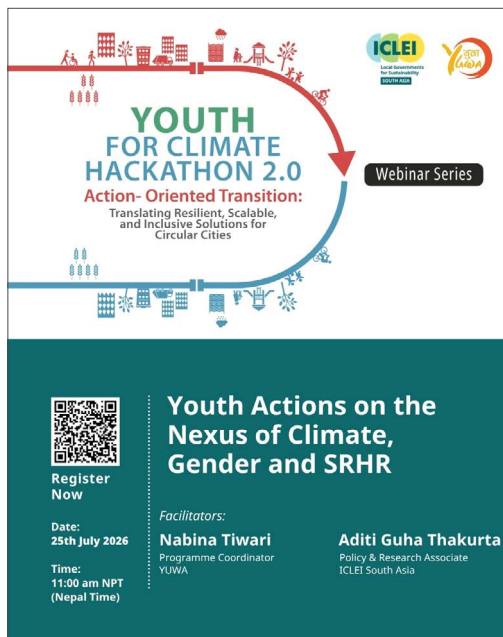
Facilitators:
Prarthana Bordoloi
Climate Consultant
Youth for Unity and Voluntary Action (YUVA)

Aditi Guha Thakurta
Policy and Research Associate
ICLEI South Asia

20th July | 12:00pm IST

Community Climate Action Solutions

by YUVA India



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YUVA
Youth for Unity and
Voluntary Action

Webinar Series

**Youth Actions on the
Nexus of Climate,
Gender and SRHR**

Register
Now

Date:
25th July 2026

Time:
11:00 am NPT
(Nepal Time)

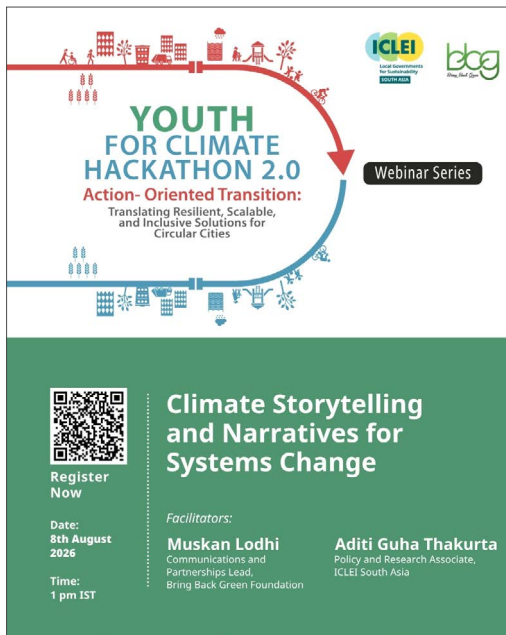
Facilitators:
Nabina Tiwari
Programme Coordinator
YUVA

Aditi Guha Thakurta
Policy & Research Associate
ICLEI South Asia

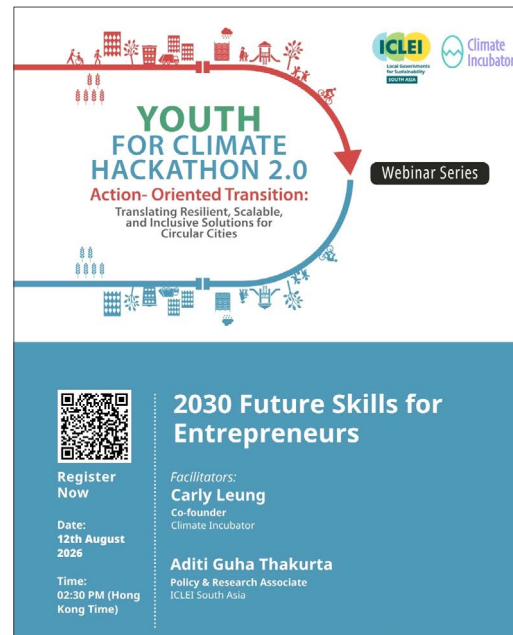
25th July | 11:00 am NPT

**Youth Actions on the Nexus of
Climate, Gender and SRHR**

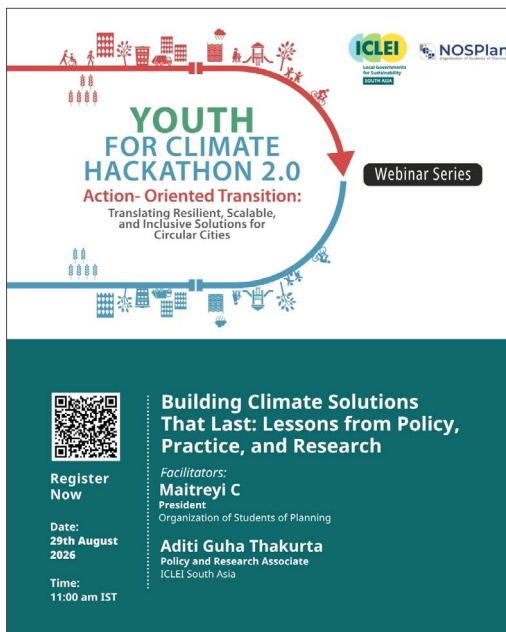
by YUVA Nepal



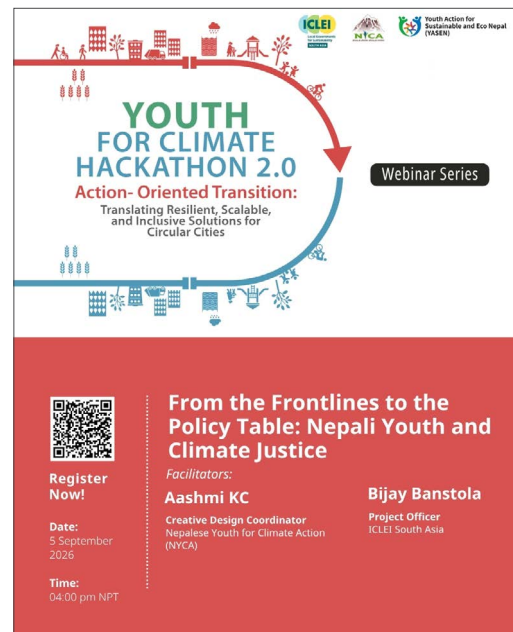
8th August | 1:00 pm IST
Climate Storytelling and Narratives for Systems Change



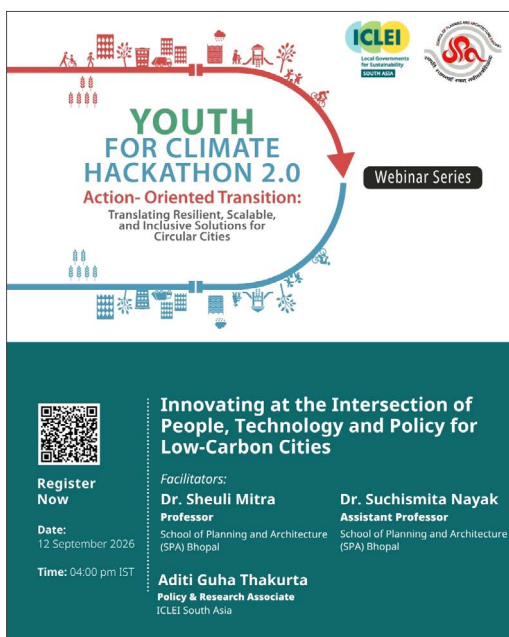
12th August | 02:30 pm
HKT- 2030 Future Skills for Entrepreneurs



29th August | 11:00 am IST
Building Climate Solutions That Last: Lessons from Policy, Practice, and Research

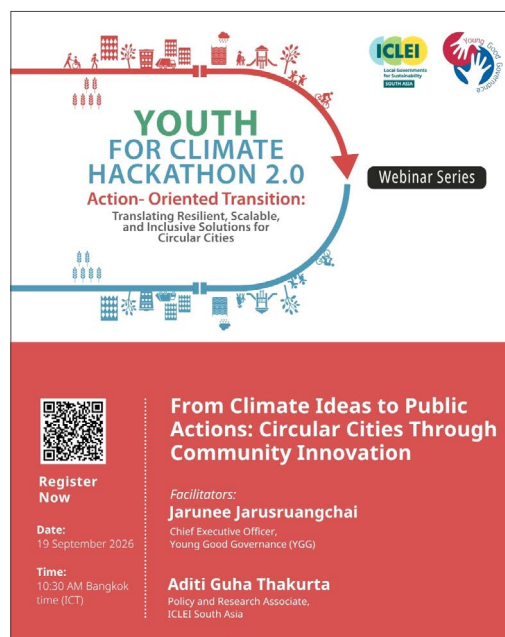


5 September | 04:00 pm NPT
From the Frontlines to the Policy Table: Nepali Youth and Climate Justice



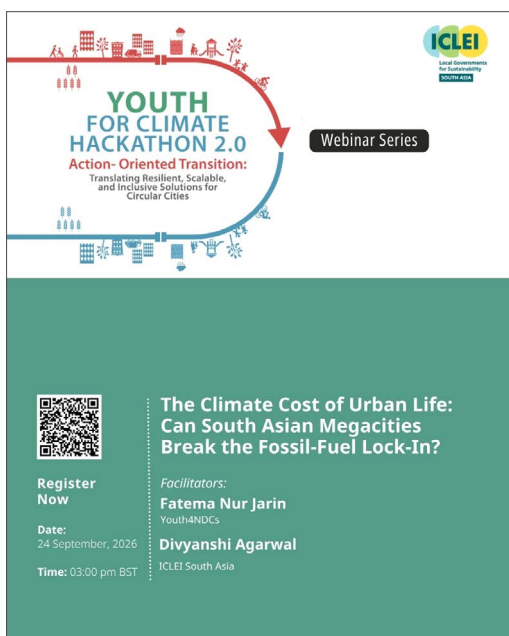
12 September | 04:00 pm IST

Innovating at the Intersection of People, Technology and Policy for Low-Carbon Cities



19 September | 10:30 AM ICT

From Climate Ideas to Public Actions: Circular Cities Through Community Innovation



24 September | 03:00 PM BST

The Climate Cost of Urban Life: Can South Asian Megacities Break the Fossil-Fuel Lock-In?

POSTER ENTRIES

Sr. No.	Team Name	Participants	Country
	Project METAL	Arpit Kumar, Abhijeet Kumar	India
	UrbanLoop Bangladesh	Ruth Shraboni Joydhor, Romana Akter	Bangladesh
	ReCube Limited	Kelvin Tsui (Tsui Ka Hei), Airy Cheung (Cheung Wai Ching Airy)	Hong Kong
4	Niveditha S Raghavan	Niveditha S Raghavan	India
5	Akatsuki	Atrayee Baruah, Ishpreet Singh	India
6	Green Lanterns	Sheikh Sajidul Islam, Mumtarin Zaman, Md Humaeid Tahsin Haque	Bangladesh
7	Thamarai Selvi. S	Thamarai Selvi. S	India
8	CCCDM	Vikashni	India
9	Team GreenQuest	Ayesha Ashrafi Rifa, Nusaiba Binte Mohiuddin	Bangladesh
10	TechNova	Md Abu Sufyan, Musfiqur Rahman, Minhajul Islam Niloy	Bangladesh
11	ZYRO	Mridula L, Monika S, Govarthani TS	India
12	Future Framework	Dharanya S, Jayanthi Venkata Sreeja, B Shivani Sundari	India
13	Waste2Wear	Narendra SK	Nepal

Country-focused Solutions

Sr. No.	Team Name	Participants	Country
1	EcoNova	Thinithi Edirisinghe	Sri Lanka
2	YOEBAR	Sonam Monger, Sangay Nidup, Lotay gyem	Bhutan
3	Evergreen	Kwankao Kittisakchoochai, Pareena Payackapan, Sahaporn Pamornmanop	Thailand



METAL / MARU: Climate-Resilient Arsenic-Safe Water



India



Arpit Kumar
Abhijeet Kumar

Navmarg Research and Innovation Pvt. Ltd. is addressing arsenic-contaminated groundwater through METAL, Magnetic Separation Technology for Arsenic Removal, productized as the MARU range. Arsenic in drinking water is a serious climate-linked public health challenge because geogenic arsenic can reappear in aquifers, while groundwater stress and unsafe dependence on borewells increase exposure. The burden is especially severe in rural and peri-urban regions where families, schools and health centres depend on decentralized water systems. Globally, about 220 million people are at risk, and India continues to report arsenic-affected districts across many states and union territories.

The main gap is not that arsenic cannot be removed; it is that many deployed systems fail operationally. Conventional adsorption, ion-exchange, reverse-osmosis and chemical-dosing systems depend on consumables, electricity, skilled operation, media replacement, wastewater handling or sludge management. When consumables run out, maintenance is delayed or operating costs rise, community plants are abandoned and people return to unsafe tube-well water. Field observations from Bihar show the human cost of this failure, including arsenic exposure reaching households, children and even maternal health pathways. Since there is no practical medicine that reverses chronic arsenic exposure, reliable safe water is the preventive intervention.

METAL takes a different route. The system uses permanent neodymium-iron-boron magnetic structures and a proprietary magnetic adherence-zone design to physically separate arsenic-associated particles from water. Because the core separation mechanism is not consumed during treatment, MARU reduces dependence on replacement media, chemical dosing, high electricity use and reject-water generation. The units are modular, ranging

from household-scale systems to community, institutional and high-flow installations for schools, primary health centres, habitations and public-water schemes. Low-pressure and gravity-compatible operation makes the technology suitable for low-resource settings, while zero reject water supports climate adaptation in water-stressed areas. Each deployment is designed for simple operation, on-site maintenance and monitoring, so the value is measured not only by removal efficiency, but by uptime, continuity of supply and community trust.

Navmarg has moved from laboratory development to field validation. Across pilot and deployment sites, the technology has delivered about 3.19 million litres of arsenic-safe water, directly impacting more than 6,200 users. Field trials in Bihar, including school installations, have shown reduction of arsenic-contaminated groundwater to below 2 micrograms per litre, well under the WHO drinking-water guideline of 10 micrograms per litre. A scale-trial unit has operated at high flow rates and served more than one thousand schoolchildren daily. The solution is supported by CSIR validation, Jal Jeevan Mission empanelment, GeM listing and granted intellectual property.

For the Youth for Climate Hackathon, MARU represents a climate-resilient safe-water innovation because it links health, water security and operational sustainability. It lowers long-term operating cost, avoids water wastage, reduces maintenance burden and can be deployed through government, CSR, NGO and institutional channels. This makes the project scalable across India, Bangladesh, Nepal and other regional arsenic belts. By making arsenic removal durable, affordable and simpler to operate, Navmarg aims to keep safe-water systems functioning for years after installation and protect vulnerable communities from a persistent invisible contaminant.



METAL / MARU: Consumable-Free Magnetic Arsenic Removal

Climate-resilient safe-water technology for arsenic-affected homes, schools and communities

Youth for Climate Hackathon 2.0 | ICLEI South Asia

220M

people globally potentially exposed to unsafe arsenic in groundwater

221

arsenic-affected districts across 25 Indian states/UTs

3.19M L

arsenic-safe water delivered across pilots and deployments

13

school and community sites deployed / validated

<2 ug/L

treated arsenic in field trials, below WHO 10 ug/L guideline

6,200+

lives directly impacted in pilot trials and studies

1. The climate-safe water problem

Arsenic is invisible: colorless, odorless and tasteless. There is no medicine that reverses chronic exposure, safe water is the preventive intervention.

- **Geogenic persistence:** arsenic re-enters aquifers even after infrastructure interventions.
- **Climate stress:** stressed groundwater can concentrate contaminants and increase borewell dependence.
- **System failure:** media, resin, power, skilled maintenance, backwash and sludge make conventional systems hard to sustain.

Field pattern: treatment exists, but exposure persists when community plants become non-functional or too costly to maintain.

75-80%

community ARUs abandoned within years

82%

plants non-functional in West Bengal

90%

units misapplied in Bihar



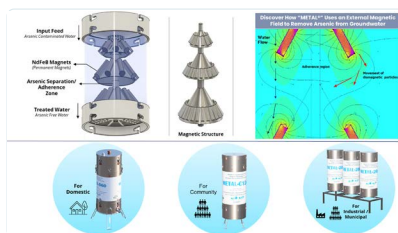
Field evidence in arsenic belts shows exposure reaching families, mothers and children

The gap is operational sustainability.

Conventional systems may remove arsenic scientifically, but rural deployments often fail when consumables run out, replacements are delayed or O&M; costs accumulate. METAL targets this failure mode, not just a new removal chemistry.

2. METAL technology powering MARU

Physical magnetic separation uses permanent NiFeB magnetic structures and a proprietary adherence-zone design to separate arsenic-associated particles.



Input feed flows through magnetic structure; arsenic-associated particles adhere in the capture zone; treated water exits



One core technology, multiple scales: households, schools, PHCs, habitations and industrial/public water systems

Why MARU is different

- **No consumed core media** during treatment - reduced recurring replacement dependence.
- **No chemical dosing, no membranes and no reject water** compared with common alternatives.
- **Gravity/low-pressure compatible** for decentralized, low-resource settings.
- **Modular product range:** 60 LPH domestic units to community, institutional and high-flow installations.

3. Validated impact and scale

- **Field performance:** arsenic reduction to <2 ug/L, below the WHO 10 ug/L drinking-water guideline.
- **Accreditation pathway:** CSIR-ICT and CSIR-CGRI validation; JJM empanelment; GeM listing.
- **Scale trial:** high-flow unit serving 1,175 schoolchildren daily with raw arsenic at 233 ug/L.

Magnetic Arsenic Removal Unit : Operational Analysis					
Mukto School Climate Resilient Block - Udhagrama, Dist - Birpur, Bihar, India					
[Lat: 25.07099 - Long: 84.5296] Installed: 20 July 2025 - MARU Site Powered by METAL					
Serving 1,175 School Children - Arsenic Free Drinking Water					
KEY PERFORMANCE INDICATORS					
Total Operational Days	Total Arsenic in Ground Water	Total Water Treated	Total Water Treated	Total Run Time	Avg Daily Output
174 days	233 ug/L	326 Kilo Liters	325,731 Liters	104 Hours	1872 L/day



Scale-pilot validation in Bihar: 4,500 LPH design capacity and 325,731 L treated in the reported operating period

5

granted patents

CSIR

validated method

JJM

empanelled tech

GeM

procurement route

Climate value: durable safe-water access with lower O&M; low energy dependence and no water wastage in water-stressed arsenic belts. Deployment routes include government/JJM, CSR, NGOs, schools, PHCs, EPC partners and D2C units.

No consumables
core replacement is not consumed

Zero reject water
no RO-style wastewater stream

Plug-and-play
single on-site O&M and monitoring

Scale-ready
Govt, CSR, NGO, B2B and D2C routes

Source: Uploaded Navmarg pitch deck and NCIC write-up (2025). Contact: contact@navmarg.in | arpi@navmarg.in | +91 72958 45814 | navmarg.in

NAVMARG RESEARCH AND INNOVATION PVT. LTD.



Loopward Chapainawabganj

Ward-level waste,
water and food loops
for a climate-resilient
circular city



Bangladesh



Ruth Shraboni Joydhor
Romana Akter

Chapainawabganj Municipality faces two connected resource pressures. Municipal stakeholders have identified source segregation, collection, awareness and institutional coordination as priorities for solid waste management. At the same time, north-western Bangladesh experiences dry-season water deficits, groundwater stress and emerging water-quality concerns. Yet market organics, roof runoff and wash-water still leave the local economy as waste. LoopWard Chapainawabganj proposes two neighbourhood resource hubs that convert these flows into useful inputs for urban and peri-urban food production.

Each pilot hub will serve one municipal market and 300 nearby households. Vendors and households will separate organics in green containers. Trained collectors will weigh each delivery, record it through a simple QR-linked ledger and award redeemable LoopPoints for clean segregation. The hub will process fruit and vegetable waste in enclosed aerobic composting units. Market roofs will capture rainwater, while wash-water will pass through a grease and sediment trap followed by a planted constructed wetland. The treated non-potable water will support compost moisture control, market cleaning, tree nurseries and demonstration gardens. Compost will supply women- and youth-led rooftop gardens, community plots and nearby mango nurseries. Recyclables will move to licensed aggregators, while residual waste remains with the municipality.

The design joins three circular-city pillars in one visible service loop. Waste supplies nutrients, recovered water replaces part of the demand for groundwater, and local gardens return food and seedlings to neighbourhoods. A public dashboard will report kilograms collected, contamination rates, litres recovered, compost produced and participating households. This evidence

will allow the municipality to adjust routes, incentives and operating fees rather than relying on assumptions.

Implementation will take twelve months. During months one and two, the municipality will confirm sites, conduct a waste and water audit, establish safeguarding procedures and sign operating agreements. Months three to five will install low-cost modular equipment and train collectors, vendors and garden groups. Months six to eleven will run the hubs, publish monthly results and test a blended revenue model based on market service fees, compost sales and nursery partnerships. Month twelve will independently review performance and prepare a scale-up package.

The pilot targets at least 60 percent correct segregation among enrolled users, recovery of 24 tonnes of organic material, reuse or harvesting of 600,000 litres of water, creation of 12 paid green roles, and supply of compost to 20 gardens or nurseries. Women, informal waste workers and persons with disabilities will help design collection points and receive priority for paid roles and enterprise support. No recovered water will be used for drinking or direct crop washing.

LoopWard is feasible because it uses proven, modular processes and complements Bangladesh's Solid Waste Management Rules 2021 and the Department of Public Health Engineering's integrated waste-management approach. The municipality can replicate one hub at a time across its 15 wards, using performance data and standard operating procedures from the pilot. Other secondary cities can adopt the same service model while adjusting technologies, incentives and end users to local conditions. This approach makes climate resilience practical, measurable and locally owned while protecting resources for residents.

LOOPWARD

CHAPAINAWABGANJ

Ward-level waste, water and food loops
for a climate-resilient circular city

TEAM URBANLOOP BANGLADESH

WHY CHAPAINAWABGANJ?

Municipal stakeholders already identify source segregation, collection and coordination as urgent priorities. At the same time, dry-season water stress and water-quality concerns threaten households and food production. Market organics, roof runoff and wash-water are still managed as separate problems.

15

municipal
wards

2

pilot
hubs

12

month
pilot



ONE VISIBLE SERVICE LOOP

1 SEPARATE + REWARD

Market vendors and 300 households separate organics. QR-linked weighing awards LoopPoints for clean material.

2 RECOVER + TREAT

Enclosed composters recover nutrients. Roof rainwater is stored; market wash-water passes through a planted wetland.

3 RETURN + GROW

Recovered water supports cleaning, composting and irrigation. Compost feeds gardens, tree nurseries and mango saplings.

12-MONTH DELIVERY PLAN

- 01 Months 1-2**
Site confirmation, waste and water audit, safeguards and operating agreements
- 02 Months 3-5**
Install modular equipment and train collectors, vendors and garden groups
- 03 Months 6-11**
Operate hubs, publish monthly data and test fees, compost sales and partnerships
- 04 Month 12**
Independent review and a standard scale-up package for additional wards

PILOT TARGETS

60%	correct segregation among enrolled users	24 t	organic material recovered
600k L	rainwater harvested or water reused	12	paid green roles, prioritising women and waste workers
20	gardens or nurseries supplied with compost		

FEASIBLE + SCALABLE

Low-cost modular units allow one hub at a time. A public dashboard tracks material, water and participation. Revenue combines market service fees, compost sales and nursery partnerships.

SAFEGUARD

Recovered water is never used for drinking or direct crop washing.



ReCube

Reusable Tableware
Rental Service



Hong Kong



Kelvin Tsui

(Tsui Ka Hei)

Airy Cheung

(Cheung Wai Ching Airy)

Our Vision

We aim to replace “Disposable” with “Reusable”,
reducing waste at source



Our Mission

We Provide...

Reusable tableware rental service that is
convenient and easy

x

Reward program that
saves cost and increases revenue

x

Reduce disposable tableware waste
at source



ReCube

Hong Kong Leading
Reusable Tableware Rental
Service Social Enterprise

#Reuse can be so easy



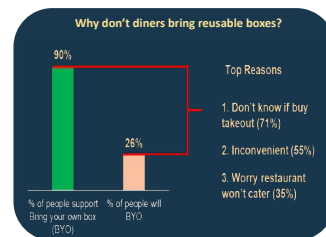
Problems & Market Overview

97060 Tonnes of plastic tableware were discarded in 2020 in Hong Kong! Equivalent to

19,400,000,000 pieces of plastic cutlery

(That's 2,590 pieces per person!)

Pain points of BYOC for diners



Diners need a **flexible, convenient, sustainable** solution

Pain points of BYOC for restaurants



Unsuitable
size, shape
for some
dishes



Deviate from
standard
procedure

Restaurants want to have an **efficient, standardized** SOP for reusable solution

Market Analysis

Huge F&B market in HK
Over 10K Restaurants



Govt. ban the use of plastic tableware,
open market gap in **Apr 2024**



ReCube Reusable Tableware Rental



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Restaurants/Office
equipped with
reusable tableware
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Scan QR Code
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an app



Enjoy

Enjoy takeaway in
our reusable
tableware with
extra discounts



Return

Return to any
kiosk/partner
restaurants/Office

Wash and reuse.

Demo Video



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<https://app.recube.hk>

Instagram



[@recube.hk](https://www.instagram.com/recube.hk)



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**Diverse containers fleet –
tailor-made for restaurants’
operation**

- ✓ Complies with food contact material standard
- ✓ Dishwasher safe
- ✓ Stackable
- ✓ Microwavable





ReCube

重用餐具租借服務

REUSABLE TABLEWARE RENTAL SERVICE

Reuse × Reward × Reduce

重用餐具租借服務方便又簡單
Reusable tableware rental service
that is convenient and easy

獎賞計劃為您開源節流
Reward program that saves
cost and increases revenue

源頭減少即棄餐具
Reduce disposable tableware
waste at source

如何借還

Borrow & Return



首次使用前登記帳戶
Register account
for new users



用戶掃描餐具
二維碼租借
Users scan QR code on the
tableware to borrow



全港任何一間
合作餐廳均可還盒
Return at any partner
restaurant all over HK



餐廳職員掃描
餐具二維碼歸還
Restuarant staff scan the QR code
on the tableware to return



清空餐盒,無須清洗
Empty tableware,
no wash needed



kelvintkh1



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Integrating Urban Circularity into Foodscapes



India



Niveditha S
Raghavan

An Action-Oriented Framework for Resilient, Scalable and Inclusive Circular Cities

Problem Statement Urban food systems are largely shaped by a linear take–make–waste model in which resources are extracted, food is produced and transported, consumed, and finally discarded. This fragmented system creates significant leakages of food, water, energy, land and labour while contributing to environmental degradation, food insecurity and economic inefficiency. In Koyambedu, Chennai's major food-distribution hub, the concentration of wholesale trade generates substantial organic waste, while inadequate segregation, decentralized resource recovery and localized food production prevent these resources from being reintegrated into the food system. At the same time, underutilized rooftops, vacant plots, street edges and ecological corridors remain largely disconnected from food production and resource management.

Proposed Solution

The project proposes transforming Koyambedu into a circular foodscape where food, water, organic waste, public space and local economies operate as interconnected loops rather than isolated systems. The framework is structured around four actions: Produce, Trade, Consume and Compost, supported by three spatial strategies: Regenerate, Activate and Connect.

Under Produce, vacant land, rooftops, setbacks, transit edges and institutional spaces are converted into community gardens, urban farms, vertical gardens and hydroponic systems, bringing food production closer to consumers. Trade decentralizes food exchange through walkable food corridors, local markets, vending zones, food hubs and cooperative enterprises, reducing supply-chain dependency while supporting informal vendors and small producers. Consume creates safe, affordable and culturally inclusive food spaces, strengthening food access and community interaction. Compost establishes decentralized organic-waste recovery systems that convert food waste into nutrients for urban farms and public landscapes.

The food loop is further connected to the water and ecological systems of the neighbourhood through rainwater

harvesting, bioswales, rain gardens, restored drainage networks and green-blue infrastructure. Harvested water can support urban agriculture, while compost and nutrient recovery regenerate soil and landscapes.

Feasibility

The proposal is designed as a retrofit strategy, making use of existing urban spaces and infrastructure rather than depending entirely on new large-scale development. Interventions can begin with pilot food streets, rooftop farms, community composting hubs, localized

markets and rainwater-harvesting systems, and progressively connect into a neighbourhood-wide network. The neighbourhood scale provides a practical balance between resource management, implementation and community participation.

Scalability

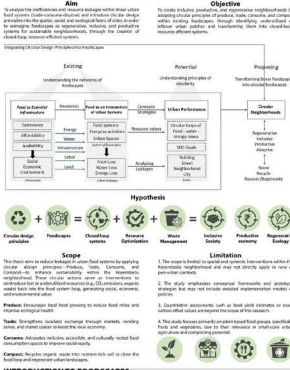
The framework is intentionally modular and transferable. Individual interventions—such as a rooftop farm, compost hub, food corridor or rainwater system—can function independently and later connect into larger circular networks. The accompanying circularity toolkit and spatial guidelines provide a basis for adapting the model to different residential, commercial, institutional and market contexts. Thus, Koyambedu becomes a demonstrative prototype that can be replicated across other neighbourhoods and cities.

Sustainability Impact

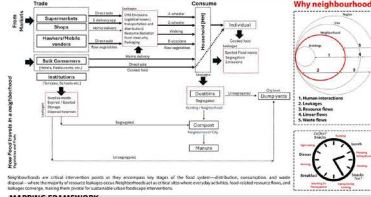
By converting waste into resources, localizing food production and connecting food with water and ecological infrastructure, the project reduces landfill dependency, food miles, resource consumption and environmental pollution. Composting regenerates urban soil; water harvesting improves water resilience; localized production strengthens food security; and decentralized trade creates opportunities for small businesses and informal livelihoods. Inclusive food streets and community spaces further promote social equity and participation. The result is a regenerative urban foodscape in which waste becomes an input, infrastructure becomes productive, and food becomes a catalyst for ecological repair, economic resilience and spatial justice.

INTEGRATING URBAN CIRCULARITY INTO FOODSCAPES

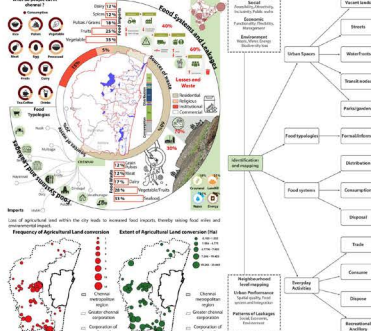
STUDY FRAMEWORK



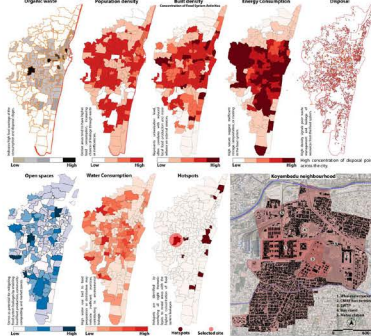
PROBLEM ANALYSIS AT NEIGHBOURHOOD LEVEL



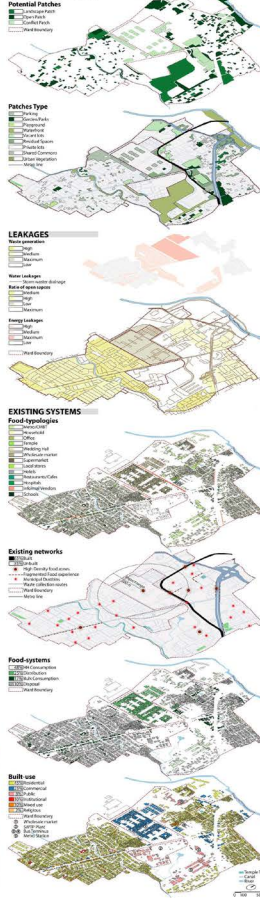
MAPPING FRAMEWORK



SITE SELECTION



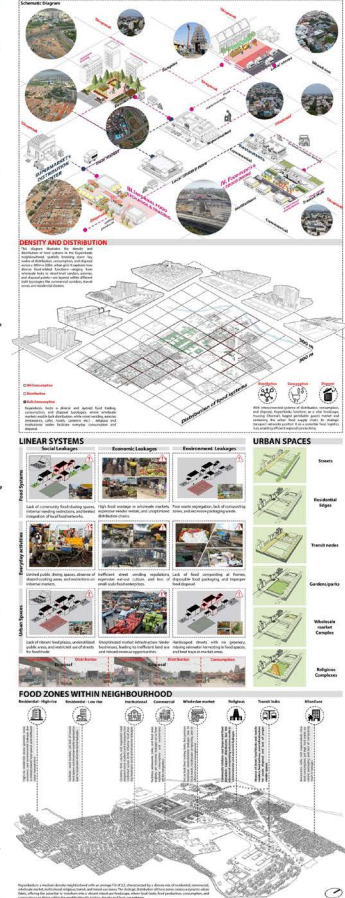
POTENTIAL RESOURCES



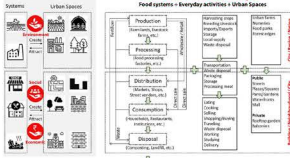
Urban Design Elements



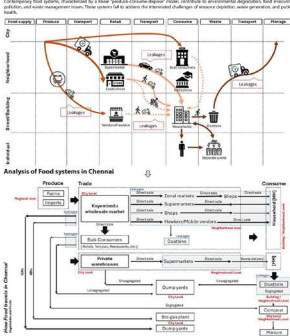
FOOD SYSTEMS: NETWORKS



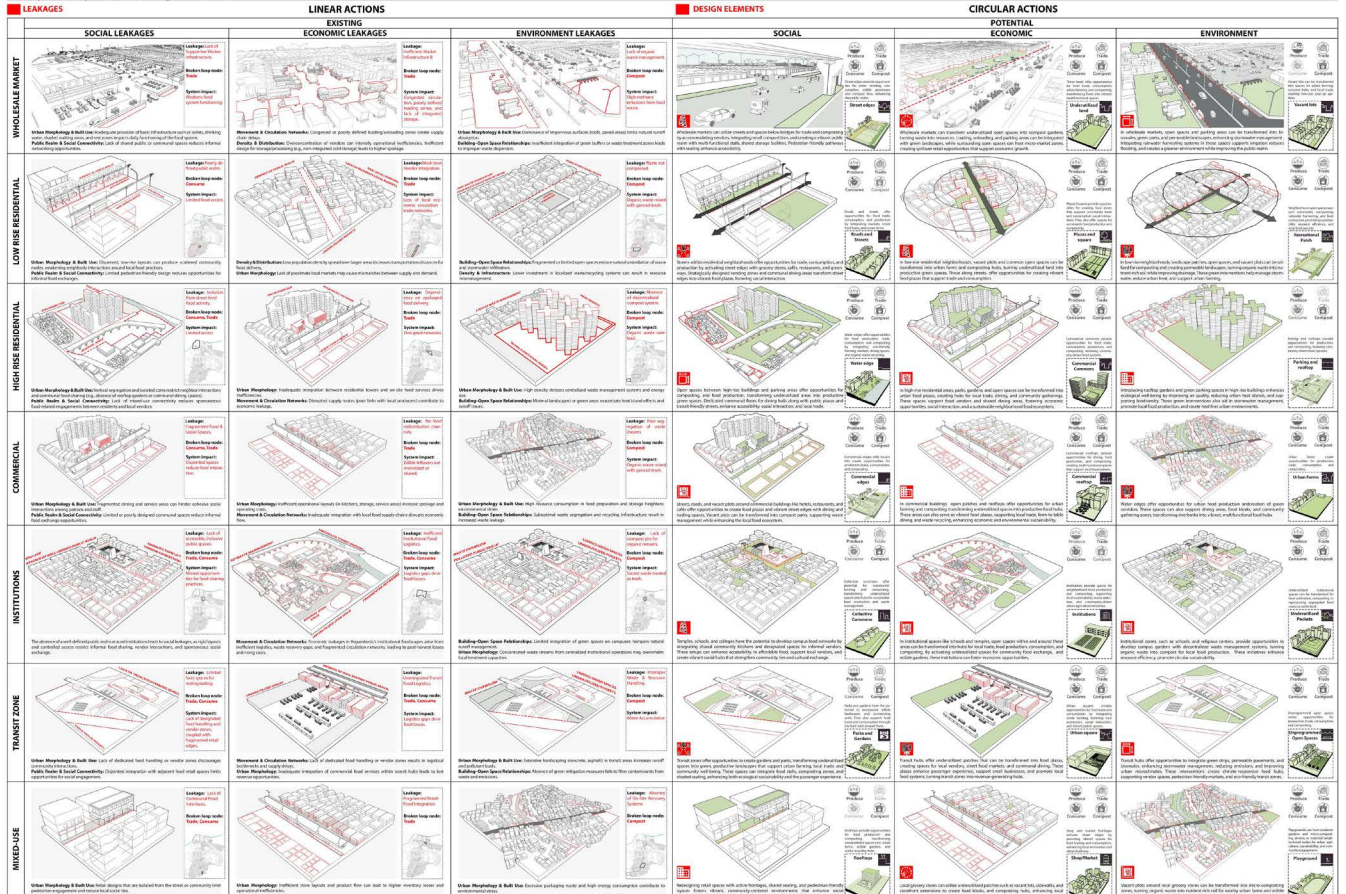
INTRODUCTION TO FOODSCAPES



PROBLEM ANALYSIS



Analysis : Koyembedu Neighbourhood





Bhoj Geo-Nexus: a circular lake, food and livelihood system for the Bhoj Wetland



India



Atrayee Baruah
Ishpreet Singh

ICLEI South Asia Youth Hackathon 2026 - Bhoj Wetland, Bhopal, Madhya Pradesh

Team - Akatsuki Members - Atrayee Baruah (26), student and Ishpreet Singh (24), student Country - India

Problem statement

The Bhoj Wetland's Upper Lake is a Ramsar site and one of Bhopal's main sources of drinking water. It is under pressure from two sides. Most of its 361 km² catchment is rural, so fertilizer and pesticide runoff reaches the lake through the streams that drain it. On the urban side, the city generates far more sewage than its plants can treat, and the untreated share arrives through nullahs that discharge straight into the lakes. Several municipal waterbodies now function largely as sewage ponds. Our satellite series shows the built-up edge spreading across the catchment from 2016 to 2026, so the load reaching the wetland is still growing.

Proposed solution

Bhoj Geo-Nexus is one system with three checkpoints: reduce, intercept and recover. It is one hub at a nullah confluence, not three separate projects. Nullah Net places small constructed wetlands, with screening and settling, where the main nullahs and streams enter the lake. Lake-Safe Farming offers farmers subsidised compost, reclaimed water, certification and market access if they cut chemical use. Weed-to-Worth has a fisherfolk cooperative turn harvested hyacinth and intercepted solid waste into compost and biogas. What one part produces, the next uses: compost returns to the farms, so every hectare converted cuts next season's runoff.

We picked hub sites from Sentinel-2A imagery for 2016, 2020, 2022 and 2026, processed in ArcGIS Pro with ArcPy. Land cover was classified with a support vector machine and

a maximum likelihood classifier, and false-colour composites with change detection show where built-up land now meets farmland. The hubs go on those contact zones.

Feasibility

Madhya Pradesh is already taking up this technology, including a constructed wetland treatment unit at Suthaliya, Raisgarh district, so the equipment is proven, not untested. Sentinel-2A imagery is free, and because the classification runs as an ArcPy script it can be repeated for a new date or catchment without redoing the work. The National Green Tribunal has also ordered outfall mapping and a time-bound plan for zero untreated discharge. Phase 1 needs only one nullah confluence, run by the municipal corporation with pollution control board monitoring.

Scalability

The hub is modular. Phase 1 proves one site. Phase 2 adds two more hubs and links the first Lake-Safe farms. Phase 3 repeats the method on Bhopal's other degraded waterbodies, issuing the hub as a standard design. Because it rests on free imagery and an existing script, a new catchment costs little.

Sustainability impact

Water: the polluted flow from a priority nullah is intercepted and treated at its confluence, well before the planned treatment plant is due. Waste: the hyacinth harvested each day goes to compost and biogas instead of a dump, so clearing the weed pays for itself. Food: organic plots here show lower nitrate and phosphate leaching than conventional ones, and the hub gives farmers a local market. Livelihoods: steady income for fisherfolk and farmers.

Together this supports SDGs 2, 6, 11, 12, 13 and 15, restoring wetland function instead of treating the problem at the pipe.

ICLEI SOUTH ASIA YOUTH HACKATHON 2026

BHOJ WETLAND : A LIFE SOURCE UNDER PRESSURE

From chemical catchment runoff and untreated urban sewage to a circular lake-food-livelihood system.



CIRCULAR ECONOMY

REDUCE → INTERCEPT → RECOVER



THE NUMBERS TELL THE STORY

361 km²

Upper Lake catchment more than 80% rural/agricultural land use

~240 MLD

Untreated sewage reaching the lake / Betwa River

~1.8 MILLION

People served by Upper Lake drinking-water supply

~40%

of Bhopal's drinking water

SPATIAL ANALYSIS - SENTINEL-2A FALSE-COLOUR SERIES TEN YEARS OF EXPANSION, IN FOUR FRAMES

The same 25 km-wide window over Bhopal and the Bhoj Wetland, overlaid across all four dates — every frame shows identical ground.



READING THE COMPOSITE
Red — active vegetation: standing crops, trees
Pale grey-green — built-up suburbs and bare ground
Black to dark — open water: the lakes and reservoirs

WHY THIS WINDOW
THE FRICTION ZONE IS THE CONTACT LINE
Where the pale built-up edge pinches against the red cropland, urban runoff and agricultural runoff meet and drain to the same nullah. Those contact lines are the coordinates the Geo-Nexus Hub is sited on and across these four frames they move steadily outward, toward the lake.

CONTEXT OVERVIEW

The Bhoj Wetland's Upper Lake, one of the only man-made lakes on the Ramsar list of internationally important wetlands supplies roughly 40% of Bhopal's drinking water to nearly 1.8 million people. It is simultaneously the city's largest inland fishery and flood buffer.

THE TWO-WAY POLLUTION PIPELINE

Bhopal's Bhoj Wetland faces a two-way pollution crisis: chemical fertiliser and pesticide runoff from the predominantly rural catchment enters the lake, while untreated urban sewage flows from the city into the lake and Betwa River. These pollutants converge in the wetland, threatening its ecological health and creating a shared risk for fisherfolk and nearly 1.8 million people dependent on the lake for drinking water.



THE CONCEPT Bhoj Geo-Nexus

One site. Three solutions. A healthier tomorrow.
Each Geo-Nexus Hub is strategically located at a nullah confluence and works as a single, **interconnected engine to treat water, recover resources and support local food systems**, reducing pressure on the wetland, while building resilient communities.



CONTRIBUTING TO THE SDGs



"Bhoj Geo-Nexus aligns water security, circular resource recovery, sustainable food systems, climate resilience, and wetland restoration with SDGs 2, 6, 11, 12, 13 & 15."

FEASIBILITY AND SCALABILITY



KOLANS RIVER
The Bhoj Wetland system in Bhopal is heavily impacted by pollution entering through the Kolans River.



BARGAON NULLAH
A foam-choked drinking-water nullah, its banks buried under garbage and industrial runoff.



KHASOT LAKE
A shrinking, trash-strewn lake choking on plastic waste and untreated sewage.

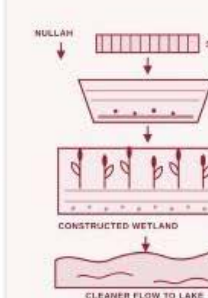


BETWA RIVER
An urban river receiving the city's pollution.

ONE SYSTEM. THREE CHECKPOINTS.

WATER NULLAH NET

A chain of decentralised constructed-wetland treatment units intercepts polluted flows at major inflow points before they reach the lake.



FEASIBILITY PROOF
Constructed-wetland STPs are already being pursued in Madhya Pradesh (e.g. a 0.80 MLD unit at Sufalkiya, Bargarh district, 2026). This proposal scales an existing, state-endorsed technology to the Bhoj Wetland's checkpoints.

FOOD LAKE-SAFE FARMING

Farmers who cut chemical fertiliser and pesticide use receive certification, better market access and price incentives.

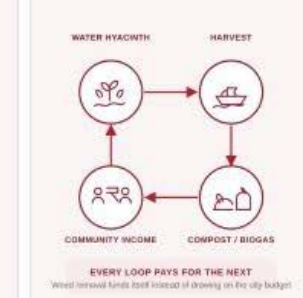


FEASIBILITY PROOF
Bhoj Wetland research and earlier watershed programmes have already explored incentive-based mechanisms for wetland-friendly farming, linking farmer livelihoods directly to watershed protection.

REDUCE → INTERCEPT → RECOVER

WASTE WEED-TO-WORTH

A fisherfolk-led cooperative harvests invasive water hyacinth and converts the biomass into compost and biogas, intercepting solid waste at the confluences.



FEASIBILITY PROOF
Turns an **invasive weed** and a **waste burden** into a **resource-recovery and livelihood model**. Fishers are already a recognised ecosystem benefits of the Bhoj Wetland, so the workforce and the cooperative structure exist.

IMPACT AND OUTCOMES



FROM GROUND TO PROPOSAL





Turag Duar: Closing the River's Forgotten Gates Through Decentralized Wastewater Treatment



Bangladesh



Sheikh Sajidul Islam

Mumtarin Zaman

Md Humaeid Tahsin Haque

Rapid urbanization and the absence of centralized sewerage infrastructure have rendered many South Asian rivers de facto conduits for untreated domestic wastewater. Gazipur City Corporation (GCC), Bangladesh's largest metropolitan area by land extent, operates no municipal wastewater treatment facility; household and market effluent therefore enter the Turag River without intervention. Field monitoring documents dissolved oxygen concentrations approaching zero and a biochemical oxygen demand (BOD₅) of 91.9 mg/L at the Tongi Khal confluence, more than double Bangladesh's regulatory discharge threshold of 40 mg/L (Environment Conservation Rules, 1997). Resident testimony corroborates this trajectory: a lifelong inhabitant of Kashimpur reported bathing in the river two decades ago, a practice now precluded by dry-season odor. Centralized alternatives have proven structurally inadequate elsewhere in the delta; Dhaka's Dasherbandi treatment plant, commissioned at a capital cost of BDT 3,370 crore for a design capacity of 500 MLD, operates at approximately 56 percent of that capacity owing to an incomplete sewer collection network.

This study proposes and characterizes a decentralized, outfall-scale intervention as an alternative to centralized sewerage. A four-stage field methodology, comprising outfall reconnaissance, indicator-based classification, grab sampling, and structured key-informant interviews ($n = 2$), was applied to the Kashimpur Bazar discharge point on the Turag River. Outfalls were classified as domestic, industrial, or mixed using visual, olfactory, and thermal indicators, with classification subsequently verified through the chemical oxygen demand to BOD₅ (COD: BOD₅) ratio. Analysis of the Kashimpur sample (T-SPL-01, collected September 2026) yielded a COD: BOD₅ ratio of approximately 2.3, consistent with readily biodegradable domestic

loading and supporting the site's suitability for biological treatment.

On this basis, a gravity-fed treatment train is proposed, comprising mechanical screening, anaerobic sedimentation, a duckweed (*Lemna* sp.) lagoon, and a polishing wetland, sized against established waste stabilization pond design criteria. Unlike precedent systems such as the East Kolkata Wetlands, where uncontrolled industrial influent has resulted in documented heavy-metal bioaccumulation, the proposed design enforces industrial exclusion at the siting stage and decouples duckweed biomass from any aquaculture contact with wastewater, harvesting it instead as feed for independent clean-water fish ponds. A peak-load design case, informed by resident-reported post-event pollution persistence of two to five months, addresses the seasonal loading associated with the annual Bishwa Ijtema congregation, a condition undocumented in the existing literature.

The principal contribution of this work lies not in the underlying biological process, which is well established, but in three previously unassembled elements: a field-verifiable, transferable outfall typology; a peak-load design case for a mass-gathering event without precedent elsewhere; and a treatment-as-a-service financing mechanism, whereby the municipal authority remunerates a local cooperative per cubic meter treated. Priced below the avoided cost of conventional treatment, this arrangement converts an unpriced ecosystem service into a defensible, revenue-generating asset. Because each module is independently viable, deployment can proceed incrementally, outfall by outfall, without dependence on a completed citywide network. The barrier to adoption of decentralized biological treatment in Bangladesh, proven at Mirzapur three decades ago, is thus procedural rather than technical, and the framework proposed here is intended to close that gap.



TURAG DUAR

Decentralized duckweed-based treatment of domestic and market wastewater at khal outfalls: A circular water-waste-food system for Gazipur City Corporation, Bangladesh



SHEIKH SAJIDUL ISLAM

23 · Final-year, B.Sc. in CE, IUT · Bangladesh



MD HUMAID TAHSIN HAQUE

22 · Third-year, B.Sc. in CE, IUT · Bangladesh



MUMTARIN ZAMAN

22 · Third-year, B.Sc. in CE, IUT · Bangladesh

1 INTRODUCTION

Gazipur, Bangladesh's largest city corporation, has no wastewater treatment, so ~2.67 million residents' waste (BBS, 2022) reaches the Turag untreated. Dissolved oxygen falls near zero in the dry season (Whitehead et al., 2018), with Tongi Khal's BOD₅ measured at 91.9 mg/L, over double the legal limit of 40 mg/L (ECR, 1997). A 56-year-old lifelong resident recalled, "Twenty years ago you could go down into this river; everyone bathed here. Now there's no chance," adding that factories "are supposed to treat their water, they don't." Even Dhaka has only ~20% sewerage coverage after decades (World Bank). Nearly five million gather annually here for the Bishwa Ijtema, and residents report degradation persisting for months after, undocumented in the literature. Industrial effluent needs enforcement; households need infrastructure that has never existed.



The Kashimpur reach: field survey, 27 August 2026

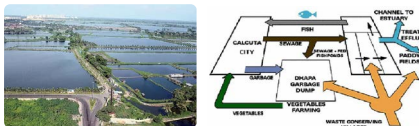
2 PROBLEM STATEMENT



CORE ISSUE — UNTREATED DISCHARGE

Industrial discharge needs enforcement. Household discharge needs infrastructure.

Wetland-based wastewater treatment is proven at scale in the **East Kolkata Wetlands** and in Bangladesh itself at **Mirzapur** (World Bank-documented). No Bangladeshi municipality has deployed it since. No one has classified the Turag's outfalls to know where it could go. No policy or financing pathway exists for it. The gap isn't technology, it's that nobody has built the siting method, the design case, or the payment mechanism that would let a city actually use what already works.



East Kolkata Wetlands (Source: vembnad.org & ResearchGate)

3 STUDY AREA

Kashimpur, Gazipur City Corporation: right bank of the Turag, ~8 km from IUT. Two discharge lines identified, with open floodplain land alongside.



Community Interview

Collected waste tipped into the river

We surveyed the Turag at Kashimpur Bazar and saw workers tipping waste straight into the river. A 56-year-old resident recalled bathing there as a boy and said factories don't treat their effluent; a 32-year-old believed a useful intervention would end local dumping.

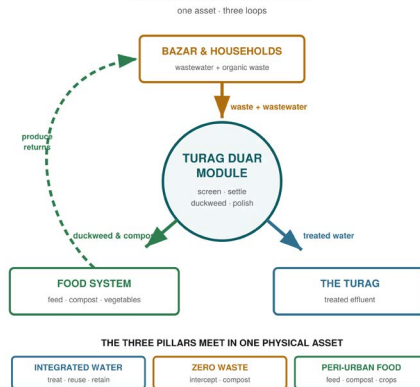
4 PROPOSED SOLUTION



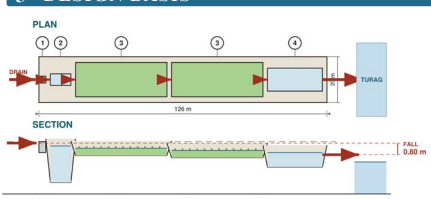
Concept illustration: module at a domestic khal outfall

Turag Duar treats wastewater at the door, not in the river. At each domestic-classified khal outfall, a gravity-fed module, screen, settling pond, duckweed lagoon, and polishing pond clean household and market wastewater before it reaches the Turag, using no electricity or chemicals. Harvested duckweed is sold as fish feed; nothing edible ever touches the wastewater. The city pays a local cooperative per cubic meter treated, turning an unpriiced service into a defensible, income-generating use of the floodplain. Industrial outfalls are excluded by design and referred for enforcement instead.

THE CIRCULAR SYSTEM



5 DESIGN BASIS



General arrangement: plan and longitudinal section

PARAMETER	VALUE	SOURCE
Design flow	60 m ³ /day	estimated: Phase 0 gauging
Influent BOD ₅	91.9 mg/L	Tongi Khal WQ study
Influent COD	212 mg/L	Tongi Khal WQ study
COD:BOD ₅ ratio	~2.3	derived — confirms domestic class
Anaerobic pond loading	100–300 g BOD/m ² ·d	WSP design manual (Mara)
Duckweed lagoon loading	27.6 kg BOD/ha·d	within 20–70 range (EKW)
Duckweed productivity	0.5–1.5 t/ha·d	Mirzapur pilot, World Bank
Target effluent BOD ₅	≤ 40 mg/L	ECR, 1997
Footprint	126 × 20 m = 0.26 ha	field survey + sizing
Total fall	0.80 m	gravity flow — no pumping

DOMESTIC	TREATMENT MODULE
grey / black / sewage odour / ambient	
INDUSTRIAL	ETP ENFORCEMENT
dye colour / chemical odour / warm	
MIXED	SOURCE SEPARATION
combined indicators	

6 NOVELTY & INNOVATION



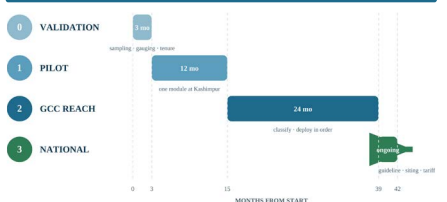
The biology isn't new; duckweed treatment is proven at Mirzapur and at scale in East Kolkata. What's missing is the method to deploy it: a khal-mouth typology deciding where treatment belongs versus enforcement, a peak-load design case built around the Bishwa Ijtema surge, and a per-cubic-meter tariff that turns an unpriiced service into defensible, income-generating use of the floodplain.

7 EXPECTED OUTCOMES

70–90% BOD ₅ REMOVAL design range	≤ 40 mg/L EFFLUENT BOD ₅ ECR 1997 standard	60–180 kg DUCKWEED / DAY to fish feed	0.26 ha FOOTPRINT per 60 m ³ m ³ /day
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Each day, the module removes 5.5 kg of BOD₅, harvests up to 180 kg of duckweed, and occupies just 0.26 ha, cleaner water and reclaimed land from a single small footprint.

8 PHASING & SCALABILITY



The pilot proves the module in twelve months; the following two years scale it across every domestic outfall Gazipur has. After that, the design becomes a standard any Bangladeshi municipality can adopt on its own.

9 CONCLUSIONS

Turag Duar treats wastewater at the outfall, closing the water, waste, and food loops in one low-cost, gravity-fed system. Key risks include Industrial contamination, monsoon overtopping, and poor upkeep are addressed through outfall screening, freeboard design, and a service tariff that gives the operator a financial stake in its upkeep. The approach advances SDGs 6, 11, 12, and 14. Kashimpur doesn't need more study; it needs one funded pilot to prove the model and open the door to the next hundred.





Blue-Green Biocentric Circularity:

An upstream
neighbourhood
intervention for the
Adyar River Edge,
Chennai, Tamil Nadu



India



Thamarai Selvi. S

The neighbourhood functions as a system of broken resource loops, creating continuous pressure on the river. Linear flows of waste, polluted water, food waste, stormwater, and unfavourable human activities, with the river becoming the disturbed receiver. This pressure degrades both the aquatic ecosystem and the surrounding urban blue-green ecosystem, while affecting human health and daily-living environments.

The proposed approach is to close the broken loops before they reach the sensitive river zone. Instead of treating the river alone, the intervention works upstream at the neighbourhood level to identify, intercept, and circulate resources before they become pollution pathways.

The pilot focuses on the Saidapet–Guindy neighbourhoods along the river, a compact urban fabric developed through a mix of residential, commercial, institutional and transport uses, now experiencing increasing large-scale business and residential development and direct interaction with the river edge.

The degradation of the urban blue-green system begins within the neighbourhood streets, roads, public corridors, and open spaces, flowing towards the Adyar River. Mixed waste and debris are exposed to rainfall and surface runoff, entering stormwater drains and eventually reaching the river. Plastic exposed to sunlight and weathering can fragment into microplastics, while waste accumulated in open grounds can be mobilised during rainfall and flooding. Major observed pressures include wastewater ingress, debris accumulation, mixed-waste spill, and unfavourable/ uncontrolled activities along the river interface. These pressures also influence the habitat network of dominant urban species and the quality of human environments.

Existing Adyar River restoration approaches address sewage control, debris removal, habitat restoration, informal-settlement relocation, shoreline bioengineering, water-carrying-capacity optimisation and continuous monitoring. However, gaps remain at the upstream neighbourhood scale, particularly in

stormwater pollution control, source-level detritus management, local habitat-network continuity, river-edge access management, decentralised rainwater utilisation and long-term operational stewardship.

The neighbourhood is therefore studied through broken-loop mapping, identifying resource and pressure points associated with food services, waste generation and segregation, waste accumulation, flood risk, water resources and human activities in relation to neighbourhood morphology.

These linear flows are transformed into circular neighbourhood systems through five interconnected layers: Resource Circularity ↔ Water Circularity ↔ Ecological Looping ↔ Human–Nature Reciprocity ↔ Multispecies Coexistence.

The intervention strategy focuses on limiting waste dumping, limiting polluted-water ingress, circulating food waste into soil, creating connected micro-habitats and establishing long-term stewardship operations. These interventions are spatially mapped and collectively represented through sections that demonstrate how resources, people, water and ecological systems interact.

The physical interventions are supported by a Stewardship Loop, connecting intervention → community action → monitoring → follow-up → maintenance → improvement. This is operated through a city-scale gaming platform by young community representatives called Blue-Green Guardians, who organise communities, mobilise stakeholders, monitor interventions, gather participation and represent neighbourhood decisions.

The project aligns with SDGs 6, 11, 12, 13, 15 and 17, with scalability through a pilot–measure–refine–replicate model. The Saidapet–Guindy pilot establishes a transferable framework that can be adapted across neighbourhoods along the Adyar and Cooum river systems, creating a continuous network of upstream neighbourhood stewardship and blue-green ecological protection.



Chennai Circular City DSS

A GIS-Based Spatial Decision Support Framework for Action Oriented Circular Urban Transitions



India



Vikashni

Problem Statement

Chennai is experiencing increasing pressure on water resources, organic waste management, urban heat and the efficient use of existing infrastructure. At the same time, resources such as treated wastewater and organic waste are generated within the city, but their potential local circular use is not always considered together with spatial demand, climate need and infrastructure availability. Planning decisions are often based on individual sectoral datasets, making it difficult to identify where circular interventions are most practical. A city-specific, evidence-based approach is therefore required to connect existing resources with suitable nearby opportunities while recognising distance, climate conditions and infrastructure readiness.

Proposed Solution

The Chennai Circular City Decision-Support System (DSS) is a GIS-based planning framework that converts available urban spatial data into clear, location-specific priorities. The system focuses on two practical circular pathways: treated wastewater for suitable non-potable urban green infrastructure, and organic-waste infrastructure linked to nearby circular opportunities. An interactive decision map allows users to examine source and destination locations, distance and priority. The system combines five factors in a Spatial Priority Index: resource suitability (30%), demand (25%), climate need (20%), spatial feasibility (15%) and infrastructure readiness (10%). The factors are normalised and combined using these weights to identify high, moderate and lower-priority opportunities.

Feasibility and Local Action

The proposal is designed as a planning and screening tool rather than a new physical infrastructure programme. It uses existing GIS datasets and infrastructure, reducing the need for new land acquisition or a separate institutional structure. For water reuse, the emphasis is on opportunities close to existing treated wastewater

sources to reduce the need for long and costly pipelines. For each identified opportunity, planners can review the spatial relationship and then undertake water-quality, regulatory, engineering and cost assessments before implementation. The same approach can support organic-waste planning by identifying existing infrastructure and nearby opportunities that warrant further investigation.

Scalability and Sustainability Impact

The framework can be updated as new spatial data, infrastructure information and planning priorities become available. Although developed for Chennai, the workflow can be adapted to other South Asian cities by replacing local datasets while retaining the same decision structure. The DSS supports integrated consideration of water, waste, climate resilience and urban green infrastructure and can help municipal agencies move from fragmented datasets towards prioritised local action. It does not claim that a high score guarantees implementation; instead, it provides an evidence-based first screening to help planners decide where detailed assessment should be focused.

Expected Outcomes

The expected outcome is a practical and transparent digital planning tool through which city stakeholders can identify priority circular opportunities, understand the factors behind each priority and access the underlying spatial data and methodology. By presenting results through maps, simple decision summaries and an accessible methodology section, the DSS is intended to improve communication between technical teams and decision-makers and support measurable progress towards circular, resilient and resource-efficient urban development.

Alignment:

Circular cities; zero waste; integrated water management; urban green infrastructure; climate resilience; SDGs 6, 11, 12 and 13.

CHENNAI CIRCULAR CITY DSS

A GIS-based Spatial Decision-Support Framework for Action-Oriented Circular Urban Transitions

ACTION-ORIENTED TRANSITIONS • CIRCULAR CITIES • CHENNAI

ZERO WASTE

WATER MANAGEMENT

TEAM CCCDM •
VIKASHINI

01 THE CHALLENGE

From fragmented resources to local action

Water resources, organic waste, urban heat and infrastructure pressures are interconnected, but are often planned separately. The challenge is to identify where existing local resources can support nearby circular opportunities.

Municipal decision-makers need a simple way to identify where detailed assessment should be prioritised.

CITY- SPECIFIC NEEDS

- 1 Use existing infrastructure before proposing new assets.
- 2 Prefer locally feasible resource destination relationships.
- 3 Account for climate need and urban environmental conditions.
- 4 Provide transparent evidence planners can inspect and discuss.

02 THE PROPOSED SOLUTION

Spatial Decision-Support System

Converts existing spatial datasets into location-specific circular opportunities. Links resources, destinations, distance, climate need and infrastructure conditions, then presents results through maps and plain-language decision summaries.

SCREENING TOOL ONLY detailed engineering, regulatory and water-quality assessment still follows.

WATER REUSE

Treated wastewater → suitable non-potable urban green infrastructure

LOCAL • FEASIBLE • ACTIONABLE

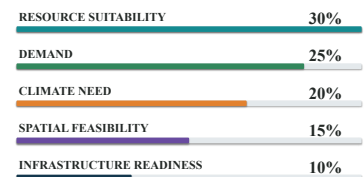
ORGANIC WASTE

Organic - waste infrastructure → nearby circular opportunities

LOCAL • FEASIBLE • ACTIONABLE

03 DECISION LOGIC

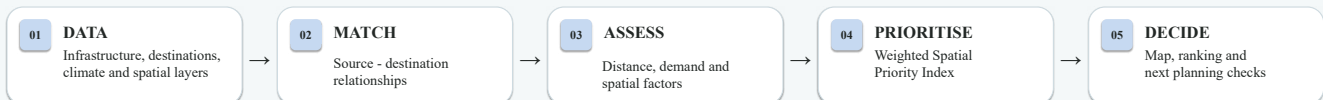
SPATIAL PRIORITY INDEX



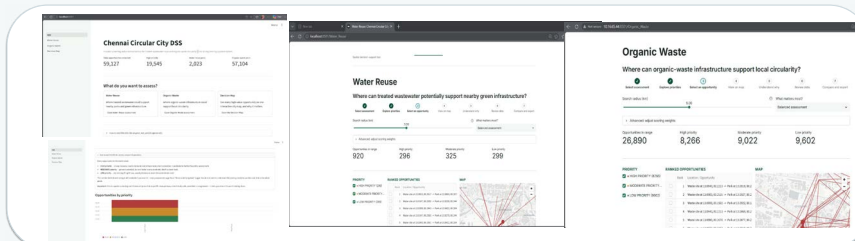
Higher scores = greater screening priority, not guaranteed implementation feasibility.

HOW THE DSS WORKS

From spatial data to a planning priority



FROM SCREENING TO ACTION



04 LOCAL ACTIONS

- 1 IDENTIFY Locate priority circular opportunities on an interactive city map.
- 2 SCREEN Compare source-destination relationships using common spatial criteria.
- 3 INVESTIGATE Focus detailed engineering, water-quality, cost and regulatory checks.
- 4 COORDINATE Provide a common spatial evidence base for departments and stakeholders.

05 EXPECTED IMPACT

RESOURCE EFFICIENCY • CLIMATE RESILIENCE • COST AWARENESS • TRANSPARENT DECISION-MAKING • SCALABILITY
ALIGNMENT: SDG 6 • SDG 11 • SDG 12 • SDG 13 | Chennai pilot framework → update with municipal datasets → apply to additional zones or cities



Dhaka LoopDrain: Repairing the Broken Chain from Waste to Water to Food



Bangladesh



Ayesha Ashrafi Rifa
Nusaiba Binte Mohiuddin

Problem Statement:

Every monsoon, Dhaka's low-lying wards become traps. Paved surfaces and vanished khals have erased natural absorption, while plastic and mixed waste chokes what drainage remains. The result is systemic failure: the Baunia Khal canal chain—Abdullahpur to Digun to Baunia to Rupnagar—empties into the Goran Chatbari retention pond, yet reduced pond capacity means Mirpur, Pallabi and Kalshi stay underwater after even light rain (Alam et al., 2023; Sakib et al., 2023). Persistent littering reflects public apathy, weak enforcement and entrenched habit, allowing the same blockages to recur.

Context:

Flooding damages residents' homes, mobility and incomes; disrupts students' classes and examinations; costs businesses and vendors trading days and stock; and exposes informal waste workers to repeated, unsafe drain clearing. The Daily Star reported that waterlogging forced the Dhaka Education Board to reschedule HSC examinations from 13 July to 24 August 2026 (The Daily Star, 21 August 2026; Dhaka Education Board, 20 August 2026). The disruption displaced students, disrupted calendars and eroded public trust.

Proposed Solution:

What distinguishes LoopDrain is not a filter medium but an accountability architecture: the Ward Loop Cell coordinates four physical modules as one system. CleanEdge intercepts solid waste at source with screened inlet baskets, stopping the clogs that trigger cascade failure. SpongeCourts buffer stormwater through rain gardens and permeable surfaces. BioDrain treats residual runoff with engineered media and root-zone biofiltration, keeping pollutants from canals. SafeFood Loops convert verified source-separated organics into compost for peri-urban agriculture. Remove any module and the loop breaks.

Implementation:

The pilot targets the Baunia Khal–Goranchatbari micro-catchment, subject to field verification, and is designed to complement the Tk 567 crore World Bank initiative restoring the Goran Chatbari pond and Turag River. The Ward Loop Cell links City Corporation and WASA staff, councillors, waste-worker cooperatives, university labs, schools, markets and residents. A sweeper reported clearing one inlet three times before noon, then watching a shopkeeper toss in a vegetable bag—work undone faster than wages earned.

Feasibility:

The indicative pilot cost is approximately 35 lakh BDT, financed through grant capital, City Corporation in-kind labour and revenue from recovered materials. Rather than importing proprietary technology, LoopDrain uses modular, locally repairable components—concrete baskets, gravel media and composting bins—that any ward mechanic can maintain.

Scalability:

Four gates determine scale-up: safety protocols proven, maintenance routines established, hydraulic performance verified and cost-per-catchment value demonstrated. If these criteria are met, the same kit-of-parts expands from pilot to full ward coverage, then to additional Dhaka catchments and other Bangladeshi cities.

Sustainability Impact:

Impact will be measured against baseline targets: drain blockage incidents cut from an estimated 12 per month to under 4, waste intercepted rising from 0 to 2.5 tonnes monthly, and compost batches tested for pathogens before distribution. The project advances SDGs 6, 11, 12 and 13. The goal is to stop waste before it blocks water, before it keeps students from exam halls, and before it undermines the systems that Tk 567 crore is meant to restore.

Ayesha Ashrafi Rifa (23) — Undergraduate Student
Nusaiiba Binte Mohiuddin (24) — Undergraduate Student
Country: [Bangladesh](#)

Why Dhaka Needs a System, Not Another Isolated Drain

Dhaka's waterlogging is produced by intersecting pressures: intense rain, paved land, lost khals, clogged inlets, polluted receiving waters and weak maintenance. Research identifies solid and plastic waste as major blockage factors, while shrinking urban drainage reduces runoff storage. Greater Dhaka's rivers remain in poor condition during monsoons, when large populations may be exposed to polluted floodwater.

The July 13, 2026 HSC exam was disrupted by waterlogging so severely that the Dhaka Education Board rescheduled it to August 24 — a human cost that makes the infrastructure gap visible.

How can one ward-scale intervention reduce avoidable blockage, slow runoff, protect food safety and create accountable local maintenance?

The diagram illustrates the CleanEdge water treatment process flow, which consists of the following steps:

- Households + Markets** (represented by a green circle icon)
- CleanEdge capture** (represented by a green circle icon)
- Sorted materials** (represented by a yellow circle icon)
- Rain + runoff** (represented by a blue circle icon)
- SpongeCourts** (represented by a green circle icon)
- BioDrain Biofilter** (represented by a blue circle icon)
- Cleaner, slower water → khal** (represented by a green circle icon)

Arrows indicate the sequential flow from one step to the next.

Dhaka LoopDrain is a ward-scale demonstration that captures waste upstream, stores and biofilters stormwater locally, and converts only tested organic material into safe non-food or food-system inputs.

It targets the mechanism Dhaka's own studies flag as most controllable at ward scale — solid waste blocking drains — with a maintained, accountable loop rather than a bigger pipe.

Four Modules

- 1. CleanEdge**
Removable inlet baskets, canyons, bypass capacity and safe lifting points. Recyclables and organics are separated at source; hazardous waste is isolated.
- 2. Sponge Courts**
Permeable paving, planted areas, Gardens and small detention cells at school markets, road edges and public places. Distributed "pressure" valves along the drainage flush.
- 3. BioDrain Biofilter**
A passive bio-retention cell with engineered media, biochar and plant-soil microbe zones. Treats a controlled first flush before the khal; bypassed during extreme rainfall.
- 4. SafeFlow Loops**
Verified source-separated organics become controlled compost or digestion feedstock. Food demonstrations use clean growing media — no untreated material enters food production.

- The innovation is the operating chain, not an imported device.
- Maintenance has owners: inspection frequency, replacement rules and payment triggers
- Circularity is pollution-aware — tested materials only enter reuse.
- A baseline-vs-intervention comparison design tests performance before scale-up.
- Modular components can be resized for another ward or a secondary city.

Pilot site: Baunia Khal-Goranchatbari micro-catchment.

Field interviews reveal a municipal sweeper clearing the same drain inlet three times before noon, then watching a shopkeeper toss a vegetable bag into it while he stood there with his broom — work undone faster than wages earned.

LoopDrain complements the Tk 567 crore World Bank Metro Dhaka Project (Goran Chatbari Retention Pond & Turag River Protection, Phase 1, 2025–2028); it intercepts waste upstream so the infrastructure being rebuilt downstream does not immediately re-clog.

Indicative pilot cost: **₹35 lakh BDT** (3,500,000 BDT), blending grant capital, City Corporation in-kind support and service revenue.

Locally repairable components – concrete baskets, gravel media, composting bins – keep upkeep within ward-level skills and budgets.

Four feasibility gates: safety | maintenance | performance | value.

Kit-of-parts scalability: pilot → ward → other Dhaka catchments → other Bangladeshi cities.

No proprietary lock-in.

- 1** **DIAGNOSE** *0-3 Months*
Select the catchment with City Corporation, WASA, water leaders and a university; map flows, hotspots and risks.
- 2** **BUILD** *3-6 Months*
Install capture points, SpongeCerts and a controlled organics hub. Train operators, commission monitoring.
- 3** **TEST** *First monsoon*
Comprehensive intervention and reference sites after comparable rainfall across every indication.
- 4** **SCALE** *Next monsoon*
Expand only if safety, maintenance and performance gates are met.

3.5 million BDT (35 lakh) for 12 months — 6 ClearEdge points, 3 SpongeCourts, 1 BioDrain cell, monitoring, training and local operator payments.

Baseline vs target: reduced blockage incidents, intercepted waste volume, and compost batches passing pathogen testing.

"Separate it. Report it. Keep the loop moving."

Residents, vendors, schools, waste workers and institutions earn verified recognition. Five category-balanced Loop Champions are selected each quarter; winners receive certificates and useful project-linked goods.

- **Markets, schools & residents** — source separation and stewardship
- **Waste-worker cooperatives** — collection and safe handling
- **Universities / labs** — testing and evaluation
- **Local enterprises** — fabrication and maintenance
- **Dhaka WASA** — technical interface
- **Ward Loop Cell** — oversight and grievance response
- **City Corporation** — permits and drainage coordination

12 → 4 Blockage / month	8 → 3 Waterlogging (hrs)	0 → 2.5 Waste intercepted (t/mo)
- Low blockage – drains functional after target storms - Cleaner runoff – turbidity, nutrients, microbial indicators - Inclusion – PPE, paid local jobs, women's participation	- Low waterlogging – duration & affected area, matched sites - Circular materials – kg intercepted, recovery, test benches - Scale readiness – cost per catchment, maintenance hrs/mo	

Primary impact: 6, 11, 12, 13 | Co-benefits: 8, 2

Bottom line: LoopDrain does not claim that baskets or wetlands alone can solve Dhaka's flooding.

We will prove that preventing waste blockage, buffering runoff, protecting food safety and paying for maintenance can work as one measurable circular service.



DrainWatch for Rajshahi



Bangladesh



Md Abu Sufyan,
Musfiqur Rahman
Minhajul Islam Niloy

DrainWatch proposes an affordable drainage maintenance system for Rajshahi that detects probable blockages, prioritises inspection, verifies cleaning, and records recovered waste. Municipal reporting from July 2026 describes garbage and mud obstructing Ward 11 drains, with cleaning restoring flow. This provides a candidate survey area, rather than a confirmed installation site. Residents, pedestrians, small businesses, and sanitation workers would benefit from more reliable drainage maintenance. [1]

We propose monitoring three drain segments within one connected urban catchment using six noncontact water level sensors and one rainfall gauge. Embedded nodes would transmit measurements to a dashboard, retaining readings locally during communication outages. Installation would follow a geometry survey, sensor calibration, connectivity assessment, and municipal permission. Rainfall, upstream and downstream water levels, rates of change, and recession patterns would inform site specific alerts. High water alone would never be treated as proof of blockage.

The engineering contribution is an explainable decision process that separates probable local obstruction, wider downstream congestion, high water, and sensor faults. Paired level analysis and drainage monitoring have precedents; DrainWatch would test their practical integration with maintenance verification and material recovery. Initial rules would be compared with a simple water level threshold before considering more complex models. Every alert would show its evidence and request inspection, preserving human judgement where hydraulic conditions are ambiguous. [2,3]

A supervisor would assign inspections through a Bangla interface. Workers would record the observed cause, cleaning action, and material quantities. Subsequent drainage behaviour would help assess whether cleaning improved flow, accounting for different rainfall conditions. Accepted recyclables would go to identified buyers; contaminated

residues would follow municipal disposal arrangements. Repeated waste entry locations would inform collection schedules and prevention measures. Workers would help design reporting procedures, receive training, and retain responsibility for operational decisions. No automated trash barrier is proposed. [4]

Development would proceed through a twelve week pilot after permissions: site assessment and worker consultation, laboratory validation, installation and baseline monitoring, then evaluation during available rainfall events. Controlled tests would vary inflow, obstruction, downstream backwater, and sensor failure. Separate evaluation trials would measure detection sensitivity, false alarms, warning time, and reliability against the baseline. Field assessment would track response time, sensor uptime, maintenance effort, waste removed, and documented recovery destinations. Inadequate rainfall would require extending observation rather than claiming effectiveness.

The RUET student team would combine CSE software and analysis with EEE sensing and power engineering, drawing on IoT experience. Proposed municipal engagement would establish inspection ownership, data access, and recurring maintenance funding before deployment. Installation and service contracts offer a potential expansion model across comparable drainage catchments, with calibration repeated at each site. Cost estimates require supplier quotations and field surveys; recycling income is supplementary. To support replication, the team would publish a sensor maintenance guide, document calibration procedures, and report failures alongside successes, enabling other municipalities to judge suitability before committing resources to deployment. Expected benefits include earlier intervention, less waste leakage, and better maintenance accountability, supporting circular and resilient urban development. These are proposed outcomes, not measured achievements; partnerships and sites remain unconfirmed. [5]

YOUTH FOR CLIMATE HACKATHON 2.0 / CITY PROPOSAL

DrainWatch

Detect likely blockages. Verify cleaning. Recover waste.

RAJSHAHI, BANGLADESH | Proposed development by RUET CSE and EEE students

Zero waste + integrated water management | Concept stage - no field results claimed

01 THE CITY NEED

Find the obstruction before it becomes an emergency

July 2026 reporting links garbage and mud to restricted flow in Rajshahi Ward 11 drains. Cleaning restored function. [1]

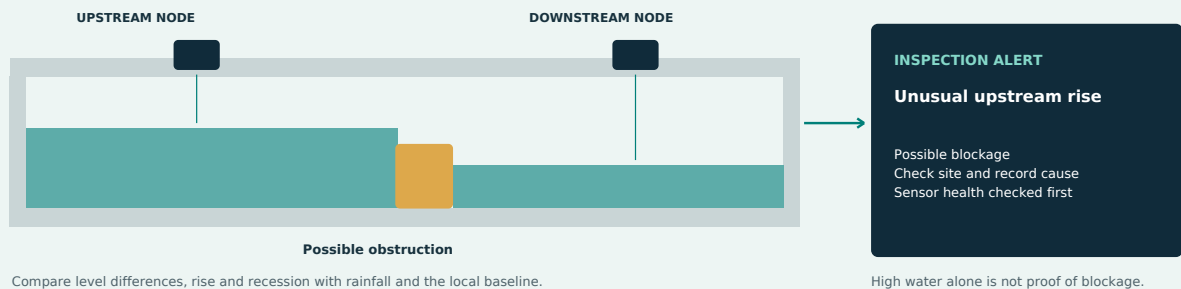
02 THE PROPOSED ADVANCE

Turn sensor readings into verified maintenance

Test explainable blockage diagnosis against a simple high-water alarm, then connect inspection, cleaning and waste destinations. Prior sensing research exists. [2,3]

03 SENSE THE DRAIN / ACT ON THE EVIDENCE

Illustrative drain section - not a surveyed site or measured result



04 CITY PILOT

3 segments 6 level nodes 1 rainfall gauge

One connected catchment, selected after survey and municipal permission. Ward 11 is a candidate survey area, not a confirmed site. [1]

Proposed 12 weeks

- 1-2: survey + worker consultation
- 3-4: laboratory tests
- 5-6: installation + baseline
- 7-12: rain-event evaluation

Extend observation if rainfall is insufficient. City access and partnerships remain unconfirmed.

05 PROVE IT WORKS

Compare against a single-sensor alarm

Controlled trials

Vary flow, blockage, downstream backwater and sensor faults. Reserve separate trials for evaluation.

Measure

- Detection sensitivity + false alarms
- Warning time + sensor uptime
- Inspection response + cleaning time
- Waste mass + accepted recovery

No accuracy, flood reduction or carbon savings claimed before measurement.

06 CLOSE THE LOOP

Less waste returns to the drain

Co-design Bangla reporting with sanitation workers. Link accepted recyclables to buyers; send contaminated residues through municipal disposal.

Prevent recurrence

Use repeated waste-entry locations to improve collection schedules.

Scale by catchment

Installation + maintenance service, with local calibration at every site.

Supplier quotes and field surveys will establish cost. Recycling income is supplementary.

DESIGN LIMITS

Sensing only: no trash barrier in the initial pilot. Maintenance ownership, safe access and recurring funding are deployment prerequisites. Capacity shortages and backwater require wider drainage action. [4]



ChennaiLoop — AI-Powered Urban Material Exchange for Circular Construction & Waste Management



India



Mridula L
Monika S
Govarthani TS

Problem statement.

Chennai's construction boom creates a large flow of materials that can be reused or recycled but are often managed as waste. Greater Chennai Corporation (GCC) reports approximately 850 tonnes of construction and demolition (C&D;) waste per day. GCC also notes that debris is frequently dumped near roads, vacant land and water bodies to avoid transportation and disposal costs. Existing processing facilities demonstrate that recovery is possible, but a persistent gap remains between material generation, trusted quality information, buyers, workers and city-level monitoring.

Proposed solution.

ChennaiLoop is a software-first circular-material exchange for Chennai. Builders and demolition contractors log C&D; material through a mobile/web interface using photographs, quantity, location and basic site information. An AI-assisted classification layer identifies likely material categories such as bricks, aggregate, metal and wood and estimates recoverability for human verification. A marketplace then matches recoverable materials with recyclers, contractors and participating informal workers using transparent pricing and availability. Each verified material batch receives a QR-based Material Passport containing its source, material type, processing status and transaction history, improving trust in secondary materials. A city dashboard aggregates anonymised data on material flows, recovery and diversion from disposal.

Inclusion and local action.

ChennaiLoop treats informal waste workers as partners in the circular economy rather than invisible labour. Participating workers can receive digital IDs, safety-gear support and

access to marketplace transactions. The pilot would work with existing recyclers, scrap dealers, C&D; processors, worker collectives and local authorities rather than attempting to replace the existing ecosystem. GCC's current C&D; guidelines and processing infrastructure provide a practical institutional base for testing the platform.

Feasibility.

The first phase can be implemented without new heavy infrastructure. A 2–3 ward pilot can test material listing, AI-assisted classification, buyer matching, QR passports and dashboard reporting. Success can be measured through tonnes listed, tonnes recovered/reused/recycled, number of transactions, average time to match, participating workers, income generated, and estimated disposal avoided. Human verification remains essential for safety and material-quality decisions; the platform is a coordination and traceability layer, not a substitute for engineering certification.

Scalability and sustainability impact.

The core model is portable: standardised material categories, digital passports, matching rules and city dashboards can be adapted to other South Asian cities. By retaining material value, ChennaiLoop supports circular construction, reduces uncontrolled dumping and creates more inclusive economic opportunities. The concept aligns with SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production), SDG 8 (Decent Work and Economic Growth) and SDG 13 (Climate Action). It also reflects ICLEI's circular-city approach of moving from a linear "take, make, waste" model toward closed material loops and local circular economies.





AquaCycle Chennai

Smart Greywater
Recycling for
Water-Resilient
Apartments on the
OMR–Sholinganallur
Corridor, Chennai



India



Dharanya S
Jayanthi Venkata Sreeja
B Shivani Sundari

Problem Statement

Chennai depends on four reservoirs — Chembarambakkam, Poondi, Puzhal and Cholavaram — that have gone completely dry in recent drought years, leaving residents dependent on costly private tankers. A 2017 Central Ground Water Board assessment classified all 20 blocks of Chennai district as “over-exploited” for groundwater. The crisis is most acute along the OMR–Thoraipakkam–Sholinganallur IT corridor, where rapid apartment construction has outpaced Metro Water pipeline coverage, forcing residents to pay ₹ 2,000–5,000+ per tanker load during shortages. Meanwhile, each apartment household discards 100–130 litres per day of only lightly-used greywater from bathrooms, washing machines and RO units — water that needs minimal treatment to be reused, yet nationally only about 5% of India’s greywater is currently recycled.

Proposed Solution

AquaCycle is a compact, sensor-automated greywater recycling unit designed for retrofit at the apartment-block level. Greywater from bathrooms, wash-basins, kitchens and washing machines is collected in a settling tank, then passed through five stages: micron filtration (500/130/15-micron) to remove solids; activated carbon to adsorb odour, oil and chemicals; UV treatment to eliminate bacteria; ion exchange to remove salts and hardness; and a sensor layer that continuously monitors level, flow, pressure and water quality. Automatic valves route only verified-safe water to toilet flushing, gardening and cleaning, while auto-backwash keeps filters clean without manual intervention. The design prevents any mixing of untreated wastewater with the reuse stream, and targets recycling 70–90% of the freshwater currently drawn for non-potable uses. In effect, AquaCycle turns each apartment block into a closed-loop water system — a building block of a circular city.

Key Features / Innovation

AquaCycle is built around four differentiators from conventional, manually-cleaned greywater units: (1) Auto-Backwash — pressure sensors detect filter clogging and trigger automatic reverse-flow cleaning, cutting maintenance from weekly to almost never; (2) Fail-Safe Diversion — any water-

quality anomaly is automatically routed to drain, never reaching the reuse tank untreated; (3) a Live IoT Dashboard giving residents real-time visibility into tank levels, litres saved, and filter health; and (4) a Modular, Retrofit-Ready design scaling from a single block to a full township. Based on published Indian small-scale system pricing, estimated freshwater/tanker demand reduction is 70–90% for AquaCycle versus ~35% for a conventional unit and 0% with no system.

Impact / Relevance

For OMR–Sholinganallur apartments already paying heavily for tanker water, a 70–90% cut in freshwater draw translates directly into cost savings and reduced dependence on an increasingly saline, over-extracted aquifer. At city scale, wide adoption would ease pressure on Chennai’s reservoirs and sewage infrastructure while cutting the volume of soap-, oil- and food-waste-laden water reaching stormwater drains and water bodies. The solution aligns with SDG 6 (Clean Water & Sanitation), SDG 11 (Sustainable Cities & Communities), SDG 12 (Responsible Consumption & Production) and SDG 13 (Climate Action), and complements Tamil Nadu’s existing mandatory rainwater-harvesting framework — offering a scalable, community-level model for climate-resilient water management across South Asian cities facing similar urban water stress.

References

1. Central Ground Water Board (2017), cited in The New Indian Express / The Quint — Chennai district groundwater over-exploitation assessment.
2. Mongabay India (2019). “Chennai water crisis once again exposes the city’s climate vulnerability.”
3. The Quint (2017). “Water Crisis Leaves Chennai Dry, at the Mercy of Tankers.”
4. Water-Energy Nexus Journal (2022). Greywater filtration study, Indian household — COD/BOD/TSS removal efficiency 85–94%.
5. The Better India (2023). JalSevak, Pune — decentralised greywater reuse case study, ~40% freshwater savings.
6. Confident Group × CWRDM Kerala (2025) — pilot apartment greywater reuse case study.



AquaCycle Chennai - Smart Greywater Recycling for Water-Resilient Apartments on the Sholinganallur Corridor



Why Sholinganallur ?

IT & RESIDENTIAL GROWTH — Sholinganallur is a rapidly developing IT-residential corridor, with increasing commercial activity and a growing concentration of apartment communities. This makes community-level water management increasingly relevant.

HIGH POTENTIAL FOR WATER REUSE — The concentration of residential communities generates a continuous stream of greywater that can be treated and reused for suitable non-potable applications, helping reduce freshwater demand and promote sustainable urban water management.

PROBLEM STATEMENT

Sholinganallur is experiencing rapid IT and residential development, resulting in growing water demand across apartment communities. At the same time, large quantities of greywater generated from daily activities such as bathing, handwashing and laundry are often discharged instead of being reused. This creates an opportunity to recover and reuse water for suitable non-potable purposes.

CGWB's 2017 assessment classified all 20 blocks of Chennai district as "over-exploited" for groundwater, and OMR-Sholinganallur apartments — many without Metro Water pipeline access — depend heavily on private tankers costing ₹2,000–5,000+ per load during shortages.

SOLUTION

AquaCycle closes the water loop at the apartment level — capturing greywater that would otherwise be discharged as waste, treating it through a multiple-stage automated process, and returning it to the building as a usable resource for flushing, gardening, and cleaning, instead of drawing fresh water or tanker supply for these needs.



AquaCycle turns each apartment block into a closed-loop water system — a building block of a circular city.

Why AquaCycle Is Different

- Auto-Backwash** — Pressure sensors detect filter clogging and trigger automatic reverse-flow cleaning, cutting manual maintenance from weekly to almost never.
- Fail-Safe Diversion** — If water quality sensors detect any anomaly, the batch is automatically routed to drain — never reaches the reuse tank untreated.
- Live IoT Dashboard** — Residents and RWAs see real-time tank levels, litres saved, and filter health — not a black-box system.
- Modular, Retrofit-Ready** — Scales from a single apartment block to a full township without redesign.

Feasibility & Scalability

Factor	Detail
Tech-ready	Off-the-shelf micron/carbon filters, UV, ESP32-class controller & sensors
Cost (retrofit)	₹2.5–4.5 lakh for ~50 flats (≈ ₹5,000–9,000/flat)
Cost (new-build)	₹2.0–3.5 lakh for ~50 flats (≈ ₹4,000–7,000/flat) — cheaper, pre-segregated plumbing
Maintenance	Auto-backwash handles routine cleaning; technician check every 2–3 weeks
Policy-aligned	Complements Tamil Nadu's mandatory rainwater harvesting rules
Scalable	Apartment block → hostel → gated township, same modular unit

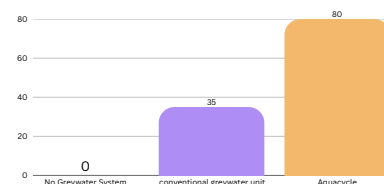
Impact at a Glance

70–90%	50+ flats	100–130 L/day	2–3 wk
Freshwater saved	Per pilot block	Greywater recovered/household	Maintenance interval

ALIGNMENT WITH SDGs



Freshwater / Tanker Demand Reduction (%)



References:

- Central Ground Water Board (2017), cited in The New Indian Express / The Quint
- Mongabay India (2019). "Chennai water crisis once again exposes the city's climate vulnerability."
- The Quint (2017). "Water Crisis Leaves Chennai Dry, at the Mercy of Tankers."
- Water-Energy Nexus Journal (2022). Greywater filtration study, Indian household.



Waste2Wear: Circular Bio-Textile Substrate

**Turning Banana
Waste into Next-
Generation
Sustainable Materials**



Nepal



Narendra SK

1. Executive Summary & Problem Context

Fast-growing cities generate huge agricultural waste in surrounding rural zones. Banana farming leaves tons of pseudo-stem waste after every harvest. Farmers typically burn these stems or leave them to decay, releasing harmful methane and carbon emissions while polluting local soil and water systems. Simultaneously, urban fashion, footwear and upholstery industries rely heavily on traditional animal leather or synthetic plastics like PVC and PU. Traditional chrome tanning pollutes rivers with toxic wastewater, while plastics linger in landfills for centuries. Waste2Wear solves both challenges by converting post-harvest banana stems into a strong, non-toxic, bio-based composite that replaces animal hides and synthetic textiles.

2. Process & Material Design

Our production process converts raw farm residue into durable bio-textile sheets through an eco-friendly method designed to safeguard proprietary technical details:

- **Fiber Extraction:** Banana stems undergo mechanical decortication to isolate long cellulose fibers, followed by mild eco-cleaning to remove natural impurities and lignin.
- **Matrix Compounding:** Cleaned fibers are blended with natural rubber latex to build a flexible substrate. A proprietary mixture of safe mineral activators and sulfur vulcanizing agents creates strong cross-links, providing elasticity, water resistance and thermal endurance.
- **Sheet Finishing:** The matrix is layer-molded, heat-pressed and sealed with organic bio-wax for surface protection.

3. Impact on Circular Cities & Livelihoods

Waste2Wear advances circular urban economies by linking city material demand with rural agricultural waste. Replacing plastics with renewable fibers keeps farm waste out of burn piles and reduces industrial chemical runoff. Decentralized decortication units in villages enable banana farmers to earn steady secondary income, boosting rural livelihoods while securing sustainable supply chains for green cities.

WASTE2WEAR: CIRCULAR BIO-TEXTILE SUBSTRATE

Turning Banana Agricultural Waste into Next-Generation Sustainable Materials

THEME: CIRCULAR CITIES | TEAM WASTE2WEAR

100%

Bio-Based Waste Valorisation

0%

Chrome Effluents & Toxic Plastics

85%

Lower Carbon Footprint

+30%

Farmer Household Income

1. THE URBAN WASTE CHALLENGE

Fast-growing cities generate huge agricultural waste in surrounding rural zones. Banana farming leaves tons of pseudo-stem waste after every harvest. Farmers typically burn these heavy stems or leave them to rot in open fields, releasing greenhouse gases (methane/CO₂) into the atmosphere.

Simultaneously, urban fashion, footwear and upholstery industries rely on animal leather or synthetic plastics like PVC and PU. Traditional leather tanning pollutes water systems with toxic chromium, while plastics persist in urban landfills for centuries. Waste2Wear solves both problems by turning banana waste into a strong bio-based substrate.

2. MATERIAL ARCHITECTURE & DESIGN

Our clean, low-carbon process transforms agricultural residues into high-performance bio-composite materials while protecting core trade secrets:

- **High-Strength Cellulose Matrix:** Structural fibers extracted from banana pseudo-stems provide internal tensile strength and durability.
- **Proprietary Eco-Curing System:** Utilizes safe mineral activators and sulfur-based vulcanizing agents to establish strong chemical cross-links without revealing explicit chemical proportions.
- **Bio-Elastomer Blend:** Combines natural plant-based elastomer base for flexibility, water resistance and heat endurance.

3. CLOSED-LOOP MANUFACTURING FLOW

1. Decortication & Eco-Cleaning

2. Matrix Compounding & Fiber Integration

3. Thermomechanical Setting & Curing

4. Organic Bio-Wax Surface Finishing

Our manufacturing process produces zero toxic effluent, operates with high energy efficiency and delivers durable bio-textile sheets ready for daily consumer goods such as ladies' purses, men's wallets, belts, formal shoes and casual footwear.

4. CIRCULAR CITIES & SOCIO-ECONOMIC IMPACT

- **Waste Valorisation:** Converts agricultural waste liability into a valuable economic asset.
- **Urban-Rural Synergy:** Connects rural farm waste supply chains directly with urban eco-conscious industries.
- **Farmer Livelihoods:** Establishes village-level decortication units, enabling farmers to earn steady secondary income.
- **Scalability:** Modular manufacturing design allows rapid scaling across agricultural regions worldwide.



Thinithi
Edirisinghe



Sri Lanka

Problem Statement

Colombo's wetland margin settlements face a growing convergence crisis, driven by shrinking flood buffer capacity, limited management of organic waste, and food insecurity that recurring economic shocks keep exposing. Canal side communities lack the land tenure, infrastructure, or budget to access proper systems on their own. Wetland degradation has already cut flood retention capacity by roughly 166,347 m3. For convenience, most households dump waste into the same canals that once buffered flooding. They also rely on unstructured home cultivation that swings between shortage and oversupply, with no market data to guide it. Coordination across councils remains limited, and no local mechanism currently turns waste, water, and food into one connected resource, leaving these communities to absorb three compounding failures at once.

Proposed Solution

WetLoop Colombo solution is a three node physical loop plus one digital coordination layer, piloted at Kolonnawa before expanding along Colombo's connected marsh network. A Compost Hub converts household organic waste into biogas and compost through a sealed biodigester and windrow composting. A Wetland Buffer Belt filters that run off and canal greywater through a constructed wetland. Producing clean irrigation water while rebuilding lost flood retention capacity. A Grow Grid uses the compost and treated water to cultivate food on plots. It is governed by a demand matched planting calendar where if a crop's market price drops, signalling oversupply, the next cycle automatically shifts area toward an under supplied crop to prevent repeat gluts. A simple points based app "Loop Points", rewards households for

waste segregation, plot volunteering, and hazard reporting.

Feasibility

Every node sits on existing public or canal reservation land, avoiding tenure conflicts entirely. The technology is low tech as sealed biodigesters and constructed wetlands need minimal electricity. A single hub processes 1–1.5 tons of waste daily, serving 500–800 households, using treatment methods already proven elsewhere. Governance stays light by design as a local authority (eg:urban council) and a residents' community co-operative operate the pilot, with no new organization required to begin, and no dependence on capital intensive infrastructure.

Scalability

The rollout is explicitly phased. A single site pilot proves the full loop functions as one system before replication begins nearby, then expands to other wetland adjacent wards across the district. At a 10 hub network, the system could process 10–15 tons of waste daily while bringing 50–80 hectares of food land under coordinated cultivation, all on land already available.

Sustainability Impact

WetLoop Colombo converts uncollected waste and polluted canal water into clean energy, irrigation water, and food. It restores wetland flood buffering capacity ahead of a floodplain population projected to nearly double by the 2060. Builds a demand matched food system resilient to future economic shocks. Also creates local livelihoods as compost operators, plot coordinators, and wetland watchers under a clear governance structure. The project directly advances SDG 2, 6, 11, 12, 13, and 15, spreading out climate resilience to the ward level for Colombo District's most flood exposed communities.

WetLoop Colombo: A Wetland based Circular System for Waste, Water and Food Security in Colombo, Sri Lanka

Aim

WetLoop Colombo aims to create a decentralized circular system that connects waste, water and food at the ward level. Instead of treating these resources as separate problems, the system turns the output of one process into the input of another. Organic waste is converted into biogas and compost, treated water is reused for food production, and crop residues return to the waste processing system. The project will begin with a pilot around the Kolonnawa wetland corridor and gradually expand to other areas once the complete circular loop is proven to work.



Why COLOMBO?

Colombo is built on a low lying river estuary and holds Ramsar Wetland City status. An accreditation that spans across multiple local councils within Colombo district. Rapid urban growth has steadily displaced the wetlands that once buffered flooding. The 2022 economic crisis showed why these can't be solved separately. It triggered a waste funding crisis, a food security emergency, and accelerated wetland reclamation, all at once.



39%

of storm floodwater can be retained by wetlands

166,347 m²

of wetland flood retention capacity already lost

9% → 32%

increase in national food insecurity after 2022

Aligned with Sustainable Development Goals (SDGs)

WetLoop Colombo contributes to SDG 2 (Zero Hunger), SDG 6 (Clean Water and Sanitation), SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), and SDG 15 (Life on Land).

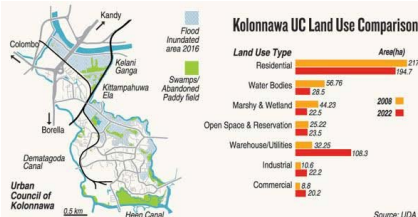


Future Risk Outlook

Risk	Projection / Indicator	Source
solid waste generated daily within Colombo	-1,320 MT (2026) will double up by 2036	WMA, 2026
Population on vulnerable floodplains	230,000-400,000 (2030s) + 400,000-500,000 (2060s)	SAR-CLIMATE /ADPC
Sea level rise	+0.2 to +0.6 m by mid-century	SAR-CLIMATE / ADPC
Projected GDP impact of climate events	-7.7%	SAR-CLIMATE / ADPC

Problem Statement

Colombo's wetland margin settlements face a growing convergence crisis, driven by shrinking flood buffer capacity, limited management of organic waste, and food insecurity that recurring economic shocks keep exposing. Existing solutions like centralized composting and waste-to-energy processing do work well within Colombo Municipal Council's own boundary, but don't reach these adjacent wards yet, while canal side communities lack the land tenure, infrastructure, or budget to access equivalent systems on their own. For convenience, most households dump waste into the same canals that once buffered flooding. Also they rely on unstructured home cultivation that swings between shortage and oversupply with no market data to guide it. Coordination across councils remains limited, and no local mechanism currently turns waste, water, and food into one connected resource. This leaves flood prone wetland communities to absorb three compounding failures at once, with nothing in place to turn them into shared assets instead.



Site Selection

The pilot begins at the Kolonnawa marsh corridor, where the Kelani River meets five of Colombo's canals. The area floods almost every monsoon, has limited local waste processing, and sits within a settlement with documented food insecurity. Here's the point where all three problems overlap most visibly, making it the clearest place to prove the loop before expanding it elsewhere.

The Solution: WetLoop Colombo

A modular hub deployed at neighbourhood scale, starting at canal-adjacent Kolonnawa. Small enough to fit on existing canal reservation or vacant public land.

1

Compost Hub (waste → fuel + fertilizer)



Input	Household organic waste, sorted wet/dry
Process	- Wet waste → sealed biodigester, 1,000-1,500 L (~25-30 days) → biogas. Bacteria break waste down in stages (hydrolysis → acidogenesis → methanogenesis) - Dry waste → compost windrows (~6-8 weeks). Piles turned every 4-5 days, thermophilic phase (55-65°C) kills pathogens/weed seeds
Output	Biogas (12-18 m ³ /day, fuels 8-12 households) + NPK compost
Runs it	Trained local youth "Loop Keepers" - handle intake segregation checks - digester feeding, windrow turning - quality testing the finished compost
Scale	1-1.5 MT/day per hub, ~500-800 households

2 Wetland Buffer (canal water → clean water + restored flood buffer)



In	Greywater, compost run-off, canal water
Process in 4 stages	1. Sedimentation-Solids and grit settle out in a shallow basin. Prevents clogging further downstream 2. Subsurface filter bed-Water percolates horizontally through gravel/sand. Has 0.6-0.8 m depth, 3-7 day retention time 3. Biofilm treatment-Microbial biofilm on roots/substrate breaks down organic matter, converts ammonia to nitrogen gas 4. Plant uptake + polishing pond-Typha, Phragmites, Canna absorb remaining nutrients/metals. final open water cell adds UV/settling time
Out	Treated water (70-90% BOD removal) + physically restored wetland edge
Runs it	Trained local youth "Wetland Watchers" - handle day to day water level - plant health monitoring
Dual function	Every m ² rebuilt directly offsets the documented 166,347 m ² citywide retention loss
Pathogen note	Reliable for nutrients/BOD, but pathogen removal depends on retention time. this is why Grow Grid irrigation starts restricted (below)

3 Grow Grid (compost + water → food)



In	Compost + treated water
Process	Drip irrigation delivers treated water direct to root zones (minimizing surface contact). Create a planting calendar tied to real local market prices so a crop losing value shifts next cycle's allocation elsewhere, preventing 2022 style gluts. Early crops restricted to non-root/cooked types under WHO 2006 wastewater reuse guidance, expanding once water testing clears higher tiers.
Out	Food, sold/shared locally. Residue returns to the Compost Hub
Runs it	A rotating roster of registered households, coordinated by the community co-operative, following a shared crop demand calendar.
Land	cultivation plots sit on existing public land contributed by the pilot ward's own local authority

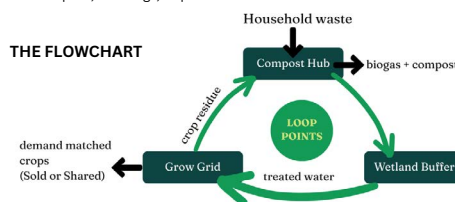
Loop Points (keeps the loop running)

A gamified mobile app (hybrid with a manual logbook, for households without smartphones) tracks and rewards the behaviors

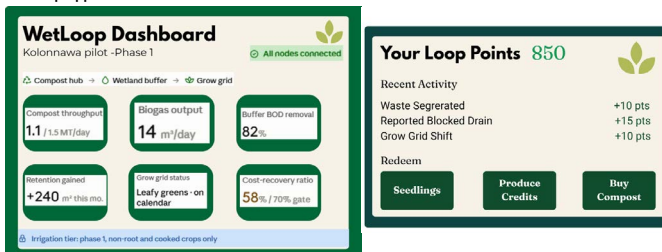
Action	Points
Waste segregation (per week)	+10 pts
Delivering wet waste to hub	+5 pts per 10 kg
Reporting a blocked drain or encroachment	+15 pts
Volunteering a Grow Grid shift	+10 pts per shift

Redeemable for: compost, seedlings, or produce credit. Prioritized for food-insecure households.

THE FLOWCHART



WetLoop Application



Impact / Relevance

Moves Colombo beyond simple waste disposal by recovering organic waste as compost, biogas and nutrients. Restores wetland flood buffering capacity ahead of a floodplain population projected to nearly double by the 2060s. Builds a demand matched local food system that reduces the risk of repeated crop gluts. Also creates local livelihoods like compost operators, plot coordinators, wetland watchers under a clear governance structure, a funded pilot. At full scale, a ten hub network could process 10-15 tons of waste daily while bringing 50-80 hectares of food land under coordinated cultivation, on existing public land with no new site conflicts. The same wastewater-to-food principle already operates at scale in India's century-old East Kolkata Wetlands, showing the model works beyond a single pilot.



Building a Circular, Locally Sourced and Climate-Resilient Livestock Feed System in Bhutan



Bhutan



Sonam Monger
Sangay Nidup
Lotay gyem

Project Overview

YOEBAR is a Bhutanese feed-manufacturing venture developing affordable, locally sourced and research-informed feed for dairy cattle, poultry, pigs and aquaculture. The business responds to a fundamental challenge in Bhutan's livestock sector: while the country has a significant livestock population and produces substantial quantities of milk, meat, eggs and fish, the feed system remains vulnerable to imported inputs, supply disruptions, price volatility and limited local manufacturing alternatives.

The opportunity is significant. According to Bhutan's Integrated Agriculture and Livestock Census (IALC) 2023, the country had approximately 260,565 bovines, 29,625 pigs, 819,335 poultry, 60,798 goats and 9,411 sheep. In 2023, Bhutan produced 43,829 metric tonnes of milk, 1,590 tonnes of pork, 1,475 tonnes of beef, 1,165 tonnes of chicken and 43 tonnes of fish, in addition to approximately 85 million eggs. Livestock accounted for 5.28% of Bhutan's GDP in 2022, demonstrating its importance to rural livelihoods, food security and the national economy.

However, livestock production depends heavily on a reliable supply of nutritious and affordable feed. When feed prices increase or imported supplies are disrupted, the effect is transferred directly to farmers through higher production costs and reduced profitability. This is particularly important for smallholder farmers, who have limited purchasing power and limited ability to absorb sudden increases in input costs.

The YOEBAR Solution

YOEBAR will establish a local feed-manufacturing system that links farmers, agricultural producers, agro-processors and livestock producers into one circular value chain.

The model begins with sourcing suitable crop residues and agro-industrial by-products through direct purchasing and contractual relationships with farmers and processors. These materials will be screened, cleaned, milled and formulated according to the nutritional requirements of different livestock categories. The formulated feed will then be processed into pellets suitable for commercial distribution.

The initial feed portfolio covers four major markets:

1. Dairy Feed Concentrated rations designed to supplement livestock diets, particularly during periods of fodder scarcity, while supporting dairy productivity.
2. Poultry Feed Starter, grower and layer formulations for backyard and commercial poultry production.
3. Piggery Feed Grower and finisher rations using locally available energy and protein resources.
4. Fish Feed Floating or sinking pellets for Bhutan's developing aquaculture sector, supported by research and formulation work.

The business will follow a "local first" sourcing principle. Inputs that can be competitively and safely sourced within Bhutan will be prioritised, while only essential materials that cannot currently be sourced domestically—such as selected vitamin and mineral premixes—will be imported.

YOEBAR

LOCALLY SOURCED · RESEARCH-LED · CIRCULAR

Turning Bhutanese by-products into resilient livestock feed

THIMPHU, BHUTAN · 2026



THE FEED SYSTEM HAS A STRUCTURAL GAP

A concentrated market, volatile imports and wasted local by-products

Yoebar builds a local alternative around what Bhutan already produces.

~75%

MARKET SHARE

held by a single dominant supplier

WINTER

FODDER GAP

scarcity hits smallholders hardest

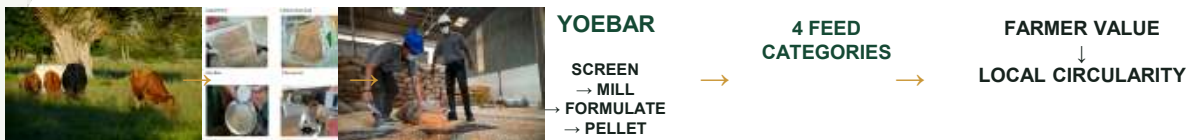
LOCAL

WASTE STREAMS

okara, mustard cake, rice bran, citrus pulp

THE YOEBAR MODEL

LOCAL FIRST · IMPORT ESSENTIALS ONLY



THE FORMULATION EDGE

NO ONE ELSE IS BUYING THESE STREAMS AT SCALE

CORE FEEDSTOCKS

Maize · rice bran & straw · mustard cake
Okara · Azolla · citrus pulp

WHY IT MATTERS

Lower input exposure + new value for farmers and processors

ONE PLANT · FOUR MARKETS



DAIRY

Concentrates for winter fodder gaps



POULTRY

Starter, grower & layer rations



PIGGERY

Grower & finisher rations



FISH

Floating/sinking pellets for aquaculture

EXECUTION, NOT JUST AN IDEA

- Business licensed · CRC90001649 (25 Aug 2026)
- 70 decimals leased at Khasadrapchu, Thimphu
- 2 tonnes/hour feed line specified; quotation signed
- Customer interest validated; supplier & mentorship links secured
- Equipment-support application submitted; 20% cost-share committed

FOUNDING TEAM

6-MONTH PATH TO MARKET

- M1-2 Site + utilities
- M2-3 Install + test
- M3-4 Formulate + validate
- M4-6 Pilot → commercial production

VISION: expand farmers' choices with sustainable local feed.

RAISING Nu. 3-5M · EQUITY / CONVERTIBLE



Circular Vegetable Beds: A Proposal for Community Resilience in Bangkok



Thailand



Kwankao Kittisakchoochai
Pareena Payackapan
Sahaporn Pamornmanop

Bangkok faces three interconnected urban challenges: chronic flooding, organic waste, and unequal access to quality food. Between 2024 and 2025, the city recorded 841 incidents of urban flooding. Meanwhile, organic material accounts for 42–52% of collected waste, but only 10–12% is recycled. Food insecurity is not simply a problem of scarcity, but many people, especially elderly and low-income residents, struggle to access affordable, safe, and nutritious food through increasingly vulnerable supply chains. These challenges share a common root: resources already available within communities are not being effectively reused. Circular Vegetable Beds aims to close this gap.

The project is a community-scale food production system that connects rainwater harvesting, food-waste composting, and vegetable growing in one circular loop. Rainwater is collected and stored to irrigate self-watering wicking beds, while organic waste is composted and returned to the growing system as fertilizer. Harvested vegetables can then be consumed within the community, reducing dependence on external food supplies and household or institutional food costs.

Each bed measures 1 m × 1.2 m × 0.5 m and is elevated on a 30 cm bamboo stand. It is constructed from a half-cut, reused food-grade Intermediate Bulk Container (IBC) giving discarded containers a productive second life. The upper section holds soil and plants, while the lower section functions as a water reservoir filled with gravel. A pipe connects the bed to a 120-litre rainwater tank, allowing water to rise through capillary action

and reach plant roots with minimal manual watering. A central, lidded composting unit allows food scraps to decompose directly in the soil, returning nutrients to the growing cycle.

The dimensions are designed around the safe reaching distance of physically limited users, including older adults, enabling greater independence in gardening. Routine operation requires only harvesting, replanting, trimming, and adding organic waste, making the system low-maintenance and accessible.

The pilot will be implemented at the Din Daeng Elderly Service Center, an active, free-access community space serving approximately 200 older adults daily. Its established health-promotion activities provide an ideal setting to integrate planting, harvesting, and composting into existing routines while enabling before-and-after impact measurement.

Implementation will take four months: site assessment and design (Weeks 1–2), construction and installation (Weeks 3–4), pilot cultivation and training (Months 2–3), and evaluation and refinement (Month 4). Through a B2B/B2G model, corporate CSR partners can fund units, while public agencies and institutions provide sites and community access.

By transforming stormwater and food waste into fresh vegetables, Circular Vegetable Beds offers a simple, affordable, and replicable model for improving food access, resource efficiency, and community resilience in Bangkok.

Circular Vegetable Beds

Turning Rainwater and organic Waste into Food supply for Community Resilience in Bangkok, Thailand

Theme	Problem in Bangkok' context
Water management	Bangkok experience frequent flooding in many areas. In 2024–2025, there were 841 incidents of urban flooding.
Organic Waste Circularity	Organic material makes up 42–52% of the total waste collected in Bangkok, while only 10–12% of the total gets recycled.
Industrial Waste Circularity	Lack of a formal repurposing system for Intermediate Bulk Container (IBC) used in food and chemical industries, Leaving small-scale operators no channels to create value from end-of-life IBCs.
Urban Food Systems	Bangkok's food security is about unequal access to affordable, safe, nutritious food and vulnerable supply chains.

IMPLEMENTATION PLAN / FEASIBILITY

Pilot Site: Din Daeng Elderly Service Center

ASSESS & DESIGN (WEEKS 1–2)

Survey the available space, sunlight, drainage system, and user needs to finalize the most suitable system layout.

BUILD & INSTALL (WEEKS 3–4)

Assemble the wicking bed, connect the 120-L water tank, and conduct flow and safety tests before operation.

PILOT OPERATION (MONTHS 2–3)

Train staff and participants to operate the system, collect food scraps, produce compost, and maintain the planting area.

EVALUATE & SCALE (MONTH 4)

Evaluate pilot performance, improve the system based on user feedback, and prepare the model for replication at new locations.

FUTURE PLAN

After the pilot, the system will be improved based on user feedback and performance results. The project will then expand to elderly centers, schools and communities through B2B, B2G and CSR partnerships.

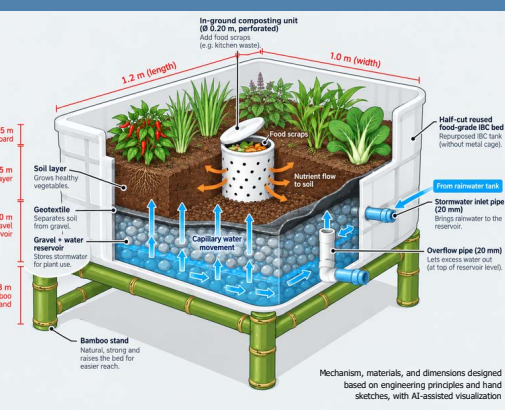
Proposed Solution

Circular Vegetable Beds are a community-scale food production system that integrates rainwater harvesting, organic waste recovery, and vegetable cultivation into a single circular system. Collected rainwater supports vegetable growth, while organic waste is converted into fertilizer and returned to the growing cycle. The harvested produce can then be consumed within the centre or community, creating a local resource-to-food loop.

Innovation and Key Features

- Modular Circular System:** Integrates rainwater harvesting, organic waste recovery, and vegetable cultivation into a modular system that can be adapted to each site by adjusting the number and arrangement of planting beds according to site conditions
- Self-Watering System:** A water reservoir, fed by the rainwater collection tank, continuously supplies moisture to plant roots through capillary action, reducing the need for frequent watering.
- Repurposed Food-Grade IBC:** Repurposes food-grade Intermediate Bulk Containers (IBCs) as safe vegetable beds, extending the useful life of discarded containers.

System Design



- 4. In-Ground Composting:** An integrated composting unit naturally decomposes food scraps and organic waste, returning nutrients to the growing cycle as fertilizer. waste.
- 5. User-Centric Design**
 - Bed dimensions are designed around the safe reaching distance of physically limited users, such as older adults.
 - Requires only basic maintenance such as trimming, harvesting, replanting, and adding organic

Local Pilot Area: Din Daeng Elderly Service Center

Site Context

- A governmental community-based elderly day center providing free social, health, recreational, daytime care services, and emergency housing for older adults.
- Serves approx. 200 older adults aged 55+ per day.

Why this place?

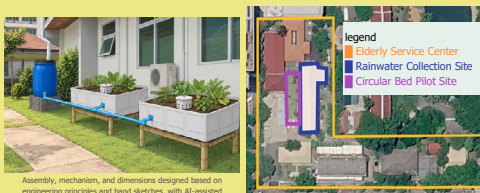
- Three Challenges in One Site:** The center provides a real-world setting to address food security, water management, and organic waste within one community facility.
- A Consistent and Vulnerable User Base:** provides a stable user group for real-world testing while addressing the needs of older adults who may face greater vulnerability to climate and resource constraints.
- Ready for Community-Based Operation:** Existing activities provide opportunities to integrate growing, harvesting, and food-waste management into daily activities.

Pilot Scope

The pilot primary purpose is to demonstrate the feasibility of a small-scale circular food system and complement, rather than replace, the center's existing food supply.

Site Integration

The pilot makes minimal adaptations to the *Occupational Therapy Building's* existing rainwater drainage system to collect and store rainwater in a collection tank, which supplies the circular planting beds in the *Recreation Garden*.



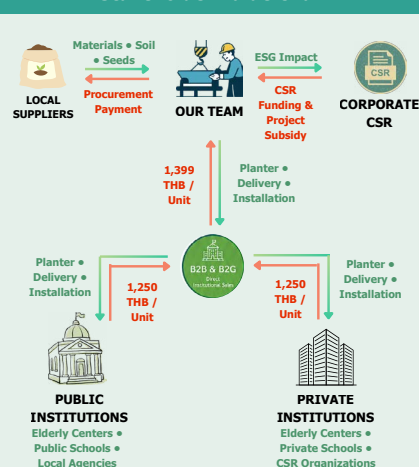
Pilot Activities



Pilot Evaluation

- system performance and durability
- resources circulated within the site and environmental impact
- user engagement, experiences and social impact
- economic feasibility

Stakeholder Value Chain



Business Model

Price 1,250 THB

The unit price includes the planter system, delivery, and basic installation.

TARGET CUSTOMER

- B2B**
Private elderly care centers, private schools, and CSR organizations
- B2G**
Government elderly centers, public schools, and local agencies

B2B&B2G Business Model

Corporate CSR partners fund the planter systems, while public agencies provide the sites and deliver the benefits to elderly people and local communities.

VALUE PROPOSITION

- Reduces vegetable and water expenses
- Converts organic waste into fertilizer
- Improves access to fresh, healthy food
- Creates activities for elderly people, students, and communities
- Generates measurable CSR and sustainability impact

HOW OUR B2B & B2G MODEL WORKS?

We directly sell planter systems to both private and public institutions at 1,250 THB per unit. Private customers include elderly care centers, schools, and CSR organizations, while public customers include government elderly centers, public schools, and local agencies. Each institution purchases units based on its space, number of users, and project needs.

Impact and Outcomes

What Changes?

Water Resilience

Captures and reuses rainwater for food production while helping reduce stormwater runoff.

Circular Resource Use

Turns organic waste and discarded IBCs into productive resources, closing local material loops.

Food Security & Independence

Improves access to fresh vegetables while enabling greater food independence and participation in the food system.

Economic Potential

Reduces input costs and creates potential savings from locally produced food, water, and fertilizer.

Our Product Contributes to 5 SDGs



