UN environment programme

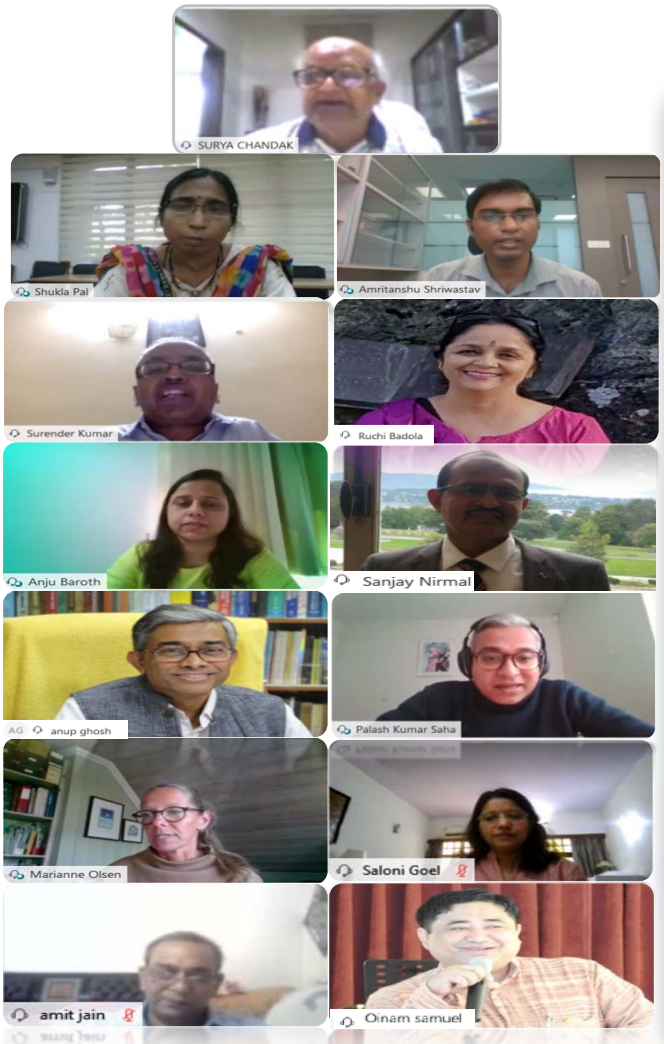
NATIONAL PRODUCTIVITY COUNCIL

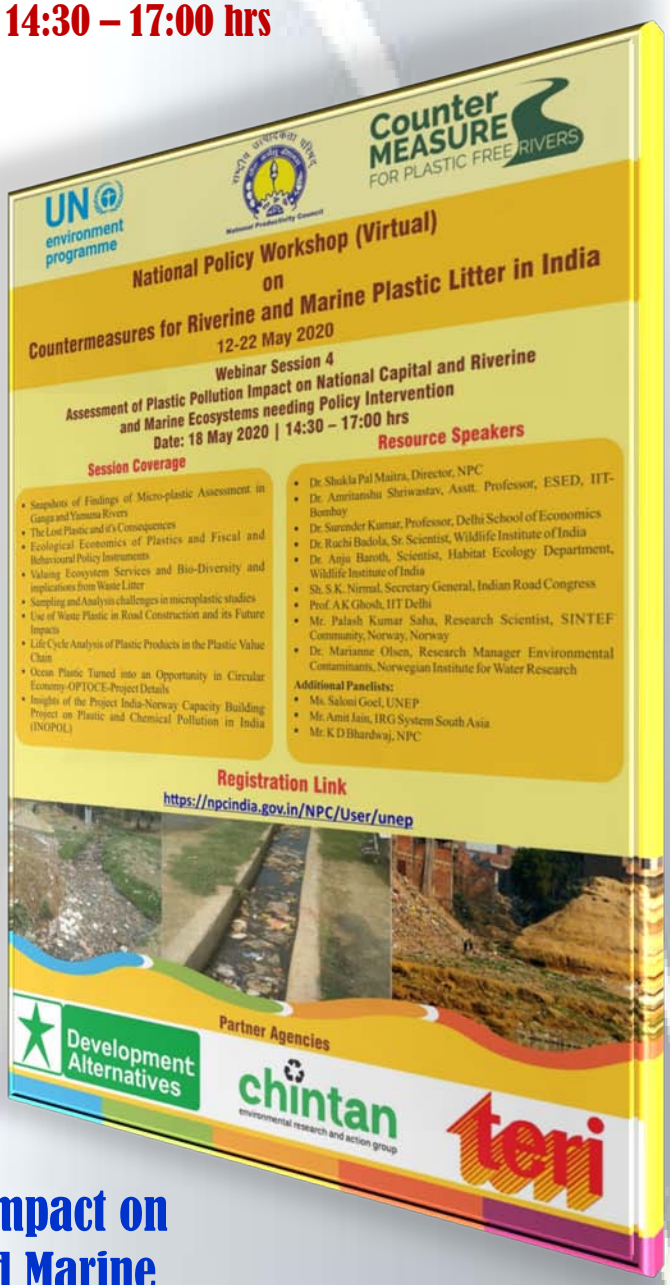
Counter MEASURE FOR PLASTIC FREE RIVERS

Proceedings

National Policy Workshop Webinar Series on "Countermeasures for Riverine and Marine Plastic Litter in India"

18 May 2020 | 14:30 – 17:00 hrs





WEBINAR 4

Assessment of Plastic Pollution Impact on Natural Capital and Riverine and Marine Ecosystems needing Policy Intervention

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Development Alternatives

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WEBINAR 4

Proceeding

Assessment of Plastic Pollution Impact on Natural Capital and Riverine and Marine Ecosystems needing Policy Intervention

18 May 2020 | 14:30 - 17:30 hrs

Moderator
Mr. SP Chandak,
Former Deputy Director, UNEP & Professor Emeritus, BIMTECH

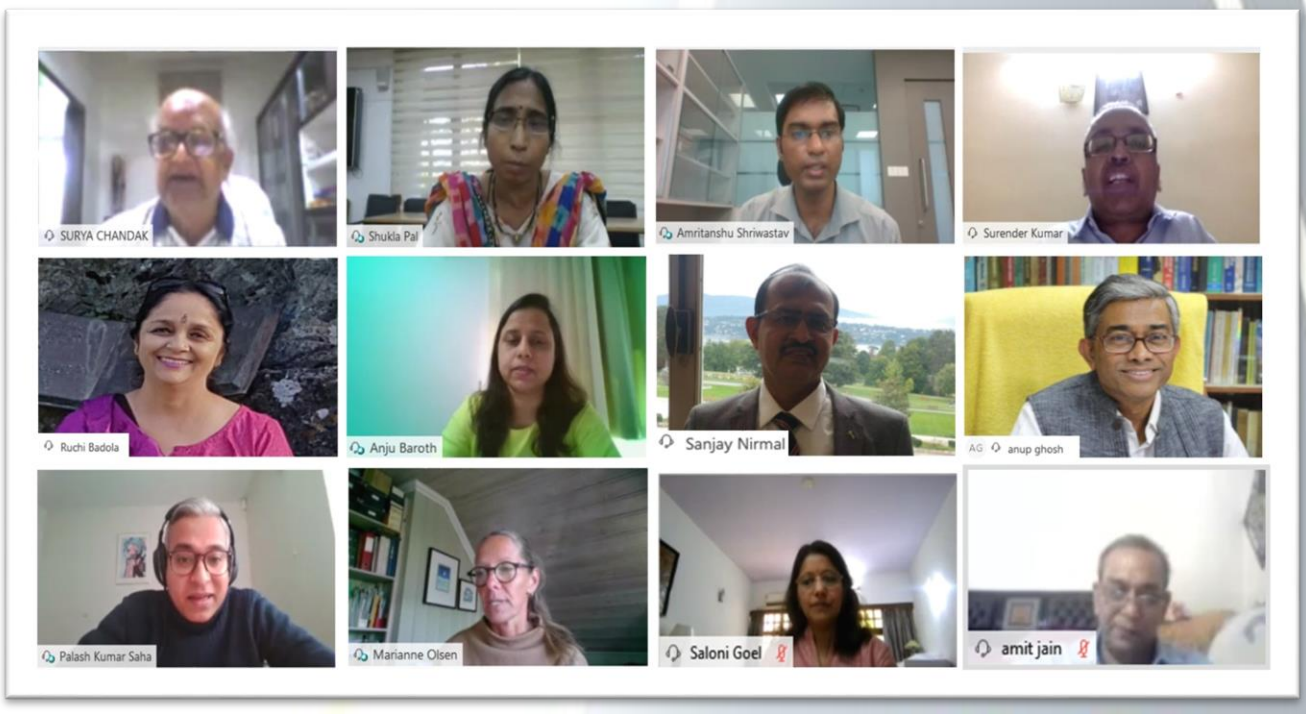
Coordinator
Mr. Oinam Samuel,
Deputy Director, NPC

INTRODUCTION

Impacts of plastics on flora, fauna and humanity have been observed by researchers. Plastic debris in the environment soaks up hazardous pollutants, transports them through the ecosystem and transfers the compounds to organisms that consume the plastic particles, potentially producing adverse health effects, and also causing plastics and associated chemicals to reach higher trophic levels into food chains. To fairly evaluate the impacts of plastics within a comprehensive ecological and economic and environmental framework and to address trade-offs, life cycle methodologies will need to be bolstered by standardized and widely-accepted plastic leakage assessment and accounting.

The objective is to understand mismanaged plastics in the environment (Macro and Micro plastic), Valuing eco - system services and bio - diversity and implications from waste plastic litter, and impact of plastics on the eco - system and food chain and Life Cycle aspects.

WEBINAR 4 AGENDA

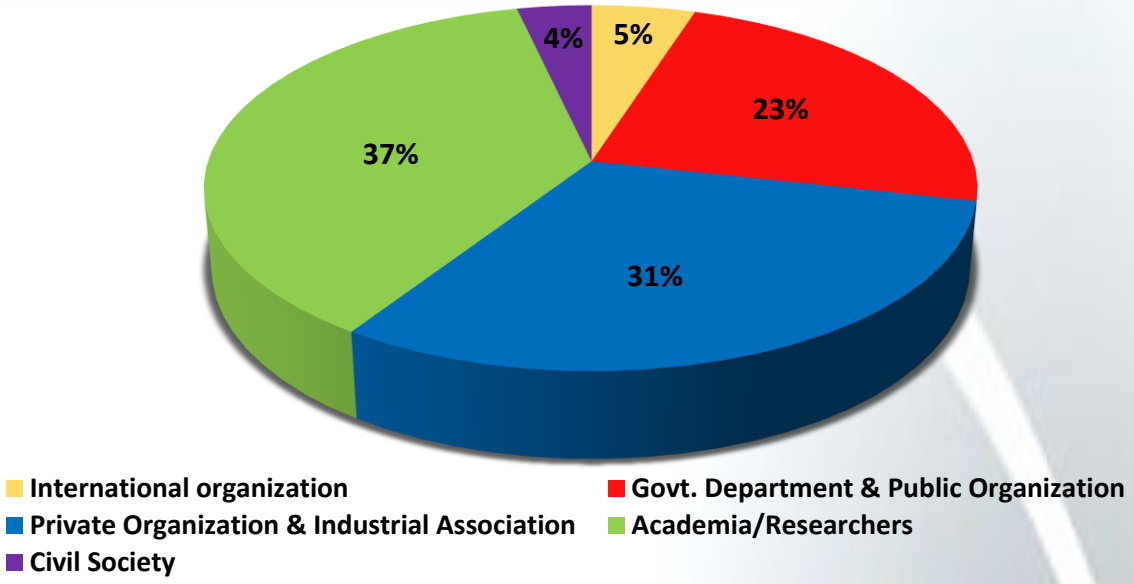


Time (hrs)	Theme/Topic	Speaker
14:30 – 14:45	Snapshots of Findings of Micro-plastic Assessment in Ganga and Yamuna Rivers	Dr. Shukla Pal Maitra, Director, NPC
14:45 – 15:00	The Lost Plastic and it's Consequences	Dr. Amritanshu Shriwastav, Asstt. Professor, ESED, IIT-Bombay
15:00- 15:15	Ecological Economics of Plastics and Fiscal and Behavioural Policy Instruments	Dr. Surender Kumar, Professor, Delhi School of Economics
15:15 – 15:30	Valuing Ecosystem Services and Bio-Diversity and implications from Waste Litter	Dr. Ruchi Badola, Sr. Scientist, Wildlife Institute of India
15:30 – 15:45	Sampling and Analysis challenges in microplastic studies"	Dr. Anju Baroth, Scientist, Habitat Ecology Department Wildlife Institute of India
15:45 – 16:00	Use of Waste Plastic in Road Construction and its Future Impacts	Mr. S.K. Nirmal, Secretary General, Indian Road Congress
16:00 – 16:15	Life Cycle Analysis of Plastic Products in the Plastic Value Chain	Prof. A K Ghosh, IIT Delhi
16:15 - 16:30	Ocean Plastic Turned into an Opportunity in Circular Economy-OPTOCE-Project Details	Mr. Palash Kumar Saha, Research Scientist, SINTEF Community, Norway, Norway
16:30 - 16:45	Insights of the Project India-Norway Capacity Building Project on Plastic and Chemical Pollution in India (INOPOL)	Dr. Marianne Olsen, Research Manager Environmental Contaminants, Norwegian Institute for Water Research
16:45 – 17:00	Panel Discussion: Standardisation of Impact Assessment Studies of Plastic Waste on Riverine and Marine System Questions and Answers	Additional Panel Members: Ms. Saloni Goel, UNEP Mr. Amit Jain, IRG System South Asia Mr. K D Bhardwaj, NPC,

PARTICIPANT PROFILE

The webinar was attended by 600 plus participants as located across 10 countriessuch as Denmark, Japan, Malaysia, Netherland, Norway, Oman, Philippines, Sri Lanka, United Kingdom, United States of America etc. The participants were from across various sectors (public / private organizations, civil society, academia, and from across a range of national and multilateral institutions such as UN Organisations, GIZ, WWF,ZSL, World Bank, JICA, SACEP etc). The Webinar has been highly appreciated by participants and is attracting attention from a wide range of stakeholders. The participant profile details are depicted in **Figure 1**.

Figure 1: Participant Profile



Sl. No.	Countries Attended	
1	Denmark	Total Attendance 643
2	India	
3	Japan	
4	Malaysia	
5	Netherlands	
6	Norway	
7	Oman	
8	Philippines	
'9	Sri Lanka	
10	United Kingdom	
11	United States of America	

WEBINAR PROCEEDINGS

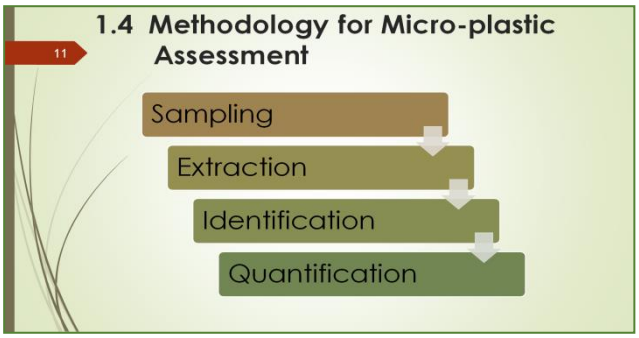
The session was opened by the coordinator Mr. Oinam Samuel, Deputy Director, NPC, by welcoming the moderator, all the resource speakers, panelists and attendees / participants on behalf of NPC and UNEP.

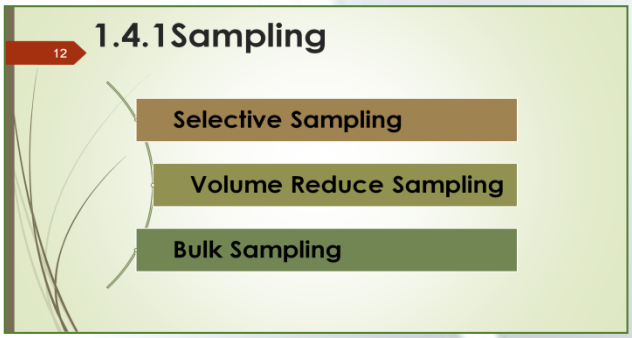
Mr. SP Chandak thanked the organizers and appreciated the idea of the virtual workshop, and briefed to resource speakers to optimise time to draw maximum attention to the core and significant aspects and important case examples. He also appealed to reflect on the key recommendations that could guide a direction for policy makers.

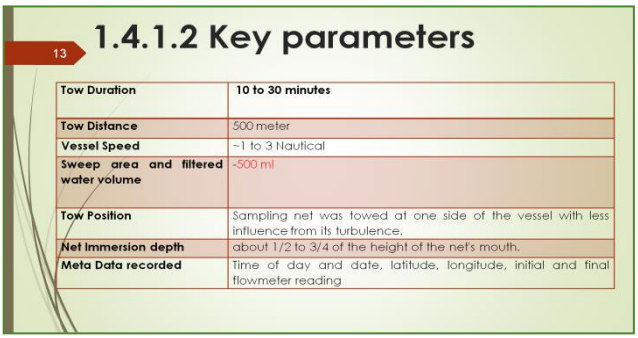
PRESENTATION 1:

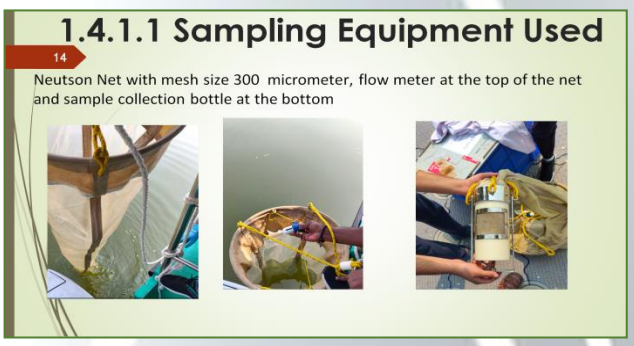
Snapshots of Findings of Micro-plastic Assessment in Ganga and Yamuna Rivers by Dr. Shukla Pal Maitra, Director, NPC

The first presentation by Dr. Shukla Pal Maitra, Director, NPCreflected on the findings of micro-plastic assessment in Ganga and Yamuna Rivers and methodology which was adopted during the micro-plastic assessment.









She described how sampling, extraction, identification, quantification stepsand equipment were used during micro-plastic assessment in Ganga & Yamuna Rivers and how microplastic results have been correlated with types of plastic waste/products assessed during clean up /perception studies. She further highlighted the major findings from perception surveysin Prayagraj & Agra that varieties of polymer were observed in water and another source of microplastic was wastewater both domestic as well as industrial which is drained into the river. She emphasised that microplastic survey also needs to be undertaken in wastewater falling into river. Microplastic survey results can be a very good source of information in developing plastic leakage scenario. The analytical data will also be helpful to develop the risk assessment and mitigation strategies.

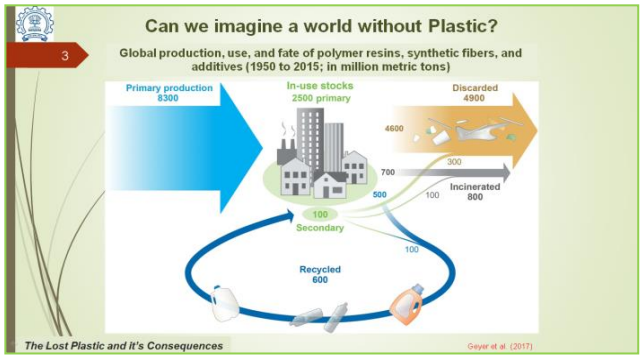
She concluded her presentation with the need for attention to the following:

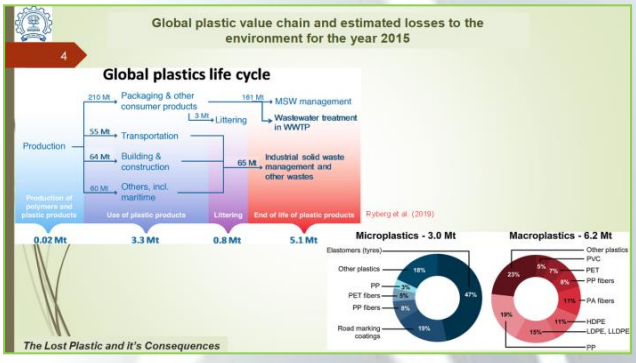
- Microplastic sampling indicated presence of polymers that are likely present in food packaging and Tobacco, Pan Masala sachet (EVOH, PVAL, PE,PP,PVC, PET), thermo packaging material (Polyamide), disposable cups and plates (polystyrene, styrene) thin polybags and plastic bags (LDPE, HDPE).
- Microplastic analysis validates our primary studies and macro assessment studies in Prayagraj and Agra.
- There is a requirement to make a comprehensive microplastic monitoring plan in water, sediments, fishes and other aquatic plants to understand its impact.

- Microplastic survey has to be validated through macroplastic assessment studies leading to identifying the polymers in macroplastic being leaked into the natural environment
- This study has to be undertaken in other major rivers and river banks and river beds along the major plastic waste generating cities in the country

PRESENTATION 2:

The Lost Plastic and it's Consequences by Dr. Amritanshu Shriwastav, Asstt. Professor, ESED, IIT-Bombay





Thesecond presentation was undertaken by Dr. Amritanshu Shriwastav, Asstt. Professor, ESED, IIT-Bombay. Dr. Amritanshu gave insights on the loss of plastics and its consequences on terrestrial and marine lives. He explained about global plastic value chain and estimated losses to the environment and this lost plastic has entered into eco system. The presence of microplastics in different environmental matrices was indicated however he reflected that data availability about human exposure and ingestion of microplastics and direct evidence of health effects on humans is still not available in detail.

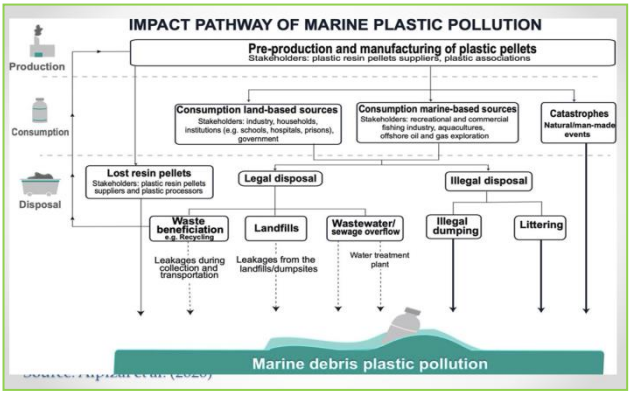
He indicated that direct evidences are available for their health effects on different organisms and further informed about how vitro studies suggest cytotoxicity to humans. Considering adverse impacts on living organisms, he highlighted the need to minimize the loss of plastic and thus its environmental burden.

Finally he gave a few key recommendations pertaining to

- Need to minimize the loss of plastic and thus its environmental burden.
- More in-depth understanding is needed for the fate of the lost plastic and the associated consequences on economics, ecology, and human health.
- A more comprehensive human exposure assessment is needed.
- There is a need to establish health related hazards due to plastic/microplastics on human health with rigorous studies.
- More studies are required to perform a comprehensive risk assessment for better management of the associated concerns.

PRESENTATION 3:

Ecological Economics of Plastics and Fiscal and Behavioural Policy Instruments by Dr. Surender Kumar, Professor, Delhi School of Economics



The third presentation was delivered by Dr. Surender Kumar, Professor, Delhi School of Economics. He began with the consumption and generation of plastic waste in India as well as global, and how plastic waste contributes to the total solid waste. He highlighted the collection efficiency of plastic waste and how it was treated. Scale of plastic problem in India and particularly how marine plastics pollution has reached at its crisis levels.

He further explained the impact pathway of marine plastic pollution and setting of policy goals to solve the problem. He also spoke about matrix of price based, rights based, regulation and behavioral instruments over targeting plastic industry, consumption by household & firms and disposal. He elaborated a case study on reducing plastic bag use with emphasis on econometric analysis.

He concluded by giving the following remarks:

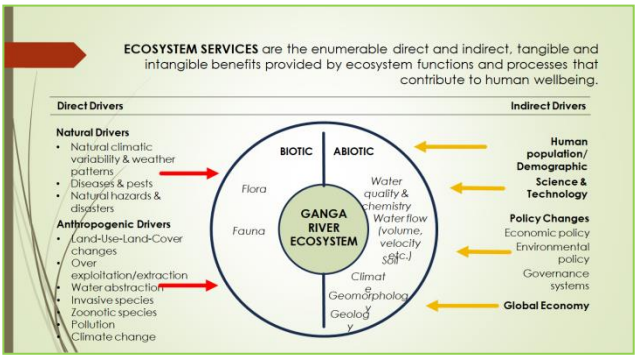
- Plastic waste in general and MPP is a serious concern in India, and land based consumption of plastic is a major source of MPP
- Effective solutions require reduction in real consumption and treatment/recycling of waste
- Economic cost of implementation and socio-cultural, environmental, and the factors that affect behavioral changes determine the effectiveness of mitigation strategies
- A combination of policy instruments is more effective rather than a single instrument, i.e., policies such as deposit-refund scheme combined with behavioral instruments

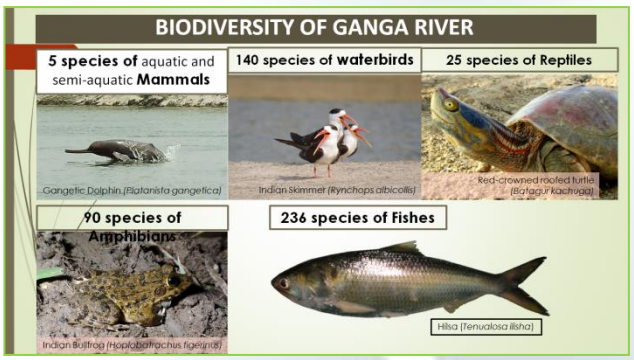
PRESENTATION 4:

Valuing Ecosystem Services and Bio-Diversity and implications from Waste Litter by Dr. Ruchi Badola, Sr. Scientist, Wildlife Institute of India

The fourth presentation was delivered by Dr. Ruchi Badola, Sr. Scientist, Wildlife Institute of India. She began with the direct and indirect, tangible and intangible benefits provided by ecosystem functions and processes that contribute to human wellbeing. She elaborated the

biodiversity profile of Ganga River of various species of aquatic and semi-aquatic mammals, waterbirds, reptiles, amphibians and fishes.





She explained about the ecosystem services provided by riverine ecosystems reflecting the variations in geology, geomorphology, soil type, climate, flora and fauna, and social and economic issues. She also narrated about various impacts such as physical impact on biodiversity, chemical impact, economic impact and health impact.

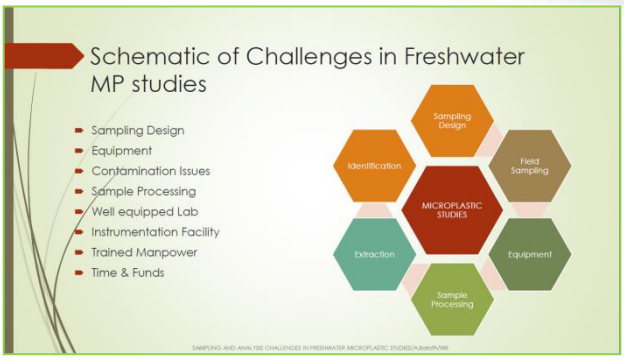
She concluded her presentation by suggesting following ways forward:

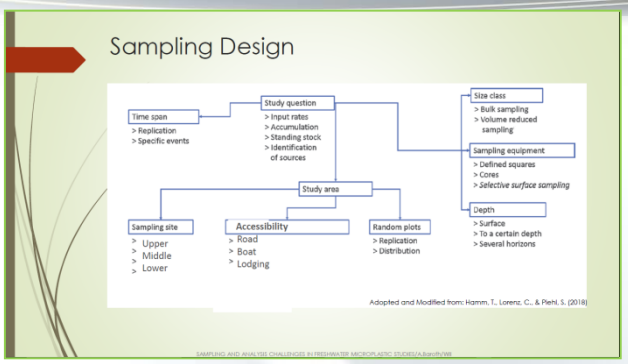
- Understand plastic waste generation at community level.
- Demand and supply of plastic waste, circular economy.
- Engage communities, mass awareness, social movements (Ganga Praharis).
- Financial and policy interventions: Local governments cover 50% of investment costs for waste systems, rest from national government subsidies and private sector.
- For macroplastics entering into sea, NMCG is setting surface and submerged trash scrapers.
- For microplastics, natural solutions such as strengthening mangrove forests of Sundarbans.
- Trans-border cooperation between India and Bangladesh.
- Working closely with GoI programs: Financing solid waste management was indicatively a challenge, more for operational costs than for capital investments.
- Cost recovery for waste services differs across income levels, full cost recovery largely limited to high-income countries.

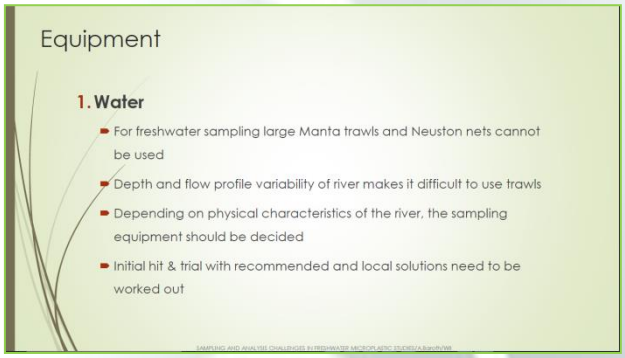
PRESENTATION 5:

Sampling and Analysis Challenges in Microplastic Studies by Dr. Anju Baroth, Scientist, Habitat Ecology Department, Wildlife Institute of India

The fifth session was taken up by Dr. Anju Baroth, Scientist, Habitat Ecology Department, Wildlife Institute of India. She explained about the challenges in freshwater microplastic (MP) studies like sampling design, equipment, contamination issues, sample processing, well equipped lab, instrumentation facility, trained manpower, time & funds etc.







She presented sampling equipment along with their description, pros and cons which can help in selecting appropriate sampling equipment as per the requirement of study and site. She outlined the steps in microplastic analysis with cost of instrumentation involved. She also listed gaps of importance and rationale behind the same to address sampling and analysis plan.

She suggested standard protocol for freshwater microplastic (MP) sampling and analysis, guidelines involving community, collaborations and exchange of knowledge.

PRESENTATION 6:

Use of Waste Plastic in Road Construction and its Future Impacts by Mr. S.K. Nirmal, Secretary General, Indian Road Congress

Shredding Machine

Central Mixing Plant

The sixth presentation was given by Mr. S.K. Nirmal, Secretary General, Indian Road Congress. He delved on waste plastic sources and advantages of using waste plastic as modifier in binder. Advantages are higher resistance to deformation, higher resistance to water induced damages, increased durability and improved fatigue life, improved stability and strength, environment friendly solution etc. He addressed the issue of disposal of waste plastic, thereby making the use of plastic environment friendly.

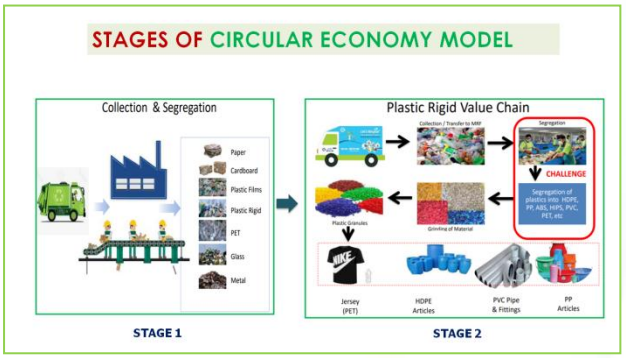
He highlighted the Indian Roads Congress guidelines for the use of waste plastic in hot bituminous mixes (dry process) in wearing courses (IRC:SP:98-2013). He shared about the waste plastic applications in road construction and initiatives taken up by the Ministry of Road Transport & Highways, Govt of India

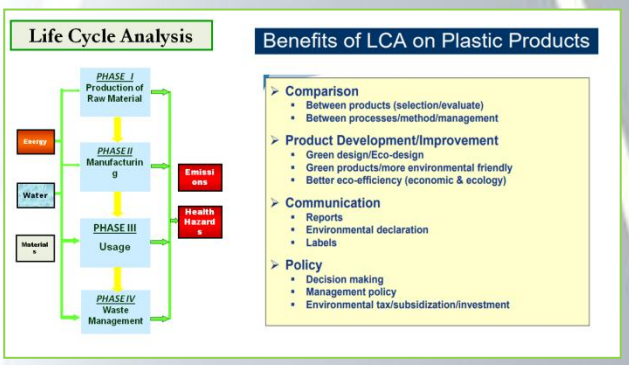
He emphasised the concerns with use of waste plastic and its toxicity and inherent properties of chemical additives which may cause environmental issues. Heating plastics may sometimes release moderate to highly toxic emissions which may cause health and safety concerns. Micro plastics flushed down into rivers, lakes and seas could pose a major threat to marine life. He concluded his presentation by suggesting that in future reuse of waste plastic modified bituminous mix should consider.

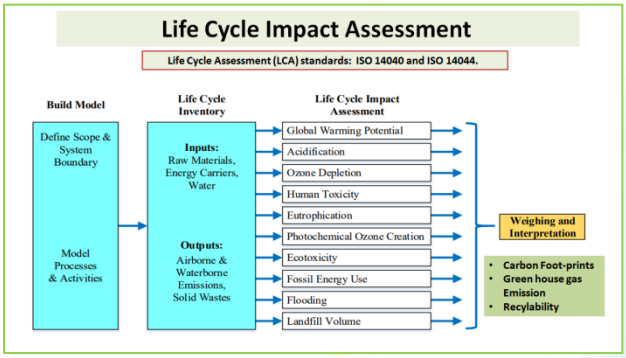
PRESENTATION 7:

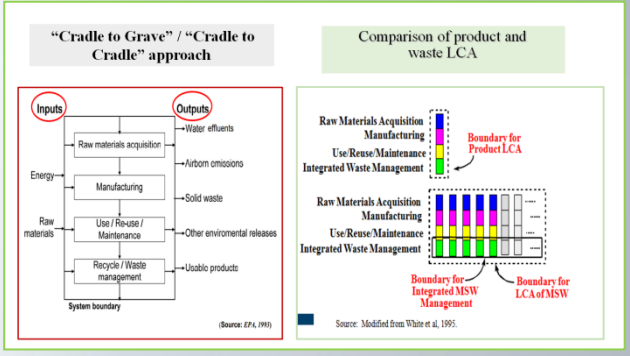
Life Cycle Analysis of Plastic Products in the Plastic Value Chain by Prof. A K Ghosh, IIT Delhi

The seventh presentation of the session was delivered by Prof. A K Ghosh, IIT Delhi. He elaborated on the life cycle analysis to preserve the value of plastics and to efficiently design the products for best possible post consumers usage.









He emphasized on the circular-economy solutions to expand the scope of recycling methods, across the plastics value chain, minimization of leakage of plastic waste and least preference to disposal in landfills. Need of plastic recycling, benefits of LCA on plastic products, life cycle impact assessment, "cradle to grave" / "cradle to cradle" approach. He also explained the importance of materials, energy and emissions during manufacturing of product, usage and disposal stages in LCA.

He further highlighted the importance of minimizing waste and maximizing value through circular economy approach. Prof. A K Ghosh concluded his presentation by indicating the need for clear definition/understanding of the recyclables for the plastics products based on the carbon foot prints, ease of recycling, economics and life cycle analysis for policy decision and emphasized the following:

- Defining recyclability
- Establishing recyclable hierarchy
- Effect on recyclability due to presence of other similar or non-similar materials
- Materials reduction (in terms of thickness) vs. collection/recyclability from waste
- Synthetic vs. biodegradable nature of materials
- Single use plastics (very widely used in the present pandemic situation)

PRESENTATION 8:

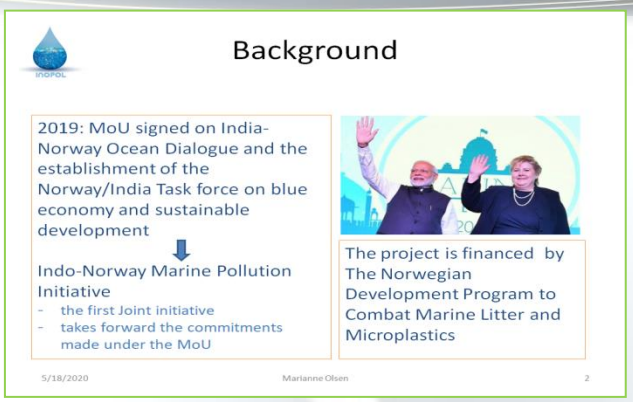
Ocean Plastic Turned into an Opportunity in Circular Economy-OPTOCE-Project Detailsby Mr. Palash Kumar Saha, Research Scientist, SINTEF Community, Norway

The eighth presentation of the session was given by Mr. Palash Kumar Saha, Research Scientist, SINTEF Community, Norway. He informed about the Ocean Plastic Turned into an Opportunity in Circular Economy – OPTOCE project from Norwegian Foundation for Scientific and Industrial Research, SINTEF. The project OPTOCE aims to investigate and document how the involvement of energy intensive industries can increase the treatment capacity for Non-Recyclable Plastic Wastes and thereby contribute to reduce the release of plastics to the Sea.

He explained how integrated waste management, co-processing of wastes in energy-intensive industry can help in improving waste treatment, resource efficiency and emission reduction. He also shared on the lessons learned from the pilot demonstrations in each country. And importance of learning to be shared through a regional multi-stakeholder forum to raise awareness, capacity building and replication through an international conference.

PRESENTATION 9:

Insights of the Project India-Norway Capacity Building Project on Plastic and Chemical Pollution in India (INOPOL) by Dr. Marianne Olsen, Research Manager Environmental Contaminants, Norwegian Institute for Water Research



The final presentation of the session was delivered by Dr. Marianne Olsen, Research Manager Environmental Contaminants, Norwegian Institute for Water Research. She briefed about the India-Norway cooperation project on capacity building for reducing plastic and chemical pollution in India (INOPOL). The objective of the project is applying a science-based approach to build knowledge and capacity to tackle plastic and chemical pollution from key sources. The focus is on developing coherent systems for data collection and analysis. The project is to build capacity and awareness of different stakeholders involved. She concluded by sharing the project deliverables.

SALIENT FEATURES OF THE WEBINAR 4

The session and presentations highlighted the following aspects:

- Methodology of microplastic assessment comprising sampling, extraction, identification and quantification steps and the results of microplastic from samples collected from Ganga and Yamuna rivers in Allahabad and Yamuna River in Agra.
- How microplastic results have been correlated with types of plastic waste/products assessed during clean up /perception studies.
- Few of the polymers couldn't be correlated with the source of plastic product/waste stream, and in an area of further research.
- The presence of polymers EVOH, PVAL, PE,PP,PVC, PET amongst microplastics in river was indicative which are likely to be present in food packaging and Tobacco, Pan Masala sachet, Polyamide in thermo packaging material, polystyrene, styrene in disposable cups and plates thin poly bags and LDPE, HDPE in plastic bags etc as sources causing contamination.
- Microplastic analysis validates primary studies and macro assessment studies in Prayagraj and Agra.
- The presence of microplastic in different environmental matrices aside, enough data availability about human exposure and ingestion of microplastics and direct evidence of health effects on humans is still not available
- Adverse impacts on living organisms highlighted the need to minimize the loss of plastic and thus its environmental burden.
- More in-depth understanding is needed for the fate of the lost plastic and the associated consequences on economics, ecology, and human health.

- Need of more research on health aspects of living organism and on associated risk assessment.
- Impact pathway of marine plastic pollution and setting up policy goals to solve the problem.
- Matrix of price based, rights based, regulation and behavioral instruments over targeting plastic industry, consumption by household &firms and disposal.
- Direct and indirect, tangible and intangible benefits provided by ecosystem functions and processes that contribute to human well-being
- Trade off between plastic benefits and negative effects to human and environment due to use of plastic
- Engage communities, and undertake mass awareness, social movements (Ganga Praharis). Further financial and policy interventions needed, focus on natural solutions such as strengthening mangrove forests of sundarbans, trans-border cooperation.
- Pros and cons which can help in selecting appropriate sampling equipment as per the requirement of study and site.
- Standard protocol for freshwater microplastic sampling and analysis, guidelines involving community, collaborations and exchange of knowledge
- Circular-economy solutions to expand the scope of recycling methods, across the plastics value chain, minimization of leakage of plastic waste and least preference to disposal in landfills.
- Materials, energy and emissions are important during manufacturing of product, usage and disposal stages in LCA

KEY QUESTIONS RAISED BY ATTENDEES / PARTICIPANTS

The session was concluded by answering of a series of questions by the speakers and panellists that were put up by several participants in the workshop.

ENCLOSURES:

- **Press Release (s)**
- **Programme Agenda**
- **Session Flyer**
- **Concept Notes**
- **Presentation by each resource speaker**