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Sri Lanka Scientific Community Workshop
11th February 2021
Report

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1. Introduction

On 11th February 2021, the UK Centre for Environment, Fisheries and Aquaculture Science (Cefas) organised a networking event for Sri Lankan researchers with a focus on investigating marine litter and microplastics. The event was organised under the Commonwealth Litter Programme (CLiP) and involved 32 scientists from across Sri Lankan institutions. The event ran for 1h30 and was hosted on Microsoft Teams.

The workshop objectives were to give researchers a platform to discuss their current projects and possible future research plans, with a view to facilitating collaborations and avoid duplication. This fits with the CLiP objective to support networking among experts to set priorities, highlight common challenges and gaps, and discuss possible solutions and way forward. Governmental agencies and department were also invited to feed the results of this discussion to the Sri Lanka Government in order to facilitate future initiatives.

1.1. Agenda

14h30 – 14h40 Introduction to the meeting (Dr Umberto Binetti)

14h40 – 14h55 Plenary session: voting priorities for scientific community in Sri Lanka (Andy Smith)

14h55 – 15h25 Breakout rooms: discussing priorities for scientific community in Sri Lanka (Andy Smith, Dave Carlin, Dr Suzanne Ware, Dr Ella Howes)

15h25 – 15h50 Plenary session: presenting breakout rooms conclusions and further discussion (Dr Umberto Binetti, Andy Smith, Dave Carlin, Dr Suzanne Ware, Dr Ella Howes)

15h50 - 16h00 Conclusions (Dr Umberto Binetti)

2. Plenary session

During the first plenary session, attendees were invited to answer a series of questions about their perception of marine litter and outstanding knowledge gaps in Sri Lanka.
In the few days running up to the workshop, invitees were issued a pre-workshop questionnaire through the platform, Slido (www.slido.com). The goal of the exercise was to identify the topics that they considered priority for research on marine debris and microplastics in Sri Lanka. The four questions were:

1) What do you think are the critical data needs, or understanding, for litter/ microplastic work in Sri Lanka? (13 answers)
2) Are there technological or resource issues that might prevent that data from being collected? (13 answers)
3) How should this be funded and how should it be brought into national programmes of work? (12 answers)
4) Any other questions you might have about the Litter area of work? (12 answers)

All the answers are included in Appendix A to this document. Cefas scientists assessed the results and identified priority topics that were common across all the answers (Table 1).
During the plenary session, workshop attendees were asked to re-join Slido (www.slido.com) for a series of further questions. The first question of the plenary session asked participants to rank the priority topics derived from the pre-workshop questionnaire. Each attendee was invited to vote for up to three topics in the list with the view that the four highest voted topics would be discussed in breakout rooms. The results of the ranking are shown in Table 1, and the highest voted topics subsequently discussed in the breakout rooms are marked by '*'.

Table 1 Results of the first question of the plenary session: 'Which three of these do you think are most important for Future Microplastic and Litter research in Sri Lanka?'. Results are expressed in number of voters and percentage of total voters that selected each topic.

Topics for discussion	Votes	Percentage
Investment in training researchers, to increase expertise in Sri Lanka*	11	55%
Acquiring the necessary instrumentation to carry out microplastic studies*	9	45%
Studies on riverine litter*	8	40%
Studies on microplastic fate and impact*	6	30%
Understanding how to attract more international funding	5	25%
Coordination of researchers and centralised, accessible data for a consistent and holistic approach using the same protocols	5	25%
Linking studies to outreach and education	4	20%
Understanding how to prioritise research areas	3	15%
Deciding whether current national programmes or specific central authorities will deliver the best marine litter and microplastic studies	3	15%
Studies on production rates for litter and microplastics	2	10%
Simple clear regulatory system for water management and funding mechanisms	1	5%

Studies to evaluate the flux of transboundary pollution	1	5%

The second question aimed at understanding the appetite for studies on specific topics in the Sri Lankan Scientific community. The attendees were asked what the next study was they would like to read. The 21 respondents showed particular interest for microplastics in matrices linked to human health (drinking water, seafood), for the characterisation of the marine litter (top 10 items) and for riverine litter (Table 2).

Table 2 Results of the second question of the plenary session: 'What is the next study you would like to read?'

Topics of interest	Number of votes
Microplastics in drinking water	13
Top 10 litter items in Sri Lanka	12
River litter	9
Microplastics in seafood	7
Beach litter	6
Floating litter on the sea	6
Litter on the seafloor	5
Microplastics in animals (no food)	3
Microplastics in the human body	1
Other	1

The third question focuses on identifying who was supposed to fund the research effort on plastic pollution in Sri Lanka. The question was 'Research funding comes from various sources. Some examples might be: Direct Government funding, indirect funds through monitoring programmes, international funding bodies, NGO's, Universities. From your experience, what is your preferred funding option?'. The answers (Table 3) showed a clear direction towards the need to access international funding. Governmental funding was also considered, while NGOs and Universities were highlighted as possible recipients.

Table 3 Results of the third question of the plenary session: 'Research funding comes from various sources. Some examples might be: Direct Government funding, indirect funds through monitoring programmes, international funding bodies, NGO's, Universities. From your experience, what is your preferred funding option? '

Answers	Number of times the answer was typed
NGO funding	1
I really believe that international funding bodies and NGO's would be great to encourage the research. There would be a follow up and more collaborations. Currently I have started my research on mangrove microplastics and its quite difficult to get local funding.	1
Very difficult to answer. I have mixed experience. Both government funds and funds from international agencies have given similar problems and opportunities. It is more about funding agency understanding ground realities	1

Funds from international funding bodies channelling to scientists through respective universities or postgraduate institutes.	1
Direct government funding, International funding bodies	1
International funding bodies , NGOs, Universities	1
International funding, especially after COVID issue, it is nearly impossible for local funding	1
Government funding	1
International funding bodies	8
Direct Government funding	1
Funding to Universities	1

The last question was: 'Are effects data from temperate countries (Europe, America) appropriate for Sri Lanka, or should it produce its own / regionally appropriate data?'. The results (18 votes) clearly indicated the need to create datasets from Sri Lanka instead of using results from studies done in other countries, even with similar conditions (climate/species).

Table 4 Results of the fourth question of the plenary session: ' Are effects data from temperate countries (Europe, America) appropriate for Sri Lanka, or should it produce its own / regionally appropriate data? '

Answer	Votes	Percentage
Use effects data from all other countries	0	0%
Create some Sri Lankan data to see if the results are similar	15	83%
Use data only from countries with similar species or climate	3	17%

3. Breakout rooms

3.1. Studies on riverine litter

In the breakout room discussing the riverine inputs of marine litter and microplastics, researchers highlighted several studies investigating the production of microplastics in everyday life. For example, studies of microplastics in table salt, and in household goods including toothpaste were mentioned. It was also said that there is planned work to engage at a community level. However, it was noted that funding is very tight. Projects on microplastics in plants were also mentioned, but difficulties in accessing funding was noted here as well. A project on coastal sediments built in partnership with Dept of Zoology and the ambitions for wider estuarine studies, particularly linked to sea turtle nesting, were also outlined.

It was understood that the situation of rivers is causing alarm, also for the wellbeing of coastal communities affected by upstream riverine plastic pollution. Monsoon conditions were discussed as a real issue affecting plastic pollution in rivers.

There was concern that, even when available, data and research outputs are not effective at influencing policy. The weak links between natural and social science was outlined as an area that requires strengthening.

The group highlighted shortcomings in existing legal mechanisms and enforcement to prevent pollution. The need to enhance and develop existing recycling facilities was also presented as a priority, but access to funding was said to be difficult.

3.2. Studies on microplastic fate and impact

In the breakout room about studies on microplastic fate and impact, it was agreed that there is a good level of general awareness but there is not enough knowledge about how microplastics are affecting the health of humans and animals, or about the fate of biodegradable plastic alternatives.

Educations programs are required and there are vast research opportunities, however, it was noted that there is limited consumer choice but to use plastic as there are no suitable alternatives. There would be significant scope for businesses and research programs to capitalise on the current trend for investments towards sustainability to look for alternatives to plastic.

Plastic waste management was also discussed as one of the most important issues for Sri Lanka, since small, piecemeal recycling initiatives are not enough to fully address the scale of the problem. Recycling efforts also suffer from the lack of a circular economy, making it difficult to manage plastic usage.

Current projects and studies on the interaction with the riverine and marine ecosystems (physical/chemical impacts) were considered insufficient. A literature review and further new research would be useful to understand which microplastics to ban and/or limit and to enable evidence based development of national regulations and national policies.

3.3. Investment in training researchers, to increase expertise in Sri Lanka

For the group in this room, the main topic was the need to develop research groups to build capability and capacity in relation to priority litter related themes. Several research topics were suggested, including:

1. Development of techniques (and associated training) in identification of plastics
2. Improvement of monitoring and sampling methods (including separation and analysis of microplastics in water, sediment and biota).
3. Development of strategic monitoring programmes (that could then be led by universities), covering different geographical regions within Sri Lanka using consistent protocols, allowing data to be combined and analysed at a national/global level).
4. Targeted research into the fate and transport of litter and microplastics (including a specific focus on accumulation in freshwater and marine ecosystems).
5. Development of community based programmes around waste management.

Several challenges were identified in relation to the aforementioned suggestions. One concern was the lack of long-term funding commitments to allow a more strategic approach to capability and capacity building in the field of marine litter and plastics. Also mentioned was a lack of chemists,

hinting at a narrowing of the research field, since most researchers are focusing on ecological research and impacts of litter on ecosystems. Finally, the lack of focus on data systems which are fundamental to optimising the outcomes of research (e.g., recognising the need for access to scientifically robust datasets that have been generated according to best practice approaches) was another problem.

3.4. Acquiring the necessary instrumentation to carry out microplastic studies

The discussion showed that there is interest in collecting samples from a variety of matrices such as water, food and biota, and sediment. The conversation also touched on the protocols and instrumentation needed to analyse the samples in the laboratory to obtain analyses of quantity and composition of the microplastic particles.

The need to upgrade the instrumentation currently available in Sri Lanka was highlighted by the attendees of this breakout room, and there was a discussion to understand what monitoring gear and laboratory instruments would be better to purchase. For example, for water monitoring purposes, there were questions about whether to use nets rather than bespoke pieces of equipment such as microplastic pumps. For the laboratory, the discussion was around pros and cons of using microFTIRs technology or RAMAN spectroscopy.

On the possibility to choose one instrument over another, it was commented that there is not a real 'best choice' and that the choice really depends on the goal of the piece of research that one is carrying out. It was suggested that using collaborations could be the best way to access instrumentation, letting different universities and agencies to buy different pieces of equipment that could compliment each other.

The importance of ensuring the security and safety during the collection and analysis of samples was also discussed.

3.5. Final Plenary

During the final plenary session, the moderator of each room reported briefly to all the attendees summarising the conversation that delegates had in the respective breakout rooms.

4. Conclusions

Based on the discussions reported above, the main conclusions (suggestions and gaps) identified by the attendees of the event are as follows:

1) There are many projects to investigate riverine and marine litter, and microplastics in several matrices (sea salt, sediment, biota). These studies focus on quantities, origins and fate of plastics. However, some studies are not considered enough and there is appetite for more studies (e.g., estuarine environment, chemistry) and monitoring programmes;
2) The situation of rivers is causing alarm, especially throughout the monsoon seasons;
3) There is a lot of interest to update protocols, monitoring gear and laboratory equipment to ensure the best science possible in Sri Lanka;
4) Lack of funding and the difficulties in accessing funds is a problem, especially for long-term funding commitments required for a more strategic approach to capacity building;

5) Research groups are needed to build capability and capacity. This could also be useful to differentiate the type of gear across Sri Lanka and boost collaborations;
6) Data and research outputs ineffective at influencing policy and the existing legal mechanisms to prevent pollution are not efficient (low enforcement). Scientific data would be useful to design the effective ban and/or limitation of plastics;
7) Data should be combined and analysed at a national/global/regional level. Data should also be easily accessible;
8) Existing recycling facilities and the plastic waste management need to be improved considering circular economy and developing community-based programmes. This might be supported by a stronger link between natural and social sciences;
9) There is limited choice but to use plastic as there are no suitable alternatives;
10) Educations programs are required.

The workshop was therefore successful in highlighting the current gaps in research and to suggest a possible way forward. This report will be shared with all the stakeholders interested in knowing what to prioritise within Sri Lanka to advance scientific research on marine litter and microplastics.

Centre for Environment Fisheries & Aquaculture Science

Cefas

World Class Science for the Marine and Freshwater Environment

We are the government's marine and freshwater science experts. We help keep our seas, oceans and rivers healthy and productive and our seafood safe and sustainable by providing data and advice to the UK Government and our overseas partners. We are passionate about what we do because our work helps tackle the serious global problems of climate change, marine litter, over-fishing and pollution in support of the UK's commitments to a better future (for example the UN Sustainable Development Goals and Defra's 25 year Environment Plan).
We work in partnership with our colleagues in Defra and across UK government, and with international governments, business, maritime and fishing industry, non-governmental organisations, research institutes, universities, civil society and schools to collate and share knowledge. Together we can understand and value our seas to secure a sustainable blue future for us all, and help create a greater place for living.

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