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OPEN UNIVERSITY
OF SRI LANKA



ICPES
International Conference on Plastics
& Environmental Sustainability

Proceedings of the 1st International Conference on Plastics & Environmental Sustainability



Centre for Environmental Studies
& Sustainable Development
7th & 8th March 2024





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&
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ABSTRACTS



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Message of the Vice Chancellor, The Open University of Sri Lanka

It is with my pleasure I write this message as the Vice Chancellor of the Open University of Sri Lanka. Conducting research, sharing findings among relevant parties, and providing international platforms to present research findings are indeed paramount duties by higher education institutions.



Understanding the role of higher education institutions, Center for Environmental Studies, and Sustainable Development (CESSD) of the Open University of Sri Lanka (OUSL) has organized the “1st International Conference on Plastic under a timely important theme on “Plastics and Environmental Sustainability” (ICPES). Plastic is a vital concern on Earth with distinguishing ecological features and critically important impacts on habitats worldwide. It provides significant environmental, social, and economic challenges for a country's sustainability. Therefore, I recognize the importance of taking the leadership of having a research conference dedicated to plastic and environmental sustainability.

I hope that the outcome of the research studies will be taken up by the interested parties including national decision-making authorities in making administrative, necessary conservation, and managerial decisions. Further, research findings will definitely be helpful in understanding the challenges faced by plastic for a sustainable future.

Finally, I convey my heartiest congratulations to all the participants for keeping trust and choosing the “International Conference on Plastics and Environmental Sustainability -2024” organized by CESSD of the OUSL to publish their valuable research findings. I would like to convey my sincere thanks to distinguished keynote speakers, plenary speakers, reviewers, collaborators, sponsors, and participants. While thanking, I congratulate the organizing committee of the ICPES -2024 and all staff members of the CESSD for making reality the 1st International Conference on Plastics and Environmental Sustainability. I wish you good luck to continue this event annually.

Professor P. M. C. Thilakerathne
Vice-Chancellor
The Open University of Sri Lanka
Sri Lanka

Message of the Secretary – Ministry of Environment

Due to its unique characteristics, plastics have become one of the essential materials in today's modern society. As with any other products and services, the generation of waste is inevitable for plastics too. However recyclability and their ability to change into other shapes and composites, the adverse effects were not noticed until quantities of plastic waste became extremely high level. According to the United Nations, under the business-as-usual scenario and in the absence of necessary interventions, the amount of plastic waste entering aquatic ecosystems could nearly triple from



some 9–14 million tonnes per year in 2016 to a projected 23–37 million tons per year by 2040. Some types of plastic are more durable than others, while some are more flexible. But no matter what type of plastic it is, it will always have a negative effect on the environment. It can take centuries for plastic to decompose. In that time, it can release harmful toxins into the ground and water. Marine animals are especially susceptible to the effects of plastic pollution, as they can mistake it for food and ingest it. This can cause them to starve or become entangled and drown.

The international community has recognized plastic pollution as a global environmental issue. In March 2022, at the resumed fifth session of the UN Environment Assembly (UNEA-5.2), a historic resolution was adopted to develop an international legally binding instrument on plastic pollution, including in the marine environment. The first session of the INC (INC-1) took place in Punta del Este, Uruguay from 28 November to 2 December 2022, followed by a second session (INC-2) in Paris, France from 29 May to 2 June 2023. The third session (INC-3) took place in Nairobi, Kenya from 13 to 19 November 2023. The fourth session (INC-4) and Fifth session (INC-5) are scheduled to be held during 23 - 29 April 2024 in Ottawa, Canada, and 25 November - 1 December 2024 in Busan, Republic of Korea respectively. At the end, the global community expects to develop an instrument that addresses the full life cycle of plastic, including its production, design, and disposal.

In line with the global community, Sri Lanka has made many positive steps in the Management of plastic pollution. Several regulations were introduced to ban selected types of single-use plastics. Burning of plastics is prohibited. Changes in the taxes were introduced to discourage the importation of selected plastics raw materials and products and to promote the recycling of plastics. National Action Plan on Plastic Waste Management 2021-2030 was developed, and the activities of the plan are implemented with the relevant stakeholders including the private sector, international funding agencies, and academia. But I believe that we have to do many other things as a country to address the plastic pollution in Sri Lanka.

I wish that this event of the International Conference on Plastics and Environmental Sustainability will bring many professionals together to share, scientific information, and experiences in various aspects related to plastic waste management. They will ultimately

contribute for the knowledge required for proper plastic waste management in Sri Lanka. I congratulate the Open University of Sri Lanka for organizing this timely important event.

Mr. B.K. Prabath Chandrakeerthi
Secretary
Ministry of Environment
Sri Lanka

Message of the Conference Chair

On behalf of the organizing committee, it is my honour and privilege to welcome you all to the First International Conference on Plastics and Environmental Sustainability (ICPES 2024). As the Chair of this conference, I extend my warmest greetings and heartfelt appreciation for your valuable presence in this momentous event.

Plastic and sustainable environment initiatives hold a vital position in the preservation of our planet's delicate ecosystems, and it is our collective responsibility to safeguard their existence. With the diverse range of themes encompassing this conference, we aim to explore the multidimensional significance of plastic management in promoting ecological balance, economic prosperity, and the sustenance of environmental health and biodiversity.

We trust that you will relish the 7th and 8th of March 2024. We sincerely thank the Secretary to the Ministry of Environment, The Vice Chancellor of the Open University of Sri Lanka, keynote speakers, sponsors, plenary speakers, session chairs, scientific & technical committee members all the authors and participants for their immense contributions in shaping this conference and making it a resounding success.

We eagerly anticipate fruitful discussions, insightful presentations, and the emergence of collaborative partnerships that will propel environmental sustainability and plastic management to new heights. Together, let us champion the cause of sustainable development and work towards a future where ecological and economic sustainability go hand in hand.

Prof. Bandunee C.L. Athapattu
Director - Centre for Environmental Studies & Sustainable Development
The Open University of Sri Lanka
Sri Lanka



Message of the Director Research, The Open University of Sri Lanka

I am delighted to contribute this message to the International Conference on Plastics and Environmental Sustainability (ICPES 2024) organized by the Centre for Environmental Studies & Sustainable Development (CESSD) of the Open University of Sri Lanka (OUSL).



The annual Open University Research Sessions (OURS) organized by the Research Unit of OUSL established itself as a high caliber research forum that attracts not only researchers from the OUSL community, but also from other state universities and higher education institutions, creating a forum for presenting and discussing valuable research findings leading to enriching experiences to the researchers. As a further step towards enhancing the research culture in OUSL, CESSD together with the Biodiversity Secretariat, the Ministry of Environment is hosting the International Conference on Plastics and Environmental Sustainability on the 07th and 8th of March 2024.

Plastic and sustainable environment initiatives are critical in addressing global challenges like pollution and climate change. Plastic pollution poses severe threats to ecosystems and human health. Adopting sustainable practices, such as recycling and reducing single-use plastics, is vital for preserving natural resources and promoting a healthier planet for current and future generations.

A conference is not just an avenue for a scientist/researcher to present their research to the wider community, but it can be an important venue for brainstorming, networking, and making vital connections that can lead to new initiatives and findings.

Therefore, ICPES 2024 will provide insights into mitigating plastic usage through the exploration of alternatives and novel approaches, fostering a sustainable future. The conference brings together an esteemed gathering of scholars, researchers, policymakers, conservationists, industry professionals, and enthusiasts from around the world.

While congratulating the presenters and thanking the Conference Committee, I wish the ICPES 2024 all the success.

Professor Shyama R. Weerakoon
Director
Research Unit
The Open University of Sri Lanka
Sri Lanka

Message From the Conference Co-Chairs



It is with great pleasure that we extend a warm welcome to all participants of the International Conference on Plastics and Environmental Sustainability (ICPES 2024), organized by the Centre for Environmental Studies & Sustainable Development (CESSD) at the Open University of Sri Lanka.

The theme chosen for this conference, "Pollution, Human Health, and Alternatives," resonates deeply with the challenges faced by our world today. With a vision to foster innovative and sustainable research for future development, we have convened this conference as a forum for the convergence of talent, knowledge, and dedication. We trust that this gathering will spark insightful ideas and facilitate the exchange of expertise among researchers, colleagues, and friends committed to global sustainable development.

The conference will delve into various sub-topics encompassing plastic and environmental sustainability, including Microplastics, Environmental Impacts of Plastics, Health Impacts of Plastics, Socio-Economic Impacts of Plastics, Plastic Waste Management, Plastic Production and Legal Aspects, and Alternatives for Plastics.

We hope that you will enjoy your time in the vibrant city of Colombo during the conference. On behalf of the conference co-chairs, we extend our sincere gratitude to our esteemed guests, keynote speakers, authors, members of the international advisory committee, members of the editorial committee, financial sponsors, and all those who have generously volunteered their time and efforts to ensure the success of this significant event.

Co-chairs

Prof. Ajith De Alwis	(University of Moratuwa, Sri Lanka)
Prof. Jagath Manatunge	(University of Moratuwa, Sri Lanka)
Prof. Terney Pradeep Kumara	(University of Ruhuna, Sri Lanka)
Prof. Rangika Bandara	(University of Kelaniya, Sri Lanka)

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SECURING MARITIME ENVIRONMENTS: COLLABORATIVE STRATEGIES IN SRI LANKA'S NAVY AND COAST GUARD'S BATTLE AGAINST PLASTIC POLLUTION

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As Sri Lanka faces a crippling tide of plastic pollution choking its coastlines, this study navigates the collaborative strategies employed by the Sri Lankan Navy and Coast Guard in tackling this environmental crisis. Employing a nuanced mixed-methods approach, the research utilized qualitative interviews (n = 10) with key stakeholders from the Navy and Coast Guard, alongside quantitative surveys (n = 230) distributed within coastal communities in the western province. This comprehensive approach unveiled a spectrum of collaborative initiatives, each with its own nuance and impact. Joint clean-up drives emerged as highly supported, with 73% of participants expressing satisfaction due to a visible reduction in plastic waste along Sri Lanka's coastlines. However, these efforts were often hampered by inadequate funding, logistical hurdles, and uneven awareness levels within communities. Meanwhile, technology-driven waste monitoring garnered the interest of 48% of respondents, who recognized its potential to leverage real-time data for optimized collection and disposal and emerged as a potential game-changer within the Sri Lankan context. Additionally, community-led recycling initiatives received endorsement, with 63% of surveyed individuals acknowledging that local communities taking ownership of their environment offered a sustainable and scalable path forward. Further, these percentage representations not only highlight these innovative approaches but also underscore the crucial need for improved communication and resource allocation among stakeholders. The study further pinpointed critical systemic challenges, with inadequate waste management infrastructure and limited stakeholder coordination acting as roadblocks to long-term effectiveness. By contextualizing these findings within the broader landscape of existing plastic pollution management and collaborative governance literature, the study sheds light on the intricacies of navigating this challenge in the Sri Lankan context. Ultimately, this research stands as a valuable contribution to the global discourse on sustainable practices and collaborative governance for combating coastal plastic pollution.

Keywords: *Coastal pollution, Plastic pollution management, Collaborative strategies, Community empowerment.*

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