



# National Action Plan on Plastic Waste Management 2021–2030





# **National Action Plan on Plastic Waste Management**

2021–2030

Ministry of Environment  
Sri Lanka

2021

## National Action Plan on Plastic Waste Management 2021–2030

Copyright© Ministry of Environment (MoE), Sri Lanka

All rights reserved

First Edition: July 2021

ISBN: 978-624-5817-02-3

This report was developed by the following project team:

<b>Authors</b>	<b>Mr. Nihal Cooray, Mr. V.R. Sena Peiris and Mr. Kirthi Rasaputra</b> Business and Industry Development Services (Pvt) Ltd. <b>Dr. Rajeev Kumar Singh, Dr. Dickella Gamaralalage Jagath Premakumara and Mr. Kazunobu Onogawa</b> IGES Centre Collaborating with UNEP on Environmental Technologies (CCET)
<b>Coordination</b>	<b>Mr. Senarath Mahinda Werahera</b> , Director and <b>Ms. Sujeewa Fernando</b> , Assistant Director, Environmental Pollution Control & Chemical Management (EPC&CM), Ministry of Environment, <b>Ms. Sarojinie Jayasekara</b> , Director, Central Environment Authority (CEA)
<b>Advisors</b>	<b>Dr. Anil Jasinghe</b> , Secretary, Ministry of Environment and <b>Mr. M.G.W.M.W.T.B. Dissanayake</b> , Additional Secretary, Environment Policy & Planning, Ministry of Environment
<b>Reviewers</b>	<b>Prof. Ajith De Alwis</b> , University of Moratuwa; <b>Dr. Anurudda Karunatatha</b> , University of Peradeniya; <b>Dr. Shunichi Honda</b> , UNEP-IETC; <b>Ms. Bhagya Kahatagahawatte</b> , Kanazawa University; <b>Ms. C. Priyankari Alexander</b> , SACEP
<b>Funded by</b>	<b>Ministry of Environment (MOE), Government of Japan through United Nations Environment Programme – International Environmental Technology Centre (UNEP-IETC)</b>
<b>Published by</b>	<b>Ministry of Environment (MoE), Sri Lanka</b>
<b>Designed by</b>	<b>match-up Co. Ltd, Tokyo, Japan</b>

### Disclaimer

This publication may be reproduced in whole or in part and in any form for educational or non-profit purposes without special permission from the copyright holder, provided acknowledgement of the source is made. The Ministry of Environment would appreciate receiving a copy of any publication that uses this publication as a source. No use of this publication may be made for resale or for any other commercial purpose whatsoever without prior permission in writing from the Ministry of Environment.

### Citation

Ministry of Environment (2021). National Action Plan on Plastic Waste Management 2021–2030, Sobadam Piyasa, Robert Gunawardana Mawatha, Battaramulla, Sri Lanka

# Forward

Plastics have become one of the essential materials in the modern society due to its wide-ranging properties which can be applied in a variety of ways in our day-to-day life. When discussing about plastics, sufficient attention must also be given to its positive as well as negative aspects. In achieving the sustainable development, the negative aspects on present as well as future generations have to be minimized while securing the positive aspects by addressing the entire lifecycle of plastics.

The National Action Plan on Plastic Waste Management 2021-2030 sets out actions that Sri Lanka needs to follow based on the principle of the 3Rs. The actions in this plan cover the entire lifecycle of plastic waste management from importation, processing, final use or collection and disposal. This will be helpful for Sri Lanka to play its role as a global partner to achieve the goals of the 2030 Agenda for Sustainable Development, particularly Goal 12 on responsible consumption and production, and Goal 14 on life below water. The entire plastic waste management system in Sri Lanka will improve considerably by implementing the activities in this action plan.

I am delighted to share this message upon completion of the action plan which was initiated in 2019 with an overall target of introducing a comprehensive action plan to show a clear path for all of society in Sri Lanka including policymakers, manufacturers, business communities and the general public in designing, determining and carrying out plastic-related actions and activities. I take this opportunity to thank the IGES Centre Collaborating with UNEP on Environmental Technologies (CCET), United Nations Environment Programme, and the Ministry of the Environment of Japan (MOEJ) for their technical and financial support as well as all the administrative staff for their tremendous support in completing this task, despite being in the midst of a global pandemic.

**Dr. Anil Jasinghe**

**Secretary**

**Ministry of Environment**

**Sri Lanka**

# Executive Summary

The National Action Plan on Plastic Waste Management is prepared based on a preventative approach and using 3R (Reduce, Reuse and Recycle) related waste hierarchy. This approach is in line with the national policies of the government based on the policy statement, "Vistas of Prosperity", as well as the view (as stated in "Sustainable Environmental Policy") that "The linear economy in which manufacturers produce goods using the existing raw materials and dispose of waste into the environment will be replaced with the circular economy in which waste in one industry can be used as raw material in another (Re-Use, Recycle, Re-Purpose). This will create eco-industrial zones and pave the way for a green economy".

The approach as discussed in this report also conforms to the National Policy on Waste Management and the National Policy on Sustainable Consumption and Production Policy. It is important to prioritize the 3R approach and work towards Zero Landfill. Sri Lanka is a participant of the regional 3R conference and joined after the Hanoi conference, which was launched in 2009 by United Nations Centre for Regional Development. To date, these conferences have provided a wealth of knowledge and experiences as well as suggested goals and targets, which means the networking of regional participants plays an important role.

Plastic waste management cannot succeed without managing the plastic industry, and the best form of management is within the industry itself through application of the 3Rs and strategies such as 'Cleaner Production'. While in-house recycling by the plastic industry is well established where around 25% of materials used by manufacturers are recycled – few companies have also offered it as a service to external clients. Further, mainly due to the

unsorted and soiled nature of collection, makes a fraction of post-consumer plastic waste generally unsuitable as a useful resource. To cater to market demand and quality issues, recycled material must therefore be cleaned and graded.

Sri Lanka currently imports virgin plastic raw materials for varying applications which amounts to 300,000 MT/annum. Municipal solid waste generation of all solid waste is currently around 10,768 MT/D and collection by local authorities only 3,458 MT/D, in which over 50% of uncollected waste, containing valuable plastics, goes to open dumps and the surrounding environment. The inflow of plastic packaging including unaccounted packaging of other goods is increasing. Polythene bags and large amounts of single use plastics have become a key issue, to which the Action Plan has suggested many countermeasures. Sri Lanka will also have to take urgent action to tackle the problem of E-waste, which contains useful plastics as well as toxic chemical additives. Studies covering brominated plastics and imported toys have led to initiation of actions by the Ministry of Environment. Health risks stemming from non-recyclable thermoset and laminated plastic waste are also on the rise.

A key activity of the plan is to facilitate collection of segregated plastic waste and recycling of plastic waste as a profitable business to produce quality raw material for the plastic industry.

Based on the strategic directions guided by national policy, relevant, measurable, attainable time-bound goals along with cross-cutting issues were determined through the series of consultative meetings and workshops inviting relevant stakeholders on plastics in Sri Lanka, as shown below.

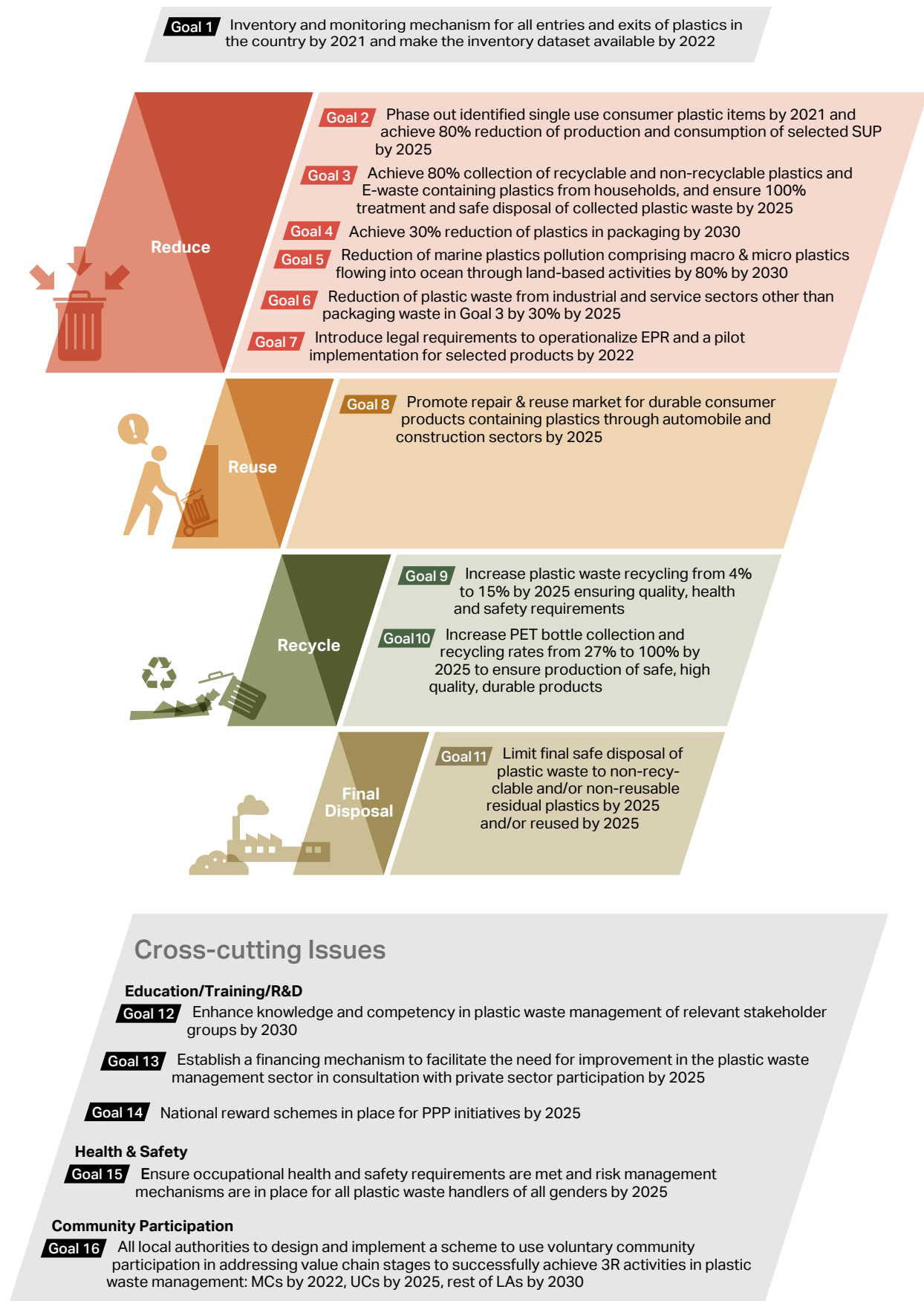


Figure 1: Plastic waste management goals under NAPPWM

# Abbreviations

<b>CAA</b>	Consumer Affairs Authority
<b>CCET</b>	IGES Centre Collaborating on Environmental Technologies
<b>CEA</b>	Central Environmental Authority
<b>EPR</b>	Extended Producer Responsibility
<b>JICA</b>	Japan International Corporation Agency
<b>LA</b>	Local Authority
<b>MoE</b>	Ministry of Environment
<b>MoEd</b>	Ministry of Education
<b>MoF</b>	Ministry of Finance
<b>MoH</b>	Ministry of Health
<b>MoPPLG</b>	Ministry of Public Services, Provincial Councils & Local Government
<b>MoT</b>	Ministry of Transport
<b>MoTech</b>	Ministry of Technology
<b>MSW</b>	Municipal Solid Waste
<b>MT</b>	Metric Tons
<b>NAPPWM</b>	National Action Plan on Plastic Waste Management
<b>NIE</b>	National Institute of Education
<b>PRI</b>	Plastic and Rubber Institute
<b>SLSI</b>	Sri Lanka Standards Institute
<b>VTA</b>	Vocational Training Authority



# Contents

Forward .....	iii
Executive Summary .....	iv
Abbreviations .....	vi
Definitions .....	ix
<b>Chapter 1 Introduction .....</b>	<b>1</b>
1.1 Objective of the plastic waste management action plan .....	2
<b>Chapter 2 Development Process of the Plastic Waste Management Action Plan .....</b>	<b>3</b>
<b>Chapter 3 Overview of Plastic Waste Management in Sri Lanka .....</b>	<b>5</b>
3.1 Plastic production and consumption .....	5
3.2 Material flow .....	6
3.3 Recycling and reprocessing (formal/informal) in Sri Lanka .....	8
3.4 Overview of major issues and gaps .....	12
3.5 Some of the current initiatives to support plastic waste management .....	12
3.6 Policies and legal framework .....	13
3.7 Policies, guidelines and multinational agreements that support overcoming challenges in plastic waste management in Sri Lanka .....	14
<b>Chapter 4 Plastic Waste Management Action Plan .....</b>	<b>15</b>
4.1 Development of the National Action Plan on Plastic Waste Management (NAPPWM) .....	15
4.2 Guiding principles .....	15
4.3 Goals and available baseline data .....	16
4.4 Action plan for plastic waste management in Sri Lanka (2021–2030) .....	21
<b>Chapter 5 Preparation, Implementation, Monitoring and Evaluation .....</b>	<b>27</b>
5.1 Introduction .....	27
5.2 Important requisites for implementation .....	29
5.3 The main players for implementation .....	30
References .....	31
Annex I .....	33
Annex II .....	35

## Figures

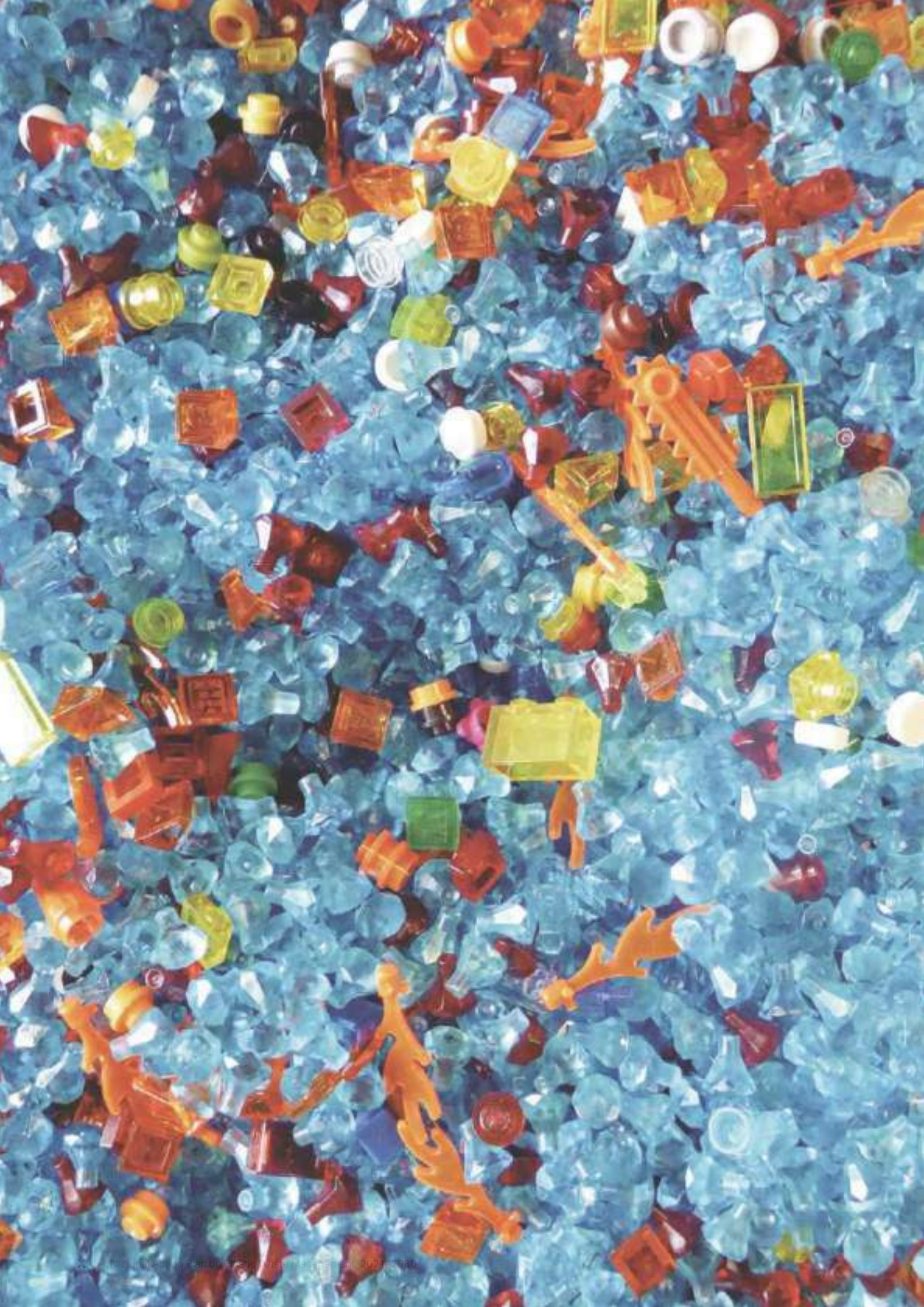
Figure 1: Plastic waste management Goals under NAPPWM .....	v
Figure 2: Meeting and workshops during the development of NAPPWM .....	3
Figure 3: Key steps in developing the National Plastic Waste Management Action Plan (NAPPWM) in Sri Lanka .....	4
Figure 4: Global production data .....	6
Figure 5: Estimated plastic material flow in Sri Lanka in 2020 .....	7
Figure 6: CEA registered waste collectors and recyclers in September 2020 .....	8
Figure 7: Average PET collection per month by ECO Spindles .....	9
Figure 8: The waste hierarchy .....	16
Figure 9: Flow chart for goals under NAPPWM .....	20
Figure 10: PCDA for NPWMAP in Sri Lanka .....	28

## Tables

Table 1: Overview of the case studies .....	11
Table 2: Guiding principles .....	17
Table 3: Criteria and Goals with baseline information .....	17
Table 4: Action Plan for Plastic Waste Management in Sri Lanka (2021–2030) .....	21
Table 5: Main governmental stakeholders .....	30

# Definitions

<b>Compostable plastics</b>	Plastic that undergoes degradation by biological processes during composting to yield CO <sub>2</sub> , water, inorganic compounds and biomass at a rate consistent with other known compostable materials, excluding conventional petro-based plastics, and does not leave visible, distinguishable or toxic residue.
<b>Energy recovery</b>	Energy recovery from waste that is conversion of waste material into usable heat, electricity or fuel through a variety of processes including combustion, gasification, pyrolysis, anaerobic digestion & landfill gas recovery.
<b>E-waste</b>	Waste generated from and end of life electronic and electrical products.
<b>Extended producer's responsibility</b>	Responsibility of a producer for the environmentally sound management of the product until the end of its life.
<b>Importer</b>	Person who imports or intends to import and holds an Importer - Exporter Code number, unless otherwise specifically exempted.
<b>Improper waste disposal</b>	Disposal of waste to land, water, or atmosphere by burning in a way that has negative consequences for the environment and public health.
<b>Manufacturer</b>	Include a person or unit or agency engaged in production of plastic raw material to be used as raw material by the producer.
<b>Monomer</b>	Chemical compound, usually of low molecular mass, that can be converted into a polymer by combining with itself or other chemical compounds.
<b>Plastic sheet</b>	Sheet made of plastic.
<b>Plastic waste</b>	Any plastic discarded after use or after their intended use is over.
<b>Plastic</b>	Material which contains as an essential ingredient a high polymer such as polyethylene terephthalate, high density polyethylene, Vinyl, low density polyethylene, polypropylene, polystyrene resins, multi-materials like acrylonitrile butadiene styrene, polyphenylene oxide, polycarbonate, Polybutylene terephthalate.
<b>Polymer</b>	Mixture of monomers using the process of polymerisation.
<b>Producer</b>	Persons engaged in manufacture or import of carry bags or multilayered packaging or plastic sheets or like, and includes industries or individuals using plastic sheets or like or covers made of plastic sheets or multi-layered packaging for packaging or wrapping the commodity.
<b>Recyclability</b>	Potential to be recycled, based on design and service considerations of finishing methods and materials of plastic products.
<b>Recycling</b>	Process of transforming segregated plastic waste into a new product or raw material for producing new products.
<b>Recyclable plastic waste</b>	Materials identified for collection, processing, recovery or reuse as part of a local government, business or other recycling collection programme.
<b>Single use plastics</b>	Plastic products made of, or containing, or packaged in plastics to be used only once within a short time frame.
<b>Thermoplastics</b>	Plastics capable of being repeatedly softened by heating and hardened by cooling through a temperature range specific to types of plastics.
<b>Thermosetting</b>	Plastics of two types: i) melts and becomes highly viscous liquid like thermoplastic when heated but becomes solid when heated continuously and is therefore difficult to recycle, e.g., melamine, ii) solidifies by chemical reaction by mixing two chemicals, e.g., epoxy resin.
<b>Virgin plastic</b>	Plastic material which has not been subjected to use earlier and has also not been blended with scrap or waste.



## Introduction

Plastic products are extremely versatile and are used in huge quantities globally due to their lightweight, low cost, ease of manufacture, ease of colouring, adaptability to required physical and chemical specifications and resistance to corrosion and adverse conditions. Levels of processing technology, machinery, automation, and dies and molds used in plastics manufacturing have risen, driven by manufacturers, designers and end users of plastics. Like any other product and service, generation of waste is inevitable but due to plastic's recyclability and ability to be formed into other shapes and composites, the adverse effects were not noticed until quantities of waste reached extremely high levels. It was estimated, as of 2015, that around 6,300 Million Metric Tons (MT) of plastic waste has been generated globally, of which about 9% was recycled, 12% was incinerated, and 79% was disposed of in landfills or into the surrounding environment (Geyer et al. (2017). Geyer et al. (2017) predict that if this current practice of production and disposal continues, about 12,000 Million Metric Tons of plastic waste will be disposed of in landfills or the surrounding environment by 2050. It is also predicted that the global plastic quantity produced will be three fold by 2050 (World Economic Forum, 2016).

As with many other developing countries in the region and world, Sri Lanka is also facing challenges in managing its Municipal Solid Waste (MSW) including plastic waste. In particular, the lack of municipal capacity for proper waste management and irresponsible and improper disposal by consumers have resulted in municipal plastic waste (MPW) management becoming a national burden for the country. Sri Lanka's MPW is mostly present as mixed waste in the forms of solid, liquid or airborne waste. In terms of total waste, 10,768 tonnes per day (MT/D) is generated and 3,458 MT/D is collected,

thus only about one third of generated waste is collected, with most of the uncollected waste being dumped in the open and surrounding environment (JICA, 2016). Further, according to secondary data from recent studies of Negombo Municipal Council (NMC) and Kurunegala Municipal Council, a high proportion of MSW is disposed of within generators' premises or outside by burning, burying or other illegal means (Karunaratna et al., 2019, JICA, 2019). The number of open dumpsites in Sri Lanka is estimated to be 349 and of the various types of plastic in wide use in the country, over 50% ends up in dumpsites as post-consumer plastic waste (Dharmasiri, 2019; Jayasekera and Karunaratna, 2019). As well as recyclable thermoplastics, a wide range of thermosetting plastics, composites, laminated and coated plastics are also disposed of in landfills – quantities of which are unknown – which can include more toxic chemicals than thermoplastics and thus present a very high health risk from burning and leachate leakage unless the dumpsites are correctly managed. It was also found that on average plastics comprised 6.89% of total MSW.<sup>1</sup> Likewise, Sri Lanka generates around 44,100 MT of fabric wastes per year from post-industrial operations of which about 28% is synthetic material mainly consisting plastic monomers such as polyester spandex material, nylon and others (NBRO, 2021). Generally 10–20% of these material goes as offcuts and end up in landfills or cement co-processing plant. In addition all the post-consumer textiles end up in dumpsites (Jayasinghe et al., 2010). However, there is no information available on post-consumer textile wastes.

According to participants at the workshop on "Development of National Action Plan on Plastic Waste Management" for Sri Lanka held on 26 February 2020, open burning of plastics including

1 Derived by author. Percentages of plastics in MSW which are categorised as soft (mostly poly bags, lunch sheets, etc.) and hard plastics (PVC, Nylon, etc.) vary widely between local authorities. Results of analyses for selected local authorities by JICA in 2015–2016 show that MSW contains 2–13% soft plastics (average 6%) and 1–2% hard plastics (average 1.1%) (JICA, 2016).

uncollected E-waste is on the increase. According to the study conducted by authors, about 47.7% (419.47 MT/D) of plastic waste is openly burnt in individual premises (Refer Figure 5).

Previously, efforts in the field of plastic management in the country have taken the form of initiatives and strategies starting in the early 1990s mainly through-donor driven programmes. Preventative strategies such as the 3Rs were implemented through the “Pilisarū” project, with its ambitious target, “Waste free Sri Lanka” (CEA, 2020), the objectives of which were to promote resource conservation and segregation at the domestic level, as well as waste reduction and provision of facilities for waste recycling following the 3R concept. However, results fell short of the goal, mainly due to its unholistic, non-inclusive nature, and while stringent laws and regulations exist, improper collection of segregated plastic wastes by the local authorities has led to failure of the recycling industry, exacerbated by non-availability of proper final treatment and disposal facilities. As a result, households, industries as well as some local authorities either burn plastic waste, causing serious health issues, or dispose them haphazardly due to inadequacy of facilities and infrastructure, which raises the prospect of increased accumulation of plastics in oceans. Moreover, some local authorities are not operating the facilities given to them by CEA effectively under National Post Consumer Plastic Waste Management Project. The need to address all the issues mentioned above requires an action plan at the national level with tasks delegated to all concerned stakeholders for efficient plastic waste management system in the country.

In consideration of the need for comprehensive plastic waste management in Sri Lanka, in August 2019 the Ministry of Environment requested IGES Centre Collaborating with UNEP on Environmental Technologies (CCET) to provide technical assistance on developing a National Plastic Waste Management Action Plan for Sri Lanka. This led to the “National Plastic Waste Management Action Plan 2021–2030”, developed by Ministry of Environment with technical assistance by CCET and United Nations Environment Programme (UNEP), and International Environmental Technology Centre (IETC), with financial support from the Ministry of Environment Japan (MOEJ).

## 1.1 Objective of the plastic waste management action plan

The primary objective of the Action Plan is to assist in achieving the National Waste Management policy’s vision – enabling a “Healthy life and Cleaner Environment for all”.

Secondary objectives of the Action Plan:

- To make all citizens and institutions aware of the need to understand their legal and constitutional responsibility of engaging in plastic waste management.
- To achieve strong co-ordination and teamwork between all stakeholders.
- To facilitate achieving Sustainable Development Goals 12, 14 and 15.
- To sensitize citizens, institutions, waste managers and service providers continuously on the need to be accountable and responsible for managing wastes individually and collectively by preventing and minimizing its generation moving beyond compliance.
- To encourage users and generators to do their utmost to align their thinking and actions for waste reduction at source, reuse, and responsible disposal of segregated plastic waste to contribute to achieving Zero Landfill.
- To carry out plastics recycling effectively as a profitable venture or industry and not solely as means to solve the waste disposal issue.
- To improve standards and introduce affordable technology for plastic waste recycling.
- To sensitize the public, raise levels of knowledge and skills, and promote and support innovation, partnerships and alliances.
- To develop a sustainable plastic waste collection mechanism throughout the country.
- To reduce risks to public health, environment, and ecosystems and improve levels of occupational health and safety of waste handlers.
- To enhance effective partnerships to meet international obligations in waste management moving beyond compliance.

# Development Process of the Plastic Waste Management Action Plan

The National Action Plan on Plastic Waste Management (NAPPWM) for Sri Lanka was developed through a brief study and a series of consultative and technical meetings and workshops inviting relevant stakeholders, led by Ministry of Environment. The consultative meetings aimed to address the actual plastic waste problem on the ground, establish a consensus among all the stakeholders on a plastic action plan and also create a sense of ownership among all the stakeholders for NAPPWM 2020–2030 for Sri Lanka. Figure 3 shows the key steps taken in preparing NAPPWM.

A core team was formulated to collect data and information on municipal waste management, focused on plastic waste management in Sri Lanka in August 2019. Next, stakeholder and PESTEL analysis were performed (September 2019) to identify the various stakeholders in plastic waste management as well the causal factors (i.e., political, economic, social, technological, environmental and legal) behind improper plastic waste management in

Sri Lanka. A status report was developed in September 2019 based on a literature review, data and information collected through a field study,

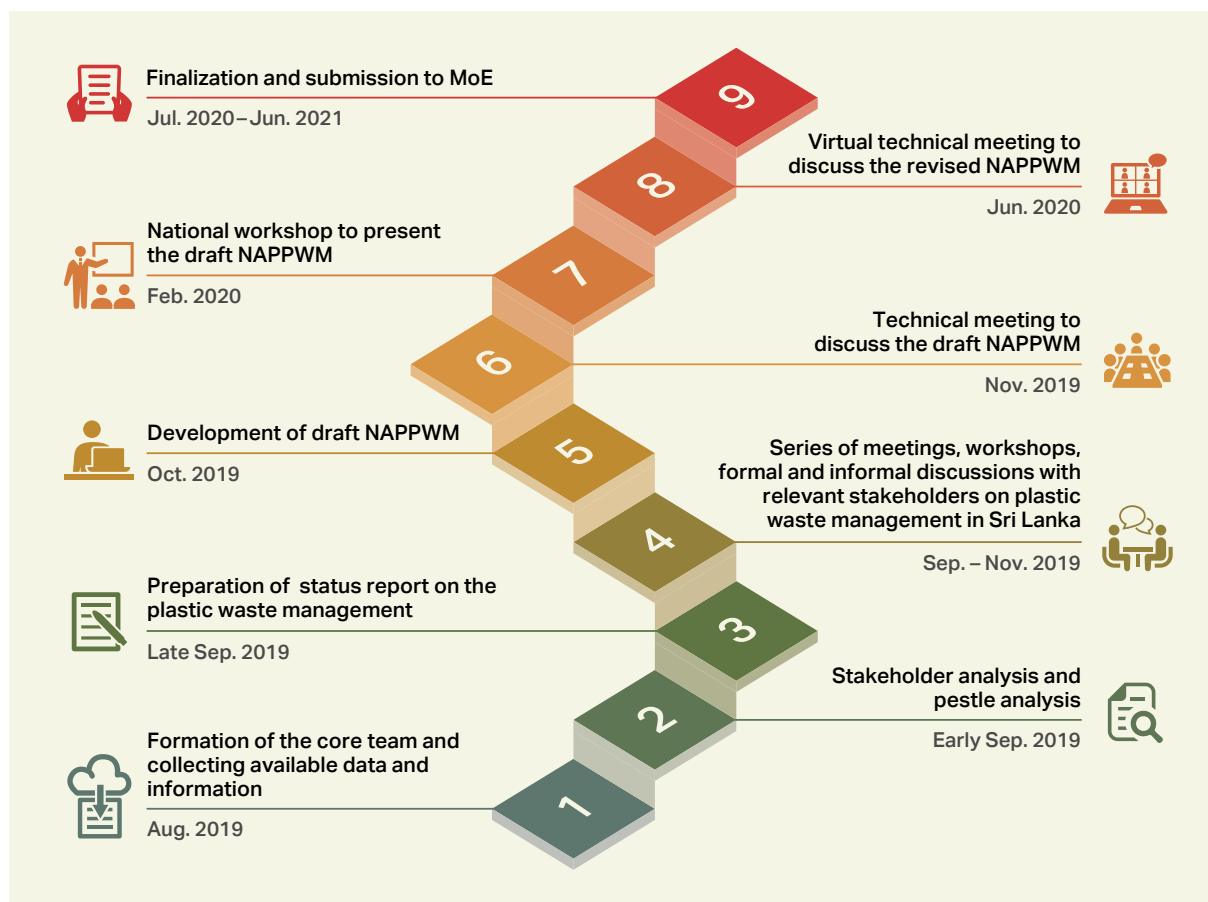


Figure 2: Meeting and workshops during the development of NAPPWM

questionnaires, meetings and interviews with relevant stakeholders on plastics.

Following this, from September to November a series of meetings, workshops, formal and informal discussions and field visits were conducted to collect more data and information and discuss the findings in the status report. Based on several focus group discussions with relevant stakeholders and a regional workshop on plastic waste management in Kandy, a first draft of the NAPPWM was developed in October 2019. A technical meeting was organized by Ministry of Environment and CCET in November 2019 to discuss the draft content, with revisions made based on the feedback received from the technical committee. The draft NAPPWM was then presented at the national workshop in Colombo in February 2020, which was attended by over 50 participants representing relevant ministries and institutions (Ministry of Environment, Ministry of Health, Ministry of Foreign Relations, Marine Environmental Protection Authority (MEPA), Central Environmental Authority (CEA), Waste Management

Authority (Western Province), National Solid waste Management Support Centre (NSWMSC), Kandy Municipal Council, Consumer Affair Authority, Legal Draftsmen's office, Industrial Technology Institute, Customers Department, Import and Export Control Department, etc.), private sectors and plastic users (Unilever, Nestle Lanka PCL, Coca Cola, Maga Engineering (Pvt) Ltd., Access Engineering PLC, etc.), waste processors (Ceylon Waste management (Pvt) Ltd, Eco Spindle), Trade, Commerce and Sectoral chambers (Ceylon Chamber of Commerce/ Bio diversity, Ceylon Chamber of Commerce, Plastic and Rubber Institute of Sri Lanka), academic institutions, non-governmental organizations (Zero Trash, HELP-O, SEVANATHA, BIDS, Public Interest Law Foundation, etc.) and regional organizations (e.g., SACEP) etc.. Feedback from the workshop led to a further revision of the draft NAPPWM, which was presented at a technical meeting held virtually in June 2020. Based on the feedback from the technical committee members, the draft NPWMAP was finalized and submitted to the Ministry of Environment.



**Figure 3: Key steps in developing the National Plastic Waste Management Action Plan (NAPPWM) in Sri Lanka**



# Overview of Plastic Waste Management in Sri Lanka

## 3.1 Plastic production and consumption

In order to understand, study and develop actions to manage plastic waste, understanding which types of waste (in addition to Municipal Plastic Waste (MPW)) are relevant to Sri Lanka are listed below:

- Industrial waste
- Waste Electrical & Electronic equipment (WEEE) /E-waste
- Health care and Clinical waste
- Hazardous plastics waste contaminated with chemicals
- Construction-related plastic waste
- Plastic waste in marine environment
- Plastics contaminated with radioactive waste
- Food and agriculture-related plastic waste

Many kinds of plastic raw materials and products have been imported to Sri Lanka since the 1950s, and manufacturing of plastic products has been a domestic industry over 45 years. However, the lack of in-depth profile of the plastics industry is a constraint for quantitatively analyzing its status, and the most recent comprehensive survey was carried out by JICA in 2000 in preparing the Master Plan of Industrialization for the Ministry of Industries (JICA, 2000). While the Ministry of Industries could not implement its recommendations fully, the report is still useful and can still be validated as a tool for verification.

According to the Export Development board website, plastic processing has flourished as an industry in Sri Lanka for over 45 years and over 400 companies are currently engaged in it. The total domestic plastic processing capacity is nearly

140,000 MT per annum with an annual average growth rate of around 10–12% (Sri Lanka Export Development Board, 2019). Plastic exports can be roughly divided into two types – primary forms of plastic exports and finished products of exports. USA has been the dominant buyer (40% of total exports) of Sri Lankan plastic products (Sri Lanka Export Development Board, 2019), and products such as sacks and bags, apparel items and clothing accessories, and cellulose are manufactured through plastic processing and exported directly or indirectly.

The plastic packaging sector ranks high overall in the plastic manufacturing and import sector. Analysis of raw material records from customs agencies shows the main materials used in plastic packaging, where LDPE and PS constitute around 21%. Along with other inputs, the packaging sector represents around 25%–30% of the plastic industry (Authors, 2019)<sup>2</sup>. As with other industrial sectors, small and medium-sized enterprises (SMEs) play a major role in the plastic manufacturing and supporting sectors, where a highly active informal sector exists, which contributes to the supply chain especially on the downstream side and involves large numbers of people in collection, segregation and cleaning.

All raw materials, additives and chemicals required for the industry are imported. According to the latest report by the National Audit Office, imports under the combined HS classification No. 39011000-39140000 in the form of plastic raw materials have gradually increased over the last five years (2014 to 2018) (National Audit Office, 2019). Analysis of the net imports of the following main materials used in production shows a slight drop of about 2.9 %. The total average annual import of plastic raw materials for 2016–2018 period was 289,218 MT.

2 Import data received from the customs from 2015 to 2019 were analyzed by Authors

No data on sectoral contributions to plastics exists, which issue is to be addressed. As compared to the global scenario given below, the prominent sectors

relevant to Sri Lanka are packaging (around 30%), consumer products and building and construction including water and electrical sectors.

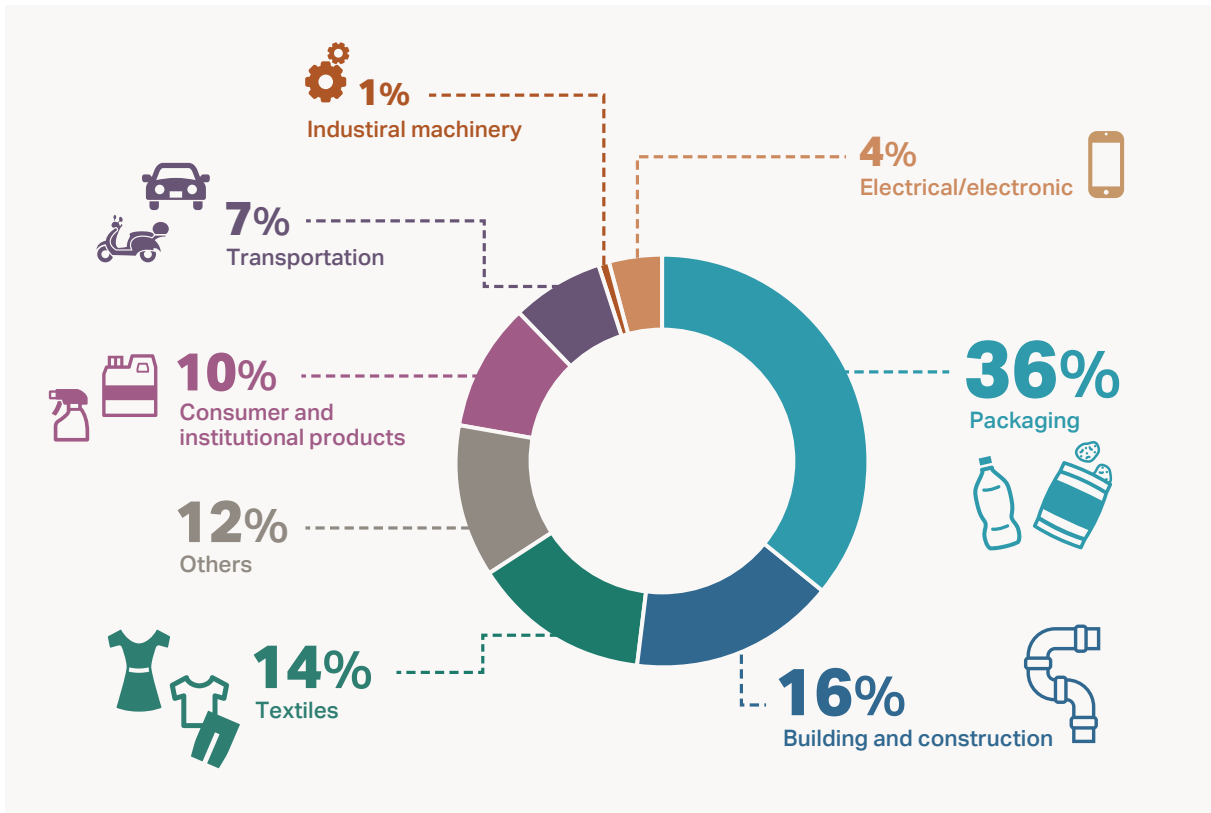


Figure 4: Global production data

Source: Adapted from UNEP single use plastic road map

### 3.2 Material flow

Plastic products are being consumed at higher rates due to numerous factors – rising populations, literacy rates, income levels, global development in technology, and changing lifestyles as well as aspects of plastic itself, such as versatility, cost advantage and formability. The data and information on plastics in Sri Lanka was analyzed and tabulated using the Material Flow Diagram (MFD) introduced by UN-Habitat to represent the present national plastic waste and recycling system, which includes

both formal and informal elements and operations and shows current plastic flows in Sri Lanka. The regression analysis model obtained from “WHAT A WASTE 2.0” was used to estimate the total solid waste generation in year 2020, utilizing data from 2009 as the baseline (Kaza et al., 2018). The model assumes that the per capita waste generation rate rises in step with economic improvement, i.e., increases in GDP per capita and population. Equations 1 and 2 were derived from the model used by World Bank report for the estimation and projections of total solid waste generation (Kaza et al., 2018).

$$\text{Proxy waste generation per capita} = 1,647.41 - 419.73 \ln(\text{GDP per capita}) + 29.43 \ln(\text{GDP per capita})^2 \quad (\text{Eq.1})$$

$$\text{Projected Waste Generation Rate Target Year} = \frac{\text{Proxy Waste Generation Rate (Target Year)}}{\text{Proxy Waste Generation Rate (Base Year)}} \times \text{Acrual Waste Generation Rate (Base Year)} \quad (\text{Eq.2})$$

GDP per capita values were obtained from PPP constant 2017 international \$/yr from World Bank's World Development Indicators for year 2009, and estimated and projected GDP per capita data were obtained from Trading Economics and CEIC data (The World Bank, 2020; Trading Economics, 2020; CEIC, 2019). Sri Lankan population data for year 2009 were extracted from World Bank data, while estimated and projected population data were collected from World Bank's standard projections from world population prospects 2019 (The World Bank, 2020; UN, 2019).

Since the baseline total solid waste generation amount is available for 2009 this was considered as the base year for our estimations for 2020 (JICA, 2016). First, the proxy waste generation per capita value in kg/year was obtained from Eq. 1 and used to calculate the projected waste generation rate per capita for the target year from Eq. 2. The population data were then used to finally estimate the total waste generation for the target year.

Since no reliable or consistent data related to the plastic waste value chain and for developing an MFD for plastic waste exists, several estimations were made by referring to the literature and previous census reports. Percentage composition of plastic waste from total waste generation was obtained from 2016 JICA survey data conducted for 10 cities: Kataragama, Thamankaduwa, Jaffna MC, Trincomalee UC, Kurunegala, Nuwaraeliya MC, Moratuwa MC, Kesbewa UC, Katunayaka Seeduwa MC, and Mt. lavinia MC (JICA, 2016). The above study covers both urban and rural areas of the country to estimate national waste generation, and an averaged value was calculated for national plastic waste composition by considering each city's plastic waste composition.

The results show that the estimated total plastic waste generated in year 2020 in Sri Lanka is about 938.42 MT/D, of which 300.30 MT/D is collected, about 261.82 MT/D is openly dumped and the approx. 38.48 MT/D remaining goes to mechanical

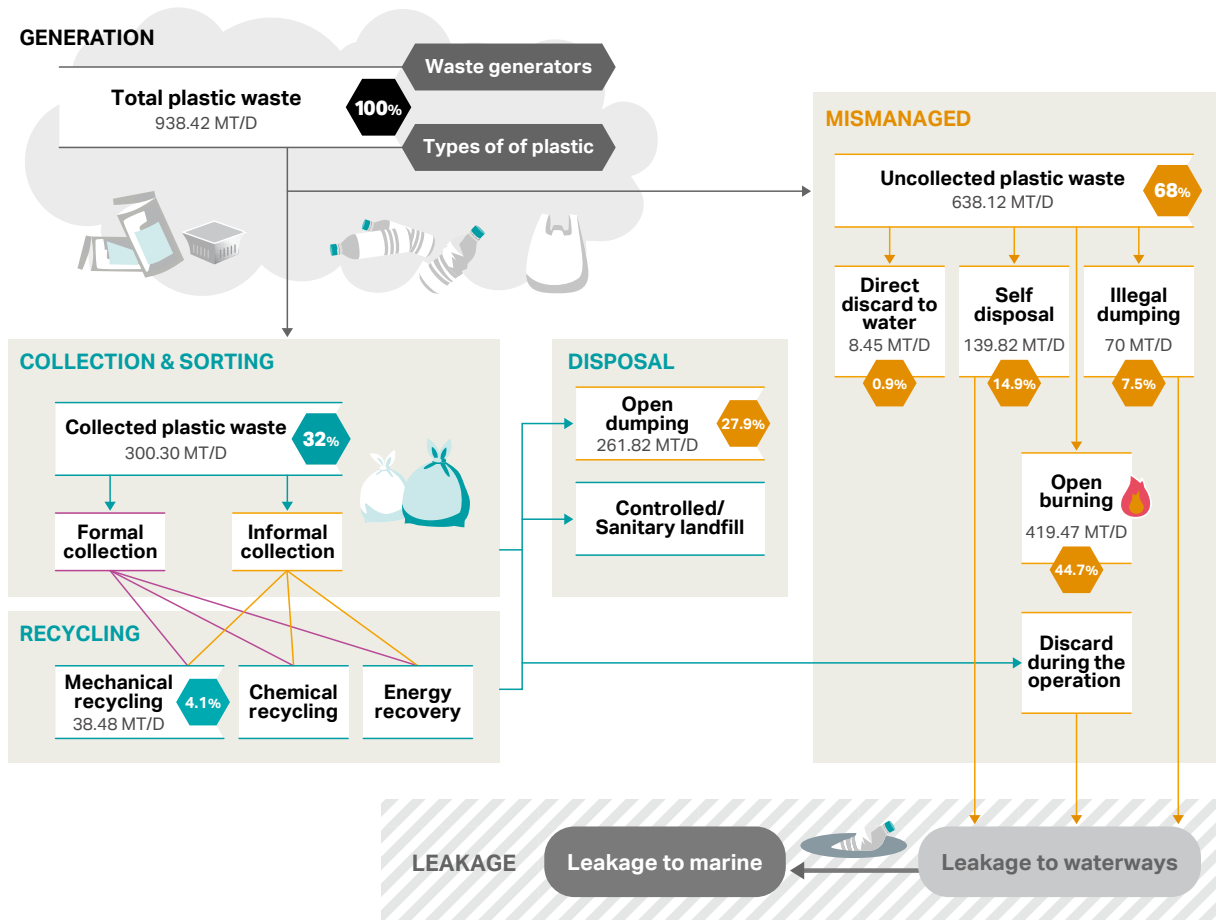


Figure 5: Estimated plastic material flow in Sri Lanka in 2020

Source: Authors

recycling. Total uncollected waste is estimated at 638.12 MT/D, of which about 8.45 MT/D is directly discarded to water sources, 139.82 MT/D is self-disposed at individual premises, about 419.47 MT/D is openly burnt in individual premises and about 70 MT/D is illegally dumped into the surrounding environment.

### 3.3 Recycling and reprocessing (formal/informal) in Sri Lanka

In Sri Lanka, recycling of plastics is mainly carried out in-house by the production sector. A few large-scale recyclers exist, for whom waste collection is mainly carried out by the informal sector. This sector collects waste from homes, streets, commercial and industrial establishments and from the final disposal sites and contributes to the wider waste management system by providing the service to municipalities, central government and residents.

Some 20 million people around the world depend on informal recycling from municipal solid wastes for their livelihoods, the main drivers of which are poverty and unemployment. However, the working conditions in this sector are often very unsafe and unhygienic, and although waste pickers contribute significantly to waste collection and recycling, they experience low social standing in all cultures instead of being viewed as environmental champions and waste reducing agents.

Of the available mechanical, chemical and biological recycling methods – Sri Lanka mainly uses mechanical technologies. According to information from WMA, the recycling rate from MSW in Western Province, the highest contributor to all waste in the country, is currently 3% and the target for 2023 is 7% (Mannapperuma, 2018).

#### 3.3.1 Profile of the Recycling Industry

There is no complete database of collectors or recyclers in Sri Lanka, and the only database is the recyclers and E-waste handlers registered with the

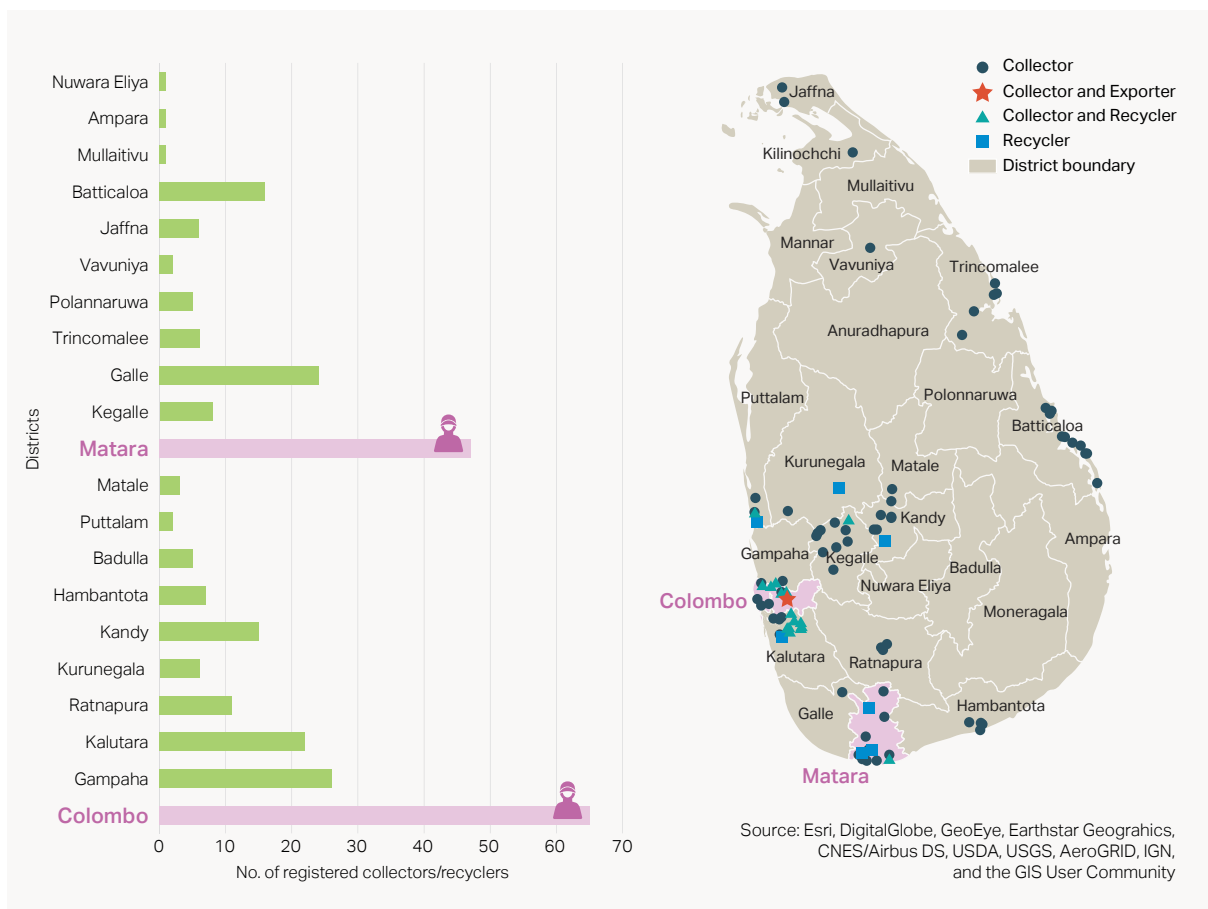


Figure 6: CEA registered waste collectors and recyclers in September 2020

Source: CEA

Central Environmental Authority. In reality, however, more private sector and established recyclers exist in Colombo than the registered. During the UNIDO project on subcontracting and partnership exchange, a comprehensive survey was carried out on the capacity of in-house and independent recyclers in order to promote sub-contracting, and noted that many successful partnerships had emerged during that period.

Figure 6 shows a very high number of recyclers and collectors are registered in the Colombo and Matara district compare to other regions of the country as of September 2020. It does not show related figures for in-house recycling carried out by plastic manufacturers. In-house operators could support the recycling of MSW, if suitably segregated and graded material were supplied to them.

Post-consumer waste recycling worldwide evolved as a solution to the solid waste problem, but the majority of Sri Lankan small- and medium-scale post-consumer recyclers failed to comply with the

levels of quality desired by the plastic industry, and some of them have also experienced problems of inadequate collection quantities and high costs. Conversely, it is encouraging to note growth in PET collection and recycling by the private sector, supported by government sector. A few donor-funded programmes supporting these initiatives also exist. Due to effective networking and the presence of collection centers and KIOSKs, collection rates are encouraging. In order to increase efficiency of collection and reduce transport costs, recyclers need to be provided with bailing machines at concessionary prices. According to a report by the Coca-Cola Foundation, Sri Lanka (primarily through its informal sector) is estimated to collect and recycle around 25–30% of PET bottles (Coca Cola, 2018). Figure 7 shows the average collection of PET bottles in Sri Lanka from ECO Spindles, one of the leading polyester yarn and filaments manufacturer in Sri Lanka.

According to records, the main recyclable, imported virgin materials are comprised of LDPE, LLDPE,

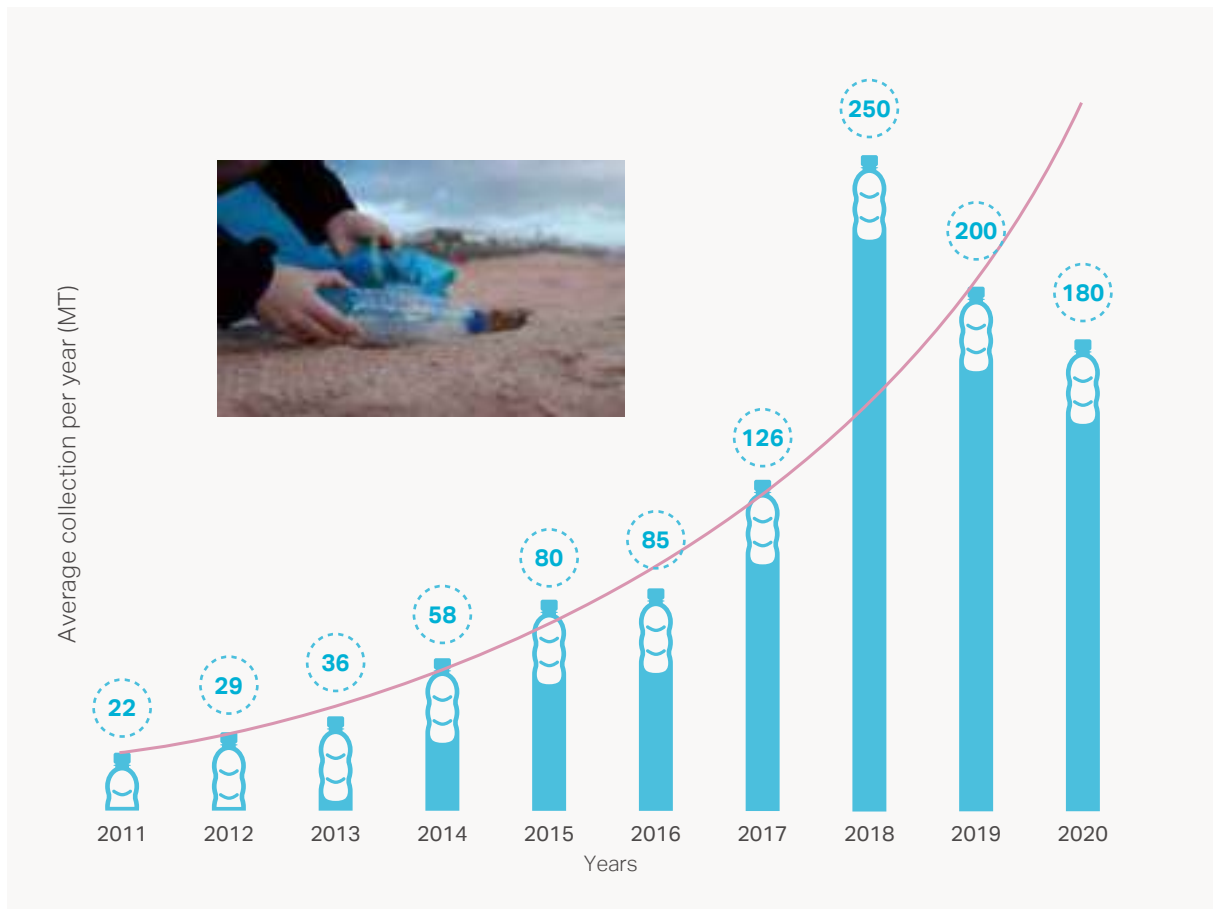


Figure 7: Average PET collection per year (MT) by ECO Spindles

Source: ECO Spindles

HDPE, PP, PS (solid and EPS) and PET (Gunaratna, 2012). The packaging sector, which mainly consumes LDPE and PS, imports 24% of all major plastic polymers, and other main users are the consumer electrical and electronics, building and construction, leisure and other industries, all of which contribute to plastic waste generation, which is the input to the local recycling industry. Figure 7 shows the average PET collection per year by ECO Spindles where the collection trend is in increasing order until 2018 however after 2018 there was a drop in the collection due to the Sunday terrorist attack and also due to the impact from COVID-19 and further drop in the collection was observed in 2020 due to the continuous influence of COVID-19.

Following are the basic processes in plastic waste management that are commonly used at the local authority level:

- Segregation at source
- Collection with or without segregation
- Further segregation into different plastics
- Intermediate buyers and storage
- Washing, and sorting
- Recycling to shredded material and/or pelletized material
- Value addition

If any of the above processes can be achieved systematically, there is business potential for producing high quality recycled products, and if this industry is to be developed it should be rehabilitated through the effort of the Ministry of Industries with other relevant stakeholders.

Apart from a few examples of current good practices that have been organized by LAs, mostly with the involvement of the private sector and NGOs, the waste source segregation and cleaning and sorting carried out is mainly unsatisfactory and inconsistent. Storage facilities are limited, and are also in a poor state in terms of environmental and health aspects. Several LAs, facing transport and maintenance issues with their vehicle fleets, also

add to the general level of improperly disposed waste.









Main reasons cited for the above low levels of achievement are as follows:

1. Other than for PET bottles where a satisfactory supply chain is being established, collection rates for other types of plastics are quite low, due to the non-availability of a sustainable collection mechanism
2. Storage facilities are in poor condition (health and safety risks)
3. Sorting is generally inefficient except in a few established institutions and companies
4. Recycling factories are inefficiently operated with low-end technologies resulting in negative impacts to the environment and health and safety risks
5. Inadequate quality control
6. Inefficient usage of energy
7. Financially unviable operations, as reported by recyclers
8. Absence of plastic technology development centers with testing facilities
9. Low recyclability due to excess printing, design, over packaging, labels, etc. in products

### 3.3.2 Case studies on successful plastic recycling

In the process of NAPPWM development, based on operational modality, two cases were selected and documented by CCET as successful examples of plastic recycling in Sri Lanka (Karunaratna et al., 2020): i) Single municipal operation, and ii) Public Private Partnership (PPP) operation. The cases were then analyzed in aspects of efficacy, technical feasibility, financial sustainability, environmental impact and sense of ownership in terms of their collection, processing, financing and supportive activities. Table 1 presents a summary of the findings.

Table 1: Overview of the case studies

	<b>Single municipal operation</b> 	<b>PPP-based operation</b> 
	<p>Kandy Municipal Council (KMC) is a large-scale waste generation municipality that introduced successful waste source separation, collection services and a recycling facility under different stages of a master plan.</p>	<p>Balangoda Urban Council (BUC) contracts a private company for the operation of a PRC, which was installed and equipped with public funding.</p>
<b>Operational modality</b> 	Single municipality: Kandy Municipal Council (KMC)	Balangoda Urban Council (BUC) and private company
<b>Type of technology used</b> 	Crushing, compacting and bailing for plastic recyclables	Crushing, compacting and bailing for plastic recyclables
<b>Waste generation/ collection</b> 	175 MTPD (estimated) / 140 MTPD	25 TPD (estimated) / 15-20 MTPD
<b>Processing capacity</b> 	500 kg/day	500 kg/day
<b>Achievements and lesson learnt</b> 	<ul style="list-style-type: none"> <li>• Able to penetrate the plastic recycling market with low-value plastic waste by ensuring a stable price even for low-value plastic throughout the contract period, normally one year.</li> <li>• Inclusion of informal waste pickers into the formal recycling activity.</li> <li>• Strict monitoring and inspection contributed to the reduction of waste burning and illegal dumping activities.</li> <li>• Segregation of biodegradable waste together with the promotion of home composting significantly reduced the waste generation.</li> <li>• Received Swarnapura (Golden City) national award for establishment of integrated waste management model (Municipal Council category).</li> </ul>	<ul style="list-style-type: none"> <li>• Able to enhance recycling activities at local level through establishment of recyclables collection centers and Plastic Recycling Centre (PRC) as a plastic processing facility.</li> <li>• Profit generation was possible after a private company took over the operation and management of PRC.</li> <li>• Received National Productivity Award in 2015 for innovative recycling model (Local Authority category).</li> <li>• Received Green Job Award in 2010 for the introduction of a school recycling programme and the Green Silver Award for Best Service Provider in 2012 for implementation of an efficient source-segregated waste collection and recycling system.</li> </ul>
<b>Lesson learnt</b> 	<ul style="list-style-type: none"> <li>• Continuous public awareness by city officials is vital for changing public's behaviour on source segregation and overall waste management.</li> <li>• Proper MSW collection service closely monitored by city officials is one of the key strategies to reinforce waste segregation at source.</li> <li>• Contracting with waste plastic buyers to supply guaranteed amounts of plastics of fixed quality motivates the city to raise the quality of waste collection and recycling.</li> </ul>	<ul style="list-style-type: none"> <li>• Continuous awareness raising by central and local governments is important in changing public's behaviour on source segregation and overall waste management.</li> <li>• Public-Private Partnership makes the operation of the public-funded recycling center more efficient through demarcation of tasks between them. However, low-value plastics tend not to be collected.</li> <li>• Establishing a recyclables collection center at a school with a facilitation group motivates not only school children but also their families to get involved in source segregation through dissemination of messages via the children.</li> </ul>

For a detailed report visit CCET website: <https://ccet.jp/publications/effective-plastic-waste-management-sri-lanka>

### 3.3.3 Gender issues

According to the 2018 census and statistics report, women participation in the plastic and rubber industry is around 36%. In waste collection it is around 50% in enterprises employing staff below 25. The general observation is that more women take part in the informal sector in areas such as collection and segregation. The USAID-funded Municipal Waste Recycling Programme (MWRP), implemented by the non-governmental organization "SEVANATHA" and others focuses on improving women participation in the Rathmalana station road community, Auburn side community in Mount Lavinia and in Badowita community, for example, and one of the key outputs of the project is increased women participation in community waste management. As a result of community awareness and mobilization efforts, the MWRP project team identified 10 community-level recyclable material collectors, of which nine were led by women who are continuously engaged in collecting recyclable waste materials within their communities and from surrounding areas. However, it was observed that often times, female waste collectors or recyclers are already overburdened, time-poor and lacks safety and childcare requirements, therefore these issues must be considered while involving them into the waste collection and recycling business by providing them the option of a pathway to safe and secure employment (Aidis and Khaled, 2019).

## 3.4 Overview of major issues and gaps

To evaluate the challenges faced in PWM, a detailed PESTEL analysis was performed, which revealed the following major shortcomings:

- Low collection rate of plastic waste
- Low collection quality due to no or insufficient segregation
- Improper waste management practices causing increasing problems to waterways and marine litter, land and air pollution
- Deficiencies in implementation of laws to curb improper waste management
- Inadequate recognition of need to develop recycling industry as a business opportunity

- Inadequate testing facilities for quality control and R&D
- Inadequate coordination between stakeholders
- Emerging health issues due to marine pollution, microplastics
- Burning of plastics containing E-waste
- Inadequate community participation
- Deficiencies in data and information management
- Inadequate attention to health issues
- Insufficient attention to existing initiatives and reports and failure to implement the recommendations

## 3.5 Some of the current initiatives to support plastic waste management

- MEPA/SAMURDI/IRRIGATION/PRIVATE SECTOR initiative to curb marine pollution
- Nestle initiative to curb plastics in Tetra packs. An alliance has been formed with other users for collection of Tetra packs and support in establishing a recycling plant
- Current efforts by the Ministry of Environment, Ministry of Industries and private sector to operationalize EPR
- Unilever's appointment of "INSEE" (former eco cycle) as a PRO to collect market returns
- Ongoing development by Sri Lanka Packaging Institute of a packaging agreement among packagers of PET bottle collectors, recyclers and packagers to manufacture textile yarn by Eco Spindle
- Recent innovative initiatives in upcycling to make PPE from polyethylene waste bags
- Initiative of Colombo City Tourist Hotels Association (CCTHA) to reduce SUP consumption
- Initiatives by Coca-Cola in PET Collection, Cargill and Keels to reuse plastic bags and



- curb poly bag pollution (Almost all super markets have promoted reusable bags)
- Supermarkets have taken initiatives to educate customers/train their own staff/on plastic mgt./Promote alternatives (paper) for bakery product packaging/Introduction of reusable bag and a point/discount system/Introduction of compostable bag/collect PET bottles and send them for recycling/Setting targets for plastic reduction/Reverse vending machine at one Super market in Colombo by Chakra
- Implementation of the plastics ban through political campaigns and meetings (Many other individual initiatives by companies and other institutions exist, details of which await compilation)
- Upcycling project by “Dilmah” group (tea production entity)
- USAID, Municipal Waste Recycling Programme
- “Sevenatha”, community participation project in Dehiwala-Mt Lavinia for promoting beach champions
- Trans Textile project to minimize textile and apparel sector waste, funded by the UK Engineering & Physical Sciences Research Council (EPSRC)’s Global Challenge Research Fund (GCRF) with strong support from the existing local contact point; project was designed and led by the Centre for Industrial Sustainability (CIS), University of Cambridge, UK
- Asia foundation project, the conclusion of which was to increase collection and recycling of PET
- USAID projects to curb marine pollution and Municipal solid waste
- Potential project to set up a material recovery plant by GIZ
- SACEP project to minimize river-based pollution
- Exemplary model provided by the Colombo Overseas school sustainability group for schools on the application of 3R for plastic waste

- Programme implemented by the “Asia Pacific Youth Ambassador for SCP, UNEP (2016)” to train farmers on plastic waste
- Plastic Free Rivers and Seas for South Asia funded by World Banka and implemented by SACEP
- PPP introduced by Ministry of Environment, Central Environmental Authority, Register of pesticides Crop Life Sri Lanka and Polycar (Pvt) for the management of hazardous plastics

## 3.6 Policies and legal framework

### 3.6.1 Legal infrastructure for plastic waste management in Sri Lanka

Due to the acute problems currently faced by plastic waste disposal and management, many ministries and public institutions are involved in the management of plastic waste in Sri Lanka. While there is visibility of the import (plastic materials and goods) and final disposal stages, many stages in between are not properly controlled. Further, due to the lack of coordination between the responsible institutions, there are many drawbacks and gaps in the management of plastic waste, which has also been affected by occasional changes in ministries and responsibilities. However, specific institutions have been created by Acts enacted by Parliament for specific objectives on the management of chemicals in general, and their authorities and responsibilities are defined along with powers for effective management of chemicals which were highlighted in the Chemical Profile of 2015. The report also provides a table showing the related ministries and institutions under each ministry for management of chemicals along with life cycles, where plastic is a raw material synthesized from chemical.

According to Mr. Barry Dyer, Chief Executive Officer of New Zealand Chemical Council and also a vice president of Responsible Care Leadership Group (RCLG) of International Council of Chemical Associations (ICCA), plastic is not a direct chemical but a raw material synthesized from chemicals. ICCA has many plastic raw material producers within their

council and are concerned about global problem of plastic waste. Therefore ICCA has created a separate group under ICCA umbrella “Plastic Waste Management Leadership Group” to work closely with “Alliance to End Plastic Waste”. (note: Lanka responsible care council, a Non profit company in Sri Lanka is the country representative member of the RCLG).

A comprehensive stakeholder analysis was carried out for all stakeholders in the management of plastic waste, important factors” of which were selected and analyzed. The factors considered in this subjective analysis are:

- Importance to sound Plastic Waste Management (PWM)
- Present level of effectiveness
- Whether or not priority is given to PWM
- Level of implementation of PWM programmes
- Monitoring level
- Level of Authority

### 3.6.2 Provisions in governing legislations of local authorities

Local authorities are legally bound for carrying out effecting proper solid waste management initiatives in their respective authority areas, as can be clearly understood from the provisions allotted to them.

The mandate and rules of the Western Province Waste Management Authority provide sufficient laws to take action against local authorities in Western Province for any violations. Although local authorities have been granted powers related to solid waste management in their respective areas, it appears that they are not performing effectively due to several reasons including lack of commitment.

## 3.7 Policies, guidelines and multinational agreements that support overcoming challenges in plastic waste management in Sri Lanka

Many policies and guidelines have been formulated and issued by various institutions in Sri Lanka which directly or indirectly provide guidance, provisions for managing waste including plastic waste, some of which are given below:

- Environmental Policy, 2003 (Under revision)
- National Waste Management Policy, 2019
- National Climate Change Policy of Sri Lanka, 2011
- National Wetland Policy and Strategy, 2006
- National Policy and Strategy for Cleaner Production, 2005 National Policy on Sustainable Consumption and Production for Sri Lanka, 2019
- Biodiversity Conservation in Sri Lanka, A Framework for Action, 1999
- National Drinking Water Policy 2009
- Food related regulations (There are 35 food regulations)
- National Health Policy 1996 (There are 28 additional policies in health sector)
- Marine Pollution Prevention Act, 2008
- Sustainable Development Act, 2017
- Factories Ordinance, 1942

Refer Annex I for Legal Framework for Plastics and Plastic Waste management in Sri Lanka

# Plastic Waste Management Action Plan

## 4.1 Development of the National Action Plan on Plastic Waste Management (NAPPWM)

The Ministry of Environment developed, through stakeholder consultations, the NAPPWM 2021–2030 for Sri Lanka to address the challenges in management of plastic waste in the country and establish a financially sustainable and environmentally sound national plastic waste and resource recycling management system. NAPPWM includes a comprehensive list of goals and actions to be achieved under short-term, mid-term and long-term targets, and also includes the key organizations responsible for their implementation.

## 4.2 Guiding principles

Following are the guiding principles considered during the development of the Action Plan.

### **Sustainable Environmental Policy**

The Sri Lankan President's "Sustainable Environmental Policy" under its policy statement "Vistas of Prosperity" states "the linear economy in which manufacturers produce goods using existing raw materials and disposing of waste into the environment will be replaced with the circular economy, by which waste in one industry can be used as raw material in another (Re-Use, Recycle, Re-Purpose). This will create eco-industrial zones

and pave the way for a green economy". The policy direction of the Action Plan is derived from the National Waste Management policy of Sri Lanka, where the vision is managing waste sustainably for a healthy life and a cleaner environment for all. The policy has stated several objectives and the main goal of the policy is "To provide coherent and comprehensive directions for waste management in the country covering all forms of wastes to meet the acute short-term challenges in line with medium- and long-term sustainable solutions up to 2030 with entrusted accountability."

Strategic directions are guided by the National Policy which states:

*"Existing internationally and nationally accepted appropriate waste management concepts such as 3Rs principle and its extensions shall be practiced with special emphasis on waste prevention/avoidance approaches, that would require 'RE-Think' as the basic prerequisite for conducive and accountable social transformation."*

Based on the above, the strategic framework is based on the waste hierarchy, involving 3Rs (Reduce, Reuse and Recycle) and for use of non-recyclable residual plastics in waste to energy plants and final disposal to engineered landfills. Thus, the 3R approach will enable Sri Lanka to change its course from a linear economy to a circular economy.

For each strategic direction, specific, measurable, attainable, realistic, time-bound goals were determined along with cross-cutting issues.

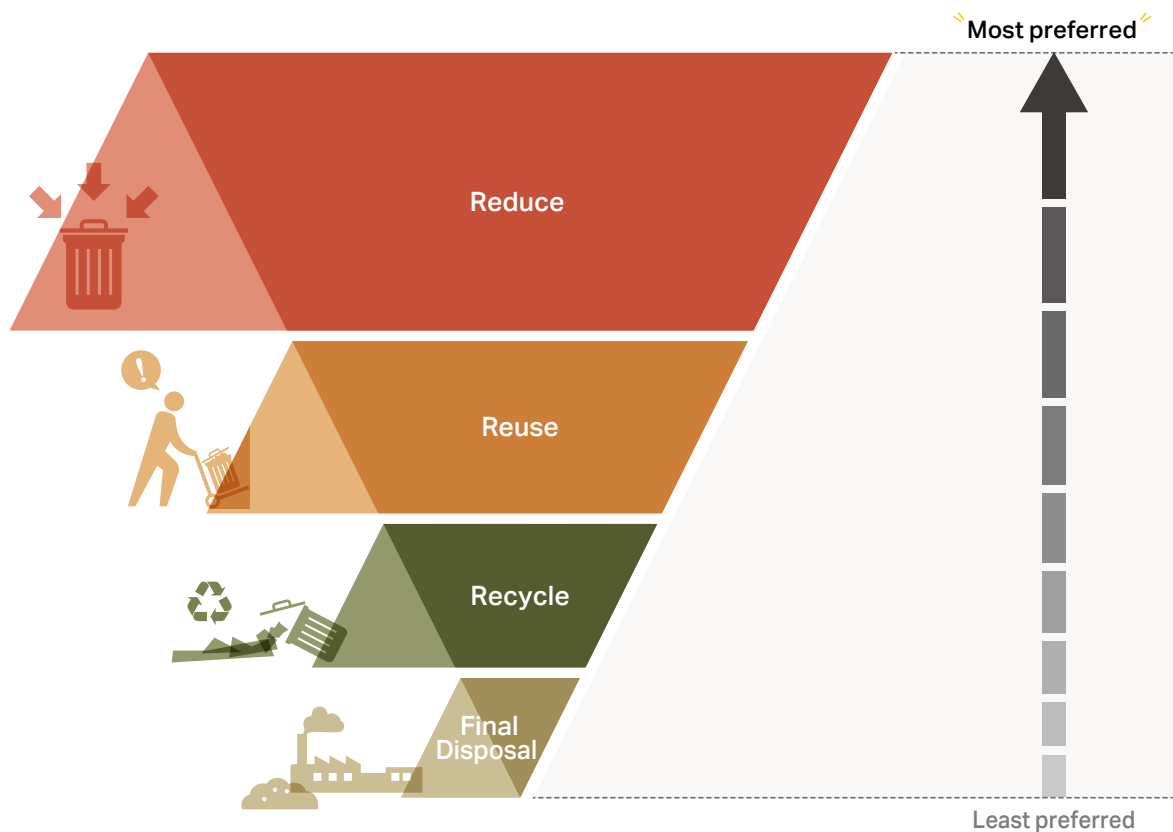


Figure 8: The waste hierarchy

#### **Sustainable Consumption and Production Policy**

Sri Lanka adopted the Sustainable Consumption and Production Policy in 2019, which is a strength of this Action Plan. It recommends applying the Polluter Pays Principle, introducing the concept of EPR for products, and following the 3R principal.

#### **Circular Economy**

The concept of Circular Economy (CE) was also carefully considered during development of the Action Plan. The monitoring framework for the circular economy by the Commission of European Parliament, the Council, the European Economic and Social Committee of the Regions states, "Circular economy is an economy where the value of products, materials, and resources are maintained in the economy as long as possible and the generation of waste is minimized" (European Commission, 2015; Robaina et al., 2020). According to Pearce and Tuener (1990), CE models maintain the added value of products for as long as possible and minimize waste, keeping resources within the economy when products no longer serve their

functions, so that materials can be used again and generate additional value. Therefore, it has been highlighted by Maio et al. (2017) that circular business models create more value from each unit of natural resources compared to traditional linear models.

### 4.3 Goals and available baseline data

Apart from the goals developed for waste management hierarchy (reduction, repair/reuse, recycle and final disposal), goals were also developed for the following cross-cutting issues, with due consideration paid to the relevant SDG goals. The following table gives details on the goals and justification of available baseline data.

- Inventory Data
- Education/R&D/Training
- Health & Safety
- Community Participation

Table 2: Guiding principles

Principle	Brief Explanation
Circular Economy against Linear economy	Actions will support circular economy thinking and development.
Preventative and Precautionary approach	Take preventive actions to avoid and arrest any processes that could harm all living beings.
Participatory, consultative process with all stake holders, ensuring transparency	Communication, stakeholder consultation including public consultation and participation, integrated into the planning and implementation mechanism
Product Stewardship	Those involved in production, importation, marketing and selling, usage and disposal should ensure that they are managed throughout the life cycle minimizing adverse effect to humans and other living beings.
Polluter-Pays	The cost of pollution and /or damage to the environment should be borne by the responsible parties.
Sustainability	Maintain sustainability in terms of environment, economy and society
Cost-Benefit principle	Be able to implement with the resources available or with external support.

Table 3: Criteria and Goals with baseline information

Criteria and Title	Goal	Baseline data	Other
<b>Database</b>			
Inventory Data	<b>Goal 1</b> Inventory and monitoring mechanism for all entries and exits of plastics in the country by 2021 and make the inventory dataset available by 2022	<ul style="list-style-type: none"> <li>Inventory dataset not available</li> </ul>	Could contribute to all other goals and overall management of plastic waste in Sri Lanka
<b>Hierarchy</b>			
Reduce/ Prevention	<b>Goal 2</b> Phase out identified single use consumer plastic items by 2021 and achieve 80% reduction of production and consumption of selected SUP by 2025	<ul style="list-style-type: none"> <li>Beech analysis of MEPA gives extents and types of SUPs which can be eliminated in a phase-out programme. This can act as the baseline.</li> <li>There is a budgetary provision made for SUPs in 2019</li> </ul>	<ul style="list-style-type: none"> <li>No list of manufacturers</li> <li>No data on production</li> <li>No definition</li> <li>There is a budgetary allocation for phasing out SUPs with a mandatory action for the ministry to register producers or importers.</li> </ul>
	<b>Goal 3</b> Achieve 80% collection of recyclable and non-recyclable plastics and E-waste containing plastics from households, and ensure 100% treatment and safe disposal of collected plastic waste by 2025	<ul style="list-style-type: none"> <li>2012 census and statistics/survey provide district-based quantities/ percentages of waste disposal by burning, disposal to waterways and unauthorized lands</li> <li>JICA Solid waste survey in 2016 and JICA studies in Kurunegala and few other studies provide information on inappropriate disposal</li> </ul>	<ul style="list-style-type: none"> <li>Research findings on burning of plastics</li> <li>Waste plastics in storm water, canals, and rivers is a well-known problem and causes leakage to the ocean.</li> </ul>

Criteria and Title	Goal	Baseline data	Other
<b>Hierarchy</b>			
<b>Reduce/ Prevention</b>	<b>Goal 4</b> Achieve 30% reduction of plastics in packaging by 2030	<ul style="list-style-type: none"> <li>No national data or user/importer declaration system</li> </ul>	<ul style="list-style-type: none"> <li>Company-wide initiatives such as alliance to reduce multilayer packaging waste</li> <li>Useful environmental performance reports generated by National Audit Office</li> </ul>
	<b>Goal 5</b> Reduction of marine plastics pollution comprising macro & micro plastics flowing into ocean through land-based activities by 80% by 2030	<ul style="list-style-type: none"> <li>Beach collections and other current data are available from MEPA</li> <li>Recent survey by NARA on micro-plastics in the ocean</li> </ul>	<ul style="list-style-type: none"> <li>“Surakimu Ganga” National Program on Conservation of Rivers in Sri Lanka</li> </ul>
	<b>Goal 6</b> Reduction of plastic waste from industrial and service sectors other than packaging waste in Goal 3 by 30% by 2025	<ul style="list-style-type: none"> <li>Since last survey in 2002, no exclusive survey on plastic industry available</li> </ul>	<ul style="list-style-type: none"> <li>Limited data is available from ministerial information sources such as Green Award scheme, National Green Reporting System</li> <li>Reports of the National Audit Office</li> <li>Success stories of reduction of PVC used in water fittings through switching standards</li> </ul>
	<b>Goal 7</b> Introduce legal requirements to operationalize EPR and a pilot implementation for selected products by 2022	<ul style="list-style-type: none"> <li>Awaiting final draft</li> </ul>	<ul style="list-style-type: none"> <li>Some EPR initiatives have commenced, e.g.:                             <ol style="list-style-type: none"> <li>Nestle Tetra Pak alliance</li> <li>Unilever INSEE partnership for PRO</li> </ol> </li> </ul>
<b>Reuse/ Repair</b>	<b>Goal 8</b> Promote repair & reuse market for durable consumer products containing plastics through automobile and construction sectors by 2025	<ul style="list-style-type: none"> <li>No baseline in construction sector</li> <li>The report “Preliminary inventory and Action Plan for sound management of polybrominated Diphenyl Ethers (PBDEs) and Hexabromo Biphenyl (HBB) in Sri Lanka” provides useful baseline data</li> </ul>	<ul style="list-style-type: none"> <li>Eco design trained personnel available</li> <li>National inventors’ annual awards scheme is in operation</li> <li>Currently, no end of life of vehicle policy</li> <li>Data available for vehicle scrapping after accidents, which could act as benchmark for repairs</li> </ul>
<b>Recycle</b>	<b>Goal 9</b> Increase plastic waste recycling from 4% to 15% by 2025 ensuring quality, health and safety requirements	<ul style="list-style-type: none"> <li>Waste Management Authority of Western Province (WMA) baseline data</li> </ul>	<ul style="list-style-type: none"> <li>Can contribute to SDG goal 12 indicators:                             <ul style="list-style-type: none"> <li>12.5. By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse</li> <li>12.5.1 National recycling rate, tonnes of material recycled</li> </ul> </li> <li>Case study developed by CCET on plastic waste management in Sri Lanka “entitled Effective Plastic Waste Management in Sri Lanka”<sup>3</sup></li> </ul>

3 <https://ccet.jp/publications/effective-plastic-waste-management-sri-lanka>

Criteria and Title	Goal	Baseline data	Other
Recycle	<b>Goal 10</b> Increase PET bottle collection and recycling rates from 27% to 100% by 2025 to ensure production of safe, high quality, durable products	<ul style="list-style-type: none"> <li>Current data available from private sector stakeholders</li> <li>According to a report by the Coca-Cola Foundation, Sri Lanka (primarily through its informal sector) is estimated to collect and recycle around 25–30% of PET bottles</li> </ul>	-
Final disposal	<b>Goal 11</b> Limit final safe disposal of plastic waste to non-recyclable and/or non-reusable residual plastics by 2025	<ul style="list-style-type: none"> <li>Data obtainable from dumpsite development project and WMA data</li> </ul>	<ul style="list-style-type: none"> <li>MoE with the assistance of CCET developed a "Guidelines for Safe Closure and Rehabilitation of Municipal Solid Waste Dumpsites in Sri Lanka"<sup>4</sup></li> </ul>
<b>Cross-cutting issues</b>			
Education/ Training/R&D	<b>Goal 12</b> Enhance knowledge and competency in plastic waste management of relevant stakeholder groups by 2030	<ul style="list-style-type: none"> <li>No specific data available</li> </ul>	<ul style="list-style-type: none"> <li>Can contribute to multiple SDG goals (i.e. SDG 3, SDG 6, SDG 8, SDG 9, SDG 11, SDG, 12, SDG, 13 and SDG 14)</li> </ul>
	<b>Goal 13</b> Establish a financing mechanism to facilitate the need for improvement in the plastic waste management sector in consultation with private sector participation by 2025	<ul style="list-style-type: none"> <li>No specific data available</li> </ul>	<ul style="list-style-type: none"> <li>Financing mechanisms such as the e-friends scheme operated under Moln could be a useful model</li> </ul>
	<b>Goal 14</b> National reward schemes in place for PPP initiatives by 2025	<ul style="list-style-type: none"> <li>Tax incentives are currently available</li> </ul>	-
Health & Safety	<b>Goal 15</b> Ensure occupational health and safety requirements are met and risk management mechanisms are in place for all plastic waste handlers of all genders by 2025	<ul style="list-style-type: none"> <li>The National Occupational safety and Health Policy, 2014</li> </ul>	-
Community participation	<b>Goal 16</b> All local authorities to design and implement a scheme to use voluntary community participation in addressing value chain stages to successfully achieve 3R activities in plastic waste management: MCs by 2022, UCs by 2025, rest of LAs by 2030	<ul style="list-style-type: none"> <li>No specific data available</li> </ul>	-

4 <https://ccet.jp/publications/guidelines-safe-closure-and-rehabilitation-municipal-solid-waste-dumpsites-sri-lanka>



Figure 9: Flow chart for goals under NAPPWM



## 4.4 Action plan for plastic waste management in Sri Lanka (2021–2030)



Table 4: Action plan for plastic waste management in Sri Lanka (2021–2030)

### Proposed actions and implementation plan under Inventory Data

Goal 1	Inventory and monitoring mechanism for all entries and exits of plastics in the country by 2021 and make the inventory dataset available by 2022	KPI - Committee appointed - Inventory data available - Monitoring system established				
Key Activity	Leading Agency Responsible	Short Term	Medium Term	Long Term		
1.1 Formation of a National Steering Committee comprising key stakeholders including private sector representatives and academia in the field of plastics and plastic waste, through a cabinet paper	MoE	✓				
1.2 Design a system to track and monitor plastic flows into and within the country to regularize data collection and plastic material flows	MoE	✓				
1.3 Study the HS codes presently used for plastic raw materials and goods and establish national sub-headings where needed	CEA	✓				
1.4 Establishment of national coordination mechanism to coordinate efficient use of funds and effective monitoring of activities and initiatives, including donor- and locally-funded projects related to plastics and plastic waste	MoE	✓				

### Proposed actions and implementation plan under Reduce/Prevention

Goal 2	Phase out identified single use consumer plastic items by 2021 and achieve 80% reduction of production and consumption of selected SUP by 2025	KPI - Number of SUP s removed or phased out				
Key Activity	Leading Agency Responsible	Short Term	Medium Term	Long Term		
2.1 Mandatory registration of importers, producers and distributors of SUPs	CEA	✓				
2.2 Phase out of selected SUP products	CEA	✓	✓			
2.3 Prepare criteria and register alternative product manufacturers and importers	CEA	✓	✓			
2.4 Promote and facilitate alternate and durable products through eco innovation and eco design to replace SUPs	MoIn	✓	✓	✓		
2.5 Design and launch a demonstration project for quality and productivity improvement for alternative and up-cycled products and replicate the project(s)	CEA	✓	✓	✓		

**Goal 3**

**Achieve 80% collection of recyclable and non-recyclable plastics and E-waste containing plastics from households, and ensure 100% treatment and safe disposal of collected plastic waste by 2025**

**KPI**  
- Percentages of collection and treatment and disposal by LAs

Key Activity	Leading Agency Responsible	Short Term	Medium Term	Long Term
3.1 Establish and operationalize a monitoring cell at the Central Environment Authority for management of plastics	CEA	✓	✓	✓
3.2 Carry out a comprehensive audit on operations of recycling machines and facilities supplied by government institutes to government and private institutions	CEA	✓	✓	
3.3 Promote and facilitate collection of plastic waste by community-based organizations such as Samurdhi recipients from areas where waste collection is not practiced by LAs (Develop micro enterprises among Samurdhi recipients for collection and preprocessing)	MoE	✓	✓	
3.4 Establish plastic materials/alternatives platform to facilitate buyers and sellers through information exchange	MoE	✓		
3.5 Include "Plastic waste management" within waste management Acts and Regulations and By-laws of local government	MoPPLG	✓	✓	
3.6 Prepare waste profiles in selected LAs based on the lessons learnt and methodology used in solid waste studies carried out in LAs	MoPPLG	✓	✓	
3.7 Review and revise existing national regulations on management of plastics and plastic waste	CEA	✓	✓	✓
3.8 Introduce suitable technologies and testing methods to facilitate identification, collection and separation of plastic waste	MoTech	✓	✓	

**Goal 4**

**Achieve 30% reduction of plastics in packaging by 2030**

**KPI**  
- Percentage reduction of plastics waste from packaging and % use of PCR in non-critical packaging  
- Sri Lanka national packaging and labeling in place

Key Activity	Leading Agency Responsible	Short Term	Medium Term	Long Term
4.1 Initiate development of national packaging and labeling regulations and standards	CEA	✓	✓	
4.2 All primary plastic packaging to be reusable, recyclable or recoverable by 2027	CEA	✓	✓	✓
4.3 Mandatory use of Post-consumer Recycled plastics (PCR) in non-food grade packaging to minimum of 25% by 2030	CEA	✓	✓	✓
4.4 Include plastics in the Green procurement list for public institutions and implement the Green procurement policy in all government departments with immediate effect	MoE	✓	✓	
4.5 Study on means and ways of reducing plastic packaging and implement such for imported goods and goods manufactured locally	MoE	✓	✓	✓

<b>Goal 5</b> <b>Reduction of marine plastics pollution comprising macro &amp; micro plastics flowing into ocean through land-based activities by 80% by 2030</b>		<b>KPI</b> - Percentage reduction of plastics entering oceans from land - Micro plastic study completed			
Key Activity	Leading Agency Responsible	Short Term	Medium Term	Long Term	
5.1 Conduct a pilot plastic waste audit in selected LAs to minimize plastics flowing into ocean from land-based activities	MoE	✓			
5.2 Study the issues of micro-plastics in order to reduce unintentional release of micro-plastics from products associated with textiles, paints, cosmetics, personal and home care products and other identified products	MoE	✓	✓		
5.3 Initiate and conduct studies on human-health impacts of micro-plastics	MoH	✓	✓	✓	
5.4 Formulation and implementation of regulations based on findings of the studies in 5.2. and 5.3.	CEA		✓	✓	

<b>Goal 6</b> <b>Reduction of plastic waste from industrial and service sectors other than packaging waste in Goal 3 by 30% by 2025</b>		<b>KPI</b> - Achieve the reduction target in industry and services other than packaging waste - E-waste action plan targets achieved			
Key Activity	Leading Agency Responsible	Short Term	Medium Term	Long Term	
6.1 Government to invite industrial sectors and service sectors to pledge plastic waste reduction targets	MoE	✓			
6.2 Phase out utensils made of non-recyclable plastics such as cups, plates, spoons and forks with alternative products	CEA	✓			
6.3 Phasing out or restricting the importation, production and use of all plastic raw materials (including additives) and products or composites that are potentially hazardous	MoE	✓	✓		
6.4 Establish a review and monitoring system and legalize a mechanism for usage, recovery and safe disposal of plastic waste from construction sector	CEA	✓	✓		
6.5 Review and implement existing quality standards for all imported plastic products and components, and study a suitable plastic certification scheme	CAA	✓	✓		
6.6 Strengthen the initiative on establishing exclusive agro/ plastic waste collection centers	MoE	✓	✓		

<b>Goal 7</b> <b>Introduce legal requirements to operationalize EPR and a pilot implementation for selected products by 2022</b>		<b>KPI</b> - EPR implementation initiated and in progress			
Key Activity	Leading Agency Responsible	Short Term	Medium Term	Long Term	
7.1 Formulation of regulations on EPR to achieve the goals of 3R and to facilitate R&D and innovation for reduction and replacement of plastic packaging	CEA	✓			
7.2 Design and implement pilot projects for selected consumer plastic products with private sector	CEA	✓			
7.3 Government to solicit proposals from private sector to invest in EPR schemes	MoE	✓			

**Proposed actions and implementation plan under Reuse/Repair of plastic products**

<b>Goal 8</b>		<b>Promote repair &amp; reuse market for durable consumer products containing plastics through automobile and construction sectors by 2025</b>			
		<b>KPI</b> - End of life policy for motor vehicles in place and service sector pilot project launched			
<b>Key Activity</b>	<b>Leading Agency Responsible</b>	<b>Short Term</b>	<b>Medium Term</b>	<b>Long Term</b>	
8.1 Initiate a discussion with the relevant sectors to promote repair of components instead of replacement with brand new ones	MoE	✓			
8.2 Prepare an End of Life (ELV) policy for vehicles in Sri Lanka	MoT	✓	✓		
8.3 Establish NVQ level course on plastic product repair and maintenance	VTA	✓	✓		

**Proposed actions and implementation plan under Recycling of plastic waste**

<b>Goal 9</b>		<b>Increase plastic waste recycling from 4% to 15% by 2025 ensuring quality, health and safety requirements</b>			
		<b>KPI</b> - Plastic waste recycling target achieved			
<b>Key Activity</b>	<b>Leading Agency Responsible</b>	<b>Short Term</b>	<b>Medium Term</b>	<b>Long Term</b>	
9.1 Establishment of a multi-stakeholder action committee led by private sector to improve plastic waste value chain	MoE	✓	✓		
9.2 Facilitate recyclers to increase the recycling of plastics through improving the collection mechanism and maintaining environmental quality, health and safety	MoE	✓	✓		
9.3 Design a simple mandatory certification scheme for recyclers	SLSI	✓	✓		
9.4 Conduct a census of plastic waste collectors, collecting centers, sorters, cleaners, recyclers at LA level including in-house recyclers	Department of Census and Statistics	✓	✓		
9.5 Study and implement mandatory resin code marking with revised rules/standards	CEA	✓	✓		

<b>Goal 10</b>		<b>Increase PET bottle collection and recycling rates from 27% to 100% by 2025 to ensure production of safe, high quality, durable products</b>			
		<b>KPI</b> - 100% achievement of PET collection and recycling rate to produce approved products			
<b>Key Activity</b>	<b>Leading Agency Responsible</b>	<b>Short Term</b>	<b>Medium Term</b>	<b>Long Term</b>	
10.1 Establish a collection mechanism for PET products to achieve 80% PET collection target	Chambers of Commerce and Private sectors	✓			
10.2 Establish a monitoring mechanism to track PET collection by 2022	CEA	✓			
10.3 Introduce product safety certification for recycled PET products (with due consideration to potential micro plastic generating products)	SLSI	✓	✓		

**Proposed actions and implementation plan under Final Disposal**

Key Activity	Leading Agency Responsible	Short Term	Medium Term	Long Term	
					KPI
<b>Goal 11</b> Limit final safe disposal of plastic waste to non-recyclable and/or non-reusable residual plastics by 2025					
- Percentage of residual plastic waste going to waste to energy plants - Percentage of residual plastic waste going to sanitary landfills					
11.1	Establish a mechanism to direct all residual plastics to sanitary landfills or WtE plants available in the country	State Ministry of Waste Disposal	✓		
11.2	Prepare a list and quantification of non-recyclable and composite products and synthetic products used in Sri Lanka and identify safe disposal mechanism	CEA	✓	✓	

**Cross-cutting issues****Proposed actions and implementation plan under Education/Training/R&D**

Key Activity	Leading Agency Responsible	Short Term	Medium Term	Long Term	
					KPI
<b>Goal 12</b> Enhance knowledge and competency in plastic waste management of relevant stakeholder groups by 2030					
- Number trained on plastics and plastic waste management in different stakeholder groups					
12.1	Support relaunching of the Young Entrepreneurs Sri Lanka (YESL) program to include plastic field when establishing school companies	MoEd	✓		
12.2	Develop NVQ Level course on plastic recycling industry	VTA	✓	✓	✓
12.3	Set minimum standards for trainers and educators for accreditation	SLAB	✓		
12.4	Conduct Training of Trainers (TOTs) at provincial/district level for trainers for officials and academics of universities	Ministries in charge of vocational training and higher education or VTA	✓	✓	✓
12.5	Enhance Training of PHIs, community health officers and Environmental police on management of plastics, including health care waste.	MoH	✓	✓	✓
12.6	Enhance knowledge and practices for plastics and plastic waste management in educational institutions	NIE	✓	✓	✓
12.7	Upgrade existing R&D centers & training centers and expand innovation platforms including setting up a model recycling center for management of plastics	PRI	✓	✓	
12.8	Study to facilitate and consider incentives on potential application of eco-friendly alternatives and upcycled products including bio-plastics, resin-infused paper and natural fiber-based packaging materials	MoIn	✓		
12.9	Conduct awareness programmes with all main stakeholders on Cleaner Production applied to manufacturing of plastics and management of plastic waste	MoIn	✓		

<b>Goal 13</b>	<b>Establish a financing mechanism to facilitate the need for improvement in the plastic waste management sector in consultation with private sector participation by 2025</b>	KPI - Financial mechanism in place			
	<b>Key Activity</b>	<b>Leading Agency Responsible</b>	<b>Short Term</b>	<b>Medium Term</b>	<b>Long Term</b>
	13.1 Introduce activities such as tax concessions on eco-friendly products to support industry for all plant/machinery/equipment/process changes, new molds, etc., as well as introduce higher taxes on harmful products, to reduce plastic waste from industry	MoE	✓		
	13.2 Establish Green credit line to promote eco-friendly product manufacturers	MoF	✓	✓	

<b>Goal 14</b>	<b>National reward schemes in place for PPP initiatives by 2025</b>	KPI - National financial and non-financial reward schemes for PPP initiatives designed and approved			
	<b>Key Activity</b>	<b>Leading Agency Responsible</b>	<b>Short Term</b>	<b>Medium Term</b>	<b>Long Term</b>
	14.1 Ministry to form a team comprising relevant stakeholders, to prepare reward schemes, including products and processes eligible for tax or other financial incentives	MoE	✓	✓	
	14.2 Revision of existing rewarding schemes to focus more on plastics and plastic waste management	CEA	✓		

**Proposed actions and implementation plan under Health & Safety**

<b>Goal 15</b>	<b>Ensure occupational health and safety requirements are met and risk management mechanisms are in place for all plastic waste handlers of all genders by 2025</b>	KPI - Achieve targets of SDG 3			
	<b>Key Activity</b>	<b>Leading Agency Responsible</b>	<b>Short Term</b>	<b>Medium Term</b>	<b>Long Term</b>
	15.1 Improvement of working conditions and implementation of mandatory health and safety requirements with special emphasis on SMEs and plastic waste handlers	MoL	✓	✓	
	15.2 Prepare guidelines for risk reduction and a plan for disaster management in plastics industry value chain	MoE	✓	✓	

**Proposed actions and implementation plan under Community Participation**

<b>Goal 16</b>	<b>All local authorities to design and implement a scheme to use voluntary community participation in addressing value chain stages to successfully achieve 3R activities in plastic waste management: MCs by 2022, UCs by 2025, rest of LAs by 2030</b>	KPI - Design of community participation scheme to achieve 3R targets completed by LAs - Numbers of community members participating in each LA			
	<b>Key Activity</b>	<b>Leading Agency Responsible</b>	<b>Short Term</b>	<b>Medium Term</b>	<b>Long Term</b>
	16.1 Increase community participation and networking to address issue of plastics waste in each DS division	MoPPLG	✓		
	16.2 Strengthen media participation in plastic waste management	MoE	✓	✓	✓

## Preparation, Implementation, Monitoring and Evaluation

### 5.1 Introduction

Preparation, implementation, monitoring and evaluation are essential functions to ensure that actions outlined in the NAPPWM are implemented

as planned against stated objectives and desired results. Thus, the NAPPWM in Sri Lanka will be planned, implemented, monitored, evaluated and revised via the PDCA (Plan-Do-Check-Action) cycle as explained below:



#### PLAN

*Preparation and drafting of the Action Plan*

- Form a core team and conduct a baseline study to understand the challenges and gaps
- Based on consultation meetings and workshops with relevant stakeholders, draft the Action Plan with relevant goals, targets with the appropriate time frame in line with existing policies and regulations
- Identify relevant organizations and institutions for implementation of these goals within the allocated time frame



#### CHECK

*Evaluation and review of the Action Plan*

- Based on the monitoring results, analyze the progress in implementation of the Action Plan in line with the targets and time period
- Review the progress with relevant stakeholders and submit results to an independent evaluation committee
- Identify and examine areas of success and failure and determine the contributory factors



#### DO

*Implementation and monitoring of the Action Plan*

- Formalize the Action Plan through appropriate administrative processes
- Disseminate the Action Plan using various outreach opportunities
- Mobilize resources (financial, technical, human and political) and deepen collaboration with relevant partners towards implementation of the Action Plan
- Conduct regular monitoring to check the progress and record such for future evaluation and review



#### ACTION

*Updating the Action Plan based on the evaluation*

- Expand and replicate successful cases
- Revise the Action Plan to address failures and emerging challenges so that goals in the Action Plan can be achieved within the given time period



**Figure 10: PDCA for NPWMAP in Sri Lanka**

The national Action Plan was prepared with strong desire towards its implementation. Considering the extent of plastic pollution on land, in waterways, in the ocean and air by burning and other routes, it is time that actions are taken and initiated to curb the adverse effects of plastic pollution in Sri Lanka.

The situation surrounding COVID-19 as of the finalization of this Action Plan has shown that consumption of plastics of lower recyclability yet of essential nature given the circumstances is higher, which further underscores the need to adopt a more preventive approach in accordance with the principles of sustainable consumption leading to the circular economy. Similarly, it was observed that most of the plastic waste finally ends to the ocean polluting the marine environment. Plastic debris in the marine environment is composed of variety of polymers and copolymers which comes from several different sources, hence, it is important to group into major classes (i.e. biodegradable plastics, oxo-degradable plastics and bioplastics etc.) (UNEP, 2015).

Almost all production and importing of plastic takes place in the private sector, whereas usage and disposal mainly occurs by the general public and other users. Therefore, in order to be successful, their participation and corporation has to be obtained and if necessary, legalized. The EU-strategy for plastics in a circular economy has listed measures for national authorities and industry to take to implement the strategy, which started with a call on stakeholders to come forward with voluntary pledges (European Commission, 2015). There is no doubt that industry as a whole will support the government on similar approaches as suggested in the Action Plan however the Ministry of Environment has a key role to play in the implementation of this Action Plan and therefore careful planning for implementation of all the strategic goals is essential.



## 5.2 Important requisites for implementation

**The following are important pre-requisites for implementation of the Action Plan:**

1. Realization of the importance of the plastic industry for the nation. During the keynote address delivered at the “No plastic bag day” on July 7, 2020 organized by the ministry in support of CCET, it was also emphasized that, despite the inevitable growth of the plastic industry, production and consumption needs to be more responsible.
2. Establish a strong structure through understanding the key roles of all stakeholders.
3. Understanding and networking with existing players for plastic waste management.

**During this assignment several synergistic projects were identified which will facilitate the ministry to execute this Action Plan. The following are useful initiatives for networking which the ministry may have already started.**

- **The World Bank Plastic free Rivers and Seas for South Asia**  
Partly for the Oceans and the South Asia Cooperative Environment Programme (SACEP) as a partnership aims to assist the South Asian region to curb marine plastic pollution and ramp up eco-innovation to reinvent plastic use and production (The World Bank, 2020).
- **USAID Community-Led Plastic Waste Management Program in Dehiwala**  
Executed by “Sevanatha”, this programme focuses on reducing plastic waste, especially single use waste, and strengthening the municipal solid waste management (SWM) system through innovative river waste traps, public awareness campaigns and technical assistance to the recycling sector. The project also facilitates public-private partnerships to foster collaboration between the SWM service providers and the primary users (USAID, 2020).
- **USAID’s Clean Cities, Blue Ocean (CCBO)** is USAID’s flagship programme to address the plastic pollution in oceans. The programme operates globally in tackling plastics waste mostly focusing on rapidly urbanizing areas that contribute significantly to the plastics that flow into the ocean each year, one of the focal countries of this programme being Sri Lanka (USAID, 2020).
- **Asia Foundation, Sri Lanka, Plastics project**  
The Asia Foundation with support from the Coca Cola Foundation, Coca Cola Beverages Sri Lanka Ltd., Environment Foundation Limited (EFL), and Eco Spindles (Pvt) Ltd., has been working together with local government authorities for development of viable recycling options (The Asia Foundation, 2020).
- **IUCN Sri Lanka, IUCN, USAID and Ceylon Chamber of Commerce** collaboration for preparing a road map for implementing EPR (The Ceylon Chamber of Commerce, 2019). According to the Ministry of Environment, the EPR for E-waste in Sri Lanka is expected to be completed by end of 2021.
- **GIZ** is developing a public-private partnership project to set up a material recovery plant aiming to reduce plastic waste and improve segregated collection. They are also planning a marine plastic reduction project (GIZ, 2020).
- **PHINLA project**  
SEVANATHA is currently implementing a Solid waste management project in Wattala, Ja-Ela and Chawakachcheri urban areas in partnership with World Vision Lanka, which also forms part of a regional project involving Philippines, Indonesia and Sri Lanka, known as the PHINLA Project (LDM, 2020).
- **EU SWITCH Asia Project for Prevention of Marine Litter in the Lakshadweep Sea**  
The project seeks to promote source-to-sea solutions to reduce marine littering in tourism clusters along the Lakshadweep shorelines of the Maldives, Sri Lanka and India. The project, yet to start, involves the National Cleaner Production Centre, Sri Lanka and The Energy and Resource Institute (TERI) India as partners (Switch asia, 2020).

### 5.3 The main players for implementation

The Ministry of Environment and its main departments, namely the Central Environmental Authority and Marine Environment Protection

Authority are responsible in areas of the environment and therefore have authority and responsibility for implementing this National Action Plan.

The following table summarizes other main governmental players in the implementation process.

**Table 5: Main governmental stakeholders**

	Ministry	Key departments	Role
1	Ministry of Environment	Central Environmental Authority	Regulator of all Plastic waste management-related work Facilitator, Coordinator, Enforcer of related laws
2	Ministry of Urban Development	Urban Development Authority Marine Environment Protection Authority	
3	Ministry of Public administration, home affairs, Provincial councils & Local government	All local authorities Western Province Waste Management authority (under the Western Provincial council)	Is responsible for and has authority over all types of users and consumers Implementing partner of the Action Plan
4	Ministry of Industries	Industrial Development board	Partner, facilitator, regulator of the Plastic manufacturing and waste Industry
5	Ministry of Health	Department of Health services	Environmental health & Food safety regulator
6	Ministry of Education	Industrial Technology Institute Inventors commission Research Institutes All state universities Department of education	Knowledge Base for Technology Integration, awareness and Training and R&D
7	Ministry of Finance	Sri Lanka customs Department of Census & Statistics Sustainable development council	Material inflow & outflow control point Data management
8	Ministry of Justice, Human rights & Law reforms	Legal Draftsmen's Department	Laws and Regulations
9	Auditor General	National Audit office	Watchdog

# References

1. Aidis, R., Khaled, D., (2019). Women's Economic Empowerment and Equality (WE3) Gender Analysis of Waste Management and Recycling Sector, USAID. Women's Economic Empowerment and Equality Technical Assistance Task Order under the Advancing the Agenda of Gender Equality (Advantage) indefinite delivery, indefinite quantity (IDIQ) contract.
2. CEA, (2021). Waste Collectors and Recyclers in Sri Lanka. <<http://www.cea.lk/web/en/component/content/article/2-uncategorised/1407-waste-collectors-and-recyclers-in-sri-lanka>> (Accessed April, 2021).
3. CEIC, (2019). Sri Lanka GDP per Capita. <<https://www.ceicdata.com/en/indicator/sri-lanka/gdp-per-capita>> (Accessed July 2020).
4. Central Environmental Authority (CEA), (2020). National Solid Waste Management Programme in Sri Lanka. <[https://www.unescap.org/sites/default/files/6\\_CEA.pdf](https://www.unescap.org/sites/default/files/6_CEA.pdf)> (Accessed February, 2020).
5. Coca Cola, (2018). We collect and Recycle PET Bottles in Sri Lanka for a 'World Without Waste'. Packaging & Recycling. <<https://www.coca-colaindia.com/stories/sustainability/packaging-recycling/we-collect-and-recycle-pet-bottles-in-sri-lanka-for-a-world-without-waste>> (Accessed January 2020).
6. Department of Census & Statistics., (2012). Census of Population and Housing 2012. Ministry of Policy Planning and Economic Affairs.
7. Dharmasiri, L.M., (2019). Waste Management in Sri Lanka: Challenges and Opportunities. Sri Lanka Journal of Advanced Social Studies Vol 9.
8. European Commission, (2015). A European Strategy for Plastics in A Circular Economy. <<https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52015DC0614&from=ES>> (Accessed June, 2020).
9. European Commission, (2015). Communication from the commission to the European Parliament, The Council, The European Economic and Social Committee and the Committee of the Regions, Closing the loop—An EU action plan for the Circular Economy. <<https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52015DC0614&from=ES>> (Accessed June, 2020).
10. Geyer, R., Jambeck, J.R., Law, K.L. (2017). Production, use, and fate of all plastics ever made. *Science Advances*, 3:e1700782.
11. GIZ, (2020). Waste Management and circular economy-conserving resources. <<https://www.giz.de/en/worldwide/15109.html>> (Accessed July, 2020).
12. Gunaratna, D.N.J.C.J., (2012), Analysis of Future Trends of Plastic Recycling in Sri Lanka, Thesis from Department of Chemistry of University of Sri Jayewardenepura in partial fulfillment of the requirements for the degree of Master of Science in Polymer Science and Technology.
13. Japan International Cooperation Agency (JICA), (2000). Master Plan study for Industrialization and Investment Promotion in the Democratic Socialist Republic of Sri Lanka—Main Report, KRI International Corp. <<https://openjicareport.jica.go.jp/pdf/11583739.pdf>> (Accessed December, 2020)
14. Japan International Cooperation Agency (JICA), (2016). Data Collection Survey of Solid Waste Management in Democratic Socialist Republic of Sri Lanka—Final Report, Kokusai Kogyo Co., Ltd.
15. Japan International Cooperation Agency (JICA), (2019). Democratic Socialist Republic of Sri Lanka Pollution Control and Reduction of Environmental Burden in Solid Waste Management (ReEB Waste), Kokusai Kogyo Co, 3. Publication by JICA.
16. Jayasekera, S, Karunarathna, A.K., (2019) Presentations, First Sub-Regional Workshop for Implementing the Global Waste Management Goals Towards Addressing SDGs in South Asia - Report of the Proceedings, SACEP/IGES/UNEP.
17. Jayasinghe, I.H., Basanayake, B.F.A., Amarathunga, K.S.P., Dissanayake, P.B.R., (2010). Environmental Conservation Efforts in Developing Textile Waste Incorporated Cement Blocks. *Tropical Agriculture Research*, Volume 21 (2).
18. Karunarathna, A., Rajapaksha, T., Gamagedara, Y., Kadera, S., Vidanage, N., (2020). Towards Sustainable Operation and Management of Centralized Composting in Sri Lanka. Publication by IGES.

19. Karunaratna, A., Singh, R.K., Rajapaksha, T., Premakumara, D.G.J., Onogawa, K. (2019). State of Municipal Solid Waste Management in Negombo City, Sri Lanka. Publication by IGES.
20. Kaza, S., Yao, L., Bhada-Tata, P., Woerden, F. V., (2018). What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050. Urban Development Series. Washington, DC: World Bank. doi:10.1596/978-1-4648-1329-0.
21. LDM, (2020). World Vision Project to provide livelihood through eco-friendly waste disposal. World Vision. < <https://lmd.lk/world-vision-5/>> (Accessed August, 2020).
22. Maio, F. D., Rem, P.C., Blade, K., Polder., (2017). Measuring resource efficiency and circular economy: A market value approach. Resources, Conservation and Recycling. Volume 122.
23. Mannapperuma N., (2018). Roundtable Discussions to develop Strategic Action Plan (Road Map) to Sustainable Waste Management in the Western Province of Sri Lanka- 2019 to 2023. Waste Management Authority (W.P.), Sri Lanka.
24. National Audit office., (2019), Environmental audit report of Importation, use, post consumption management of Sri Lanka (PER/B/2019/01).
25. National Building Research Organisation (NBRO), (2021). Research Areas, Building Materials, State Ministry of National Security and Disaster Management. < [http://www.nbro.gov.lk/index.php?option=com\\_content&view=article&id=75:research-areas&catid=2&Itemid=286&lang=en](http://www.nbro.gov.lk/index.php?option=com_content&view=article&id=75:research-areas&catid=2&Itemid=286&lang=en)> (Accessed April, 2021)
26. Pearce, D., Turner, R.K., (1990). Economics of Natural Resources and the Environment. Johns Hopkins University Press, Baltimore.
27. Robaina, M., Murillo, K., Rocha, E., Villar, J. (2020). Circular economy in plastic waste- Efficiency analysis of European countries, Science of the Total Environment 730.
28. Sri Lanka Export Development Board, (2019). Plastic Products. < <https://www.srilankabusiness.com/plastic/overview.html>> (Accessed December, 2019).
29. Switch Asia, (2020). Prevention of Marine Litter in the Lakshadweep Sea. < <http://www.switch-asia.eu/project/promise/>> (Accessed August, 2020).
30. The Asia Foundation, (2020). Establishing Sustainable PET Plastic Recycling in Sri Lanka. < [https://asiafoundation.org/wp-content/uploads/2020/06/Establishing-Sustainable-PET-Plastic-Recycling-in-Sri-Lanka\\_2020.pdf](https://asiafoundation.org/wp-content/uploads/2020/06/Establishing-Sustainable-PET-Plastic-Recycling-in-Sri-Lanka_2020.pdf)> (Accessed July, 2020).
31. The Ceylon Chamber of Commerce, (2019). Call for proposals: Market and socio economic study of the project for introduction of an extended producer responsibility system (EPR system) for post consumer management of plastic waste. < <https://www.chamber.lk/index.php/projects/15-projects/206-call-for-proposals-market-and-socio-economic-study-of-the-project-for-introduction-of-an-extended-producer-responsibility-system-epr-system-for-post-consumer-management-of-plastic-waste>> (Accessed August, 2020).
32. The World Bank, (2020). Indicators. Data. <<https://data.worldbank.org/indicator>> (Accessed July 2020).
33. The World Bank, (2020). Indicators. Data. <<https://data.worldbank.org/indicator/SP.POP.TOTL?locations=LK>> (Accessed July 2020).
34. The World Bank, (2020). Plastic Free Rivers and Seas for South Asia. Data. < <https://www.worldbank.org/en/region/sar/brief/plastic-free-rivers-and-seas-for-south-asia>> (Accessed August 2020).
35. Trading Economics, (2020). Sri Lanka GDP per capita PPP. <https://tradingeconomics.com/sri-lanka/gdp-per-capita-ppp> (Assessed June 2020).
36. UNEP, (2015). Biodegradable Plastics & Marine Litter. Misconceptions, Concerns and Impacts on Marine Environments. United Nations Environment Programme (UNEP), Nairobi.
37. United Nations, (2019). Department of Economic and Social Affairs Population Dynamics. World Population Prospects 2019. <<https://population.un.org/wpp/Download/Standard/Population/>> (Assessed June 2020)
38. USAID, (2020). MWRP Sri Lanka: Strengthening Plastic Waste Management in Fast-Growing Urban Areas. < <https://urban-links.org/resource/mwrp-sri-lanka-strengthening-plastic-waste-management-in-fast-growing-urban-areas/>> (Accessed July, 2020)
39. USAID, (2020). Clean Cities, Blue Ocean. < <https://urban-links.org/project/ccbo/>> (Accessed August, 2020)
40. World Economic Forum, (2016). The New Plastics Economy Rethinking the future of plastics.

# Annex I

## Legal Framework for Plastics and Plastic Waste management in Sri Lanka

Since plastic waste is associated with General solid waste it is important to consider the constitutional provisions and the Local authority ordinances also along with other regulations

### 1. Summary

- 1.1 Constitutional provisions
- 1.2 Provision in governing legislations of Local Authorities
- 1.3 Provision under provincial statutes
- 1.4 Provisions under acts and regulations

#### 1.1 Constitutional Provisions

- Article 27 (14) of the Constitution  
"The State shall protect, preserve and improve the environment for the benefit of the community".
- Article 28 (F)  
"It is the duty of every person to protect the nature and the natural resources of Sri Lanka".

These provisions are implemented through the institutional structure created under the legislations enacted by the parliament.

Following Institutions specifically, are entrusted with the protection of environment in the country.

#### 1.2 Local Authorities

- Municipal Councils ordinance No 16, of 1947, Chapter 252, sections 129, 130, 131  
Special reference to procedure Act No. 15 of 1979 - Public Nuisances: Section 98
- Urban Council Ordinance No. 61 of 1947: Section 118, 119, and 120 specify waste management
- Provincial Councils Act No. 42 of 1987: Amended by Act No. 56 of 1988. It contains provisions for waste management by LAs
- Pradeshiya Sabha Act No. 15 of 1987: Sections 93 and 94

#### 1.3 Provisions under provincial statutes

- North western province environmental statute No 12, 1996
- Western province waste management authority No 1, 2007

#### 1.4 Provisions under acts and regulations

- 1.4.1 National Environmental Act No. 47 of 1980 as amended by Act No. 56 of 1988 and (amendment) Act No. 53 of 2000

It is important to refer gazette 1533/16, 2008

Prescribed activities when an environmental license is issued

- 1.4.2 Marine Pollution Prevention Act No. 35 (2008): Section 21, Section 26, and Section 27

- 10 Marine Environment Protection Sea Dumping Regulation 2103 (2012): This regulation requires waste
- Waste water discharge standards and sea dumping permits (Laws of Sri Lanka)

- 1.4.3 Nuisance Ordinance No. 62 of 1939 and No. 57 of 1946: Sections 1–12 (This is a legal instrument often used by public to complain against violations including disposal of plastic or other waste, problems of operations of production factories)

- 1.4.4 Key Regulations relevant to Management to Plastics

- 1.4.4.1 Food Act No-26/1980

- Amendment: Melamine in milk  
Extra ordinary Gazette 1534/18 of 2008  
No person shall, discharge, deposit or emit waste into the environment or carry on any prescribed activity determined by an Order made under Section 23A of the National Environmental Act, No. 47 of 1980 in circumstances which cause or are likely to cause pollution, or noise pollution
- Food contact packing materials and Articles  
Extraordinary gazette 1660/30 of 2010 covering food grade packing materials and articles

#### 1.4.5 Key Regulations gazette

**The following Key gazette Notifications under National Environmental Act No 47 of 1980 section 23W provide regulatory prohibitions on plastic manufacturing and disposal.**

##### 1.4.5.1 No 2034/33

Prohibit

- The manufacture of polythene or any polythene product of twenty (20) microns or below in thickness for in country use ; or
- The sale, offer for sale, offer free of charge, exhibition or use of polythene or any polythene product which is twenty (20) microns or below in thickness within the country.

#### **National Regulations on Plastic manufacturing**

##### 1.4.5.2 No 2034/34

Prohibit

- The manufacture of food wrappers from polythene as a raw material for in country use; and
- The sale, offer for sale, offer free of charge, exhibition or use of food wrappers manufactured from polythene as a raw material within the country.

##### 1.4.5.3 No 2034/35

Prohibit

- Manufacture of any bag of high density polyethylene as a raw material for in country use; and
- Sale, offer for sale, offer free of charge, exhibition or use of any bag manufactured from high density polyethylene as a raw material within the country.

##### 1.4.5.4 No 2034/36

- These Regulations may be cited as the National Environmental (Prohibition of open burning of refuse and other combustible matters inclusive of plastics) Regulations No. 1 of 2017.
- No person shall burn openly or cause to, allow or permit the open burning of refuse or other combustible matters inclusive of plastics.

- Any person who fails to comply with the regulations above shall be liable to an offence and punishable under Section 31 of the National Environmental Act, No. 47 of 1980.

##### 1.4.5.5 No 2034/37

Prohibit the use of all forms of polyethylene, polypropylene, polyethylene products or polypropylene products as decoration in political, social, religious, national, cultural or any other event or occasion.

##### 1.4.5.6 No 2034/38

Prohibit

- The manufacture of food containers, plates, cups and spoons from expanded polystyrene for in country use ; and
- The sale, offer for sale, offer free of charge, exhibition or use of food containers, plates, cups and spoons manufactured from expanded polystyrene within the country.

##### 1.4.5.7 No 2211/51

Minister of Environment, do by this Order, with effect from March 31st, 2021, prohibit the use of-

- Polyethylene terephthalate (PET) or polyvinyl chloride (PVC) material for packing agrochemicals used for any process, trade or industry; and
- Any plastic item specified herein for any process, trade or industry: -
  - (i) Sachets having less than or equal to a net volume of 20ml/net weight of 20g (except for packing food and medicines).
  - (ii) Inflatable toys (except balloons, balls, water floating/pool toys and water sports gear).
  - (iii) Cotton buds with plastic stems (except plastic cotton buds used for medical/ clinical treatment).

## Annex II

Stakeholders involved in the development process of the National Action Plan on Plastic Waste Management 2021-2030

	Name	Designation	Organization
1	Mr. W. T. B. Dissanayake	Additional Secretary (EP&P)	Ministry of Environment (MoE)
2	Ms. Dhammika Wijayasinghe	Former Director	EPC&CM, Ministry of Environment
3	Mr. S M Werahera	Director	EPC&CM, Ministry of Environment
4	Ms. Sujeewa Fernando	Assistance Director	EPC&CM, Ministry of Environment
5	Ms. Jeewanthi Ranasinghe	Assistance Director	EPC&CM, Ministry of Environment
6	Ms. B. Ruchira. L. Perera	Environment Management Officer	EPC&CM, Ministry of Environment
7	Ms. Saranga. Jayasundara	Programme Assistant	EPC&CM, Ministry of Environment
8	Ms. K. Pathirage	Development Officer	EPC&CM, Ministry of Environment
9	Ms. D Wickremesinghe	DO Legal Division	Ministry of Environment
10	Ms. J S N Gunewardena		Ministry of Environment
11	Mr. U Indraratne	DDG (Waste Management)	Central Environmental Authority
12	Mr. N S Gamage	Director (Investigation)	Central Environmental Authority
13	Ms. Sarojinie Jayasekara	Director (SWM)	Central Environmental Authority
14	Ms. Hasanthi Urugodawatte Dissanayake	Director General/Ocean Affairs, Environment and Climate Change	Ministry of Foreign Affairs
15	Mr. A J M Gunasekare	DGM	Marine Environment Protection Authority
16	Mr. P.L.A.M.C. Wijewarnasuriya	Marine Environment Officer – Special Unit Head Office	Marine Environment Protection Authority
17	Mr. Nalin Mannapperuma	Executive Director	Waste Management Authority (WP)
18	Mr. Roshan Salinda	Program officer	Ceylon Chamber Of Commerce/Bio diversity Society of Sri Lanka
19	Mr. Chandrarathna Vithanage	Senior Asst. Sec. General	Ceylon Chamber of Commerce
20	Mr. Kaushal Rajapakse	President	Plastic & Rubber Institute of Sri Lanka
21	Mr. D. P. Indika	Deputy Director	NSWMSC
22	Mr. N. D. Dissanayake	Engineer	Kandy MC
23	Ms. Deepthi Tissera	Director /Legal and Enforcement	Consumer Affairs Authority
24	Ms. V Thalaysingham	Legal Officer	Legal Draftsmen's office
25	Ms. D M H S Dissanayake,	Senior Research Engineer	Industrial Technology Institute
26	Mr. C Rathnayake	Deputy Supt of Customs	Department of Customs
27	Mr. M. K. U. S. Fernando	Assistant Controller	Department of Imports & Exports Control
28	Dr. Inoka Suraweera	Consultant Community Physician	Environmental & Occupational Health Directorate, Ministry of Health
29	Ms. C.Priyankari Alexander	Programme Officer	SACEP South Asia Co-operative Environment Programme (SACEP)
30	Ms. Shashi Sooriarachchi	Head of Regulatory Affairs	Nestle Lanka PLC

31	Mr. Lakshan Madusanghe	Director	Coca-Cola
32	Ms. Sangeethi Kodippili	Superintendent of Audit	National Audit office
33	Mr. Hemantha Withanage	Executive Director	Centre for Environment Justice
34	Mr. I C Dekumpitiya	Environmental Manager	Maga Engineering (Pvt) Ltd
35	Ms. Anushka Kumarasinghe	Country Safety, Health & Environment Manager	Unilever
36	Mr. P. N. Wickramarachchi	Consultant Civil & Env. Eng	Access Engineering PLC
37	Mr. Tharuka Dissanayake	Manager	Ceylon Waste management (Pvt) Ltd
38	Mr. Priyankara Dissanayake	Head of Sourcing	Eco Spindle
39	Mr. Ukwatte	COO	Eco Spindle
40	Mr. K. A. Jayaratne	President	Sevanatha
41	Ms. S Gunewardena	Director	Public Interest Law Foundation
42	Mr. Chathura Welivitiya	Chairman	HELP-O
43	Mr. Hasanka Padukka	Co-founder	Zero Trash
44	Mr. D. P. Hettiarachchi	Consultant	Freelancer (Former Additional Secretary, Ministry of Provincial & Local Government)
45	Ms. Thamara Mallawarachchi	Sec. General & Focal Point in Sri Lanka	National Chapter of City Net in Sri Lanka
46	Ms. Abirami Ratnakumara	Environment Consultant	Free Lance
47	Ms. Chiranthi Wijesinghe	Analyst	Carbon Consultancy company
48	Mr. H.M U Chularatne	Executive Director	Sewanatha
49	Mr. Indhra K Rajapaksa	President	Plastic and Rubber Institute of Sri Lanka
50	Mr. Janaka Wijesekare	Head / Environmental Management	Cleantech
51	Mr. Priyantha Hapuarachchi	President	Sri Lanka Recyclers association
52	Mr. A S Illiyas	Director	MD Plastechs
53	Mr. Rohana Sirimanna	Director	RS Consultant
54	Mr. Janaka Rathnakumara	COO/GM	Wijeya Newspapers
55	Mr. Anuradha Jayasinghe	President	SLIP
56	Ms. Eng. Ms. Shahina Mysan	D/Director, Eng. (SWM),	Colombo Municipal Council
57	Mr. Anura Wijetunga	President	Polymer Manufacturers & Recyclers Association of Sri Lanka
58	Mr. S W B Wijekoon	Consultant	0812497205, 0777852090
59	Mr. Kazunobu Onogawa	Director	CCET-IGES
60	Dr. D G J Premekumara	Deputy Director	CCET-IGES
61	Dr. Rajeev Kumar Singh	Researcher	CCET-IGES
62	Mr. Kirthi Rasaputra	Director	BIDS
63	Mr. Nihal Cooray	Consultant	BIDS
64	Mr. Sena Peiris	Consultant	BIDS





United Nations Avenue, Gigiri  
PO Box 30552, 00100 Nairobi, Kenya  
Tel +254 720 200200 | [communication@unep.org](mailto:communication@unep.org)  
[www.unep.org](http://www.unep.org)

Economy Division  
International Environmental Technology Centre 2-110  
Ryokuchi koen, Tsurumi-ku, Osaka 538-0036, Japan  
Tel: +81 6 6915 4581 | [ietc@unep.org](mailto:ietc@unep.org)  
[www.unep.org/ietc](http://www.unep.org/ietc)



IGES Centre Collaborating with UNEP on  
Environmental Technologies (CCET)  
2108-11 Kamiyamaguchi, Hayama, Kanagawa,  
240-0115, Japan  
Tel +81-46-855-3840  
[www.ccet.jp](http://www.ccet.jp)



## **Ministry of Environment**

Sobadam Piyasa, 416/C/1, Robert Gunawardana Mawatha,  
Battaramulla, Sri Lanka  
[www.env.gov.lk/web](http://www.env.gov.lk/web)