Proceedings of WSDS Thematic Track Event - 2025

Science and Policy Action on Reducing Plastic and Chemical Waste in the Marine

Proceedings of WSDS 2025

At the World Sustainable Development Summit 2025 (organised by TERI), the Indo-Norway team of scientists and policy experts organised the thematic track session titled "Science and Policy Action on Reducing Plastic and Chemical Waste in the Marine Environment" on March 5th, 2025, at the India Habitat Centre, New Delhi.

This session was hosted as part of the **Indo-Norwegian Marine Litter Initiative and encompassed Plastic pollution, and Persistent Organic Pollutants (POPs)** that contaminate the marine ecosystems, leading to toxic bioaccumulation in food chains and long-term ecological damage. Addressing these challenges necessitates science-based approaches to effectively managing plastic waste and POPs, thereby safeguarding the natural environment from the detrimental impacts of such pollution.

The Indo-Norwegian cooperation project (INOPOL) is an initiative led by the Norwegian Institute for Water Research (NIVA) and Mu Gamma Consultants (MGC) in collaboration with Indian partners, such as CIPET, Toxics Link, and SRM Institute of Science & Technology. The project is supported by the Royal Norwegian Embassy in New Delhi and anchored by the Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India.

The thematic track event was inaugurated by Her Excellency Martine Aamdal Bottheim, Minister Counsellor and Deputy Head of Mission, Royal Norwegian Embassy in New Delhi. The special address was delivered by Mr Ved Prakash Mishra, Joint Secretary, MoEFCC, Government of India. The welcome address was delivered by Dr Hans Nicolai Adam, Senior Research Scientist, NIVA. The master of the ceremony was Mr Nathaniel Bhakupar Dkhar, Senior Research Scientist, MGC.

INAUGURAL SESSION

In his welcome address, Dr Adam mentioned that the primary focus of the INOPOL project is on reducing plastic and chemical pollution in the marine environment, with the Cauvery River in Tamil Nadu serving as the main case study site. The project addresses critical environmental challenges by bridging knowledge gaps related to macro- and microplastic pollution. It also emphasises capacity-building for Central and State Pollution Control Board technical professionals. He emphasized close ties with the Tamil Nadu Pollution Control Board with the Tamil Nadu Pollution Control Board (TNPCB) to establish robust monitoring protocols for pollution control.

He mentioned that a major focus of the initiative is understanding the interrelationship between plastic and chemical pollution while developing effective policy actions based on rigorous scientific research. By leveraging targeted data and insights, the project aims to inform better environmental policies that address both local and global challenges. This effort highlights how international collaboration can lead to innovative solutions for environmental sustainability, demonstrating the value of shared expertise and resources in addressing pressing ecological concerns.

H.E. Ms Martine Aamdal Bottheim, the Deputy Ambassador of Norway to India, highlighted in her keynote address the significance of the Norway-India cooperation in the blue economy. This partnership has been focusing on the sustainable use of marine resources and addressing environmental challenges.

She also mentioned that the India-Norway Task Force on Blue Economy plays a crucial role in catalysing cooperation across important sectors related to the oceans, including initiatives to combat marine pollution. Both Norway

and India are actively involved in international negotiations for a legally binding treaty on plastic pollution. Norway co-chairs the High Ambition Coalition to End Plastic Pollution, highlighting a comprehensive approach to plastic management. The INOPOL project supports India's environmental targets by providing scientific insights and capacity-building initiatives, highlighting the importance of science-based knowledge in informing policy decisions. This collaborative effort demonstrates how international cooperation can lead to innovative solutions for global environmental challenges.

Mr Ved Prakash Mishra, Joint Secretary, MoEFCC, highlighted the pressing issue of plastic pollution and the need for sustainable consumption patterns. He noted that the rise in plastic consumption globally, particularly in developed countries, poses significant environmental challenges. Despite lower per capita consumption in developing countries, the sheer volume of plastic waste in India necessitates urgent action. India has been actively engaged in international negotiations to address plastic pollution, aligning with global efforts to reduce its impact.

He also mentioned how India has taken several steps to manage plastic waste effectively. Recently, the country banned certain single-use plastic items, despite facing opposition, as part of its commitment to environmental sustainability. The "Mission LiFE" initiative, launched by the Hon'ble Prime Minister of India, Mr Modi, encourages lifestyle changes to reduce plastic use by promoting traditional practices such as using reusable bags. The Plastic Waste Management Rules (PWM) have been instrumental in establishing a framework for managing plastic waste by emphasising the principles of reducing, reusing, and recycling. Additionally, India has mandated extended producer responsibility (EPR) to ensure that manufacturers are accountable for recycling their plastic products.

He mentioned that to tackle plastic pollution comprehensively, India has adopted a whole-of-government approach, involving all ministries and agencies in implementing plastic waste management policies. The strategy includes promoting a circular economy by encouraging the reuse and recycling of plastic, with a focus on upcycling rather than downcycling. Efforts are also underway to replace plastics with eco-friendly alternatives such as jute, paper, and biodegradable materials derived from agricultural products. The government supports micro, small, and medium enterprises (MSMEs) in developing recyclable and biodegradable products and providing financial and technological assistance. Furthermore, research and development in biodegradable materials are being pursued, with standards set for bio-based products to ensure their safety and efficacy.

The two baseline reports titled **'Baseline Report on Plastic Waste Management in Tamil Nadu, India: Perspectives and Pathways'** and **'Hazardous but Invisible: A Baseline Report on Persistent Organic Pollutants (POPs) in Tamil Nadu, India'** were released by the dignitaries.

Mr. Nathaniel Bhakupar Dkhar thanked the dignitaries for their insights and valuable deliberations and proposed the vote of thanks for the inaugural session of the event.

TECHNICAL SESSION

The inaugural session was followed by a technical session, in which **Dr Rachel Hurley** from NIVA gave a presentation on 'Monitoring riverine macroplastic pollution: Preliminary results from the Cauvery River'. Her presentation emphasised the importance of international cooperation in addressing plastic and chemical pollution, with the Cauvery River in Tamil Nadu serving as a key case study site. She detailed out that as part of the INOPOL project, riverine macroplastic pollution has been monitored across two field campaigns in the pre-monsoon and post-monsoon periods: in November 2024 and February 2025. Six sites were identified in the Tamil Nadu area of the Cauvery River, providing spatial representation from the Stanley Dam to the river mouth. Three complementary methods were optimised for the local environmental context. These comprise visual observation for floating macroplastic, net sampling for submerged macroplastic, and riverbank surveys – which together produce a holistic overview of plastic pollution at a given site by facilitating characterisation of plastic typologies, investigation of spatiotemporal trends and generation of harmonised datasets.

She further presented the results which indicated that the macroplastic flows did not differ significantly between the two campaigns, with the exception of a set of measurements taken in Trichy in November 2024 during a heavy rainfall event. Overall, levels of macroplastic did not increase downstream, a finding which is likely attributed to the prevalence of check dams and barrages along the Cauvery which interrupt water and plastic flows. Macroplastic densities on riverbanks along the river were generally higher in February 2025, where water levels had receded and the energy in the system was lower. The typologies of plastic observed across the two monitoring campaigns point towards current solid waste management practices for municipal waste as a likely source of plastic pollution to the environment. Human behaviour and interactions with the river was also noted as an important release pathway. Less than 2% of all plastic items detected across the two monitoring campaigns were characterised as items included within single use plastic bans in India, indicating that legislative actions may be effective in meaningfully reducing plastic pollution.

Prof. Paromita Chakraborty (SRMIST) delivered a presentation on 'Persistent Organic Pollutants (POPs) and their monitoring in the River Cauvery'. Her presentation highlighted the significant challenge of the mismanagement of plastic waste, which contributes to environmental pollution and health

risks in India. The burning of plastics releases harmful chemicals, exacerbating pollution. Additionally, the use of personal protective equipment (PPE), including masks and gloves during the pandemic, added to plastic waste. These plastics contain additives and contaminants that can be harmful when burnt or leached into water, posing threats to aquatic life and human health.

The research design for the project involved covering the stretch of the Cauvery River in Tamil Nadu until it falls in the Bay of Bengal. Samples included water, sediment, fish, and bovine milk to assess chemical contamination. She also narrated that passive air samplers (PAS) were used to track atmospheric pollution, due to POPs. Preliminary results showed significant levels of perfluoro-alkyl sulphonates (PFAS) and other chemicals in water and groundwater samples. The study also highlighted the importance of understanding seasonal variations in chemical pollution to develop effective mitigation strategies.

Community engagement and capacity building were integral components of the project. Capacity-building initiatives were conducted for researchers and community members to enhance their understanding and skills in addressing these issues. She mentioned how new methods, such as the "Mantra Pot," were created and studied to make water treatment more sustainable and cost-effective. These methods use plants, nanofilter beds, and native microbes to eliminate chemicals at levels as low as parts per billion (ppb).

Moving forward, continued research and collaboration with local communities and industries are crucial for implementing sustainable solutions and reducing plastic waste. The project underscores the importance of addressing plastic pollution through a comprehensive approach that includes scientific research, policy changes, and community engagement. By working together, it is possible to develop effective strategies that align with sustainable development goals (SDGs) and protect both human health and the environment.

PANEL DISCUSSION

The Panel Discussion was chaired by Dr Girija Bharat, MGC. The four panellists were

- Mr. Satish Sinha, Toxics Link
- Dr. Smita Mohanty, CIPET
- Ms. Vilde Kloster Snekkevik, NIVA
- Ms. Avanti Roy Basu, MGC

Mr. Satish Sinha: When asked about the public awareness and education campaigns to mitigate the risks associated with plastic additives and toxic chemicals in both consumer products and the environment, Mr Satish emphasised that public awareness played a crucial role in addressing the risks associated with plastic additives and toxic chemicals. There was a significant knowledge gap regarding these substances, which were often misunderstood as merely litter rather than a source of harmful chemicals. The INOPOL project had shown that increased plastic use led to more contaminants in the environment, including POPs and other chemicals that leached into water and air. These additives were loosely bound and could be released under external forces, posing serious health risks. Chemicals like PFAS, HBCD, and diphenyl ether were particularly hazardous and globally regulated due to their toxicity.

He noted that raising awareness required empirical data to fill knowledge gaps and inform the public about the risks. This data also pressured manufacturers to be more responsible and transparent about the chemicals used in their products. Previously, labelling and transparency were lacking in the supply chain, making it difficult to track chemicals throughout a product's lifecycle. Awareness had influenced upstream changes by pushing for better labelling and safety standards. For instance, using symbols to indicate safe recycled plastics had simplified decision-making for consumers.

Awareness has also driven policy discourse by putting pressure on governments to intervene with regulatory measures. This effort has led to both regulatory and voluntary approaches to managing plastic pollution. Ultimately, raising awareness through scientific research and data dissemination was essential for protecting human health and the environment. By educating the public, we created a more informed and proactive community that demanded safer practices from manufacturers and policymakers. This collective effort was vital for addressing the complex issues surrounding plastic additives and toxic chemicals.

Dr. Smita Mohanty: When asked if she envisions India progressing in addressing plastic pollution through a systemic approach, particularly in light of recent efforts to reduce single-use plastics along the

Cauvery River and the implementation of Extended Producer Responsibility (EPR) rules for plastic waste management, she replied that India has made significant progress in managing waste through policy developments. This includes the creation of a standardised EPR portal.

Over 2,700 plastic waste producers have registered, and each industry has been assigned targets for recycling and using recycled content. The government has also banned 19 categories of single-use plastic products, further emphasising its commitment to reducing plastic waste. Additionally, there has been an increase in the thickness of carry bags from 70 microns to 120 microns to ensure they can be recycled into value-added products.

There is a strong emphasis on upcycling rather than downcycling to avoid potential contamination issues. This requires scientific input to process and use recycled materials effectively across various application sectors, beyond packaging. The goal is to target multiple sectors for the use of recycled products, ensuring they are not limited to just packaging applications. This approach necessitates targeted solutions and a clear understanding of where these products can most effectively be used.

She also stated that India's EPR system is more advanced compared to many other countries, particularly in the Asia-Pacific region. The government has also introduced restrictions on compostable and biodegradable materials, requiring them to comply with EPR regulations. Furthermore, efforts are underway to standardise and regulate microplastic content in soil, sediment, and water, aligning with ISO standards and incorporating these assessments into waste management regulations. This comprehensive approach demonstrates India's commitment to addressing plastic pollution through both regulatory measures and technological innovations.

Ms. Vilde Kloster Snekkevik: When asked about her insights from Intergovernmental Negotiation Committee (INC) and the challenges and opportunities in implementing international monitoring protocols for plastic pollution. She mentioned that she had been involved in the INC process for a global plastic treaty and observed how research fit into global perspectives on plastic pollution. She noted that monitoring programmes were crucial for assessing the policy's effectiveness.

When asked about how she sees India's role evolving in these negotiations, particularly in balancing national interests with global commitments to reduce plastic pollution, she stated that comparing India and Vietnam, India's ban on certain single-use plastics had been more effective, as these items were less prevalent in India compared to Vietnam, where such bans were not yet in place. She highlighted the importance of adapting monitoring programmes to local conditions, as each river and region presented unique challenges. Local knowledge was essential for identifying different types of plastic pollution and tailoring solutions accordingly. On a global level, the draft text for the Plastics Treaty included provisions for monitoring, identifying hotspots, and establishing international capacity-building and awareness-raising programmes. These efforts aimed to address plastic pollution comprehensively across different regions and countries.

Ms. Avanti Roy Basu: When asked about the strategies that India should prioritise to address PFAS contamination in drinking water, particularly considering the country's current regulatory framework and technological capabilities for PFAS removal, she stated that in addressing PFAS contamination in drinking water, several key strategies were identified for India. Developing national regulations and setting standards for PFAS levels was considered essential, drawing from international standards like those of the European Union and the US EPA. Incorporating PFAS limits into existing BIS standards

was considered a significant regulatory step.

A comprehensive national action plan was proposed to reduce emissions from industries and agriculture.

A national PFAS monitoring programme is crucial for tracking contamination trends and identifying pollution hotspots. Research was needed to identify and characterise PFAS pollution sources, potentially creating a national PFAS contamination map.

Embedding water treatment technologies and strengthening technical capacity locally was critical. Partnering with global organisations could have helped India access new technologies and strategies. Stricter regulations were proposed to limit PFAS discharge and mandate transparency in PFAS usage. By implementing these measures, India could have effectively regulated PFAS pollution, protected public health, and strengthened its system for managing water quality.

Dr Hans Nicolai Adam summed up the session by drawing valuable messages from all the speakers, presenters, and panellists.

SUMMING UP

The results of the discourse led to suggestions on actionable steps, including:

1. India must adopt a comprehensive strategy to tackle plastic and POPs pollution, focusing on improving waste management, promoting circular economy principles, and fostering collaboration across all sectors.
2. Awareness campaigns can educate consumers about the dangers of harmful plastic additives in consumer goods and the environment, enabling them to make informed decisions and advocate for safer alternatives.
3. Continuous monitoring and adaptive strategies are necessary to address identified health impacts over time.
4. Clear labelling and consumer education are crucial to prevent greenwashing and ensure proper disposal of bioplastics and compostable plastics.
5. Further assessment is required to assess the actual impact of the SUPs ban and identify areas for improvement in enforcement and implementation.
6. India can enhance its microplastic and POPs monitoring protocols by implementing standardised methodologies and quality assurance procedures that utilise international best practices.
7. The Indian government, industry, research institutions, and communities must work

together to tackle the intricate issue of water pollution caused by plastic additives.

8. India should prioritise research and monitoring of Per- and Polyfluoroalkyl Substances (PFAS) in drinking water to assess potential health risks and inform regulatory actions.

9. Targeted studies are needed to address research gaps related to POPs in India and other developing countries by identifying sources, understanding pathways, and assessing impacts.

10. Investments in scientific and technical personnel's skills and capacity building are crucial for efficient environmental monitoring, risk assessment, and sustainable solutions.

11. India's active participation and involvement in the INC 5 process is crucial for shaping the global framework for addressing plastic pollution.

Annexure 1: Agenda of the Event

Title: **Science and Policy Action on Reducing Plastic and Chemical Waste in the Marine Environment**
Date: 5th March 2025 Time: 1130 – 1300 Hrs
Venue: Magnolia Hall, India Habitat Centre
Format: Panel discussion/ roundtable
Mode: In-person
Emcee: Mr. Nathaniel Bhakupar Dkhar

Time	Agenda Item
5 minutes	**Welcome Address**:Dr. Hans Nicolai Adam (NIVA)
10 minutes	**Keynote Address**:Her ExcellencyMartine Aamdal Bottheim, Minister Counsellor& Deputy Head of Mission,Royal Norwegian Embassy in New Delhi
10 minutes	**Special Address**: Mr Ved Prakash Mishra, Jt. Secretary, Ministry of Environment, Forest & Climate Change, Government of India
45 minutes	**Presentations** Dr. Rachel Hurley (NIVA) - Monitoring riverine macroplastic pollution: Preliminary results from the Cauvery River Prof. Paromita Chakraborty (SRMIST)- Persistent Organic Pollutants (POPs) and their monitoring in the River Cauvery **Panel Discussion** (25 minutes) **Chair**: Dr. Girija Bharat **Panelists:** Mr. Satish Sinha, Toxics Link Dr. Smita Mohanty, CIPET Ms. Vilde Kloster Snekkevik, NIVA Ms. Avanti Roy Basu, Mu Gamma Consultants (MGC)
10 minutes	Question and Answer
5 minutes	Release of reports by dignitaries on the dais
5 minutes	Concluding remarks: Dr. Hans Nicolai Adam (NIVA)

NIVA Norsk institutt for vannforskning Norwegian Institute for Water Research | mu gamma | SRM Institute of Science & Technology | CIPET सिपेट | Toxics Link | Norway

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Date: 5th March 2025 Time: 1130 – 1300 Hrs
Venue: Magnolia Hall, India Habitat Centre

(I) Problem statement and state of play

The marine environment, covering over 70% of the Earth's surface, is a crucial ecosystem that supports biodiversity, regulates climate, and provides resources for millions of people. However, this vast and vital habitat is under increasing threat from human activities, particularly plastic and chemical pollution.

Plastic pollution, ranging from large debris to microplastics, has become one of the most pervasive environmental challenges. These materials, often non-biodegradable, accumulate in oceans and disrupt marine life, causing entanglement, ingestion, and habitat destruction. Similarly, chemical pollutants—such as heavy metals, pesticides, persistent organic pollutants (POPs), industrial waste—contaminate marine ecosystems, leading to toxic bioaccumulation in food chains and long-term ecological damage. POPs are a group of chemicals of particular concern, due to their toxic properties, resistance to degradation, and potential to bioaccumulate and be transported long-range.

The impact of these pollutants is far-reaching, affecting marine organisms, coastal communities, and even human health through seafood consumption. Addressing this crisis requires global cooperation, stringent regulations, and innovative solutions to reduce plastic waste, control chemical discharges, and restore marine ecosystems.

India is a significant contributor to marine plastic pollution, primarily due to its large population, extensive coastline, and challenges in waste management. Recent estimates indicate that India generates approximately 9.3 million tonnes of plastic waste annually, accounting for nearly 20% of

the global plastic waste. Of this, about 3.5 million tonnes are mismanaged and leak into the environment each year, surpassing other major polluters such as Nigeria, Indonesia, and China.

Efforts are underway to address this issue. The Indian government has initiated steps towards formulating a National Marine Litter Policy, aiming to track and monitor litter, develop circular economy solutions, and implement extended producer responsibility to reduce, reuse, and recycle plastics.

Addressing these challenges necessitates science-based approaches to effectively manage plastic waste and POPs, thereby safeguarding the natural environment from the detrimental impacts of such pollution.

(ii) Objectives of the thematic track

- Sharing and building knowledge and capacities to tackle plastic and chemical pollution and its associated social, economic, and environmental impacts
- Identify opportunities associated with reducing plastic and chemical waste in the marine environment
- Build a robust science-informed research foundation for policy relevance.

(iii) Questions

- How can robust science-based policy support the reduction of plastic and chemical pollution?
- How can lessons from the global research landscape be applicable in the Indian context?
- In which ways can India best contribute to the global efforts on plastic and chemical pollution management?