

Outline for the progress report on (Distribution, Source, Fate and Impacts of Marine Microplastic in Asia and the Pacific)

1. Introduction and justification

1.1 Background

Marine microplastic pollution has become an emergent pollutants, drawing global concern. Considering the mounting concerns against a limited knowledge of microplastics and their impacts, WESTPAC established this regional research programme on microplastics, aiming to advance cooperation among scientists, institutions and countries on microplastic research and monitoring, and enhance scientific knowledge on the distribution, source, fate and impacts of microplastics in marine environments.

1.2 Principal Investigator (Chairperson) and Program Steering Group

Principal Investigator: Daoji Li, State Key Laboratory of Estuarine and Coastal Research, East China Normal University, China

Program Steering Group:

- (1) Daoji Li, East China Normal University, China;
- (2) Won Joon Shim, Korea Institute of Ocean Science and Technology
- (3) Zainal Arifin, Indonesian Institute of Sciences, Indonesia;
- (4) Somkiat Khokiattiwong, Phuket Marine Biological Center, Thailand;
- (5) Chengjun Sun, State Oceanic Administration No.1 Ocean Institute
- (6) Noo Azhar M. Shazili, Institute of Oceanography and Environment (INOS), University, Malaysia Terengganu, Malaysia

The Project Steering Committee is established to meet the scientific, managerial implementation, and resource needs of the WESTPAC- Marine Microplastics Project. It has overall responsibility for the formulation of strategy, and for the planning and coordination of WESTPAC Marine Microplastics Project.

The Group will carry out the following functions:

- (1) Review the regional concerns on Marine Microplastics, and identify the project requirements;
- (2) Promote efficient and cost-effective implementation of the WESTPAC Project
- (3) Prepare recommendations on this implementation to the IOC Sub-Commission for the Western Pacific and the IOC's Intergovernmental Panel for Marine Microplastics;
- (4) Identify the resources necessary to meet Marine Microplastic project needs;
- (5) Report to the IOC Sub-Commission for the Western Pacific.

2. Timeframe and objectives

Timeframe:

2017.05–2025.07

Objectives:

- (1) Establish a marine microplastic monitoring and research network;
- (2) Share existing microplastic monitoring and research approaches, and further develop capability of research and monitoring;
- (3) Identify challenges and gaps in monitoring and assessing the impacts of microplastic on marine ecosystems;
- (4) Discuss the possibility of developing a joint-monitoring plan on the distribution of microplastic, and a shared ecological risk assessment model for microplastic in the region.

3. Major activities, outputs & outcomes over the last intersessional period (May 2021- April 2023)

Over the last intersessional period, the progress of our project was significantly impacted by the COVID-19 pandemic, many of our previously planned activities were postponed or moved to online platforms.

Major activities:

- (1) Harmonizing standardized methods for microplastic sampling and analysis in marine water and biota.
- (2) Drafting monitoring protocol for riverine plastic and microplastics.
- (3) On November 26th, 2021, we organized an incubator “Stemming the tide of plastic and microplastic transport from rivers to the ocean” at UN Ocean Decade Regional Kickoff Conference. In that incubator, we invited seven speakers from the WESTPAC region to give brief mini-talks regarding to various aspects of riverine plastics, such as the current limitations in the monitoring of riverine plastic waste, the latest policy, citizen science activities, technology development to tackle this issue, as well as progresses in specific countries in the region. By the end of this incubator, we identified priorities, formed the basis for this incubator, and made promotions on our next steps, especially for collaborative, co-designed, solution-oriented research and monitoring actions.
- (4) On December 16–17th, we organized “Seminar on the Global Governance Process of Marine Plastic Pollution” in Shanghai. The conference was divided into two topics: "Challenges in the Global Governance of Marine Plastic Pollution" and "Prospects for Plastic Circularity and Innovation." Discussions and exchanges focused on establishing new mechanisms for preventing and controlling plastic pollution, management and policy regulations, compliance with

international conventions, innovative solutions for the circular economy, the necessity of future global agreements, relevant factors and obstacles, opportunities, and strategies.

- (5) Based on previous work and the outcomes of the Incubator, we applied Decade Action with our collaborators which was successfully registered as “UN22. Stem the tide of Asia’s riverine plastic emission into the ocean” in April 2022. The overall objectives of this project is to develop a better understanding of the sources, pathways, fluxes, leakage and accumulation hotspots of river plastic and microplastics via co-designed field samplings, site visits, analysis, and modeling; catalyze management, infrastructure, technological and behavioral solutions to reduce riverine plastic waste, via the conduct of joint research, capturing and sharing of lessons learned and best practices, technology innovation, and engagement of local authorities, NGOs, business and private sectors, and other stakeholders if relevant; and develop research capacity of young scientists and students in developing countries for marine plastic and microplastic research and monitoring
- (6) In 2022, we organized a bunch of online meetings to discuss the detailed work plans and framework for our Decade Action.
- (7) We performed sampling and validated and compared methods during the Yangtze River's historic flood events.

Outputs & Outcomes

- (1) A standardized methodology draft developed for riverine and marine microplastic monitoring.
- (2) Ocean Decade Project was successfully registered.
- (3) Comprehensive microplastics studies in various environmental matrix along China coast, West Pacific Ocean and Indian Ocean, and preliminary assessments on the sources, distribution hotspots, transport and fluxes of plastic and microplastics in typical regions.
- (4) More than 10 policy briefs/recommendations at regional and national level to combat marine plastic and microplastic pollution.
- (5) A training video for microplastic sampling at surface seawater. More than 50 young scientists and students were trained.
- (6) We organized 9 citizen science activities since 2020, including scientific seminar on marine plastic and microplastic pollution and coastal cleanup activities.

4. A summary of key achievements since its establishment

The key achievements of this project since its establishment can be summarized as the following categories.

Restricted distribution

4.1 Harmonizing the monitoring methodologies

- (1) Harmonized standardized methods for microplastic sampling and analysis in beach sediments.
- (2) Harmonized standardized methods for microplastic sampling and analysis in marine water and biota
- (3) Harmonized standardized methods for microplastic sampling, analysis and flux monitoring in rivers.

4.2 Sampling and database establishment

- (1) Microplastics sampling and analyzing in both pristine and populated pilot sites in representative countries.
- (2) Intensive microplastic sampling in coast, coastal seas, estuaries, West Pacific Ocean, East Indian Ocean, including surface water, water column, sediments, biota, sediments. A baseline database was established.

4.3 Publish scientific papers

In total, 15 scientific papers were published at reputable peer-reviewed journals.

4.4 Cultivation of student and young scientists

5 students got their PhD degrees and 3 students got their master degrees. We also have PhD students from Thailand and Vietnam, a postdoc from Pakistan studying in our group.

4.5 Training activities

- (1) Make a set of training manuals.
- (2) Make a Training video for microplastics and plastic sampling in surface water and water column were held in Sanya, Hainan province, China
- (3) More than 200 young students and new scientists and technicians were trained for microplastic study via a serial of training lectures, videos, etc..

4.6 Establishment of Regional Training and Research Center on Plastic Marine Debris and Microplastics

In April 2019, the UNESCO IOC Regional Training and Research Center on Plastic Marine Debris and Microplastics was established in East China Normal University. The center is aiming to closely link the capacity building activities to the attainment of international research goals, transfer marine technology, and improve research capacity of countries in the Asia-Pacific region to address marine plastic and microplastic pollution.

4.7 Registration of Ocean decade action

We applied Decade Action with our collaborators which was successfully registered as “UN22. Stem the tide of Asia’s riverine plastic emission into the ocean” in April 2022.

4.8 Organize or co-organize a serial of international trainings, workshops, and meetings.

- (1) WESTPAC inception workshop named “Distribution, Source, Fate and Impacts of Marine Microplastic in Asia and the Pacific” was held in 20-22 September 2017, Phuket, Thailand. We also established two open-ended Working Groups(WGs): microplastics in Surface Water WG and Microplastics in Marine Organism WG.
- (2) Co-organization of ASEAN Conference on Marine Debris(22-23 Nov 2017, Phuket).
- (3) Co-organization of the 2nd International Symposium on Marine Microplastic Pollution and Control (24-25 April 2018, Shanghai).
- (4) WESTPAC second workshop named “Distribution, Source, Fate and Impacts of Marine Microplastic in Asia and the Pacific” was held in 15-17 October 2018, Shanghai, China.
- (5) WESTPAC third workshop named “Distribution, Source, Fate and Impacts of Marine Microplastic in Asia and the Pacific” which was held in 15-17 October 2018, Shanghai, China.
- (6) Co-organization of the “Combating Marine Plastic Waste-2019 Shanghai Forum” which was held Nov 4–5, 2019, Shanghai, China.
- (7) Co-organization of the “Seminar on the Global Governance Process of Marine Plastic Pollution” which was held Dec 16–17th, 2021, Shanghai, China.

5. Self-assessment on implementation against objectives

In summary, this project has been conducted smoothly according to the plan. We are excited to see those outcomes and looking forward to the next step of work.

We will continue to do our best to move the process forward and make more accomplishments.

6. Problems encountered and recommended actions

The major challenge encountered during the conduction of this project is the outbreak of COVID-19. Travelling was limited and many planned activities were canceled, postponed or moved to online platforms. For instance, the joint sampling plan with scientists from Egypt, Bangladesh, Pakistan, and Thailand was postponed, and the training classes scheduled were canceled. Additionally, the fourth workshop of the project was also postponed.

7. Objectives to be achieved, if applicable, over the next intersessional period (May 2023-April 2025)

In the next intersessional period, our main goal is to wrap up our outcomes and publish the rest of the data. We will also publish the guideline for the sampling and analysis of microplastics.

Meanwhile, the project team will move their focus to the Decade Action project which was established based on the outcomes of this project.

8. Planned activities for May 2023- April 2025

After successfully registering Decade Action, this project's framework and work plan now align with those of Decade Action. As a result, the activities of this project will be integrated with Decade Action's initiatives going forward.

In April 2023, hold an international workshop (Online or in person), discussing the outcomes of this project, sharing the experience and discussion on publications. Considering the work framework on the Decade Action project.

In June 2023, first monitoring training for the riverine plastic and microplastic sampling, sample process and analyzing.

In July 2023, Dec 2023, conduct field sampling in at least three pilot rivers and finish the sample analysis and data process by Dec 12, 2024.

In May 2024, hold an international workshop to share experiment and discuss the progress made.

In October 2024, hold another training workshop on the transport of plastic and MPs in rivers.

In April 2025, hold a workshop to share and discuss the progress the Action has made.

[provide, in tabular form, the action items that should be included in the work plan and budget]

Program					Funding Required		Remark
	Activities	Objectives	Expected outputs/outcomes	Date and place	IOC	Other sources (i.e., from national or international)	
	1. International workshop	Discussing the outcomes of this project, sharing the experience and discussion on publications. Considering the work framework on the Decade Action project.	<ul style="list-style-type: none"> ● Project summary report outline; ● Decade Action project work framework. 	April 20 th , 2023 Online	0	20,000 RMB From East China Normal University	
	2. Training workshops for the riverine plastic and microplastic sampling,	Based on the methodology established, train young scientists and students in the Asia-Pacific region on the using of the methodology	<ul style="list-style-type: none"> ● At least 50 young scientists and students will be trained. 	June 26-28 th , 2023 Sanya, Hainan, China	0	50,000 RMB From East China Normal University	
	3. Field sampling in pilot rivers	Collect <i>in situ</i> riverine plastic and microplastic data in pilot rivers	<ul style="list-style-type: none"> ● At least three pilot rivers will be sampled and the data 	July 2023, Dec 2023, Selected pilot rivers	0	100,000 RMB From East China Normal University	

<i>Program</i>						<i>Funding Required</i>		<i>Remark</i>
	<i>Activities</i>	<i>Objectives</i>	<i>Expected outputs/outcomes</i>	<i>Date and place</i>	<i>IOC</i>	<i>Other sources (i.e., from national or international)</i>		
			will be obtained.					
	4.International workshop	Share experiences and discuss the project progresses; Make plan for the future.	● A project progress report	May 2024 Sanya, Hainan, China	Depends on IOC's budget	50,000 RMB From East China Normal University		
	5. Training workshop on the transport of plastic and MPs in rivers.	Train young scientists and students in the Asia-Pacific region on the modeling the transport of plastic and microplastic in rivers.	● At least 50 young scientists and students will be trained.	Oct 16-18 th ,2024 Sanya, Hainan, China	0	50,000 RMB From East China Normal University		
	6.International workshop	Share data, experiences and discuss the project outcomes	Project Tire 1 report	May 2024 Sanya, Hainan, China	Depends on IOC's budget	50,000 RMB From East China Normal University		