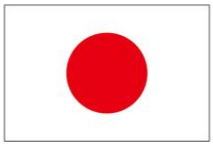
Counter MEASURE FOR PLASTIC FREE RIVERS

UN environment programme

उपाय प्लास्टिक मुक्त नदी

Promotion of Countermeasures against Marine Plastic Litter in Southeast Asia and India:

Final Report



From
the People of Japan

About this report

This report is submitted by the United Nations Environment Programme, Regional Office for Asia and the Pacific (UNEP ROAP) to Ministry of Foreign Affairs (MoFA), the Government of Japan, as terminal report of the project CounterMEASURE. It is organized in four chapters, the first being the introduction. The second chapter describes the project achievements in both Mekong and India components, project framework to identify sources and pathways for plastic leakages, outreach and stakeholder's consultations and development of countermeasures. The third chapter describes the financial report of the project. The fourth chapter describes the lessons learned consisting of major achievements and impacts of the CounterMEASURE project, limitations and constraints and finally the recommendations for future initiatives. The Japanese version is also available.

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Abbreviation

AIT	Asian Institute of Technology
ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer
DEM	Digital Elevation Model
CAGR	Compound Annual Growth Rate
CTU	Can Tho University
EPR	Extended Producer Responsibility
GIC	Geoinformatics Center, AIT
GIS	Geographic Information System
GPS	Global Positioning System
HDPE	High Density Polyethylene
LDPE	Low Density Polyethylene
LLDPE	Linear Low Density Polyethylene
MFU	Mae Fah Luang University
MoE	Ministry of the Environment, Japan
MoFA	Ministry of Foreign Affairs, Japan
MRC	Mekong River Commission
MT	Metric Tonnes
NGO	Non-Governmental Organization
NPC	National Productivity Council
NUOL	National University of Lao
PET	Polyethylene Terephthalate
PP	Polypropylene
PVC	Polyvinyl Chloride
RRCAP	Regional Resource Centre for Asia and the Pacific, AIT
RUOP	The Royal University of Phnom Penh
SRTM	Shuttle Radar Topography Mission
SUP	Single Use Plastic
UBU	UbonRatchathani University
ULB	Urban Local Bodies
UNEA	United Nations Environment Assembly
UNEP ROAP	United Nations Environment Programme, Regional Office for Asia and the Pacific

Executive Summary

Plastic pollution in Asia is one of most prominent environmental concerns of our time. Much of this pollution is said to originate in Asian rivers. The significance of promoting science-based and evidence-driven action, i.e. "countermeasures", to reduce and prevent the influx of plastic into economically and culturally important rivers, such as the Ganga (also known as the Ganges) and the Mekong, cannot be overemphasized. However, an on-the-ground understanding of how and where of the plastic leakage into the rivers was occurring was not readily available for decision and policymaking.

In this context the project on "Promotion of Countermeasures against Marine Plastic Litter in Southeast Asia and India (hereafter referred to as CounterMEASURE) was implemented from May 2019 to May 2020 with a budget of USD1,100,000. A sum of USD 1,057,108 (96% of the budget) was utilized by the end of project implementation period. Funded by the Ministry of Foreign Affairs (MOFA) of the Government of Japan and implemented by the United Nations Environment Programme (UNEP), the project focused on identifying ways to reduce land-based plastics entering waterways. The overall goal of CounterMEASURE was to generate knowledge related to plastic pollution leakage in Asia Pacific in order to improve policy implementation in the region. The project activities were carried out in a total of nine main sites in the Lower Mekong Basin Region and India, and included close to 900 verification sites.

CounterMEASURE has generated insights into pathways of plastic leakage that were not well known before. The project found that plastic pollution characteristics are site-specific. It also revealed that smaller cities with access to waterways and tributaries and without good waste collection coverage are equally as important as megacities in reducing plastic leakage into rivers. Ports and piers may also be key locations to reduce plastic leakage. These sites not only contribute to plastic leakage through improper waste practices, but also accumulate plastics that have leaked from upper segments of rivers. They could serve as strategic intervention points for plastic pollution reduction. Microplastic testing along the Mekong confirmed that the river collects plastic debris as it flows. Lower parts of the Mekong, such as Can Tho in Vietnam, contain significantly more microplastic than the upper river sections.

Local knowledge from all project sites was summarized in the report, "The Plastic Leakage Assessment and Monitoring in River Basins in Asia", and identified four types of plastic leakage hotspots (namely plastic value chain hotspots; plastic leakage source hotspots; plastic accumulation hotspots, and plastic application hotspots), as well as the framework to identify plastic leakage pathways for evidence-based countermeasures. In addition, the project established a network of experts, NGOs and agencies in Asia with expertise in plastic leakage assessment and monitoring. The project demonstrated how local stakeholders could come together and act on new knowledge, as shown by communities in India who organized a series of sensitization exercises in the form of pledges, walks, workshops, clean-up events, and social media campaigns to collect vital information on plastic hotspots and leakage pathways as well as to galvanize action to curb plastic pollution. A clean-up in a dense mangrove site at Sagar Vihar in Mumbai, for example, demonstrated multiple benefits, i.e. cleaning of a targeted area, increased public awareness on hazards of indiscriminate plastic waste disposal and generation of site-specific plastic waste data. The exercise also served to verify the effectiveness of the state-wide ban on the use of Styrofoam containers and disposable utensils. The volunteering team who organized the clean-up observed a near absence of Styrofoam amongst the collected waste.

The project concluded in May 2020 with a set of recommended future interventions:

1. **Support science-based countermeasures**

- Geolocation of plastic leakage hotspots and pathways using secondary and primary data
- Promotion of standardized methodologies and tools, and capacity building for assessment and monitoring
- Catalyzing countermeasures with Open Data Policy and regional and national data platforms
- Promotion of affordable microplastic testing and generation of source products database

2. **Outreach to generate support for countermeasures**

- Catalyzing countermeasures with citizen engagement
- Catalyzing countermeasures with media engagement

3. **Plastic and waste management as countermeasures**

- Elimination of unnecessary plastics while incentivizing of alternatives and recycling
- Focus on sector/product specific management policies
- Investment in waste management infrastructure in medium and smaller cities and expansion of waste collection coverage especially river and drain-side areas

4. **COVID-19 - Strengthen mechanisms to deal with spike in plastic waste and plastic biomedical waste management infrastructure (SUPs from e-commence, PPEs, sanitation material)**

An independent effectiveness evaluation of the project concluded in July 2020 and confirmed that the project achieved its objective and delivered its outputs. It also determined the project was able to mobilize local community leaders and institutions to support the project activities and demonstrated an innovative approach in understanding plastic leakage sources and pathways. The project was found to be highly relevant to many global, regional and national agendas, particularly with respect to the 4th Session of the UN Environment Assembly (UNEA 4) resolution on marine plastic litter and microplastics, the Bangkok Declaration on Combating Marine Debris adopted by the ASEAN member countries, and the Mekong River Commission's ongoing effort to develop a plastic waste assessment and monitoring programme.

While mostly positive, the evaluation also highlighted important limitations of the project that stemmed from operational delays, programmatic ambiguity, and the global COVID-19 pandemic that affected the final stage of data collection and field activities. The evaluation offered a set of recommendations to consider when undertaking similar initiatives in future.

Chapter 1: Introduction

Plastic pollution in Asian rivers has been highlighted in many studies to account for an estimated 86% of the global input of plastics into oceans. Though only modeled estimates have been available, the information available prior to 2018 already provided a view of factors – such as increasing plastic production and use, prevailing plastic waste generation and stagnating waste management capacities and disrupted plastic waste trade flows - that would potentially make Asian rivers a major plastic pollution source.

The significance of promoting science-based and evidence-driven action, i.e. "countermeasures", to reduce and prevent the influx of plastic into economically and culturally important Asian rivers cannot be overemphasized. The Mekong River system, for example, hosts one of the most diverse and prolific freshwater capture fisheries in the world, hosting up to 1,148 species of fish, 20,000 plant species, 430 mammals, 1,200 birds and 800 reptiles and amphibians. Two transboundary river basins in Asia, the Ganga and the Mekong, are among the 10 most plastic-polluted rivers in the world. The Ganga flows through India and Bangladesh and empties into the Bay of Bengal while the Mekong runs through China, Myanmar, Laos PDR, Thailand, Cambodia, and leads to a Delta in Vietnam. Pollution, including plastic waste, continues to deteriorate the value of these major rivers. Effective action to reduce plastic pollution in Asian rivers require an on-the-ground understanding of how plastics are leaked into the natural environment. This critical knowledge is still limited in Asia and the Pacific.

1.1 The Project and its Goal and Objectives

The project "Promotion of Countermeasures against Marine Plastic Litter in Southeast Asia and India (hereafter referred to as "CounterMEASURE"), was launched in May 2019 and implemented through May 2020, including the period of no cost extension from March-May 2020. The project focused on land-based plastic entering waterways and rivers, and was implemented by the United Nations Environment Programme (UNEP) Regional Office for Asia and the Pacific and UNEP's India Office, and received a financial contribution of USD 1.1 million from the Ministry of Foreign Affairs (MOFA) of the Government of Japan.

Per the project outline (Annex 1) the overall goal of CounterMEASURE was to generate knowledge related to plastic pollution leakage in Asia, which could then be used to improve policy implementation in the region and to assemble know-how of Asia to lead global bench-marking and standards setting. Specific objectives were as follows:

1) In India, to develop a region-based plastic leakage assessment and monitoring tool and apply that to river basins, then use that knowledge to foster partnerships in the country to support development and implementation of countermeasures.
2) In the Mekong region, to develop a region-based plastic leakage assessment tool and create partnerships to ensure knowledge sharing among countries that could be used to refine tools and methods.

The CounterMEASURE project was a sub-project of the global PoW Project No. 522.4, "Protecting the Marine Environment from Land-based Pollution through Strengthened Coordination of Global Action" and responded to the 4th United Nations Environment Assembly (UNEA) Resolution on marine litter and microplastics.

1.2 Project Areas and Partners

The CounterMEASURE project was carried out in collaboration with academia, think tanks, civil society groups, and national and local governments in a total of nine sites – five sites along the Lower Mekong Basin Region, three sites along the Ganga[1], plus the City of Mumbai in India **(Figure 1.1)**.

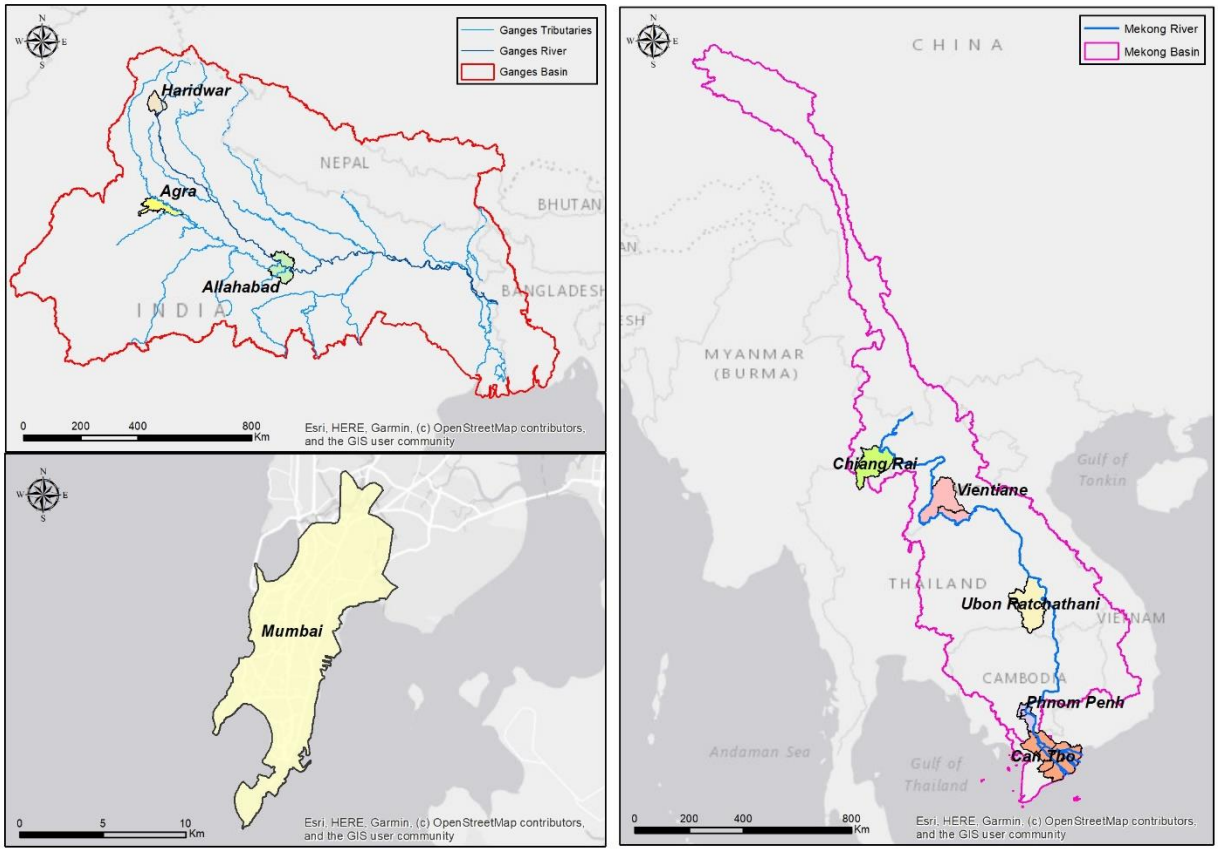


Figure 1.1: Project areas

The project engaged a number of entities in Asia as partners for specific activities and outputs. These included Mae Fah Luang University (MFU), National University of Lao (NUOL), UbonRatchathani University (UBU), The Royal University of Phnom Penh (RUOP), Can Tho University (CTU), Geoinformatic Center (GIC), the Regional Resource Centre for Asia and the Pacific (RRC.AP), the Asian Institute of Technology (AIT), and Pirika, Inc. in activities in the Mekong Region. In India, the partners included the National Productivity Council (NPC), Chintan, Development Alternatives (DA), The Energy and Resources Institute (TERI), New Delhi Television Ltd. (NDTV) and IRG Systems South Asia Private Limited (IRGSSA). Project-wide activities, such as the production of the project-wide tools and the final stakeholder conference in May 2020 involved all of these partners.

[1]Prayagraj is shown as Allahabad in the map.

Chapter 2: Achievements, May 2019 – May 2020

2.1 Key achievements

CounterMEASURE, through its activities and products, supported efforts to identify and reduce plastic leakage into Asian rivers such as the Ganga and the Mekong. Among its key achievements were the following:

a) Support for science-based countermeasures

- Compilation of data inventories with secondary data and primary data collection.
- Identification, classification and prioritization of plastic leakage hotspots (1. plastic value chain hotspots; 2. plastic leakage source hotspots; 3. plastic accumulation hotspots, and 4. plastic application hotspots) both at the level of city and river basin.
- Development of the framework to identify the plastic leakage pathway for evidence-based countermeasures (see Section 2.5, *Framework to identify the sources and pathways of plastic leakage*).
- Geolocation of plastic leakage hotspots and pathways using primary and secondary data.
- Standardization of methodologies and tools for macroplastic analysis. Collections of over 3,411.4 kg of waste in 21 clean-ups in the Mekong, Ganga basin (Yamuna Sub basin) and Mumbai found major plastic items such as disposable cutlery, multilayer food packaging, sachets (e.g. for tobacco), fishing gear, and items associated with worship and festivals (e.g. textiles, flowerpots).
- Standardization of methodologies and tools for microplastic analysis by conducting microplastic surveys at 39 points in seven cities along the Mekong, Ganga, and Yamuna river basins.
- Usage of the state-of-the-art tools like mobile apps, drone and satellite imaging for monitoring and collecting primary data.
- Promotion of standardized methodologies, tools and capacity building for assessment and monitoring of plastic pollution.
- Catalyzing development of a knowledge base with open data policy and regional and national data platforms for dissemination and scale up.
- Promotion of affordable microplastic testing and generation of source products database.

b) Outreach to generate support for countermeasures

- Gaps in stakeholder understanding of plastics and in local public sector capacity are key challenges in plastic waste management. Therefore, outreach and local capacity building has been identified as an important component to generate support for countermeasures.
- Catalyzing support with citizen engagement during clean-up drives and through media engagement e.g. visit of Japanese media to project sites; three television episodes on NDTV in India
- Ensuring good alignment of outreach and citizen engagement with regional and national strategies and plans for effectiveness and sustainability.
- Development of outreach material in English, local languages, braille in video, audio, and print.
- Technical and outreach capacity for extension in other regions. In India, the project dissemination webinars were attended globally by about 1,000 participants from diverse institutions, e.g. 44 participants from International Organizations, 286 from Government Departments and Public Organizations, 215 from Private Organizations & Industrial Associations, 294 from Academic Institutions and 28 from Civil Society Organizations.

c) Plastic and Waste management as countermeasure

- The project identified evidence-based countermeasures such as policy and action plan development against plastic pollution through establishment of regional plastic leakage monitoring and an assessment approach aligned with the Asian context.
- Elimination of unnecessary plastics while incentivizing alternatives and recycling and aiming to achieve circularity.
- Focus on sector- and product-specific management policies.
- Investment in waste management infrastructure in medium and smaller cities and expansion of waste collection coverage, especially river and drain-side areas.

Notable statistics associated with project impact are summarized in **Table 2.1** below.

Table 2.1: Outcome statistics of CounterMEASURE

	India	Mekong	Total	Note
Number of direct beneficiaries – e.g. stakeholder workshop and training	3,620	179	3,799	India: 500 students through 5 awareness programs in Mumbai, 300 participants on World Wetlands Day event held in Mumbai, training of 75 trainers in Mumbai, roundtable discussion of stakeholders held in Mumbai in December 2019, 2,000 participants at the pledge event in Mumbai, 640 attendees at six national level stakeholder workshops, 25 at partner's meeting in December 2019 in New Delhi, 50 stakeholders at workshop and visit of UNEP Deputy Executive Director to Agra in February 2020 Mekong: MRC workshop, three expert meetings, and Japanese expert meetings
Number of direct beneficiaries – the Final Stakeholder Conference, 25-28 May 2020	-	-	1,286	Participants of 6 live virtual sessions (1176) and 1 virtual workshop (110)
Number of indirect beneficiaries – CM project video (views)	-	-	107,166	UNEP websites, social media channels including Instagram, Facebook, LinkedIn - as of 1 August 2020.
Number of indirect beneficiaries – TV programmes	1,500,000	131,200	1,631,200	India figures are based on (average viewership) for one panel discussion and three films aired during primetime by NDTV. Mekong figure is of two programmes aired by Thai PBS. As of 13 March 2020.
Number of hotspots mapped	302	584	886	Via CM1 mobile verification app
Macroplastics collected (kg)	2,870	541.4	3,411.4	
Macroplastics analyzed (kg)	1,436	151.7	1,587.7	
Number of people who took part in clean-ups	710	187	897	India: 710 volunteers participated at 19 sites (total) in Haridwar, Agra, Prayagraj and Mumbai. These included personnel from press/media. Mekong: UbonRatchathani - 117 people, Chiang Rai - 70 people in collaboration with Trash Hero and school students

2.2 Products delivered

The project delivered a total of 39 products mainly in the form of reports, brochures and films. Annex 1 and 2 consolidate the project activities aligned to the specific objectives 1 and 2 as described in Section 1.1.

2.3 India - The Ganga Basin & Mumbai

The India component, with the riverine and marine ecosystems among target areas, developed a set of region-based plastic leakage assessment and monitoring tools and applied the knowledge to foster partnerships to support development and implementation of countermeasures.

2.3.1 Desk Review (Product No 1.1, Annex 1)

A desk review of around 200 national, regional and global documents confirmed the project's original perception about the lack of scientific evidence in India that is necessary for development of effective action to reduce plastic leakage. It also found that current measures towards plastic pollution risk being ad-hoc, while national governments are making efforts to formulate policies to combat plastic pollution most notably in the form of a ban on certain plastic items, such as single-use plastic shopping bags. Among key findings were the following:

Status

- India has a moderate level of plastics consumption of 12 kg/capita/year.
- In India, a wide range of plastic polymers is being manufactured. Polypropylene is the major polymer manufactured in India (35.91% of all plastics in 2019-20), with HDPE (18.08%), LLDPE (14.56%), PET (13.12%) and PVC (9.09%), comprising most of the rest as of 2019-20.
- India has been consuming approximately 16.5 million MT of plastic annually, which was expected to increase to 20 million MT by 2020. This includes 43% of plastics consumption as manufactured for single-use packaging material.
- Currently, plastic waste represents ~12-22% of the total municipal waste generation depending on the urban characteristics of cities and is expected to increase at an even faster pace (approx. 10-11% CAGR) considering anticipated increase in plastic consumption with increased consumerism and plastic demand to support India's developing economy. Based on initial estimations, ~11.6 Million MT of plastic waste is generated annually across Indian cities as part of municipal solid waste, which constitutes ~70% of the total plastic consumption across India.
- Municipal solid waste management across India is crippled with severe policy, institutional, governance, infrastructure, and service delivery deficits that have led to rapidly declining service levels and consequently increasing environment and public health hazards in cities, owing to low collection rates and inadequate infrastructure for treatment and/or safe disposal.
- The plastic waste that forms a major part of the non-biodegradable municipal waste is mostly being dumped in the open or burnt due to a lack of adequate waste management systems. Thereafter, it either causes local environmental issues or goes into inland waterways/water bodies, eventually finding its way to the oceans.
- Rivers such as the Ganga and the Yamuna are severely polluted largely due to a significant quantum of waste generated from adjoining cities and towns. About 11,625 tonnes of solid waste was being generated every day from cities and towns along these rivers.

Response

- The Government of India has identified solid waste management as a national priority and is currently implementing Swachh Bharat Abhiyan (Clean India Mission) through state and local governments. In addition, many states are also making concerted efforts to address the municipal waste management issues through state sponsored investment programs and policies.
- The Government of India imposed a ban on importing plastic waste in March 2019, which came into force on 1 September 2019 and later expanded on 3 October 2019 as part of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 to address the mismanaged plastic waste problem.
- Further, the Government has committed to eliminate all single-use plastics (items like carry bags, straws and water bottles among others) from the country by 2022, following which many states have implemented prohibitions on single-use plastics.
- Plastic is being used in Road Construction as per Indian Road Congress guidelines. Further, it is used for energy recovery, conversion into oil through pyrolysis and co-processing in cement kilns.

Gaps & Needs

- A big gap exists in the understanding of plastic leakage pathways and the impacts of macro & micro plastics on terrestrial ecology (air, soil, riverbank and shoreline) and aquatic and marine ecosystems in the Ganga basin.
- The impact of plastic pollution on the trophic linkage, food chain and, ultimately, human health does not exist since the Ganga basin has many eco-sensitive zones and serves as a major agriculture, horticulture and fishery base for India.
- Achieving efficient forecasting of plastic waste pollution levels requires some level of validation from field studies.
- There is a need to develop a number of countermeasures at policy, programme, plan and project level to overcome this gap.
- There is need for synergies with ongoing programme, plan & project level interventions, e.g. Clean India Mission, NamamiGange, Air Quality Monitoring Program, Ground Water Quality Program & Soil Health Card Program in India.
- Differences in results between modelling and field surveys have been noted.

2.3.2 Data collection, analysis and visualization (Product No. 1.2 and 1.3.1 – 1.3.5, Annex 1)

Coordinated by the NPC, Chintan, DA, and TERI collected secondary data for Agra, Haridwar/ Prayagraj and Mumbai respectively, mainly from reports and databases of national agencies such as the Directorate of Census, the National Ganga River Basin Authority (NGRBA), State Government Agencies such as the Department of Urban Development, and reports of Urban Local Bodies (ULBs) (Master Plans, Waste Management Reports, Maps, Slum Rehabilitation Plans, Statistic and Annual Reports). The satellite imagery, SRTM and ASTER DEM open sources data were used to prepare contour maps and digital elevation models of the cities within municipal boundaries. Data on flow observation, rainfall runoff and temporal change of riverbanks were difficult to collect in most cities.

Primary data collection was done through 1) visual inspection for the illegal dumping site or littering spot and waste accumulation at the artificial barriers in waterways; 2) plastic waste audit during cleanup activities; and 3) microplastic sampling. The visual inspection was implemented by using GPS, still camera, 360° camera and mobile phone application developed by GIC (See **Figure 2.12** in Section 2.6.2 Partner engagement).

Waste audits during cleanup activities were conducted at 19 sites in total from November 2019 to early March 2020. About 1,436 kg of plastic waste from 19 sites was collected with the assistance of 710 volunteers. Microplastic sampling surveys were conducted in the Ganga and Yamuna rivers in Haridwar, Agra and Prayagraj (**Figure 2.1**). An effort was made to provide capacity building of stakeholders by developing easy-to-use tools such as a Plastic Leakage Assessment Toolkit, Tutorial videos for Macroplastic Assessment and Microplastic Assessment (**Product 1.3.1** and **1.3.3**).

Figure 2.1: Sampling survey in the Yamuna River

Macroplastic and microplastic surveys revealed that plastic pollution characteristics are site-specific. While polyethylene bags, multilayer packaging, food packaging, and garments and textiles were the top plastic waste items found in all cities, in Prayagraj, tobacco sachets were also predominant **(Product 1.2).**

The collected data were processed and analyzed by the fuzzy overlay approach to map plastic leakage sources and associated risk (**Figure 2.2)**

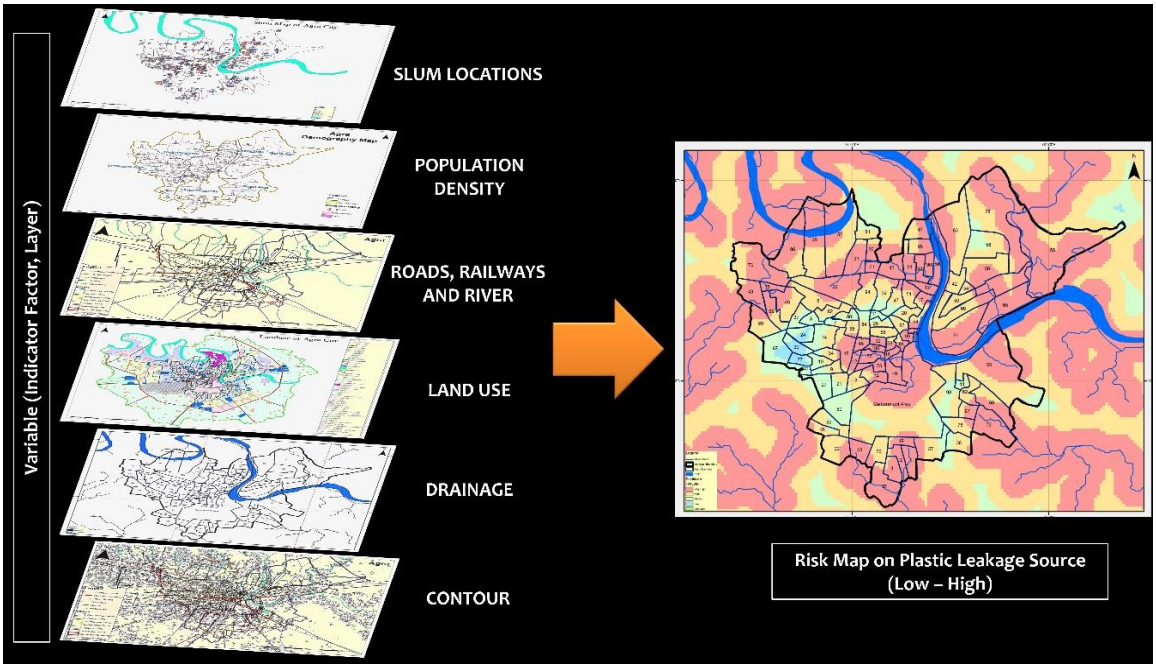


Figure 2.2: Plastic Leakage Risk Map of Agra

CounterMEASURE has shown that plastic leakage from hotspots and their pathways can be reasonably compiled by combining field data on macroplastics and microplastics, global open data sources, and preexisting data in a riparian city. Local communities engaged and supported the project to verify leakage hotspots such as dumping sites, littering spots and plastic waste accumulation at artificial barriers and riverbanks.

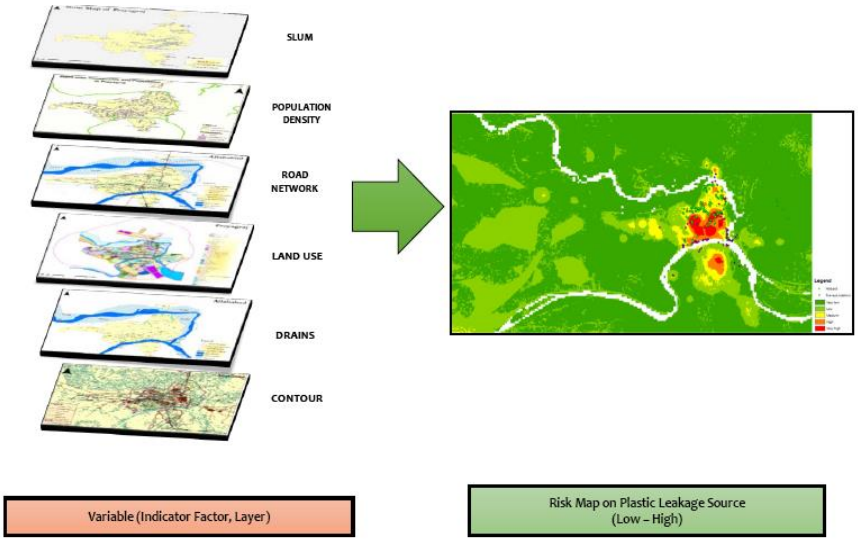
Story of Prayagraj (Allahabad), India

Prayagraj city is spread across 82 sq.km anddivided into 80 wards between two rivers: the Ganga and the Yamuna. The urban setting and growth trends of Prayagraj can be classified into three main categories: The Old City, the New City, and the OG areas, which are satellite towns and ribbon developments along major corridors. The city has grown organically, and the old and new city areas are densely populated while the OG areas are emerging new areas of the city**.** The population is 1,117,094 (Census, 2011), having witnessed a constant increase from 1951. The slum population is 470,467 with 91,025 households residing in 185 slums in the city.

Of the 721 tonnes per day (TPD) of solid waste generated every day in Prayagraj, 101 TPD is not collected according to Agra *Nagar Nigam* (Municipal Corporation) City Development Plan. The densely populated Old City generates much of the waste. Most of the waste generated in Prayagraj comprises food and other discarded waste materials such as paper, plastic, glass, metal, rags, and packaging materials. Field surveys indicated that, while about 38% of slums have daily clearance of garbage, in about 28% of the slums, the collection of waste is totally absent. A majority of the slum areas were found to be affected with unsanitary conditions, which required immediate attention from concerned authority.

A massive amount of plastic was observed to be littered during the field study at more than 200 locations in the city. A stepwise approach was adopted to identify the hotspots, which serve as sources

of plastic leakage into the river, i.e. identification of vulnerable areas using fuzzy logic approach adopted by GIC-AIT and identification of leakage points, followed by field reconnaissance and verification and cleanup activities. Subsequent discussion with the Municipal Corporation suggested hotspots, which were in line with predicted vulnerable areas.



Clean-ups and microplastic sampling were carried out knowing the hotspots and leakage pathways. Waste categories found during cleanups include plastic bags, multilayer packaging, plastic sheets and other thicker plastic bags in black and white color, water pouches, small packaging, e.g. tobacco sachets, biscuit packets, detergent packaging, rusks, etc. Microplastic sampling and analysis indicated that the total number of polymer types found in the Yamuna and the Ganga were 40 and 17, respectively.

The above information collectively gives valuable feedback to develop evidence-based and effective countermeasures to reduce plastic leakage. For example, it indicates the specific areas where the Municipal Corporation needs to improve plastic waste collection efficiency, as well as how to target its awareness raising efforts.

2.3.3 Perception Survey and Policy recommendations (Product 1.4.4 and 1.4.5, Annex 1)

Gaps were identified in the current knowledge and capacities of institutions and stakeholders at local, state and national levels. Some of the major findings of perception survey are given below.

- Communities and members of local authorities have limited knowledge of plastics and polymers. Only the ragpickers, scrap dealers and others involved in waste management have knowledge about products and packaging related to plastics.
- Low cost of plastic products and packaging material and their wide availability make them attractive to use. Stakeholders are aware of alternative items available to replace plastic items, but the affordability and availability deter them.
- Awareness of plastic waste collection and its management exist, but segregation of plastics from mixed waste is poor. Individual actions and efforts are the most effective way to address plastic waste, and so stakeholders believe that a more targeted awareness campaign to fill the knowledge gap as well as strict enforcement of existing waste related regulations will be needed.

- Consumers are not in consensus about the use of alternatives products to plastics, mainly due their habits and non-availability of credible replacements.
- Littered areas, which are in proximity of the river, are plastic leakage hotspots and become part of the leakage pathways.
- Plastic tends to end up in open sewerage and clogging drains due to the negligence and carelessness of people around the city. They also become carriers of plastics to waterways and rivers.
- Active doorstep waste collection is found in high-profile areas, leaving the economically neglected areas unchartered. Therefore, slum areas become hotspots and a source of plastic leakage.

In light of COVID-19 restrictions, the NPC organized a National Policy Workshop through a series of six webinars from 12-22 May 2020 to disseminate the findings of the project and to deliberate on future initiatives to be undertaken (**Table 2.2)**. The sixth session of the webinar, for high ranking policymakers, on 22May 2020 was chaired by Mr. C. K. Mishra, Secretary, Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India and was attended by 716 participants. Composition of the attendees is shown in **Figure 2.3**.

Table 2.2: Six webinars of the National Policy Workshop

Session topic	Day & Time	No. attendees
Session 1: The Science, Technology of Plastics & Techniques/Best Practices of Plastics Pollution Assessment and Investigation	12 May 2020 | 14:30 – 17:00	700
Session 2: Community Perceptions and Behavioural Aspects for Plastic Management and Promotion of Countermeasures to address Plastic Litter	14 May 2020 | 14:30 – 17:00	450
Session 3: Activities and Best Practices to Counter Plastics Litter by Sustainable Waste Management and Circularity	16 May 2020 | 14:30 – 17:00	700
Session 4: Assessment of Plastic Pollution Impact on Natural Capital and Riverine and Marine Ecosystems needing Policy Intervention	18 May 2020 | 14:30 – 17:15	643
Session 5: Impact of COVID-19 on Plastic Waste Generation (used PPEs and wastes from HCFs) and Upcoming Challenges	20 May 2020 | 14:30 – 17:30	633
Session 6: Scenarios to Counter Plastics Litter by Overcoming Barriers and Identifying Enabling Measures	22 May 2020 | 14:30 – 17:00	716

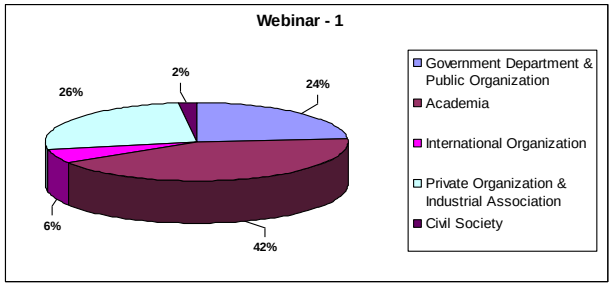


Figure 2.3.1: The Science, Technology of Plastics & Techniques/Best Practices of Plastics Pollution Assessment and Investigation

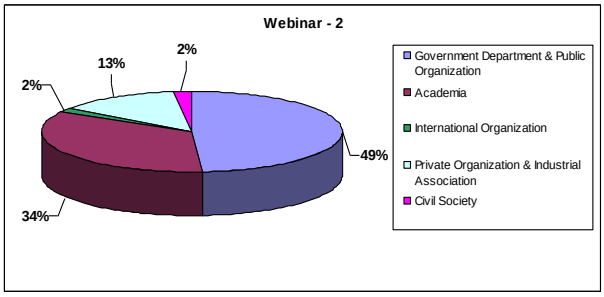


Figure 2.3.2: Community Perceptions and behavioral aspects for plastic management and promotion of countermeasures to address (Riverine and Marine) plastic litter

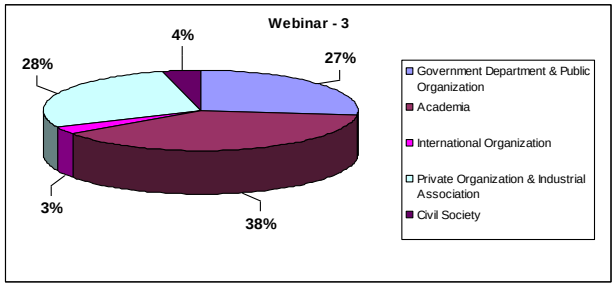


Figure 2.3.3: Activities and Best practices to counter plastics litter by sustainable waste management and circularity.

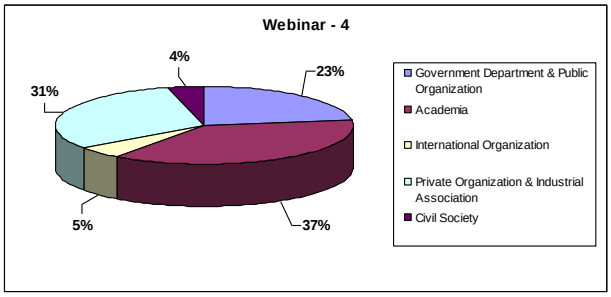


Figure 2.3.4: Assessment of plastic pollution impact on natural capital and riverine and marine ecosystems needing policy intervention

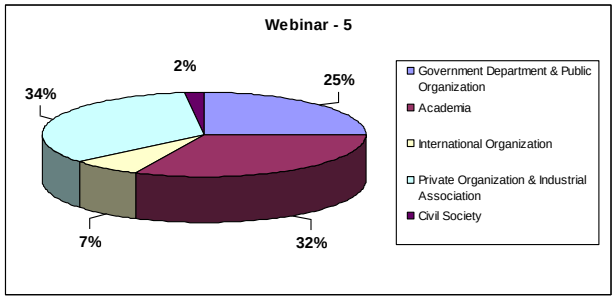


Figure 2.3.5: Impact of COVID-19 on plastics consumption, innovation, logistics and waste generation (including PPEs and wastes from Health Care Facilities) and related challenges.

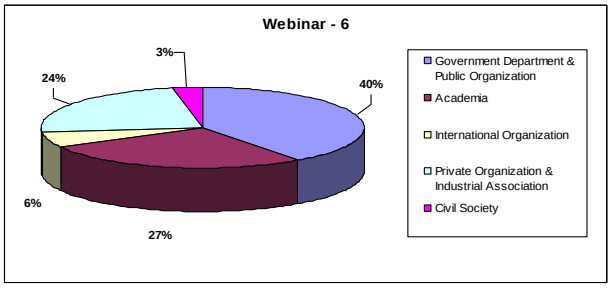


Figure 2.3.6: Scenarios to counter plastics litter in river and marine environment by overcoming barriers and identifying enabling measures and shaping roadmap and strategy ahead.

Figure 2.3: Composition of the attendees

Recommendations for countermeasures that have been gathered through the National Policy Workshop are summarized in **Table 2.3**.

Table 2.3: Recommendations in India Policy Dialogue

Topic	Proposed countermeasures
Science & Technology	Development of a standardized methodology for data generation in waste management chain and plastic value chain (including macroplastic polymers in litter and reverse logistics) and constructing a database and information dashboard and/or repository; Development of capacity for detailed assessment of plastic leakage in India; Study to evolve standardized process for macroplastic assessment and collation of all data; Robust monitoring of groundwater for toxic chemicals associated with plastics as well as integration of studies conducted by research institutions and agencies onto one platform; Support for R&D of improved plastics management systems and sustainable design of plastics (e.g. more easily recyclable or more easily biodegradable), working in close partnership with industry; Policies to prevent manufacture and sale of certain plastic products that generate waste that are difficult to treat; A national marine litter policy to control and manage the litter at land boundaries to prevent litter from entering the marine environment.
Outreach	Using scientific evidence and knowledge to bridge knowledge gaps and nudge behavioral change; Language of communication should be broad-based, including in English, vernacular, pictorial, audiovisual, braille; Civil society-led clean-ups for deepening community sensitization to be continued; Campaigns under government schemes such as SBM, NamamiGange to be synergized with municipal-level waste management system and initiatives such as UNEP CounterMEASURE project;

Topic	Proposed countermeasures
	Higher fines for littering and open dumping to induce behavior change.
Circular Economy	Replicate good models to increase recycling and circularity by supporting economic and social viability for scale-up via economic instruments and structural and financial frameworks; Good practices need to be documented and disseminated; Use of recycled plastic in products to be encouraged and ecofriendly product features to be highlighted; Economics of plastic recycling needs to be examined in greater detail with focus, among others, on the 'economics of pick ability' so as to not only increase the picking rate (particularly of plastic film and sheets) but also open up additional job opportunities; Taxes on the use of virgin plastics or differentiated value added taxes for recycled plastics or plastic products; Introduction of more ambitious recycling rate targets and harmonization of the methods used to calculate these rates.
Waste Management	EPR based regulatory mechanism to be evolved and implemented, including facilitation and encouragement of suitable financing models; Effective waste management infrastructure; Regular monitoring and evaluation network to inform local, national and regional action.
COVID-19 and Waste Management Systems	Development of appropriate strategy and guidelines for the collection and handling of waste materials from households and quarantine facilities with positive or suspected COVID-19 patients. This may include segregation at source and a separate collection mechanism should be pushed to prevent the further spread of virus. The collected waste should be labelled to avoid mixing with MSW; Enhance the design principles in waste management and improve the incentives for recycling of PPE; Inventorization of waste generation and disposal practices adopted during pandemics like COVID 19 and monitoring and evaluation of the same.

2.4 Mekong

2.4.1 Desk review (Product 2.1, Annex 2)

A desk review was conducted in the project inception phase in 2019, aiming to generate a base for development of a framework of a region-based approach for plastic pollution assessment and monitoring in Asian region. A total of 16 documents that were available at the time of the project initiation were reviewed, including reports, project documents, and scientific papers for identification and quantification of plastic leakage into rivers and oceans. Among the key findings of the desk review were the lack of scientific evidence and that current countermeasures against plastic pollution were at risk of being ad-hoc and reactive. Also, it was found that national governments are making efforts to formulate policies to combat plastic pollution, most notably in form of a ban on certain plastic items such as single-use plastic shopping bags. NGOs and citizen groups are often supportive of these measures. As well, it was found activities such as cleanups and promoting 3Rscan raise awareness on the issue. However, the lack of evidence-based policy is likely to result in limited outcomes with potential repercussions. In addition, the desk review identified the following challenges to fight plastic pollution effectively, which are particularly impediments in the Asian region.

- Limited support to generate scientific information on the status of plastic pollution, including microplastic pollution, in natural water bodies in Asia
- Lack of a regionally tested assessment and monitoring model of plastic pollution in rivers and waterways
- Limited evidence of the effectiveness of existing measures against plastic leakage

- Increase in alternatives with unknown environmental impact
- Difficulty in prioritizing plastic items for phasedown or phaseout
- Limited presence of Asian expertise in global science and policy communities concerning plastic pollution.

2.4.2 Data collection, analysis and visualization (Product 2.2, Annex 2)

The Geoinformatics Center (GIC) of the Asian Institute of Technology (AIT) and all partners in the Mekong region, including Mae Fah Luang University (MFU), UbonRatchathani University (UBU), National University of Lao (NUOL), Royal University of Phnom Penh (RUOP), and Can Tho University (CTU) collected secondary data based on a data inventory (**Product 2.2.1**) of primarily national and local authorities. Some data were inaccessible or not collected owing to the limitation of national and local data sources provided by authorities, so maximum use of open source data was encouraged. Data collection, particularly in slum areas, on flow observation, rainfall runoff, temporal change of riverbanks, and waste collection station points was challenging (**Figure 2.4**). Collected data was processed and analyzed by the fuzzy overlay approach (**Product 2.2.6**) to map out plastic leakage density, resulting in the creation of a plastic leakage source map.

Figure 2.4: Sampling survey in the Mekong River

Similar to project sites in India, primary data collection was carried out in the form of visual inspection at illegal dumping sites and littering spots, observing waste accumulation at artificial barriers in waterways, a plastic waste audit during cleanup activities, and microplastic sampling. The visual inspection was done using the mobile phone application developed by the project (See **Figure 2.12** in Section 2.6.2 Partner engagement). Waste audits during cleanup activities were conducted in Chiang Rai and

UbonRatchathaniin September and October 2019 respectively, and about 200 volunteers collected 93 bags of waste weighing 541.4kg.

With respect to the microplastic survey, 449 of the 570 solids collected from 33 survey points in the Mekong River Basin were analyzed by Pirika Inc. The following pie chart (**Figure 2.5**) is plastic resin-type composition at the 33 survey points. The average amount of microplastic per cubic metre in each pilot site is shown in **Figure 2.6**.

Using an ArcGIS-based online tool called the CounterMEASURE GIS Platform, a visualization of plastic leakage hotspots and pathways was attempted for 4 of 5 Mekong cities. (**Figure 2.7**, **Product 2.2.10, Annex 2**)

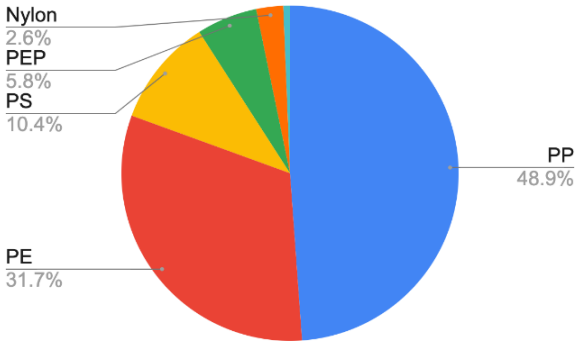


Figure 2.5: Plastic resin type composition

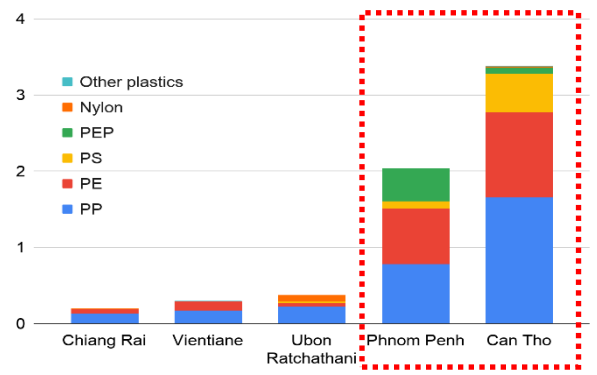


Figure 2.6: Average number of microplastics (per m^3)

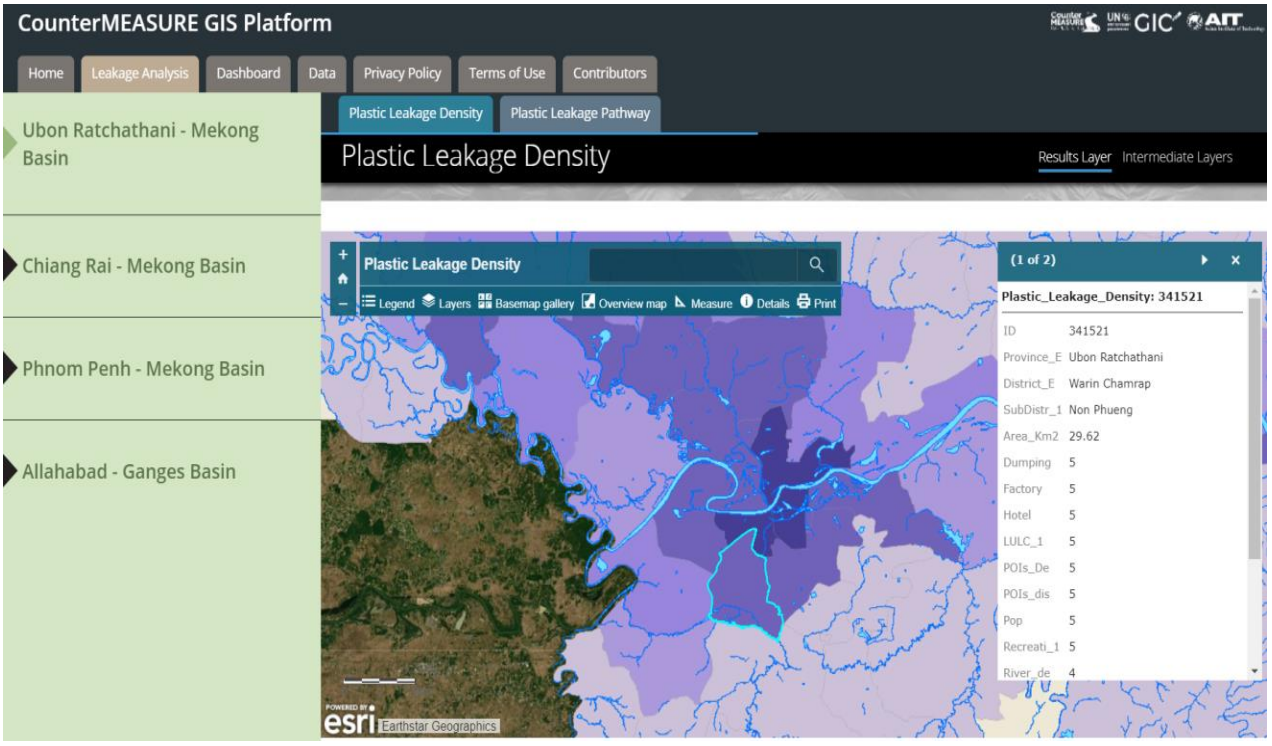


Figure 2.7: CounterMEASURE GIS platform

2.4.3 Regional technical workshop on assessment and monitoring of plastic pollution in the Mekong River

CounterMEASURE advocates for the promotion of transnational collaborative action that leverages efforts and capacity at local, national and regional levels to monitor and assess plastic flow into rivers and oceans. The project conducted a capacity mapping exercise to assess the capacities of Lower Mekong Countries, i.e. Cambodia, Lao PDR, Thailand and Viet Nam, to monitor and assess plastic waste leakage into the Mekong. (**Product 2.2.3, Annex 2**). The exercise mapped the structures, systems and resources at community or local, national and sub-regional levels, and generated recommendations for future interventions as well as a capacity mapping tool.

Plastic monitoring and assessment refers to the systematic observation and recording of plastic pollution on land and in water environments, and the use of monitoring data to support decision-making and planning processes related to plastic waste management. In this context, a regional technical workshop on assessment and monitoring of plastic pollution in the Mekong River was organized by UNEP in collaboration with the Mekong River Commission (MRC) in February 2020 in Vientiane, Lao PDR. The aim was to assess the current situation and challenges pertaining to plastic pollution, to discuss the plan for assessment and monitoring of plastic leakage, and to strengthen networking amongst stakeholders to tackle plastic pollution (**Product 2.3.1, Annex 2**). In total, 53 participants, mostly from national and local governments in the Lower Mekong Countries, joined the meeting to discuss their challenges with plastic pollution and to identify countermeasures. International organizations, academia, the private sector, and the media also participated the meeting to share their experiences. Some participants were interviewed by the media.

2.5 Framework to identify the sources and pathways of plastic leakage

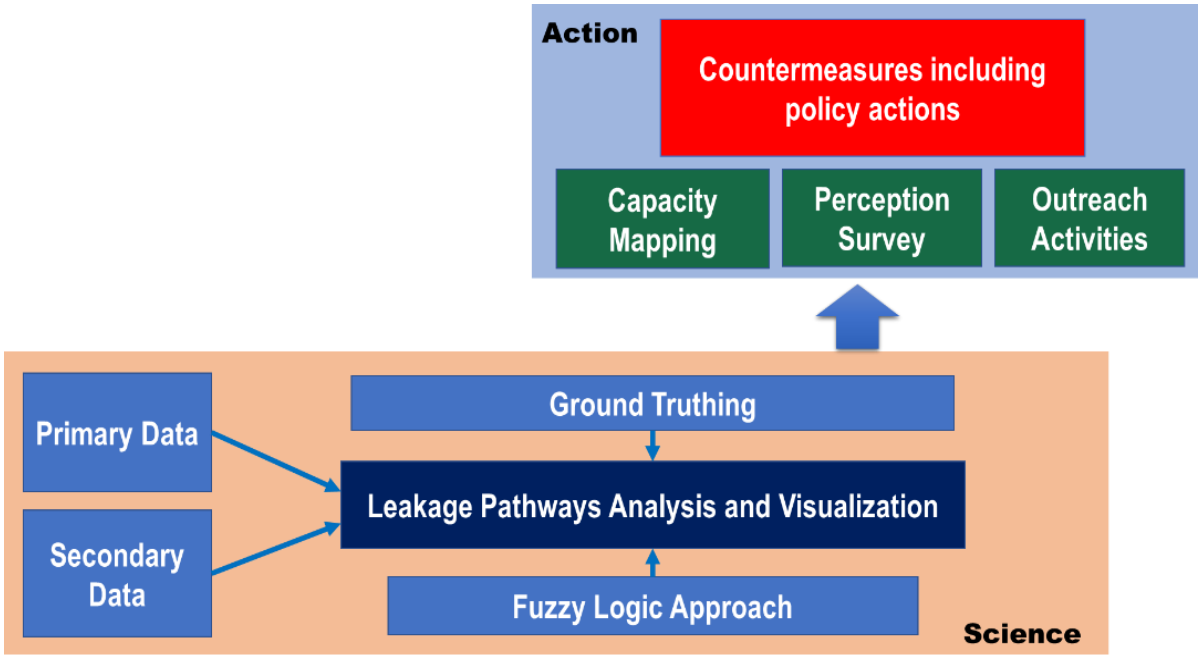


Figure 2.8: Framework to identify the plastic leakage pathway for evidence-based countermeasures

The framework to identify sources and pathways of plastic leakage is shown in **Figure 2.8**. Data collection methodology was developed with a focus on establishing the plastic value chain, the identification, classification and location of hotspots and the associated leakage pathways (source,

carrier and sink) within city boundaries. This was done by way of an expert consultation held in Bangkok on 5 June 2019 with thirty participants from various national and local governments, the private sector, academia, and civil society organizations, UN agencies and other intergovernmental agencies. The objectives of the technical consultation were:

a) To receive feedback on the draft desk review of existing methodologies for marine litter and plastic pollution assessments;
b) To discuss key aspects of the current concept of the regional model for plastic leakage monitoring and assessment in Asia and recommend any improvements necessary, and
c) To explore opportunities for collaboration among stakeholders of the project "Promotion of Countermeasures Against Marine Plastic Litter in Southeast Asia and India".

Based on further analysis during desk reviews of reports and studies that existed prior to the project, the data collection and analysis from nine project sites under the present project, as well as dialogues with experts in the region, the project concluded that there are four plastic leakage hotspots that are prominent in Asian rivers such as the Ganga and the Mekong, namely: (i) plastic value chain hotspots, (ii) plastic leakage source hotspots, (iii) plastic accumulation hotspots, and (iv) plastic application hotspots (**Table 2.4**). Further, the probable countermeasure to address it is also given in Table 2.4.

Table 2.4: Definition of hotspots in the project CounterMEASURE

Hotspot	Definition
1. Plastic value chain hotspot	Includes **attributes of the plastic value chain in Asia**, including elements of plastic production, conversion, trade, use or disposal. Plastic value chain hotspots are not related to any specific plastic application or product but can **often be related to a plastic type (e.g. a polymer) or an industry or sector.** Development of regulation of managing plastic and the capacity development for the identified sectors will be the relevant countermeasure.
2. Plastic leakage source hotspot	Source of **plastic waste with high risk of leakage to waterways and rivers**. Identified through an optional analysis, using GIS tools, based on parameters such as population density, waste generation rate, percentage of plastic in waste stream, waste collection rate, distance to waterways and rivers, catchment run-off, slope and wind patterns. **Examples: Illegal dumpsites, littering spots, areas without regular or formal waste collection service.** It is essential to ensure that the plastic waste is well managed around the identified areas. Improvement of waste management operation and raising awareness for the surrounding community will be the important countermeasure.
3. Plastic accumulation hotspot	**Location where waste accumulates in waterways and rivers locally and regionally**. **Examples: artificial barriers and topographic barriers.** Regular cleanup activity will be essential countermeasure.
4. Plastic application hotspot	Is related to **a product or packaging** that is partially or completely made of plastic that is found in abundance in macroplastic (cleanups) or microplastic surveys. **Examples: disposable cutlery, multilayer food packaging, sachets (e.g. for tobacco), fishing gear, items associated with worship and festivals (e.g. textiles, flowerpots).** Regulation and policy to the identified products will be effective countermeasures. e.g. Implementation of "Containers and Packaging Recycling Law", Establishment of agricultural plastic greenhouse.

The conceptual design of the data collection methodology, including the data inventory, was discussed among stakeholders, experts and officials, and pilot tested in Prayagraj in early November 2019. The data templates and findings of the pilot cleanup were presented at a side event during the SEA of

Solutions conference held on 11 November 2019 and were further discussed during a partners meeting held on 15 November 2019 in Bangkok, Thailand.

Assembled understanding of leakage pathways is summarized graphically in **Figure 2.9 (Product 2.4.3)**. The red arrow shows plastic losses from each value chain triggered by specific causes such as accidental loss, unintentional loss, degradation of buoys, loss of nets, littering, and unmanaged and mismanaged waste. Some plastic loss and leakage is directly (or via a drainage system) emitted into waterways, some is collected at an accumulation site, such as an illegal dumpsite or a littering spot, and some is scattered on land according to human behavior and topographical features. The accumulation site may be a potential plastic leakage source (plastic leakage source hotspot), with the possibility of the collected waste leaking into a waterway due to strong wind, heavy rain, flooding, and human factors such as intentional dumping. Plastic waste emitted into the waterway more directly become marine plastic pollution if it reaches the ocean through the river network. There are artificial and topographic barriers in waterways and rivers including riverbanks, so some plastic waste is trapped by those barriers and accumulates there (plastic accumulation hotspot). Finally, plastic waste can pass by those barriers and enter the ocean.

The implementation of the CounterMEASURE project has shown that a decent set of geo-referenced information on plastic leakage sites, hotspots and pathways can be compiled through a combination of field data on macroplastics and microplastics, global open data sources and preexisting data sources. These include local demography, land use and waste generation/collection coverage. This information is augmented by fuzzy analysis (**Product 2.2.6**), and community support to visit and verify what is actually happening at ground level by geo-tagging hotspots like dumping sites, littering spots and plastic waste accumulation at artificial barriers and riverbanks. Details on the region-based approach for plastic pollution assessment and monitoring are included in the report as “Plastic Leakage Assessment and Monitoring in River Basins in Asia” (**Product 2.4.1, Annex 22).** Based on the approach, a plastic leakage StoryMap (**Product 2.4.1, Annex 2**) for each project site of the Mekong region was also developed with findings contributing to evidence-based policy formulation and outreach activities as countermeasures.

Figure 2.9: Plastic leakage hotspots and pathways

CounterMEASURE provided revealing information on the character and type of hotspots. From those outcomes, CounterMEASURE was able to recommend four interventions, i.e. reduce plastic inputs, reduce the plastic loss, mitigate current plastic leakage, and promote plastic recycling **(Figure 2.10)**.

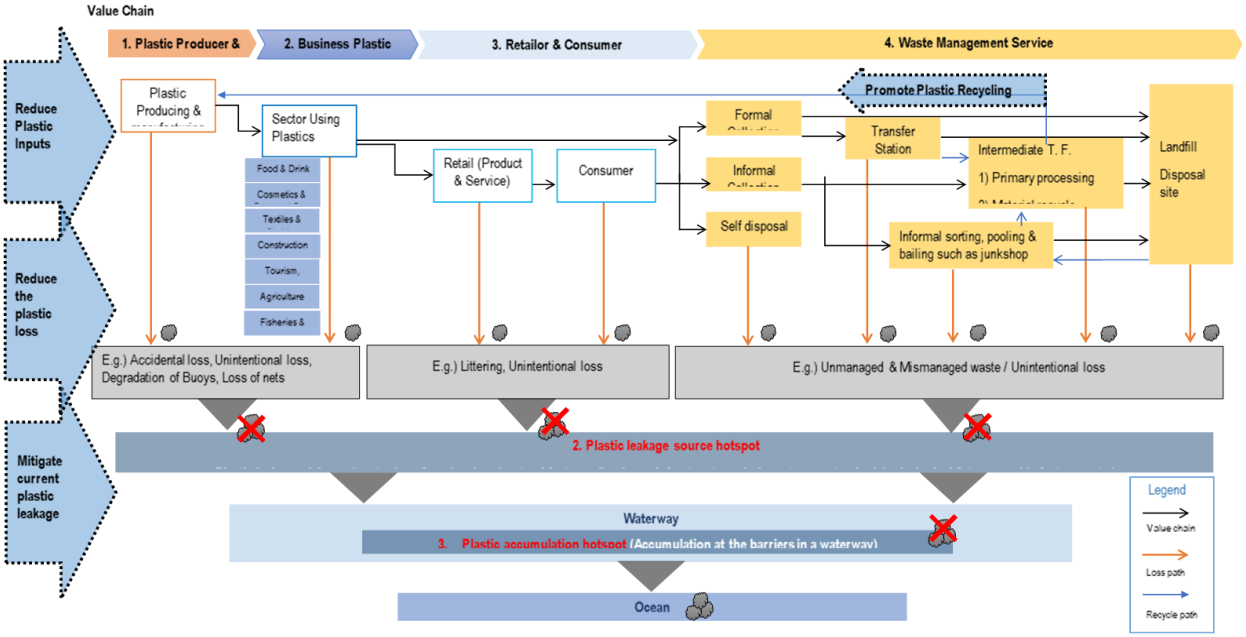


Figure 2.10: Four possible interventions (dotted allow) to mitigate plastic leakage to the waterways

2.6 Outreach and Partner engagement

2.6.1 Media Tour

While the project ensured that outreach efforts were made for every activity – whether a cleanup for data collection, a technical consultation, or a stakeholder workshop – its signature outreach effort was in the form of media tour. The media tour aimed to provide media an opportunity to see plastic pollution issues and on-the-ground approaches towards the reduction of plastic pollution and the development of plastic leakage models.

A media tour in India was organized from 19 to 21 February 2020 to highlight the problem of riverine and marine plastic pollution. The tour showcased how the project worked on causes and solutions in target cities and helped to trigger behavioural change **(Product 1.4.6)**. The tour included journalists from Fuji TV, Mainichi Papers, and NDTV India (Hindi). Led by Chintan, the project partner in Agra, the tour was timed around the Taj Mahotsav, a local cultural festival, whose entry ticket carried the message of the ill effects of single-use plastics. Local government agencies worked with Chintan under the project to spread the message of reducing and eliminating single-use plastic and media had an opportunity to interact with Agra city officials.

As part of a sensitizing drive, participating journalists accompanied cleanup activities on the banks of the Yamuna river, witnessed the extent of plastic pollution at the Hathi Ghat on the banks of the river, and received briefings from NPC on microplastic studies and the issue of pollution overall. They also viewed how plastic was sorted, collected and got to understand the kind of plastic that is found in the river. Media also met with schoolchildren to understand how they felt about plastic pollution and what they had learned through the cleanup and sorting. The Fuji TV team and the Mainichi team also interviewed UNEP Deputy Executive Director Joyce Msuya, who was visiting the project site. Chintan explained to the media how the tour guides at the Taj Mahal were trained to educate the travelers visiting the famous landmark on how not to litter.

The media tour in the Mekong region brought journalists from ThaiPBS, NHK, Nikkei, Reuters, Kyodo News, and the Australian Broadcasting Corporation (ABC). The journalists were invited to attend the regional technical workshop on assessment and monitoring of plastic pollution in the Mekong River held on 12 February 2020, followed by a field tour from 13-14 February 2020 (**Product 2.6.1**). During the workshop, journalists had opportunities to observe the discussion of workshop participants, which included national representatives, public and private sector participants, as well as academic researchers. The field tour allowed journalists to see the waste management situation in Vientiane including a transfer station, landfill operation and littering spots. Media also viewed field surveys conducted under the project, such as microplastic sampling and a drone survey. The tour gave them many opportunities to interview government authorities, members of the community, and researchers. **Table 2.5** shows the major media coverage after the two media tours.

Table 2.5: Media coverage

Media	Contents	Source	Date released	Viewers
Jagaran News	Boycott Single Use Plastic	https://www.jagran.com/uttar-pradesh/agra-city-single-use-plastic-boycott-message-will-be-given-at-taj-mahotsav-19952964.html	20 January 2020	4 million (average viewership)

Media	Contents	Source	Date released	Viewers
	Avoid Polythene and single use plastic	https://www.jagran.com/uttar-pradesh/agra-city-taj-mahotsav-2020-will-give-the-message-of-save-environment-jagran-special-20035400.html	16 February 020	4 million (average viewership)
Fuji TV	Agra Macroplastic Cleanups-Microplastic sampling&Hotspotting	https://www.fnn.jp/posts/00050799HDK/202003201130_sasakimakoto_HDK	20 March 2020	
NDTV	1.Panel Discussion 2.Video clips	https://www.ndtv.com/video/news/we-the-people/how-to-address-india-s-plastic-waste-problem-549702	20 May 2020 22 May 2020 24 May 2020 28 May 2020	1,500,000 (average viewership)
Thai PBS	Waste Management in Vientiane (Thai version)	https://www.facebook.com/teeneethaipbs/videos/195200314892790	19 February 2020	130,000 views (as of 13 March 2020)
	Waste Management in Vientiane (English version)	https://www.facebook.com/teeneethaipbs/videos/502195837159077	23 February 2020	1,200 views (as of 13 March 2020)
NHK World	Ridding the Mekong of Plastic Poison	https://www3.nhk.or.jp/nhkworld/en/news/videos/20200330192911835/	20 March 2020	
Nikkei	Ridding the Mekong of Plastic Poison	https://drive.google.com/open?id=1KIJZOZRGQDE5v_gsHl5c2NYewyZLkM	8 April 2020	

2.6.2 Partner engagement

The project engaged a number of entities in the Mekong Region and in India as partners for implementation of specific activities and outputs. These included academic institutions and NGOs for implementing on-the-ground activities and primary and secondary data collection. Specific engagement of each partner and the outputs received from them is shown in **Table 2.6.**

Table 2.6: Partners

Are of expertise	Mekong Region	India
1. Desk review of existing methodologies	(conducted by UNEP Office for Asia and the Pacific)	National Productivity Council (NPC)
2. Data collection and analysis	Mae Fah Luang University (MFU) National University of Lao (NUOL) UbonRachathani University (UBU) The Royal University of Phnom Penh (RUOP) Can Tho University (CTU)	NPC

Are of expertise	Mekong Region	India
	Pirika Inc	
3. Data visualization / GIS platform	Geoinformatic Center (GIC), Asian Institute of Technology (AIT), NPC, Pirika Inc	
4. Region-based approach for plastic pollution assessment and monitoring	Regional Resource Centre for Asia and the Pacific (RRC.AP) of AIT, NPC, Chintan, Development Alternatives (DA), The Energy and Resources Institute (TERI)	
5. Capacity mapping	RRC.AP, AIT	NPC, Chintan, DA, TERI, IRG Systems South Asia (IRG SSA)
6. Stakeholder consultation on policies	RRC.AP, AIT	NPC, Chintan, DA, TERI
7. Outreach	(own production by UNEP Asia and the Pacific Office with media companies)	NPC, Chintan, DA, TERI, IRG SSA, NDTV

Each partner brought to the project a specific area of expertise. and the project was able to catalyze new cooperation between project partners. For example, the GIC- and AIT-led production of a simple but useful data collection app for CounterMEASURE (https://arcg.is/1bDqbW) allowed the project to enhance its work with citizen science (**Product 2.2.10**). As of May 2020, the app had collected 886 georeferenced points with images of illegal dumping sites (leakage hotspots) and plastic waste stagnating in waterways and rivers (accumulation hotspots) across the project areas. The app remains active and as the information continues to be logged, it will be helpful in furthering the understanding of plastic leakage in Asian rivers (**Figure 2.11**). To further improve the app, it may be modified to include only a photo uploader and one dropdown menu to collect any necessary data.

Drone images (**Figure 2.12**) taken and processed by GIC were shared with another project partner, Pirika Inc., for analysis to explore the ability of artificial intelligence to detect plastic leakage covering large areas along rivers. There is more potential for such cross-fertilization among the CounterMEASURE partners.

Figure 2.11: A flyer with QR code to download the mobile application for leakage verification points

Figure 2.12: Field data collection

2.6.3 Technical and Stakeholders consultations

In addition to the consultations and workshops that took place for India and the Mekong specifically, the project organized several project-wide and regional technical and stakeholder consultations to receive feedback on project progress and to disseminate findings and messages. In total, three technical consultations and four coordination meetings were held among managers of Japan-funded projects on marine plastic litter (8 March 2019, 2 May 2019, 9 July 2019, 24 September 2019) (**Product 2.5.1**).

- Technical consultation for the project "Promotion of Countermeasures Against Marine Plastic Litter in Southeast Asia and India", 5 June 2019, The Sukosol Bangkok Hotel, Bangkok, Thailand (**Product 2.4.4**)

- Expert Group Meeting for the project "Promotion of Countermeasures Against Marine Plastic Litter in Southeast Asia and India", 23 August 2019, Pullman Bangkok Grande Sukhumvit, Bangkok, Thailand (**Product 2.5.2**)

- The 2nd technical consultation on the project "Promotion of Countermeasures Against Marine Plastic Litter in Southeast Asia and India", 15 November 2019, United Nations Conference Center (UNCC), Bangkok, Thailand

The 2nd technical consultation in November 2019 was held on the margins of the SEA of Solutions (SOS) conference (http://sos2019.sea-circular.org/), an annual event organized by the project SEA circular that is led by UNEP and the Coordinating Body on the Seas of East Asia (COBSEA) to inspire market-based solutions and encourage enabling policies to solve marine plastic pollution at source. Partners of CounterMEASURE took part in SOS 2019 where the project had an exhibition booth. (**Product 2.5.3**)

As the project neared the end of its implementation period, the CounterMEASURE Final Stakeholder Conference was organized from 25-28 May 2020 (**Figure 2.13**). It showcased important achievements of the project from its first phase and previewed the second phase of the project. The virtual conference highlighted key stories, accomplishments, and innovative solutions – even to the growing concern around the COVID-19 pandemic.

Figure 2.13 Conference banner page

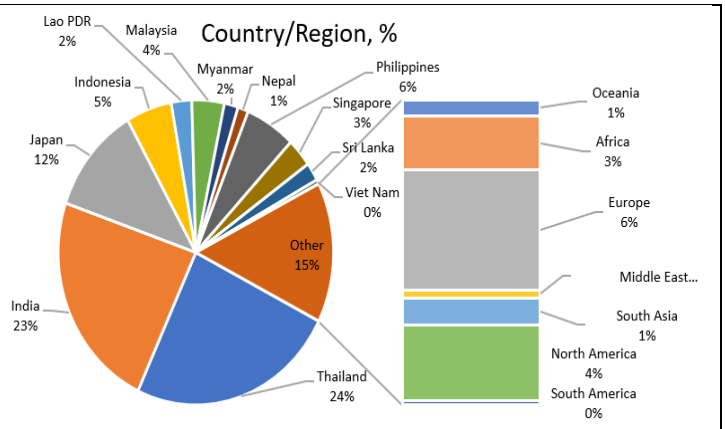


Figure 2.14 Participant representation by country and region

This virtual event reached a total of 1,286 participants from 58 countries in Asia and beyond **(Figure 2.14)** (**Product 2.5.4 and 2.5.5**). Participants included policymakers, researchers,

engineers, private sectors, civil society and citizens. The conference featured streamed keynote sessions, 6 live sessions and one workshop with two breakout sessions, and a press conference.

A video prepared by the project was launched during the conference **(Figure 2.15) (Product 2.5.6)**. Between UNEP's website and social media accounts and promotion by Antoinette Taus, UNEP's National Goodwill Ambassador for the Philippines, the video generated 87,405 views during the conference period. Including views on Instagram, Facebook, LinkedIn, the video was viewed 107,166 by 1 August 2020. The Philippines Department of Environment and Natural Resources (DENR) even organized a watch party on their page, which received 16,000 views.

Continuous effort was made throughout the project implementation period to disseminate information on plastic leakage in Asia rivers. Technical contributions were made through MoFA Japan (e.g. ODA mail magazine メールマガジン第 398 号 2019 年 5 月 24 日発行) and the Ministry of the Environment Japan in media (e.g. the web magazine, *Ethica)* **(Figure 2.16)**.

Several partners of CounterMEASURE spoke about the project and its findings at key regional events, such as the Thailand-Japan Environmental Solutions Week in Bangkok from 14-16 January 2020, which was co-organized by the Ministry of the Environment of Japan and the Ministry of Natural Resources and Environment of Thailand. A CounterMEASURE display board was set up during the event (**Product 2.6.3**).

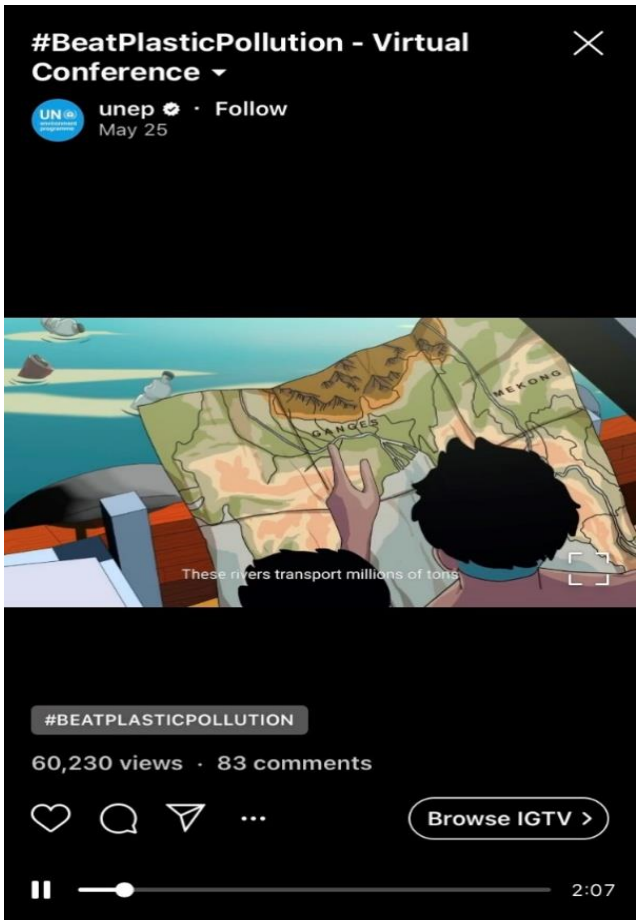


Figure 2.15 CounterMEASURE video

In May 2020, the theme study *Changing Sails: Accelerating Regional Actions for Sustainable Oceans in Asia and the Pacific* was published by the United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP). Produced in line with the 76th Session of the Economic and Social Commission for Asia and the Pacific, the study explores the key areas around which regional platforms can rally interdisciplinary and cross-sectoral solutions for the ocean. It highlights the lack of data and statistics on the ocean, the growing demand for moving towards inclusive and green maritime shipping, deteriorating fish stocks and gaps in fisheries management and the mounting pressure of marine plastic pollution. The assessment and monitoring framework and preliminary findings from CounterMEASURE were highlighted as a case study (**Product 2.6.2**), stressing the importance of science-based and region-based action to reduce plastic leakage into rivers.

街中でポイ捨てされたプラスチックが海に流出

プラスチックはコンビニのレジ袋やペットボトルなどの容器包装、家庭用品等、私たちのライフスタイルに浸透しており、もはや必要不可欠な存在となっているといえます。それは、ひとえにプラスチックの素材としての有用性にあります。というのもプラスチックは軽量で耐久性があり、好きな形に成形することができ、かつ安価に生産できます。ただ、プラスチックはポイ捨てされたり、屋外に放置されたりすると、雨や風によって河川に入り、海に流出し、海の生態系に悪影響を及ぼすことが懸念されています。海洋プラスチックごみの多くは、陸から海に流れ出ているものだといわれています。

「街中に捨てられた大量のプラスチックごみ(タイ) UNEPバンコク事務所より

特に、近年注目されるのは、「マイクロプラスチック」です。それは細かい粒子のプラスチックで、Ⅰ)最初から微細なプラスチックである一次マイクロプラスチックと、Ⅱ)もとは大きいプラスチックだったものが海洋含む環境中で破砕され、微細化した二次マイクロプラスチックの二つに分けることができます。Ⅰの具体例はスクラブ洗顔料等に含まれるマイクロビーズ、Ⅱの例はタイヤの破片や河川敷の人工芝などを挙げることが出来ます。マイクロプラスチックは回収が難しく、下水等を通って海に流れ出たマイクロプラスチックを魚などがエサと間違えて食べたり、ひいては我々人の健康にも悪影響を及ぼす可能性が懸念されています。

Figure 2.16: Article on marine plastic litter, in the web magazine, *Ethica*, October 2019 edition (http://www.ethica.jp/48862/)

Chapter 3: Financial report[2]

Financial Figures provided in this report are provisional and subject to change once the Financial Closure of the project is completed. The final certified financial report will be provided once all commitments are closed.

The project's total approved budget was USD 1,100,000. The budget was revised in December 2019 to accommodate changes in the project implementation plan.

Total expenditures and commitments to date[1] amount to USD 1,057,108 (96% of budget). This consists of direct costs of USD 935,494 and indirect programme support costs of USD 121,614.

Staff and other personnel cost
These costs represent salaries of project staff as well as fees for consultants and experts. Total expenditures and commitments under this budget class to date account for USD 190,703 against a budget of USD 193,470.

Travel
Total expenditure and commitment under travel to date amounts to USD 52,874 against a budget of USD 78,061. The under-utilisation of 32% is due to the travel restriction during COVID-19.

Contractual services
Total expenditure to date under this budget class amounts to USD 23,370 compared to a budget of USD 31,481. These costs include the costs of products and services from commercial vendors for project data collection, production of outreach material, meeting venues and service costs for the technical consultation (June 2019), expert group meeting for the project (August 2019), outreach activities and technical and logistic arrangement for conducting data analysis on microplastics sampling.
Grants and contributions (Transfer/ IP grant)
Total expenditure and commitment under this budget class to date amounts to USD 647,465against a budget of USD 648,724. These include the following small-scale funding agreements (SSFAs) and UN Agency to UN Agency Contribution Agreements:

- SSFA with GIC-AIT to develop a data and scenario visualization platform for monitoring macroplastic leakage and identification of hotspots in the Mekong River Basin and the Ganga river basin and identification of plastic leakage scenarios (sources and pathways of major plastic leakage) in five sites in the Mekong River Basin;
- SSFA with RRCAP-AIT to organize a two-day workshop, "Regional technical workshop on assessment and monitoring of plastic pollution in the Mekong River" and to conduct capacity mapping on the assessment and monitoring of plastic pollution in the Mekong River involving four Mekong Basin countries: Cambodia, Lao PDR, Thailand, and Vietnam;
- SSFA with DA, TERI and Chintan to partner with local bodies/agencies for an on-the-ground campaign to reduce plastic pollution; community engagement including outreach based on a household perception survey in Haridwar, Prayagraj (Allahabad), Mumbai and Agra;
- SSFA with NPC for desk review of studies and reports in India, identification of plastic leakage scenarios (sources and pathways of major plastic leakage) in Mumbai, and three locations along the

[2]Total actual expenditures is subject to change once all commitments are liquidated.

Ganga River Basin (Haridwar/ Rishikesh and Prayagraj [Allahabad]) and the Yamuna River Basin (Agra),and identification of possible countermeasures for hotspots through local stakeholder consultations; and

- UN Agency to UN Agency Contribution Agreement with UNDP India. Activities included organizing virtual participation for project partners to attend the final stakeholder meeting, a press tour, organizing a two-day National Policy Workshop on Marine and Riverine Plastic Litter in India, conducting macroplastic& microplastic sampling and analysis, and organizing a national media campaign.

1000/32CPL - TF CtrpartCtrs Supp Envrmt Activities

S1-32CPL-000362 - Promotion of countermeasures against marine plastic litter

Provisional Financial Statements for the period 1 January 2019 to 31 August 2020 [1]

(Expressed in US dollars)

Income	
Voluntary contributions pledged	1,100,000
Transfers from/(to) Grant	-
Voluntary contributions in kind	-
Total Voluntary Contributions	1,100,000
Investment income	-
Miscellaneous income	-
Total Income	**1,100,000**

Expenditures	**Expenditures**	**Outstanding Commitments**	**Total Expenditures & Commitments**
Staff and other personnel cost	190,703	-	190,703
Supplies, Commodities and Materials	810	-	810
Equipment, Vehicles and Furniture	4,912	-	4,912
Contractual Services	23,370	-	23,370
Travel	50,010	2,863	52,874
Transfers and Grants	464,915	182,550	647,465
General Operating and Other Direct Costs	7,861	7,500	15,361
Total direct expenditures	**742,581**	**192,913**	**935,494**
Indirect Support Costs (United Nations)	113,010	-	113,010
Indirect Support Costs (Implementing Partners)	-	8,604	8,604
Total indirect support costs	**113,010**	**8,604**	**121,614**
Total expenditures	**855,591**	**201,517**	**1,057,108**

Net excess/(shortfall) income over expenditure	**42,892**
Exchange rate (loss)/gain	204
Refunds	-
Unspent contribution balance, beginning	**-**
Unspent contribution balance, ending [2]	**43,096**
Outstanding Contributions Received. at To Date	**0**
Available Balance [2]	**43,096**

[1] Financial figures provided in this report are provisional. Final certified financial report will be issued once all outstanding commitment are closed

[2] Available Balance is subject to change once all outstanding commitments are closed. Final available balance is estimated to be USD 65,000. The final balance will be returned to the Government of Japan upon issuance of the Final Financial Report.

Chapter 4: Lessons Learned

The CounterMEASURE project envisioned making substantial contributions to the science- and evidence-driven knowledge base so that effective solutions and action, i.e. countermeasures, could be found. Were the project activities effective in achieving the project objectives and the expected outputs? Has the project made a positive impact in regard to local awareness on plastic pollution and what interventions are necessary to combat it?

To respond to these questions objectively, UNEP commissioned an independent evaluation of the project by an external consultant. The evaluation made use of qualitative and quantitative data collected through a desk review of the project's documents and outputs, semi-structured interviews with key informants, and an online survey among project stakeholders. Data gathering for the evaluation was conducted from May to June 2020, and the final report was submitted to UNEP on 7 July 2020.

Overall, it was reported that project partners and stakeholders acknowledge that the project achieved its objective and delivered the outputs even with a limited implementation period. It was also found that the project made efficient use of its human and financial resources, and project partners were able to mobilize local community leaders and institutions to support the project activities. The project was also able to demonstrate an innovative approach in understanding the plastic leakage sources and pathways, through the use of drones for capturing aerial images and artificial intelligence (AI) for analysis, and new equipment, such as the Albatross microplastic survey machine. Employment of these technologies reduced time and costs in plastic leakage assessment and monitoring. Among other impacts highlighted in the evaluation were: development of a regional network of experts and agencies with relevant knowledge and experience, capacity building among that network, and awareness raising among local government bodies, community and faith-based organizations, schools and the general public.

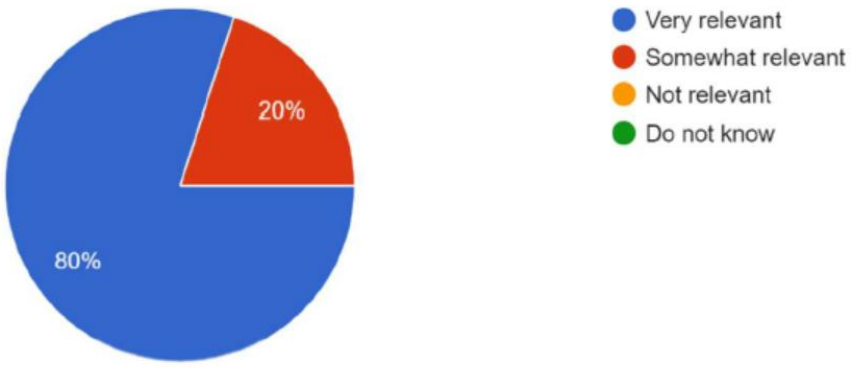


Figure 4.1: How relevant was the project to UNEA resolutions

The evaluation also found that the project was highly relevant to many global, regional and national agendas, particularly with the 4th Session of the UN Environment Assembly (UNEA 4) resolution on marine plastic litter and microplastic (**Figure 4.1**). At the regional level, the project is highly relevant to several initiatives such as the Bangkok Declaration on Combating Marine Debris adopted by the ASEAN

member countries and the Mekong River Commission's ongoing effort to develop a plastic waste assessment and monitoring programme.

While much was positive, the evaluation also highlighted important limitations of the project. Delays in the recruitment of key project team members and issuance of project contracts resulted in the slow start of activities. The global COVID-19 pandemic limited the data collection and field activities. The non-utilization of a project monitoring framework by project partners made the progress monitoring and reporting challenging. The project objectives and expected outputs were not always expressed clearly or consistently in the Project Outline and other project documents. Limited involvement of national governments and regulatory bodies was said to be an important impediment for the project in achieving its desired impact.

UNEP's response to the evaluation recommendations are summarized in the table below.

Recommendation by the Evaluation	UNEP response
All project documents and materials should adhere to UNEP's Glossary of Results Definition to ensure clarity of goals, objectives, outputs, outcomes, and activities among project team members and partners.	In line with this recommendation, the CounterMEASURE II Project Document has an Implementation Plan consistent with UNEP's Programme Management Guidelines. UNEP's Regional Office for Asia and the Pacific has introduced a Project Approval Review Routing process to ensure compliance and approved the CounterMEASURE II Implementation Plan.
Should the donor's project planning practices vary from UNEP's standard procedures, necessary documents may be prepared that follow the donor's requirements along with an internal-use companion document based on UNEP's standards.	In CounterMEASURE II, the project budget alignment with UN Secretariat's Administrative System, i.e. UMOJA, was completed in July 2020 with agreement from the donor.
Appropriate project monitoring frameworks should be established for every project and should be consistently applied throughout the period of implementation. Project reviews should be conducted at scheduled intervals.	The CounterMEASURE II Implementation Plan has a Monitoring Framework for the project's Results Framework.
Project planning and timelines should take into account the administrative and financial processes of UNEP.	CounterMEASURE II will reduce the inception phase by utilizing existing partners and service providers whenever possible. UNEP will identify ways to increase project managers' understanding of UNEP administrative processes and encourage advanced planning.
Projects should have a results management framework – based on a Theory of Change and a Pathway for Change – and share it with project partners and stakeholders. Partner agencies, consultants and other contributors should understand how their outputs contribute to higher level objectives.	The CounterMEASURE II Implementation Plan has been developed with a Results Framework and the project team, implementation partners have been briefed including roles and responsibilities. Briefs and PowerPoint presentations are available to regularly communicate the Results Framework and accountabilities to all partners bilaterally and collectively.

A full project team should be assembled before the project implementation or as early as possible. Existing in-house human resources or contracting of short-term consultants may be considered, especially in projects of short duration where new hiring may not be practical.	This is in line with UNEP current procedures. A consultant was engaged to cover the initial period of the project while the recruitment is ongoing. The delay was a result of unfortunate episode, whereby the selected candidate for the position declined the offer in the last minute, thus recruitment needed to be re-initiated.
Appropriate information technology (IT) tools should be utilized as well as various communication platforms to foster team collaboration and systematic project management and to improve productivity.	For CounterMEASURE II, cloud storage and communication software will be used for document management and collaboration. Wiki space and a virtual whiteboard will be established for collaborative brainstorming, knowledge generation and management. A distributed version control system will be used to apply an open-source approach in our digital tool and platform development. Project management software is now under the review to install for systematic project management monitoring to ensure quality results and impact
Future projects should seek synergy and avail of the technical knowledge and expertise in the international community and other global initiatives and relevant regional initiatives and platforms.	All Focal Area leads in CounterMEASURE II implementation plans and the terms of reference for activities will be assessed by UNEP Project Team to ensure this compliance.
External experts should review CounterMEASURE's framework, "Plastic Leakage Assessment and Monitoring in River Basins in Asia", including the procedures for data collection and technology application.	All Focal Area leads in CounterMEASURE II implementation plans and the terms of reference for activities will be assessed by UNEP Project Team to ensure this compliance. In addition, the concept of activities and methodologies, and reviews of results will be assessed by a Science Advisory Group to be established under CounterMEASURE II.
Future projects in this line of work should engage national authorities to promote policy development and with local government bodies to promote practical solutions.	All Focal Area workplans and terms of reference of CounterMEASURE II will identify national focal points for the project activities and identify opportunities to engage them.
Project planning should take account of the ongoing global COVID-19 pandemic and ensure activities are planned and implemented in a manner that minimizes or eliminates risk of disease transmission.	The impact of COVID-19 on the issues relevant to the scope of work of CounterMEASURE II has been incorporated in the CounterMEASURE II Implementation Plan, and the approach to activities and policy advocacy, communications will be guided by UNEP and national level guidance on the impact of COVID-19 on projects, including socioeconomic impacts identified by the UN and its partners.