



Commonwealth
Litter Programme



Training for the Plastic Recycling Sector in Sri Lanka

Overview and outcomes of training delivered in March 2021

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1. Executive Summary

The Commonwealth Litter Programme (CLiP) is an initiative delivered by the Centre for Environment, Fisheries and Aquaculture Science (Cefas) and funded by the United Kingdom's Government. The initiative supports countries across the Commonwealth in preventing litter entering the ocean.

In 2021, CLiP engaged Asia Pacific Waste Consultants (APWC) to undertake a training needs analysis, culminating in the delivery of a two-day workshop showcasing best practice plastic recycling frameworks, infrastructure, technologies, and community engagement activities around the globe. Through a needs analysis conducted through remote desktop literature reviews, attendance at other CLiP online workshops held for Sri Lankan attendees and input from our in-country advisor, APWC identified several training gap areas for the Sri Lankan plastic recycling sector. A two-day workshop was then designed to showcase opportunities for plastic recyclers in Sri Lanka and to facilitate discussions about collective actions that need to be taken in-country with regards to legislation, policy, infrastructure, and technology to help tackle marine litter and broader waste issues.

This report presents the results of the needs analysis and the training workshops delivered through videoconferencing in Sri Lanka on the 30 and 31st of March 2021 under strict COVID-19 travel restrictions and included experts from 8 countries around the globe.

The workshops were attended respectively by 43 and 41 participants (excluding presenters and organisers) on the two days. Attendees were from the government, private and NGO sectors in Sri Lanka and included local legal and packaging consultants. Due to the lack of face-to-face contact in a period of COVID-19 restrictions, attempts were made to collect feedback from participants through a combination of pre-workshop and post-workshop surveys and through Q&A and working group sessions during the workshops. The interactive feedback sessions during the workshops were the most productive and engagement on the WhatsApp group has remained high even after the workshops have been completed.

Based on feedback from participants, the opportunity to participate in such broadscale training workshops was deeply appreciated along with facilitation of conversations and networks between participants who had not had the opportunity to work together before. As Sri Lanka lacks formalised opportunities for networking and relationship building across the plastic materials supply chain, APWC strongly recommends a programme that replicates similar opportunities in the future.

2. Introduction

Sri Lanka is a country of 21.8 million¹ people, as of 2019, with the most populous regions in Colombo, Gampaha, Kurunegala, Kalutara, Galle, and Kandy². Consequently, the areas of highest waste generation per capita are within these regions as well with Colombo having the highest waste generation per capita.

While statistics of 7,000 MT waste generation on the island have been proposed by some research³ with a 5.1 kg daily waste generation rate per capita⁴. The local scientific community are not in agreement on these numbers⁵. However, local experts do agree that while formal waste collection does exist in many parts of metropolitan Sri Lanka, the majority of waste, is not collected consistently or through an appropriate garbage collection and disposal procedure.

Sri Lanka's most populous regions are also very often adjacent to the ocean. Therefore, inconsistent and inadequate collection infrastructure and systems on-land mean that wastes generated by urban and rural populations very often find its way to waterways, surrounding beaches and eventually the ocean surrounding the entire island. Sri Lanka's exposure to marine litter and pollution is exacerbated by its proximity to other very populous nations without adequate and appropriate waste management infrastructure, namely India, Bangladesh, Myanmar, Malaysia and Indonesia⁶.

The development of Sri Lanka's waste management infrastructure has been marred by decades long civil war, instable governments and lack of investment in strategic resource recovery facilities and initiatives. With the local recycling industry fractured by ethnic tensions after the 2019 Easter attacks and the economic downturn in 2020 due to the COVID-19 pandemic, opportunities to collaborate and exchange ideas have been few and far between.

¹ <https://data.worldbank.org/indicator/SP.POP.TOTL?locations=LK>

² <http://www.statistics.gov.lk/PopHouSat/CPH2012Visualization/htdocs/index.php>

³ WRAP UK., 'WRAP UK Recycling Sector Workshop – Sri Lanka', 04th March 2021 [online].

⁴ <https://science.sciencemag.org/content/347/6223/768/tab-figures-data>

⁵ <http://www.ft.lk/columns/Sri-Lanka-A-great-ocean-polluter-with-plastics-No-we-are-not/4-696016>

⁶ Kumara, T.P., 'Marine Litter in Sri Lanka', *Training Workshops for the Plastic Recycling Sector in Sri Lanka*, 30th March 2021 [online].

2.1. Project need

Exposure to best practice in plastic recycling from across the world is a key priority to help stimulate the reach and capacity of the local Sri Lankan recycling sector and to help deal with the issue of waste management and the prevention of land and marine-based litter.

Sri Lanka's use of plastic didn't begin until the late 1970's when a country whose main populations relied on subsistence farming and banana and coconut palm leaf packaging as their way to transport goods across the island suddenly changed. This was brought about by the opening up of the economy and the institution of the Democratic Socialist Republic of Sri Lanka, breaking through decades of stiff socialist rule, ending trade embargoes and opening up a market economy. With free trade came waves of freshly imported goods all wrapped in plastic packaging to keep the tropical heat and humidity from spoiling foodstuffs and delicate electronics and electrical items⁷. All this came into a country with no infrastructure to recycle or even collect this plastic material. Political instability and lack of investment in public infrastructure has meant that while the influx of plastic into the island continues, the facilities to manage these wastes on-land are few in number and very often lack investment.

Being surrounded by ocean means that 55% of protein consumed in the country comes from fish, with the fisheries industry contributing over 220,000 jobs, 1.3% of the country's GDP and exports worth US\$130 million⁸. The presence of marine litter and the continuous occurrence of marine life washed up on-shore having suffocated or with stomachs filled with plastic items has raised the alarm for these fishing communities and those that rely on them.

One of the most important links in ensuring that the increased plastic waste generated on land is managed well, is better access to source separated material for recyclers and appropriate facilities where this waste can be managed at scale. Very often, the plastic recyclate collected cannot be sold on and so is stockpiled and often eventually dumped in landfills as markets cannot be found for this material. As a small country, local plastic recyclers need support in access to onward markets and improved collection loads to prevent materials going to landfill and/or being leaked to waterways.

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https://www.cbsl.gov.lk/sites/default/files/cbslweb_documents/publications/otherpub/60th_anniversary_sri_lankas_external_trade_relations.pdf

⁸ <https://www.ips.lk/talkingeconomics/2019/05/27/trash-talk-dealing-with-marine-plastic-pollution-in-sri-lankas-oceans/>

Further, Sri Lanka needs a strong legislative system and a public that is educated on advocating for best practice regulations on plastic usage and management in the country. 31st March 2021 would mark Sri Lanka's 4th attempt at banning single use plastic having begun this campaign in 1994, with second and third attempts in 2006 and 2017⁹. While many remain hopeful for the renewed ban, previous attempts have been marred by ineffectual enforcement, lack of proper alternatives for the public for these types of plastics and a lack of options for recyclers to recycle or upcycle stockpiled recyclate into alternative goods.

3. Waste data and service gaps

APWC conducted a desktop literature review along with short interviews with Cleantech personnel in Colombo, Sri Lanka to understand the waste data and service gaps in the country. Cleantech is one of Sri Lanka's foremost waste collection companies and is a licensed solid and e-waste management collector and exporter under the CEA's licensing requirements. Cleantech is a service provider to the Colombo Municipal Council in the areas of household garbage collection, street cleaning, drain cleaning, vegetation management, graffiti management and recycling.

3.1. Data and service gaps

Theme	Gaps
Policy/legislation	<p>The National Environmental Act of 1980 has been passed and there are several regulations pertaining to prohibition on the production or use of PVC and PET for packaging. However, there are several exceptions made in the wording of these plastic ban regulations which would prohibit these laws from having a true impact on plastic waste generation or collection.¹⁰</p> <p>Punishable offences under the Act are very weak and fines that are applied to environmental crimes are not material. Public education on illegal dumping, use of prohibited plastics, etc. is negligible and so there is little community awareness that these acts are crimes punishable by imprisonment or fines.¹¹</p> <p>The National Policy for Solid Waste Management¹² was instituted in 2007 and an update has been in draft since 2019. This instituted the "Pilisaru" programme to:</p> <ul style="list-style-type: none"> • Develop a National Policy and Strategy on Solid Waste Management • Develop an effective education and awareness programme for all stakeholders on SWM including training and capacity building • Facilitate implementation for implementation of SWM projects/programmes for local authorities

⁹ http://www.colombopage.com/archive_21A/Jan31_1612112539CH.php, <https://www.ips.lk/talkingeconomics/2019/05/27/trash-talk-dealing-with-marine-plastic-pollution-in-sri-lankas-oceans/>

¹⁰ https://www.unescap.org/sites/default/files/2_MoE_S%20Bandara.pdf

¹¹ <https://www.elaw.org/system/files/National+Environmental+Act+of+1980.pdf>

¹² <http://mmde.gov.lk/web/images/pdf/2018/nationalwastemanagementpolicy-english.pdf>

	<ul style="list-style-type: none"> • Set up legal reforms to strengthen effective law enforcement. <p>Despite the efforts of the Pilisaru programme, there is still no consistent policy on public awareness and education on source segregation, proper disposal, fines for illegal dumping, etc.</p> <p>While definitions for general waste do exist, policy definitions for classification of industrial, construction and demolition, hazardous waste, litter, etc. are unclear or lacking. With so many organisations deemed responsible for each category of waste and without proper waste definitions, it is difficult to understand where various organisation's responsibilities begin.</p> <p>There is no stipulation for management or documentation of wastes in-transit and so while documentation exists for discharge/removal/collection from a facility, there is no requirement to show evidence that wastes have been safely transported for final disposal/recycling.</p> <p>There is a National Waste Management Support Centre at the State Ministry of Provisional Councils and Local Government Affairs¹³, a Waste Management Division at the Central Environmental Authority and a National Cleaner Production Centre working on resource efficiency and circular economy initiatives, however, there is little evidence of coordination between these organisations.</p> <p>Overall, there seems to be a lack of national level coordination and consensus on waste definitions, collection responsibilities, transportation requirements and enforcement of regulations.</p> <p>There are no national or state level resource recovery target set by any of the above policy instruments.</p>
Data collection and decision making	<p>There is a real lack of uniform data collection across all jurisdictional levels. Existing waste audit data, in particular, only exists for certain regions, certain types of waste or for sporadic years.</p> <p>There is no consistent drive for waste audits to be conducted and there is a lack of baseline data for comparisons or assessments of improvements. The conduct of waste audits is very often a result from foreign aid projects and is not a regular requirement from overall national, state or local policy instruments.</p> <p>There is no consistent analysis or reporting conducted on any waste audit data and it is unclear whether there is internal capacity at local or provincial councils to use the data for decision-making purposes.</p> <p>It is unclear whether waste audit data provided by foreign aid projects¹⁴ is being utilised appropriately as well. There are sporadic plastic litter audits but these are concentrated to one location or issue. There is no clarity on who should collect litter data or who should make decisions on litter reduction.</p> <p>There is no consistent weighbridge data available across Sri Lanka and it is unclear whether all landfills are fitted with weighbridges at entry/exit gates. With weighbridge data that does exist, there is not categorisation beyond broad categories for MSW and separated organic waste. It is unclear whether this weighbridge data is collected and utilised for any policy or operations decision-making processes.</p>

¹³ http://www.lgpc.gov.lk/web/index.php?option=com_content&view=article&id=71&Itemid=190&lang=en

¹⁴ <https://openjicareport.jica.go.jp/pdf/12250213.pdf>

	<p>With the regular prevalence of open, unregulated dumps across the country, it is unclear whether managed waste facility data would fully account for waste amounts being generated in the country.</p>
Economic instruments	<p>Sri Lanka has had previous success with container deposit schemes that were legislated and voluntarily run by food and beverage manufacturers¹⁵. However, these deposit mechanisms have largely vanished from the country given the cheapness of plastic bottles and their disposal rather than relying on the country's unreliable logistics systems to bring glass or metal packaging back to suppliers for refilling.</p> <p>There are proposals to introduce a recycling deposit/fee for electronic waste as well though this has also not materialised¹⁶.</p>
Collection services	<p>Collection services are the responsibility of local municipal councils, urban councils and Pradeshiya Sabhas.¹⁷</p> <p>Collection services in metropolitan municipalities are often tendered out to external contractors which include Cleantech, Fairway Waste Management, CareKleen, and INSEE.</p> <p>Collection services in suburban and rural areas are covered by the relevant local authority.</p> <p>There is no standard methodology for collection or waste transport for these contractors or local authorities to follow. Lack of consistent collection services is a topic constantly discussed in local and social media.</p>
Contracts and tenders	<p>Waste collection contractors are used by many of the larger metropolitan councils e.g., Colombo, Kaduwela, Kandy, etc., and a competitive tendering process has been set up for these councils. However, there are no consistent waste collection or disposal contract tendering processes set up for councils across the island. Much of the waste services outside the metropolitan areas occur on an almost ad-hoc basis using local logistics providers with often no equipment suited for and no training on solid waste management.</p> <p>Methodologies for specific waste management tendering and contract management are not available and it is unclear how collection contractors and local authorities are assessed on performance.</p>
Equipment and maintenance	<p>Waste collection equipment used is often purchased second-hand from developed countries or received as donations from foreign aid agencies. There are limited stocks of spare parts and limited knowledge on maintenance of these vehicles and types of equipment¹⁸.</p> <p>Waste collection trucks, in particular, are often used well past their recommended lifetimes and are often never replaced. There is a real lack of enclosed waste collection trucks and compactors for collection of waste in suburban and rural areas in particular. In general, trucks are not fitted with any type of leachate control and so, waste leachate is often seen leaking from trucks, creating opportunities for release of odours and pathogen transmission. Covered vehicles and the provision of a leachate box are required by the CEA's Technical Guidelines on Solid Waste Management¹⁹ and compliance with these guidelines are expected in order to continue licensed operations.</p>

¹⁵ <https://www.ips.lk/wp-content/uploads/2018/07/Sustainable-Development-under-Economic-Constraints.pdf>

¹⁶ <https://www.ips.lk/wp-content/uploads/2018/07/Sustainable-Development-under-Economic-Constraints.pdf>

¹⁷ https://www.unescap.org/sites/default/files/2_MoE_S%20Bandara.pdf

¹⁸ Interview with Wickramasinha, Reshan, Cleantech CEO, APWC consultant, 03rd March 2021.

¹⁹ <http://www.cea.lk/web/images/pdf/Guidlines-on-solid-waste-management.pdf>

	<p>Rust, exposure to sea air and acidic waste leachate are all factors that degrade the cosmetic and practical qualities of this equipment. No special coatings or paintings are applied when equipment is sent for use in Sri Lanka, an extremely humid tropical environment.</p>
Landfill design and management	<p>Landfill design and management are guided by the CEA's Technical Guidelines on Solid Waste Management²⁰ which defines four classes of landfills along with required liner systems, leachate control, gas control and buffer distances based on the tonnages received per day by the landfill. For Class C and Class D landfills which receive between 50-200 tonnes and over 200 tonnes of waste per day respectively, the buffer distance is only 200 metres and 150 metres for Class A and B landfills which receive 10 tonnes or less, and 10-50 tonnes respectively. This is a very small buffer distance compared to other countries such as Australia which require a minimum buffer distance of 500m-1km depending on the population density of the region²¹.</p> <p>In reality when visiting the main landfills such as Bloemendahl and Meethotamulla which serve the Colombo region, there is a stark lack of compaction or vector control activities at each of these landfill sites. Very often, fencing is broken and nearby domesticated animals such as cows, buffaloes and goats are allowed to graze on dumped garbage.</p> <p>Waste pickers at landfills are of all ages and genders and often work in very unsanitary conditions with no use of PPE. Waste picker activity is not regulated nor is it formalised.</p>
Education and engagement	<p>There is no formal, broad-arching environmental education/awareness programme for communities across Sri Lanka. Definitions of source segregation of bins in metropolitan areas are very broad and it is unclear what types of waste are meant for each bin (please see figure below). It is unclear as well whether these definitions translate well into Sinhalese and Tamil, which are the other two predominant languages in the country. There are also no provisions made for illiterate populations though this is a very small part of demographic.</p> <p>Environmental education and source segregation information are taught at primary school levels and inconsistently at secondary school levels.</p> <p>There is a real lack of any electronic media including websites, social media and/or mobile apps with management and recycling information though the majority of Sri Lankans own mobile phones.</p> <p>Signage is limited to being shown on bins and occasionally in metropolitan neighbourhoods. No education/awareness is provided on illegal dumping and fines, and there is limited signage across metropolitan and rural areas advocating for keeping spaces clean.</p> <p>It is unclear how national and international education projects are being coordinated and it is unclear whether there are any staff at the Central Environment Authority that strategically coordinate such projects.</p> <p>Waste education or awareness campaigns are mainly run by special interest NGOs and community action groups but there are no formalised waste education activities.</p>
Recycling	<p>A range of plastic, glass, metals, paper, organics, and e-waste are collected from households, commercial and industrial organisations and recycled</p>

²⁰ <http://www.cea.lk/web/images/pdf/Guidlines-on-solid-waste-management.pdf>

²¹ https://www.epa.sa.gov.au/files/47793_info_landfill_gas.pdf

	<p>within Sri Lanka but it is unclear what percentage of the material collected is successfully recycled. Many new products manufactured on the island do not utilise recycled content, though, and in particular, glass recyclers have to import raw materials because they cannot access enough collected recyclate²².</p> <p>Scrap copper is specifically banned from being exported and a range of metals, e.g., iron, aluminium, copper, tin, etc. are smelted locally.²³</p> <p>Paper mills in Sri Lanka use collected paper loads for creation of new paper and packaging. However, most scrap paper e.g., printed off-cuts, OCC, newspaper, textile tubes, box boards, are baled and exported to India for further processing²⁴.</p> <p>Organics are generally sent for composting or to piggeries as feed. However, data on these amounts diverted is unavailable or unreliable.</p> <p>E-waste is pre-processed in Sri Lanka, disassembling plastic and metal parts locally, and then are exported for further processing.</p> <p>Medical waste is only incinerated on a small scale and often sent to (often unregulated) landfills.</p> <p>Compact fluorescent lamp (CFL) recycling is a fraught subject in Sri Lanka and while there are a few recyclers that engage in globe and lighting disassembly and recycling, problems arise when finding markets for the collected mercury powder which is dangerous to dispose of to the environment.</p> <p>Obtaining licenses and finance for establishment of recycling facilities is perceived as a tedious and laborious task and often recyclers do not get assistance accessing markets for their recycled content.</p> <p>The major recycling facilities in Sri Lanka manage plastic and paper. There are very few facilities for the recycling of glass. The majority of these facilities are located in the Western Province surrounding the capital city, Colombo.²⁵</p> <p>While green procurement initiatives do exist for Sri Lankan government organisations, the only reference in the National Procurement Manual²⁶ to use of recycled content is on the subject of photocopy paper and paper packaging. It is unclear whether these recycled content procurement targets are being driven, evaluated and monitored uniformly across the country.</p>
Monitoring	<p>There is a framework established for monitoring plans set up under the National Policy for Solid Waste Management (2007), however, it is unclear how this monitoring data is used for decision making.</p> <p>Monitoring data is often collected by authorities e.g., Central Environmental Authority, through annual license reports for the basis of assessing whether licenses should be re-issued. However, there are no official reports in the public sphere on the collection or assessment of this data. Lists of licensed recyclers, collection contractors and exporters²⁷ are the only data available in this space.</p>

²² APWC interview with Kasun Karunanayake, Environmental Engineer, Cleantech, 2nd March 2021.

²³ APWC interview with Kasun Karunanayake, Environmental Engineer, Cleantech, 2nd March 2021.

²⁴ APWC interview with Kasun Karunanayake, Environmental Engineer, Cleantech, 2nd March 2021.

²⁵ APWC interview with Kasun Karunanayake, Environmental Engineer, Cleantech, 2nd March 2021.

²⁶ https://www.nprocom.gov.lk/web/images/pdf/FINAL_Procurement_Manual_for_Goods_Works_Services_and_I_S_Final_10_04_2018.pdf

²⁷ http://www.cea.lk/web/images/E_waste_list_2021.03.23.pdf

Training	<p>Training is offered under the Central Environment Authority, the State Ministry of Provincial Councils and Local Government Affairs' National Solid Waste Management Support Centre and the National Cleaner Production Centre.</p> <p>Several major universities and vocational institutes provide degree programmes, short certificates and courses in general and special waste management.</p> <p>Foreign-aid funded trainings are also numerous and include contributions from JICA, USAID, AusAid/DFAT, the UK and EU.</p> <p>There is a major disparity between waste management capacity in councils in urban areas and with those of rural areas.</p>
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Figure 1: Neighbourhood signage - bin collection schedule, Colombo Municipal Council

3.2. Training gap analysis

Due to COVID-19 restrictions, data gathering on training gaps was limited. However, APWC staff based in Australia and Sri Lanka attended workshops held by:

- WRAP UK on 4th March 2021 - Recycling Sector workshop
- Wood PLC on 25th March 2021 – Discussion on the Waste Management Desktop Study for Sri Lanka.

Along with a desktop literature review and knowledge from our in-country advisor, the above two workshops provided the foundation for the workshops that APWC set up for late March 2021.

During WRAP UK's workshops, APWC staff requested that participants join a WhatsApp group to keep in touch on opinions about training gaps and to encourage them to continue

productive conversations. An online poll was sent through the WhatsApp group to determine the types of topics the plastic recycling sector was interested in. The results for the survey are presented below.

Subject topic	No. of respondents who selected this topic
Broad view of finance options for recycling facility establishment from foreign and local organisations	5
Best practice community engagement and education from improved source segregation	7
Best practice collection systems and equipment for ensuring high quality plastic loads	8
Legal framework & barriers to recycling/using recycled content and how to overcome them	9
Value added entrepreneurship opportunities for recyclers	8
Types of plastics and related technologies for recycling	7

Table 1 - Online Poll Results used to determine training workshop topics for Sri Lanka Plastic Recycling Sector



Figure 2 – Online suggestions used to determine Sri Lanka Plastic Recyclers Workshop topics

Based on the above polled topics and the topic suggestions, APWC developed a programme for in-country training to be developed through Zoom. Taking advantage of the online format, APWC sought the assistance of experts in the areas of plastic recycling, collection and remanufacturing from 8 countries across the world to help showcase the opportunities for the Sri Lanka plastic recycling sector.

4. Workshops

Due to the restrictions for in-country training during the COVID-19 pandemic, the training workshops for plastic recyclers were held through Zoom video calls on:

- 30th March 2021 from 9am to 12pm
- 31st March 2021 from 9am to 12pm.

Each of these workshops (two halves of the same event) was simultaneously translated into Sinhalese and also translated from Spanish to English and Sinhalese for the presenters from Mexico and Panama.

The workshops were well attended with 43 and 41 people attending on 30th and 31st March respectively from the following sectors and organisations:

Sector	Organisation
Government	<ul style="list-style-type: none"> • Marine Environment Protection Authority • National Cleaner Production Centre • Colombo Municipal Council Engineering • Kaduwela Municipal Council
Industry Associations	<ul style="list-style-type: none"> • Sri Lanka Institute of Packaging • Sri Lanka Recyclers Association
Collectors	<ul style="list-style-type: none"> • Cleantech • Clean Sri Lanka (Arugam Bay) • ZeroTrash • Plastics & battery collection business owner – Kamal Pushpakumara
Recyclers	<ul style="list-style-type: none"> • Modern Pack Lanka • Penguin Lanka • Cleantech • Clean Sri Lanka (Arugam Bay)
Manufacturing	<ul style="list-style-type: none"> • Modern Pack Lanka • Hirdaramani Group – Sustainability Team
NGOs	<ul style="list-style-type: none"> • Environment Foundation Limited • Federation of Environmental Organisations Sri Lanka
Consultants	<ul style="list-style-type: none"> • Local legal consultant • Local Circular Economy/Packaging consultant

4.1.Objectives of the workshop

The main objectives for this two-day workshop were as follows:

- Provide an overview of the legislative frameworks to enable plastic recycling in Sri Lanka
- Provide inspiration for value-added entrepreneurship activities for Sri Lankan plastic recyclers
- Showcase best practice collection systems and technologies for ensuring high quality plastic loads
- Detail the types of plastics and the different types of recycling technologies available
- Aggregate best practice community engagement and education for improved source segregation of plastic wastes.

4.2.Key outcomes

The following table outlines the key ideas contributed during the working group sessions with workshop participations on 30th March 2021.

Area	Details
Improve data	<ul style="list-style-type: none"> • Incoming plastic <ul style="list-style-type: none"> ◦ Work with Sri Lanka Customs to get an idea of imported plastic materials per month • Local councils/municipalities/Pradeshiya Sabhas <ul style="list-style-type: none"> ◦ Sample testing at landfill sites and at weighbridges to check the % of plastics in collected loads e.g., single-use plastics, laminated plastics ◦ Regular (daily) spot checks at household level to visually estimate organics vs. non-organics generated by householders
Fact-based education & awareness	<ul style="list-style-type: none"> • Source segregation mechanisms and education needs to be in line with the above collected data. • Use digital apps to disseminate education on source segregation
Facilitate mobile-enabled collections	<ul style="list-style-type: none"> • Utilise Sri Lanka's high mobile phone penetration along with locally built logistics apps e.g., PickMe and major collection partners, e.g., Cleantech to connect waste generators with collectors. • E.g., Kurunegala Municipal Council is using IoT sensors on bins – use this a case study for further investment.
Strengthen informal collection	<ul style="list-style-type: none"> • Pay informal sector for low-grade plastic waste. • Strengthen waste collection along beaches and riverbanks
Improve access to markets	<ul style="list-style-type: none"> • Facilitate export markets for products made out of ocean plastics

Strengthen networks	<ul style="list-style-type: none"> Create networks for collectors, processors, manufacturers to have sustainable models for plastics recovery.
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4.3. Programme

The workshops brought together 15 experts from 8 countries to present to a diverse audience from Sri Lanka.

4.3.1. 30th March CEFAS APWC Workshop for Sri Lankan Plastics Recyclers

Time	Topic	Presenter
8.55am	Technical check	APWC
9.00am	Welcome to Workshop	Dr. Amardeep Wander, APWC
9.05am	Introduction to CEFAS	Dr. Umberto Binetti, Cefas
9.10am	Housekeeping	Jerastin Dubash, APWC
9.20am	Context on Marine Litter in Sri Lanka	Dr. Terney Pradeep Kumara, MEPA
9.40am	Education and Engagement	Guada Lado, Western Sydney Regional Organisation of Councils
10.00am	Best practice legislative measures to address plastic recycling	Dr. Karen Raubenheimer, ANCORS, University of Wollongong, Australia
10.20am	QUESTIONS	APWC
10.30am	Taiwan Recycling Management and Accomplishment	Justin Wang, CIER, on behalf of Taiwan EPA
10.50am	Utilising digital technology to improve plastics recycling	Giorgio Baracchi – RecycleSmart Australia
11.20am	WORKING GROUP	APWC
11.55am	Wrap-up for the day	APWC

4.3.2. 31st March CEFAS APWC Workshop for Sri Lankan Plastic Recyclers

Time	Topic	Presenter
8.55am	Technical check	APWC
9.00am	Welcome to Workshop – Identifying gaps in Sri Lanka's legislation	Wardani Karunaratne, Legal Consultant
9.10am	Formalising the informal sector	Javier Vasquez, City of Buenos Aires
9.30am	QUESTIONS	APWC
9.40am	Introducing Recycling	Martina de Marcos, APWC
10.00am	Session highlighting 3R initiatives from around the world <ul style="list-style-type: none"> ZeroTrash Sri Lanka – Heminda Jayaweera 	

Time	Topic	Presenter
	<ul style="list-style-type: none"> Upcycled clothing in Guatemala – Olga Reiche Reciplast plastic wood in Panama – Fredy Ramirez Carpinteria Plastica plastic wood in Mexico – Juan Ibarra NevHouse plastic wood housing in Australia – Nev Hyman 	
11.00am	Roundtable	APWC
11.20am	Building a total loop of supply chain which facilitates suppliers, processors and buyers of recycled products	Peter Brisbane, Australian Packaging Covenant
11.45am	Circular Economy Entrepreneurs Network – WasteAid	Zoe Lenkiewicz, WasteAid
11.55am	Closing- Feedback and session close	APWC

The recordings of the sessions are available here - <https://cliptrainingcourses.azurewebsites.net>.

5. Lessons Learned

5.1. Workshop participation

While workshops were well attended on the 1st day, participation dropped slightly on the second day. Further, several email invitations were sent out to government officials, however, except for attendance by staff from the Marine Environment Protection Authority and the National Cleaner Production Centre, government officials from the Ministry of Environment and Central Environmental Authority did not attend.

Participation during workshops was better than expected as APWC was careful to ensure several opportunities for attendee participation through:

- Online typed questions in chatboxes
- Online interactive working groups
- Consistent conversations through the WhatsApp group.

The WhatsApp Group automatic joining link was most productive for ensuring participation from a broad range of participants in the plastic recycling sector including NGOs from far east in Sri Lanka, though many participants were based in western Sri Lanka.

5.2. Automation of workshop registration and more interactive feedback collection

To ensure participants joined on-time and provided basic pre-workshop survey information, APWC will, in future, require workshop registration through the completion of a short personal details profile so that we can ensure to collect proper demographics on workshop participants. It was a challenge to encourage completion of these surveys remotely.

The best quality feedback was received **during** workshop sessions though pre- and post-workshop surveys provided a number of quality suggestions. Due to COVID-19 restrictions, participants seemed to relish the opportunity to interact with others across their industry and parallel sectors as well as those in other countries. In fact, the opportunity for international idea exchanges was the most praised in all participant feedback and while COVID-19 restricted travel, videoconferencing allowed the opportunity for so many Sri Lankan recyclers to interact with their peers and parallel sectors abroad very cost-effectively. APWC will investigate further ways to keep these interactions going outside current tools such as the common WhatsApp group.

5.3. Low-cost, low-tech solutions from developing countries and legislative frameworks

Workshop participants most appreciated hearing from the Taiwanese government representative on how plastic recycling is strictly enforced and encouraged in the country and how education on source segregation is mandatory for all their citizens, from schoolchildren to their country's President. Many participants commented positively on the ideas presented about low-tech options using mobile apps, converting collected plastic to housing materials and apparel and textiles.

6. Recommendations and lessons learnt

6.1. Engage the Ministry of Industry, Ministry of Environment and the Central Environmental Authority

APWC did not have contacts for the Ministry of Industry at the time and regrets the non-attendance of the Ministry of Environment and the Central Environment Authority contacts to whom we had sent out formal invites by e-mail. The President of the Sri Lanka Institute of Packaging had informed APWC after the workshops that there is a Committee on Plastics being formed through a partnership with the Sri Lanka Institute of Packaging, the Ministry of Industry, the Ministry of Environment and the Central Environment Authority.

APWC will continue to keep informed on the workings of this Committee and recommends that CEFAS remains involved in future Committee meetings.

6.2. Partnership with USAID's Clean Cities, Blue Oceans (CCBO) programme

Several workshop participants mentioned that they had applied for the plastics recycling grants from USAID's CCBO programme and were waiting to hear back on the outcomes. APWC recommends that Cefas works to partner with USAID on their work in Sri Lanka to help create synergies and prevent overlaps between CLiP and CCBO's activities.

6.3. Engage the Ministry of Tourism and Aviation

Marine litter and plastic pollution detract from the image of pristine beaches and lush, green jungles which have been the hallmarks of Sri Lanka's tourism campaigns. With COVID travel restrictions to ease soon, combined with a lack of beach and waterway cleaning in some regions, APWC believes that Sri Lanka's Ministry of Tourism and Aviation would be an important stakeholder to involve in future marine litter abatement

activities given the detrimental effect marine litter has on tourist hot-spots across the island.

6.4. Engage Sri Lanka Association of Software Services Companies (SLASSCOM) and Federation of IT Industry Sri Lanka (FITIS)

SLASSCOM is the national chamber for the IT industry in Sri Lanka and acts as a catalyst for growth and FITIS is the apex body for the ICT industry in Sri Lanka. APWC recommends that Cefas highlights the issue of marine litter to these IT chambers to gather ideas and proposals from these chambers' members on using technology to:

- Improve data collection on marine litter
- Create engagement on marine litter impacts and the importance of source separation of waste types
- Streamline collection and disassembly/stripping/shredding/granulating recycling processes in factory environments.

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