CENTRE FOR GLOBAL AFFAIRS & PUBLIC POLICY

CGAPP

Ganga Plastic Pollution Initiative (2025)

Key findings in the water samples from Kolkata

Introduction

Centre for Global Affairs and Public Policy (CGAPP) hosted the Kolkata leg of the Ganga Plastic Pollution Initiative from 5-9 April 2025 as part of Kolkata Climate Week. The initiative brought together communities, civil society organisations, startups, researchers, and government stakeholders to address the growing challenge of plastic pollution in the Ganga River through research, outreach, and technology-driven interventions.

The Kolkata leg focused on:

- Research and community outreach activities along the ghats of the Ganga
- Technology-led demonstrations for river waste management and monitoring
- Scientific testing and analysis of water and sediment samples
- Stakeholder engagement around scalable and implementation-focused waste-management solutions

I. Research and Community Outreach (5-9 April)

The Climate Week began with community engagement and research activities along the ghats of the river Ganga in Kolkata. CGAPP, in collaboration with volunteers from local organizations including **Cultx**—a youth-led group focused on environmental awareness and action—and **River Rangers**—a grassroots initiative working since 2019 to reduce waste and restore river ecosystems—organized sensitization sessions and a hands-on clean-up drive. The clean-up not only demonstrated practical waste management but also served as a passive awareness tool, encouraging bystanders to reflect on their role in keeping the ghats clean.

In parallel, the research team conducted fieldwork to understand the socio-economic factors contributing to plastic pollution. They mapped the area and engaged with households, local businesses, non-profits, and community leaders through interviews and surveys to gather insights on community perceptions, behaviors, and barriers to sustained action.

The outreach also extended to schools, where researchers from CGAPP, in collaboration with **Teach For India (TFI) – Kolkata**—an education-focused non-profit working to expand educational opportunities for children in under-resourced communities—led interactive sessions with teachers and students. These discussions focused on raising awareness about the normalization of plastic use, the importance of sustainable alternatives, and how school-led initiatives like Eco Clubs can foster long-term behavior change. Students shared their experiences from the clean-up drive and brainstormed ways to influence their families and communities to reduce plastic consumption. They joined community clean-up drives during the Climate Week along the ghats of the Ganga, reinforcing their role as active changemakers beyond the classroom.

These activities aimed to build a deeper understanding of local dynamics while fostering community ownership in addressing plastic pollution.

II. Showcase of Technological Solutions (6–8 April):

As part of its focus on advancing tech-driven solutions to plastic pollution, CGAPP organized live demonstrations of innovative land- and water-based technologies along the Ganga, engaging community members, teachers, and students.

A key highlight was the **Aqua Skimmer**, an innovative water drone developed by **Eunoia Innovations** to tackle floating waste in rivers, lakes, and urban water bodies. Designed for autonomous or remote-controlled operation, the Aqua Skimmer collects plastic, debris, and solid waste using a front-mounted gate and onboard collection bin. With an operational range of 5 km, it also supports real-time water quality monitoring through integrated sensors measuring pH, TDS, DO, turbidity, and temperature. Compact and eco-friendly, the skimmer measures 6 ft (L) x 4 ft (W) x 4 ft (H), has a payload capacity of 100 kg, and can collect up to 300L of waste—expandable to 1000L. It is specifically designed for inland and shallow waters and is available in two variants: **V1 (Remotely Controlled)** and **V2 (AI Edge)** with automated trash detection.

The demonstration of the Aqua Skimmer invited active participation from teachers and community members, who observed and engaged with the technology firsthand, asking questions about its effectiveness, scalability, and potential for application in their local contexts.

Another featured innovation was the trash collection device **Gobbler**, a compact mobile waste management unit developed by **Cosmic Healers Private Limited**. Designed for urban environments, the Gobbler efficiently handles both dry and wet waste, promoting on-site waste segregation and reducing litter in public spaces. Its compact and easy-to-operate design makes it well-suited for community clean-up efforts, eco-parks, and public areas with high foot traffic.

Teachers and community members participated in the Gobbler demonstration as well, raising questions around its operational capacity, ability to handle mixed waste streams, and its role in complementing manual clean-up efforts. The interactive sessions helped demystify the technology, creating an opportunity for direct dialogue on how such innovations can support waste management at the grassroots level.

Both demonstrations served not only to showcase practical innovations but also to inspire local stakeholders—especially educators and young students—to envision how technology can drive behavior change and support cleaner, healthier ecosystems.

III. Technical Analysis (6–8 April)

As part of Kolkata Climate Week, **CGAPP** conducted scientific testing and analysis of water and sediment samples from four prominent ghats along the Ganga in Kolkata—**Ahirtola Ghat,**

Mullick Ghat, Babu Ghat, and Outram Ghat. This technical exercise aimed to assess pollution levels using real-time, technology-driven methods, including the innovative **Aqua Skimmer** developed by **Eunoia Innovations**.

The **Aqua Skimmer**, beyond its role in physically collecting floating waste, was equipped with onboard sensors to measure critical water quality parameters such as **pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS), Dissolved Oxygen (DO), Turbidity, and Temperature**. This combination of physical intervention and real-time scientific monitoring allowed the team to gather precise, on-site data that was immediately analyzed and interpreted.

Water Quality Testing Results:

Day	Test No.	Site	pH	EC (µS/cm)	ER (Ω·cm)	TDS (ppm)	Temp (°C)	DO (ppm)	Turbidity (NTU)	Copper (ppm)	Iron (ppm)
Day 1	Test 1	Ahirtola Ghat	8.41	2065	484.26	1239	31	4.53	13	0	0
Day 2	Test 1	Mullick Ghat	8.2	2074	482.63	1348	30.5	5.26	20.3	0	0.1
Day 2	Test 2	Babu Ghat	8.16	2072	482.6	1388	30.5	4.8	18.6	0	0
Day 3	Test 1	Outram Ghat	8.41	2087	479.06	1398.29	31.5	4.23	16	0	0

Interpretation of Findings:

Parameter	Observed Range	Standards & Limits (BIS/CPCB)	Interpretation
pH	8.16 – 8.41	6.5 – 8.5 (BIS & CPCB Class B/C)	Within acceptable range; slightly alkaline.
EC (µS/cm)	2065 – 2087	Class C max: 2250 µS/cm	High but acceptable for river water (Class C); indicates elevated salinity.
ER (Ω·cm)	479 – 484	No defined standard	Low resistivity reflects high ionic concentration; potential for corrosion.
TDS (ppm)	1239 – 1398	BIS Max: 2000 ppm; Class C Max: 1500 ppm	Above desirable but within permissible river water limits; may affect taste, scaling.
Temperature	30.5°C – 31.5°C	Should not exceed 5°C above ambient	Slightly elevated; may influence dissolved oxygen levels.
DO (ppm)	4.23 – 5.26	Class B: ≥5 ppm; Class C: ≥4 ppm	Only Mullick Ghat meets Class B standard. Others meet minimum but show stress on aquatic health.
Turbidity (NTU)	13 – 20.3	BIS Max: 5 NTU; Class B: <10 NTU	All ghats show high turbidity, exceeding both drinking and bathing norms—visible pollution evident.

Copper (ppm)	0 ppm	BIS Max: 1.0 mg/L; CPCB: <1.5 mg/L	No contamination detected.
Iron (ppm)	0 – 0.1 ppm	BIS Max: 1.0 mg/L; CPCB Max: 0.3–1.0 mg/L	Well within acceptable limits.

Key Takeaways from the technical analysis of water samples and sediments:

1. **Overall Water Quality:** All sites meet **CPCB Class C** standards (safe for drinking after treatment) but only **Mullick Ghat** meets **Class B** (safe for outdoor bathing). The presence of high turbidity and low Dissolved Oxygen (DO) at several sites indicates mild to moderate environmental stress on the river.
2. **Concerns Identified:**
    - Elevated **Turbidity** (13–20.3 NTU) suggests significant suspended particulate matter—likely plastic, organic debris, and silt.
    - **DO** levels at most sites fall below bathing quality, highlighting the need for better waste management and flow restoration.
    - High **EC** and **TDS** point to salinity stress, possibly from untreated waste or runoff.
3. **Role of Aqua Skimmer:** The use of the **Aqua Skimmer** enhanced both the clean-up and the real-time monitoring of water health. Its integrated sensors allowed the team to measure multiple parameters on-site without reliance on lab-based testing, demonstrating how technology can make river monitoring faster, more accessible, and community-driven.