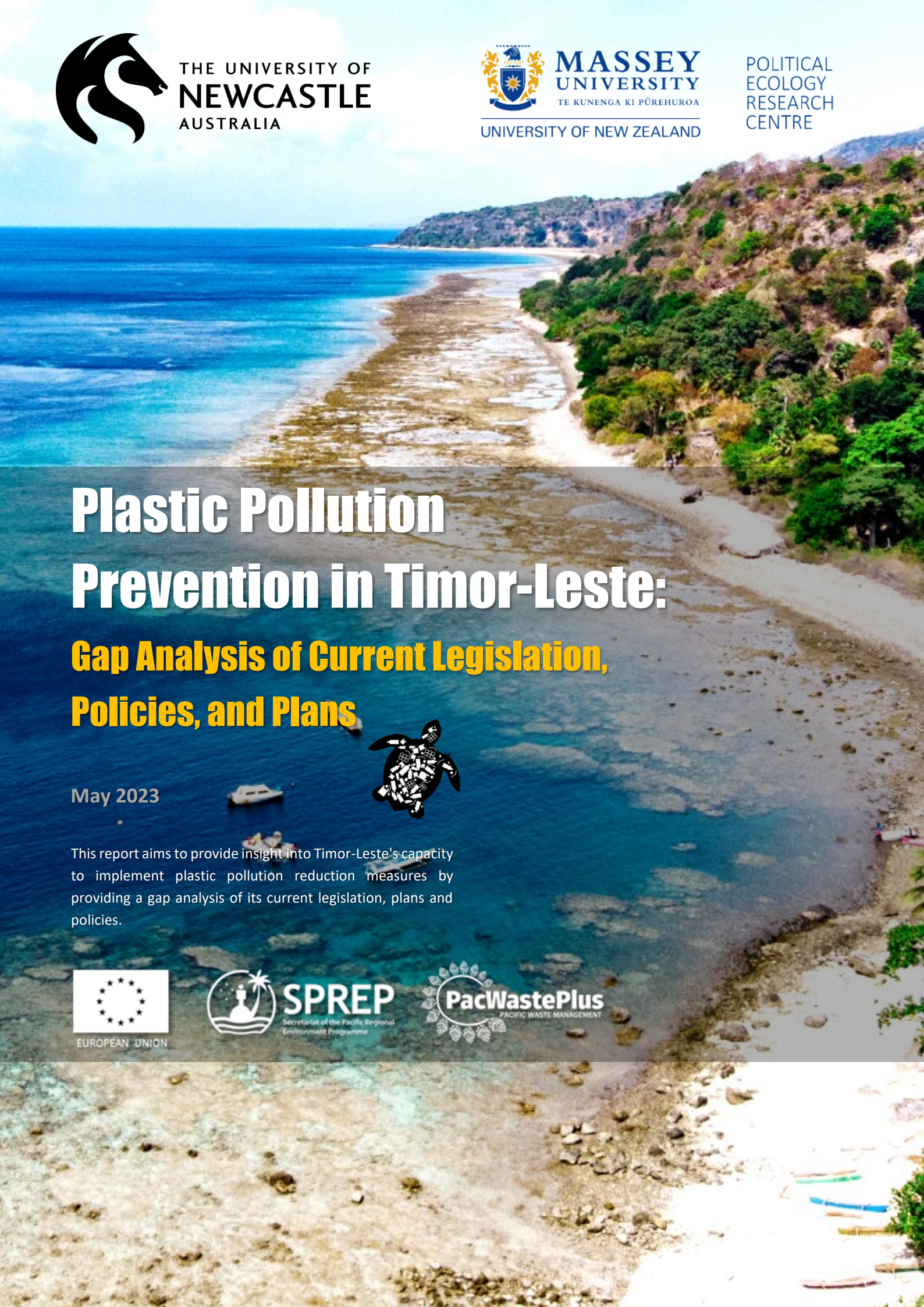

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POLITICAL ECOLOGY RESEARCH CENTRE

Plastic Pollution Prevention in Timor-Leste:

Gap Analysis of Current Legislation, Policies, and Plans

May 2023

This report aims to provide insight into Timor-Leste's capacity to implement plastic pollution reduction measures by providing a gap analysis of its current legislation, plans and policies.

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Authorship: This report was prepared by Els Steenhagen, Researcher Associate, Newcastle Institute for Energy and Resources, The University of Newcastle, Australia; Dr Sascha Fuller, Pacific Engagement Coordinator, Research and Innovation Division, University of Newcastle, Australia; Associate Professor Trisia Farrelly Massey University Political Ecology Research Centre [PERC], New Zealand; Dr Stephanie Borrelle, Birdlife International; and Dr Ana Rengel-Goncalves, Newcastle Law School, The University of Newcastle, Australia.

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Secretariat of the Pacific Regional Environment Programme (SPREP)
PO Box 240 Apia, Samoa
www.sprep.org
sprep@sprep.org

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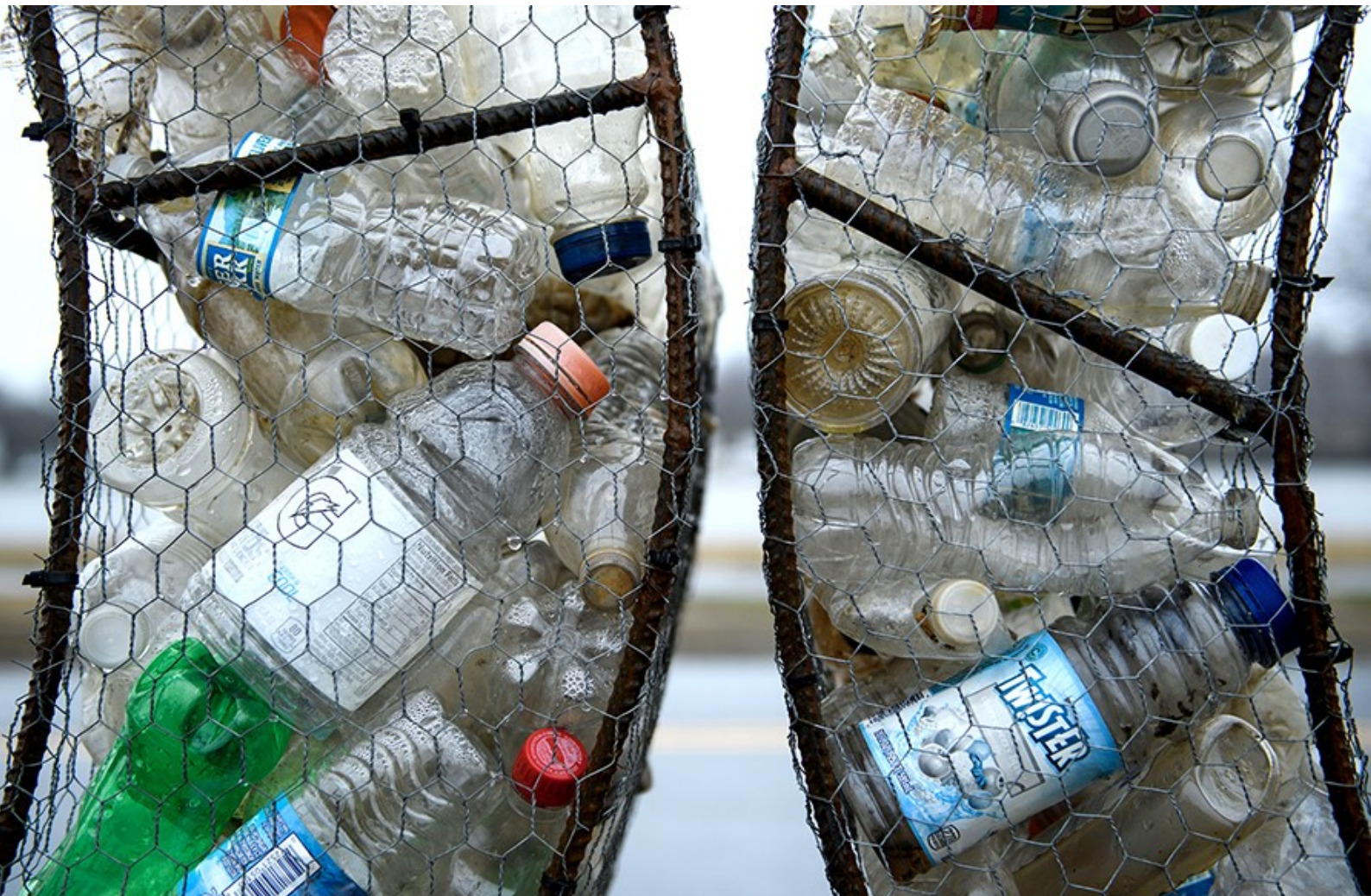
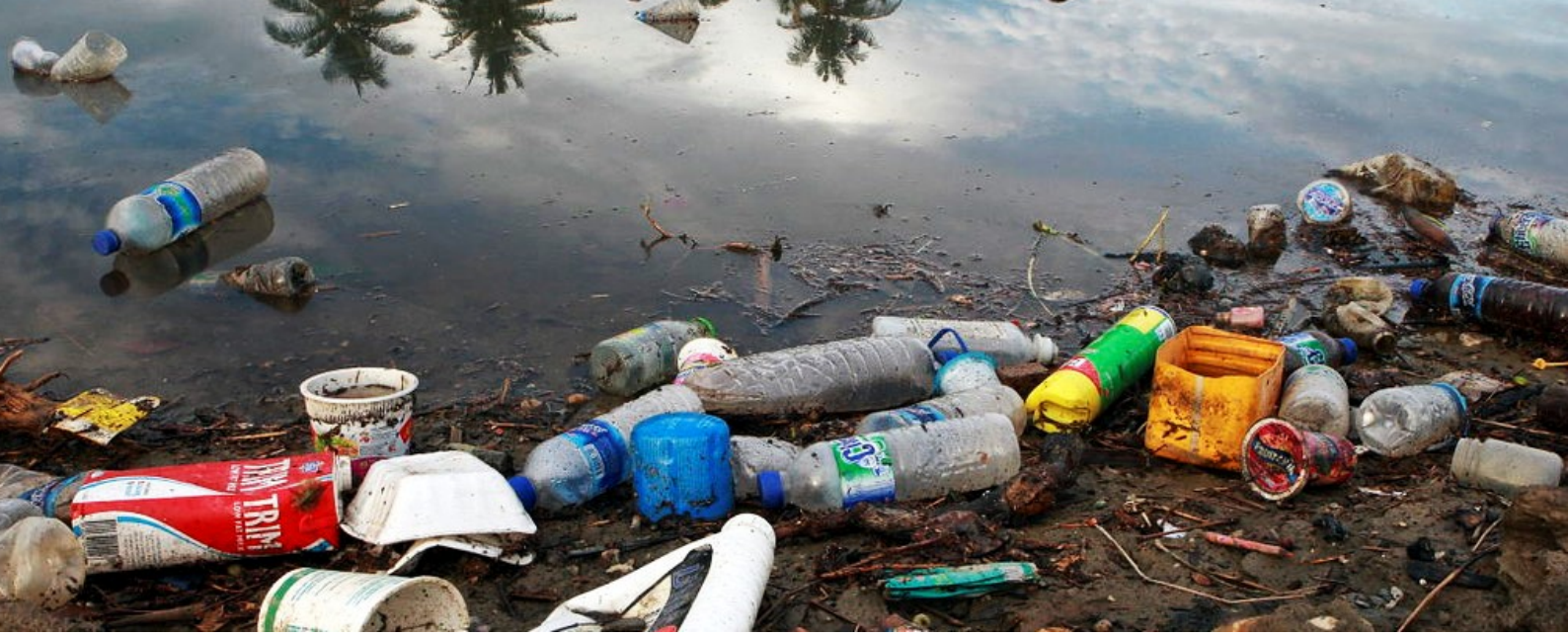




Executive Summary

Plastics comprise sixty to eighty percent of all marine litter globally, with millions of metric tonnes originating from land-based sources every year (Borrelle et al., 2020; PEMSEA, 2020). An estimated 11% of plastic waste generated globally are mismanaged and enter freshwater and marine environments, equating to 86,740 metric tonnes (Mt) every day (Borrelle et al., 2020). If current production and waste management trends continue, roughly 12,000 Mt of plastic waste will be in landfills or in the natural environment by 2050 (Geyer, Jambeck & Law, 2017, p. e1700782). Small Island Developing States (SIDS) such as Timor-Leste are disproportionately impacted.

Timor-Leste is currently experiencing disastrous impacts to marine ecosystems, health related problems and destruction of biodiversity due to the alarming increase of land- and marine-based plastic pollution. In Timor-Leste, approximately thirteen percent of the waste stream is made up of plastic. The Pacific Region Infrastructure Facility (PRIF) estimated that approximately 20.7Mt of plastic waste was released in the waters around Timor-Leste in 2010, with the amount expected to rise to 64.2Mt by 2025 (PRIF, 2018). Mismanaged plastic waste because of poor waste infrastructure and failed landfills is transported by wind, waste-water outfalls, and inland rivers, much of which eventually enters waterways, land and soil, and the marine environment (PRIF, 2018). Consequently, the government committed to eliminating plastics from the natural environment by 2023 through the ambitious ‘Zero Plastic Timor-Leste’ campaign. It was a goal in name only, as it is not close to being achieved as of 2023.

This report aims to provide insight into Timor-Leste's capacity to implement plastic pollution reduction measures by providing a gap analysis of its current legislation, plans and policies. The research finds significant gaps in all analytical categories. Most alarming are the gaps that exist under the waste prevention, microplastics, and protection of human health themes. Findings suggest that the current institutional framework cannot protect human and environmental health, including human rights and biological diversity. The protection of Timor-Leste’s environment through the elimination of the discharges of plastics into the environment will only be possible through extensive amendments to legislation and policy frameworks that prioritise prevention through strict import rules, and supported by an effective international global treaty on plastic pollution that mandates that mandates core obligations, control measures, and implementation measures for the elimination of plastic pollution at all stages of the plastics life cycle.

Background

Plastic pollution is a global transboundary problem. Therefore, preventing continued plastic pollution will only be possible if based on an extensive framework fostering sustainable production and consumption at the international level (EIA, 2020). There is growing political momentum, evidenced by an increasing number of declarations and current multilateral environmental agreements, as well the global plastics treaty currently under negotiation, that prioritise plastic pollution prevention within a full life cycle approach. Small Island Developing States (SIDS), such as Timor-Leste, are disproportionately affected by the human health, human rights, and environmental impacts of plastic pollution (Lachmann et al., 2017). In March 2022, the mandate for a legally binding international plastics treaty was endorsed by 175 Member States including Timor-Leste. However, there is little understanding of Timor-Leste's capacity to effectively implement legislation, plans and policies capable of meeting obligations under such an agreement. It is within this context that we seek to understand Timor-Leste's current capacity to prevent plastic pollution.

Timor-Leste is in the eastern part of the island of Timor in South-East Asia and has a land area of 14,870 km^2 and a coastline of 783 km (World Bank, 2018; PEMSEA and Ministry of Agriculture and Fisheries 2019; CIA, 2020). It is part of the Coral Triangle, a marine area in the western Pacific Ocean, encompassing a rich marine environment whose biodiversity supports local subsistence, livelihoods, tourism development and cultural practices.

Following decades of conflict, Timor-Leste's independence was officially declared in 2002. Since then, the Government of Timor-Leste (GoTL) has been working to rebuild the nation. Natural gas and petroleum infrastructure and development through the Tasi Mane project have played a central role in state building (Bovensiepen & Nygaard-Christensen, 2018). Agriculture, tourism, petroleum, and manufacturing are the four sectors that have been put forward for Timor-Leste's transformation and economic diversification (Lopes & UNESCAP, 2021). The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) argues prioritising and investing in these sectors would enable Timor-Leste's 'sustainable development' and would see Timor-Leste move out of the Least Developed Countries (LDCs) category. Each of these sectors has the potential to cause harm through plastic pollution unless a strong plastic pollution prevention framework is in place. As in many places, there is an everyday contradiction between development aims and environmental and health outcomes in Timor-Leste.

Timor-Leste faces several social, economic, and environmental challenges in state building, as well as continued political instability (Hutt, 2020). Population growth alongside rapid urbanisation means that 30.9 percent of the 1.3 million population are now living in urban areas *(*CIA, 2020). Economic growth and changes in consumption patterns, e.g., shifting from traditional food options in favour of imported packaged foods means Timorese are increasingly import dependent (Courvisanos & Boavida, 2017; Lachmann et al., 2017). This recent growth and urbanisation have led to a substantial increase in the generation of waste (GoTL, 2010; ADB, 2014; Lachmann et al., 2017). However, without preventative measures, including, *inter alia*, removing subsidies from extractive industries, tariffs/taxes, bans, and other control measures on imports, including, renegotiate trade agreements, and manufacturing, labelling, and end-of-life standards, plastic pollution has become a significant problem.

This problem is often attributed to poor waste management infrastructure and capacity (Da Costa & De Jesus, 2020). Until the introduction of *Decree-Law no. 2/2017 - Urban Solid Waste Management System*, despite the ubiquity of waste and plastic pollution, there was no national-level waste prevention or management legislation. Currently, there remain few resources directed to an integrated waste management system (SPREP, 2020), and none directed to an integrated plastic pollution prevention system.

Timor-Leste's community level waste management system is informal and involves the open burning or dumping of waste. This has dire human health implications as the chemical compositions that are released from emissions of burning persistent organic pollutants are carcinogenic (Cogut, 2016). Waste pickers and families living on the Tibar dumpsite are more exposed to the frequent burning of plastics and waste and experience difficulties in breathing, leading to coughing and skin irritations (De Corte Real Araujo et al., 2015).

These poor waste management practices place further pressure on Timor-Leste's already struggling public health system (CIA, 2020; OASIS, 2020) (SPREP, 2020). It is because of this, and the fact that plastics are accountable in the climate crisis (because they are made from fossil fuels) that plastic pollution is a human rights issue along the lifecycle of plastics (Farrelly & Fuller, 2021). The right to a clean, healthy, and sustainable environment, the right to the enjoyment of the highest attainable standard of physical and mental health, the right to an adequate standard of living including the right to food and the right to water, and the right to life are all under threat from plastics pollution since plastics contaminate all elements of the natural environment and human bodies (Farrelly & Fuller, 2021).

Plastic pollution intensifies the impacts of climate change. Communities in Timor-Leste are increasingly threatened by cyclones, strong winds, extreme rainfall, flooding, and sea level rise caused by global warming (Mercer et al., 2014). Global warming impacts reveal the inefficiency and inflexibility of the current waste management system in Timor-Leste, which cannot provide an adequate response to the impact on urban solid waste management posed by failed landfills post-disaster, abandoned, lost or otherwise discarded fishing gear (ALDFG) let alone regular, albeit intensified, weather events. During the wet season, for example, most of the drainage channels are clogged with plastic bottles and bags, contributing to frequent flooding in many areas of the city (OASIS, 2020). In early 2021, Timor-Leste was devastated by flash flooding, with the Government of Timor-Leste declaring a State of Calamity, atop of the COVID-19 related State of Emergency (UN RCO, 2021). In SIDS such as Timor-Leste, the mobilisation of mismanaged plastics during flooding events can increase by a factor of five (Roebroek et al., 2021, p. 8).

Publicly, the Government has committed to action aimed at preventing plastic pollution. The *Program of the VIII Constitutional Government*, a five-year policy instrument prioritising the sustainable development measures defined in the country's leading policy document, the *Strategic Development Plan 2011 – 2030*, was introduced in 2018.

During the United Nations Environment Assembly (UNEA) Ad Hoc Open-Ended Expert Group on Marine Litter and Microplastics (AHOEEG) meeting in November 2019, the Timor-Leste Secretary of State for the Environment stated:

> *We understand that if no action will be taken, both at national and international level, the use of plastic will continue to increase at an alarming rate and will cause serious damage to marine ecosystems, destruction of biodiversity and bring health related problems. (GoTL, 2019).*

This statement preceded the introduction of the 'Zero Plastic Timor-Leste' campaign, a national commitment to eliminate plastics from the natural environment by 2023. This initiative was first introduced in September 2018 during a high-level 'Less Plastic, More Quality of Life' seminar workshop in Dili. The seminar was organised by Scope Asia Timor-Leste in partnership with the national companies Kmanek and Ce'mill and Avani, an Indonesian company that produces biodegradable alternatives to the use of plastic. It was, therefore, focused on the top of the Zero Waste Hierarchy, on increasing programs to combat plastics such as bag bans, awareness raising activities, and the development of the plastic recycling industry (GovTL, 2018). To achieve these aims, the Government of Timor-Leste signed a memorandum of understanding in 2019 with Mura Technology (a joint venture between the University of Sydney's spin-out company Licella Holdings and power supplier Armstrong Energy) for a chemical recycling plant (GoTL, 2019; University of Sydney, 2019). Timor-Leste's Zero Plastic objectives are currently supported and funded by several international and national organisations who are part of the Plastics Upcycling Alliance – the European Union (EU), the United States Agency for International Development (USAID), Korea International Cooperation Agency (KOICA), Caltech, Heineken, and Mercy Corps. The irony of these partnerships is that the solution is focused on waste to energy and not at the top of the zero-waste hierarchy (***Figure 2***), and therefore, Timor-Leste's zero plastics ambitions will remain unattainable. Furthermore, despite this commitment, no official 'Zero Plastic' policy or plan has been implemented nor made publicly available.

Timor-Leste's recent plastic prevention efforts are at odds with the country's role in plastic production. Timor-Leste is the second most oil dependent country in the world and the revenue from offshore oil and gas reserves dominates the economy. In 2017, the oil sector accounted for 36 percent of the country's GDP with 91 percent allocated to the state's budget through the sovereign wealth Petroleum Fund (EITI, 2017). Since 2006, state-building efforts have primarily been funded by this fund and international aid (Bovensiepen & Nygaard-Christensen, 2018). After oil and gas are extracted in Timor-Leste, they are used for plastics feedstocks, that is, they are exported to plastic producing countries (e.g., China) to manufacture virgin pellets, which are then imported back into the country to manufacture single-use and other plastics products. Consequently, Timor-Leste bears the environmental cost of the full life cycle of plastics from the extraction of fossil fuels used to produce plastics, importation of plastic pre-production pellets, and the manufacture of plastic products to the leakage of plastics into the environment.

Aims

This gap analysis of current and publicly available legislation, plans and policies (***Appendix 1***), aims to

1. identify the current limitations of plastic pollution prevention policy frameworks in Timor-Leste;

2. provide insight into Timor-Leste's readiness to meet a 'Zero Plastic' target; and

3. identify the elements of the multilateral legally binding plastic pollution treaty (currently under negotiation) that would be needed to prevent plastic pollution in Timor-Leste.

Methodology

This study is guided by the methods and analytical framework developed by Farrelly, Borrelle and Fuller (2020, 2021) to examine national legislation, policies, and plans in Timor-Leste (***Table 1***). This framework has been chosen because of its strength in focusing on themes related to plastic pollution prevention rather than management and its focus on the promotion of a safer circular economy. The framework is crucial to understanding Timor-Leste's capacity to prevent plastic pollution through its legislative frameworks.

The study assumes that if there is significant representation of the themes in the analytical framework (combined with evidence of their accurate interpretation and sound implementation), there is an improved chance for Timor-Leste to prevent plastic pollution and to meet obligations to a potentially comprehensive and effective global plastics treaty.

All Portuguese documents were reviewed by co-author Ana Rengel-Goncalves, a native Portuguese speaker who is also an expert in waste legislation. Relevant sections of key legislation, policies and plans were then translated to English and presented in this report.

Following the findings of this research, we noted one major shortcoming of the original Farrelly, Borrelle and Fuller (2020; 2021) analytic framework, and of Pillar II from the Environmental Investigation Agency's (EIA) Convention on Plastic Pollution on which it was based. Namely, the omission of an 'education and capacity development' theme. The omission of the education and capacity development theme in the original analytical framework came about because an emphasis on education and capacity development often focuses too heavily on community engagement/ awareness raising, and at the same time, does little to protect communities from the disproportionate power of corporate action over those communities.

Education and awareness raising activities as preventative actions aimed at consumers can also feed into the dangerous myth that plastic production and pollution is driven by consumers. However, education and capacity development provisions do feature in the legislation, plans and policies of Timor-Leste, and therefore, present an opportunity to provide an important discussion on where education and awareness raising efforts should be focused.

We have included 'Education and Awareness Raising' as a category in the analytic framework under 'Waste Prevention' to represent education and capacity development campaigns aimed at the top of the zero-waste hierarchy, including extractive industries, petrochemical and plastics producers, plastic product manufacturers, importers and exporters, distributors, and retailers.

Here, plastics prevention education and awareness activities can create the foundation for plastic pollution prevention, particularly through funding of plastic pollution prevention activities.

Legislative tools can be used to authorise relevant stakeholders, such as producers and retailers to engage in plastic pollution prevention education programmes and require mandatory reporting on progress of activities aimed at plastics reduction (UNEP, 2020). Education and awareness raising activities aimed solely at the consumer/community level are not considered preventative and, therefore, would still be marked as red in the gap analysis traffic light system.

In addition to the education and capacity development theme, we have updated five themes and their definitions for greater clarity: 'A safe circular economy for plastics' has been updated to 'A safer circular economy for plastics' reflecting the definition given in the UNEP factsheet produced for the Pacific Islands region (Farrelly & Fuller, 2021), recognising that no plastics economy can be truly safe for human health or the environment; 'Waste Hierarchy has been renamed 'Zero Waste Hierarchy'; The definition for 'Closed loop recycling' has been updated to include more precise detail; 'Additive Restriction' has been renamed 'Additive and Monomer Restrictions' recognising they are distinct categories; and the definition of 'Transparency and Freedom of Information has been updated to include all stakeholders, not only consumers.

In terms of the document analysis, country-level legislation, policies and plans with relevance to plastic pollution were selected based on the following themes: overarching environmental legislation; environmental policy; solid waste management policy; social policy; land and property; water and sanitation; culture and heritage; tourism, and customs/ trade.

The *Timor-Leste National Health Sector Strategic Plan 2011-2030* contains the by-line 'Towards a Healthy East Timorese People in a Healthy Timor-Leste. It does not include any mention of waste or plastic pollution and as such has not been included in our analytical framework. Likewise, Timor-Leste's *Human Rights Law (7/2004)* and *Labour Code* (*Decree Law no 4/2012*) have not been included in our analytical framework as there is currently no scope for these laws to prevent plastic pollution in any way (e.g., through the protection of human health, or the protection of informal waste workers).

Selected documentation (***Appendix A***) was cross referenced to ensure the inclusion of the most up to date legislation, policies and plans in this gap analysis.

The following sources were used to obtain documents:

- ECOLEX;
- Assessment of Legislative Frameworks Governing Waste Management in Timor-Leste, University of Melbourne, Melbourne, Australia;
- National official online sources of legislation;
- Environmental Impact Assessment (EIA) Dili Solid Waste Management Project, OASIS;
- InforMEA;
- Karasik, R., T. Vegh, Z. Diana, J. Bering, J. Caldas, A. Pickle, D. Rittschof, and J. Virdin. 2020. 20 Years of Government Responses to the Global Plastic Pollution Problem: The Plastics Policy Inventory. NI X 20-05. Durham, NC: Duke University.

Table 1: *Analytical Framework including the categories, themes and definitions taken from Farrelly, Borrelle and Fuller (2021, p.5) including updates to 'Safer Circular Economy for Plastics', 'Education and Capacity Development', and 'Closed Loop Recycling'.*

Category	Themes	Definition
Global objectives	**Long-term elimination of discharges**	Sustainable, long-term solutions
	Safer circular economy for plastics	No plastics economy can be one hundred per cent safe to human health or the environment. A safer circular economy recognises this. It is a circular economy that has minimal waste and reuses raw materials again and again, where any materials circulating in the economy are safe by design, allowing their introduction into the economy and their reuse without risks for human health and the environment. This includes keeping 'substances of high concern' (e.g., POPs as plastic additives) out of the circular economy and ultimately aims to eliminate them entirely.
	Intergenerational equity and justice	Ensures future generations flourish as a result of the current and future policy, legislation and action.
	Sustainable Development Goals (SDGs)	Progresses the UN Sustainable Development Goals: Target 3: Good health and well-being Target 6: Clean water and sanitation Target 11: Sustainable cities and communities Target 12: Responsible consumption and production Target 13: Climate action Target 14: Life below water (protection of the seas and oceans) Target 15: Life on land (restore ecosystems and preserve diversity).
	Protection of human health	The connection between plastics and human health is explicit and/or provisions are made
	Vertical integration	Responds to regional and international obligations.
	Horizontal Integration	Evidence of coherence between legislation, and national policies, plans and strategies (inter-ministerial cooperation).
	Precautionary approach	Lack of scientific data or certainty is not a reason for inaction to prevent serious or irreversible damage.
	Waste hierarchy	There is either explicit reference to the waste hierarchy and/or a focus on the top of the zero waste hierarchy (refuse, reduce, reuse, redesign).
	Climate Change	The connection between plastic pollution and climate change is made explicit and/or provisions are made.
Waste prevention	**Trade in non-hazardous, recyclable, and reusable plastics**	Import and export bans and restrictions, minimum environmental standards for plastics imports and exports, fees on problematic imported plastic.
	Sustainable financing mechanisms/market-based instruments	Examples include waste-management fees, deposit-refund schemes, extended producer responsibility (EPR) schemes, licensing schemes, plastic taxes and levies, advanced disposal fees, polluter pays, and user pays.
	Government Infrastructure investments	The government invests in accessible and regular separate waste collection, recycling, reuse, and preventative measures.
	Recognised impact on economic development	An explicit link is made between the impact of plastic pollution on economic development (e.g., tourism, safe and secure employment opportunities, agriculture). This might also factor in the economic cost of not preventing plastic pollution/inaction. Plastic pollution is presented as a potential business risk.
	National reduction targets	Measurable plastic pollution reduction targets and timelines.
	Virgin plastic use	Control and standards to reduce virgin plastics entering the economy (e.g., caps).
	Market restrictions	Prohibitions on certain polymers (including bioplastics) and additives and controls on the use of Endocrine Disrupting Chemicals (EDCs), Persistent Organic Pollutants (POPs), and carcinogens.
	Promotion of traditional/local solutions	E.g., woven reusable bags to replace single-use plastic bags, leaf wraps for food, and the promotion of traditional/local knowledge.

Category	Themes	Definition
	Education and Capacity Development	Makes explicit reference to plastic prevention capacity development and/or education campaigns/programs aimed at big plastics producers/ manufacturers, importers/exporters/ distributors, and retailers.
Waste management	**Closed loop recycling (primary market or secondary markets)**	Primary market recycling, also commonly known as P2P or plastic to plastic recycling, is when recovered plastics are used to manufacture products with similar performance and characteristics of the original product, e.g., where PET bottles are used in the production and manufacture of new PET bottles. Whereas secondary ('cascade' markets) recycling or 'downcycling' refers to transforming plastics from a higher value product to a lower grade product. E.g., from a PET bottle into a less/non- recyclable product such as carpet.
	Remediation and legacy pollution	Includes protocols and guidelines to recover legacy plastics (e.g., marine debris) to be safely reused, recycled, or repurposed and remediation of landfills (e.g., following storm damage).
	Transport	Transport infrastructure; access; port capacity; backloading (filling empty trucks and/or shipping containers with waste on their return to point of origin/producers); and reverse logistics (shipping the product back to the producer post-consumption for recycling or reuse).
Microplastics	**Intentionally added (e.g., microbeads)**	Restrictions on the importation and trade of products with added microbeads.
	Wear and tear (e.g., tyres, textiles)	Restrictions on the importation of plastic products with high wear and tear.
	Agriplastics	Management and prevention of plastics used in agriculture such as plastic mulch and microbeads in controlled-release fertilisers.
	Management (e.g., pellets)	Handling guidelines or restrictions.
Standardisation	**Product design**	Eco- and bio- benign product design.
	Polymer restrictions	Restrictions on the importation and trade of certain polymers.
	Additive restrictions	Restrictions on the importation and use of toxic additives and monomers, such as those categorised as EDCs, POPs, and carcinogens.
	Voluntary certification schemes and industry standards	Compliance to certification schemes such as ISO for home compost-ability; and products and services certified 'zero waste to landfill'. Businesses commit to reducing plastics throughout their supply chain.
	Mandatory product stewardship	Government mandated participation in accredited schemes for the stewardship of plastic products.
	National monitoring and reporting, national inventories, and reduction targets	Tracking of production, trade, consumption, and recycled content, final treatment. National reduction targets with agreed and enforced timelines.
	Transparency and freedom of information (consumer justice, labelling)	Information is readily available to all stakeholders including importers, customs, retailers, consumers, and waste managers. Information could include recycled content, recyclability, appropriate disposal, compost-ability, additives, GHGs, and hazard potential.
	Compliance measures (monitoring and reporting) and enforcement	Minimum requirements, monitoring, and reporting. Mechanisms for managing suspected or identified instances of noncompliance such as financial penalties, imprisonment, or confiscation.
	Definitions	Standardised definitions. E.g., 'reusable', 'compostable', 'recyclable', 'biodegradable'.

Analysis

This gap analysis is based on the gap analysis undertaken by Farrelly, Borrelle, and Fuller (2021), 'The Strengths and Weaknesses of Pacific Islands Plastic Pollution Policy Frameworks', and consists of a five-step method:

1. Selected relevant legislation, policies and plans in English were searched for the following terminology: 'waste', 'plastic', 'refuse', 'garbage', 'litter', 'pollution', 'microplastic', 'marine debris', 'hazardous waste' 'toxic waste' 'emission' and 'contaminant'.

2. Selected documents in Portuguese were reviewed for their use of the following search terms: 'resíduo' (waste), 'residuo redução' (waste reduction); 'resíduos sólidos' (solid waste); 'lixo' (litter); 'sucata' (garbage); 'plástico' (plastic); 'recusar' (refuse); 'poluição' (pollution); 'microplástico' (microplastic); 'detritos marinhos' (marine debris); 'resíduos perigosos' (hazardous waste); 'resíduos tóxicos' (toxic waste); 'emissão/emissões' (emission/emissions); 'contaminante/contaminação' (contaminant).

3. When a document was found to contain any of these terms, it was analysed for its correlation to plastic pollution prevention. From this, fifteen documents were selected that were considered 'key' to preventing plastic pollution in Timor-Leste.

4. Next, themes and keywords, including synonyms and synonymous phrases, from the analytical framework were used to make statements about the contribution of national legislation, policies, and plans to plastics pollution prevention. Relevant sections of documents in Portuguese were translated into English.

5. Based on the definitions provided in the analytical framework, a traffic light system was used to map gaps in the policy framework. Green indicates explicit mention of the theme in the document; yellow indicates that the document either partially includes the theme or that it is inferred; and red indicates that that theme is absent in the document.

It is important to note that some of the key documents analysed in this study were out of date. For example, the Timor-Leste *National Plan of Action for the Coral Triangle Initiative* is only available as a draft version, dated the 1st of October 2009.

This raises the question of how, or whether, lessons learned from obsolete policies have been incorporated into the drafting of new legislation?

There may be a need for greater resourcing and/ or technical support in reviewing Timor-Leste's legislation to draft newer and integrated policies, plans and legislation that will make up Timor-Leste's plastic prevention policy framework.

Relevant International and Regional Agreements

There are several international and regional agreements in place that contain criteria aimed at preventing plastic pollution (***Table 2***). Timor-Leste is party to some, but not all these agreements, highlighting both the drivers and gaps that may filter down to national level legislation, plans and policies.

International Treaties

The Stockholm Convention on Persistent Organic Pollutants is aimed at protecting human health and the environment from toxic chemicals that remain intact for long periods. The Convention has a robust scientific body, strong collaboration with other conventions, and achieves global bans on certain substances (McLachlan, 2018).

The Basel Convention limits the trade of hazardous waste between countries, specifically between the Global North and the Global South. To date, Timor-Leste is not a party to the Basel Convention. Without sound and transparent international regulations, it is difficult to stop developing nations using it as the dumping ground for their hazardous waste (Holden, 2019). Thus, by not signing and ratifying the Basel convention, and by not enshrining very low contamination limits in national law, Timor-Leste places itself at risk of waste dumping by other nations.

The UN International Maritime Organization (IMO) Convention for the Prevention of Pollution of Ships (MARPOL) is, at the global level, the most ambitious attempt to prevent marine pollution from operational activities and accidents (Szepes, 2013). The IMO Marine Environment Protection Committee (MEPC) adopted an Action Plan in 2018 to address marine plastic litter from ships (e.g., fishing gear). Timor-Leste is not a signatory to MARPOL.

Table 2: *International Conventions ratified, signed, or acceded by Timor-Leste. Green represents Timor-Leste is party to the agreement, yellow that it has participated and/or acknowledged they will sign (but have not yet).*

International Agreements	Description	Pollution source	Timor-Leste
UNCLOS - United Nations Convention on the Law of the Sea (1982)	Legally binding global instrument for the protection of the marine environment from all sources of pollution.	Land and Marine	2013
MARPOL 73/78 Annex V	Legally binding global instrument to prevent marine pollution from ships (Annex V - Prevention of pollution by garbage from ships (includes all plastics & fishing gear).	Marine	
London Convention 72 ('Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter')	Legally binding global instrument listing prohibited pollutants and those requiring permits for dumping (intentional dumping into the sea).	Marine	
London Convention Protocol 96	Legally binding agreement for the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (1996).	Marine	
Conservation Management Measure on Marine Pollution (2019)	Prevent and significantly reduce marine pollution of all kinds to Support the Implementation of Sustainable Development Goal 14, International Convention for the Prevention of Pollution from Ships (MARPOL) Annex V, London Convention and London Protocol.	Marine	
Intervention Protocol 73	Concerning pollutants other than oil in the high seas.	Marine	
Convention on Biological Diversity (CBD)	The CBD has three main objectives: 1) The conservation of biological diversity, 2) The sustainable use of the components of biological diversity, 3) The fair and equitable sharing of the benefits arising out of the utilization of genetic resources.	Land and Marine	2006
The 2030 Agenda for Sustainable Development (SDGs)	Broad scope including pollution management. Land and Marine	Land and Marine	

International Agreements	Description	Pollution source	Timor-Leste
Basel Convention 1992 (Plastic Waste Amendments)	Legally binding global instrument on the transboundary movement of hazardous wastes and other wastes (plastics as other wastes).	Land	
Stockholm Convention (2004)	Legally binding global instrument to control persistent organic pollutants.	Land	
Rotterdam Convention (2004)	The Convention creates legally binding obligations for the implementation of prior informed consent in the trade of hazardous waste.2019 decisions to protect human health and the environment from the harmful effects of chemicals and wastes, including plastic waste.	Land	
International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM) 2004	Aims to prevent the spread of harmful aquatic organisms from one region to another by establishing standards and procedures for the management and control of ships' ballast water and sediments.	Marine	
Nairobi WRC (2007)	A legal basis for coastal states to remove wrecks which pose a hazard to the safety of navigation or to the marine and coastal environments. Covers prevention, mitigation or elimination of hazards created by any object lost at sea from a ship (e.g., lost containers).	Marine	
Hong Kong Convention (2009)	Aimed at ensuring that ships do not pose any unnecessary risk to human health and safety or to the environment when recycled after reaching the end of their operational lives.	Marine	
United Nations Framework Convention on Climate Change (UNFCCC)(1992)	Climate change convention 1993.	Land and Marine	2006
Montreal Protocol (1987)	Designed to protect the ozone layer by phasing out the production of numerous substances responsible for ozone depletion.	Land	2009
Vienna Convention on the Protection of the Ozone Layer	Convention to restrict production and use of ozone depleting substances	Land	2009
STRATEGIES			
The Honolulu Strategy (2011)	A global framework for prevention and management of marine debris including land and sea-based sources.		

Regional Partnerships & Strategies

Policy instruments relevant to Timor-Leste at the regional level are the Noumea Convention, The Bangkok Declaration on Combating Marine Debris in the ASEAN Region, and the Ha Noi 3R Declaration (***Table 3***).

- The Noumea Convention is an umbrella agreement for the protection, management, and development of the marine and coastal environment of the South Pacific Region. It represents the legal framework of the UNEP Action Plan for managing the Natural Resources and Environment in the South Pacific (1983) and its protocols obliges parties to endeavour to take all appropriate measures to prevent, reduce and control pollution from any source using the best practicable means at their disposal and in accordance with their capabilities to ensure sound environmental management and development of natural resources. Timor-Leste has not ratified this agreement.
- The Bangkok Declaration on Combating Marine Debris in the ASEAN Region emphasises to "promote cooperation for the protection, restoration and sustainable use of coastal and marine environment, respond and deal with the risk of pollution and threats to marine ecosystem and coastal environment, in particular in respect of ecologically sensitive areas" (ASEAN, 2019). It is ASEAN's commitment to protect the marine environment and strengthen

regional cooperation in addressing marine debris issues, particularly to achieve SDG 14 and its target 14.1 which seeks to prevent and significantly reduce marine pollution of all kinds, specifically from land-based activities, including marine debris. Timor-Leste is not a signatory to this declaration.

- The Ha Noi 3R Declaration - Sustainable 3R Goals for Asia and the Pacific for 2013-2023 is a voluntary commitment between member states, international organizations, bilateral and multilateral agencies, research organizations and professionals in the field of waste management supporting sustainable actions and measures for achieving resource efficient society and a green economy in the Asia-Pacific region through the implementation of the 3Rs (reduce, reuse, and recycle). Reaffirming, as noted in the Johannesburg Plan of Implementation, the need for consolidated efforts to prevent and minimize waste and to maximize reuse, recycling, and use of environmentally friendly alternative materials, with the participation of government authorities and all stakeholders to minimize adverse effects on the environment and improve resource efficiency (UNCRD, 2013). Timor-Leste joined 29 other countries from Asia Pacific to sign the Ha Noic 3R Declaration in 2013.

There are also several regional bodies/ associations and programmes relevant to waste management and plastics pollution in Timor-Leste, namely, the Coordinating Body on the Seas of East Asia, the Partnership in Environmental Management for the Seas of East Asia, Arafura & Timor Seas Action Programmes (ATSEA 2), the Association of South East Asian Nations, the Coral Triangle Initiative, the Archipelagic and Island States (AIS) Forum, and PacWaste Plus (***Table 3***).

- The Coordinating Body on the Seas of East Asia (COBSEA) oversees the implementation of the East Asian Seas Action Plan; a regional environmental agreement covering a large part of the marine area within the Asian Pacific. COBSEA members adopted the Regional Action Plan on Marine Litter (RAP MALI) to address marine pollution, marine litter and microplastics. Timor-Leste is not a member of COBSEA, however, they work with COBSEA through the Partnership in Environmental Management for the Seas of East Asia (PEMSEA).
- PEMSEA aims to foster and sustain healthy and resilient coasts and oceans by adopting regional coordinating mechanisms, such as, strategic action plans. Operating in twelve East Asian countries, including Timor-Leste, PEMSEA provides Integrated Coastal Management (ICM) solutions to create positive impacts on communities through a diverse range of programs and projects, including those focused on plastic pollution prevention and waste management. The PEMSEA Resource Facility (PRF) is the implementing partner for ATSEA-2.
- The second phase of the Arafura & Timor Seas Action Programmes (ATSEA 2) is funded by the Global Environment Facility (GEF) and was launched by the United Nations Development Program (UNDP) in 2019. The ATSEA 2 programme is designed to enhance regional coordination and collaboration in the Arafura and Timor Seas (ATS) region (involving Australia, Indonesia, Papua New Guinea (PNG) and Timor-Leste) for addressing the root causes of environmental degradation. The approach is underpinned by scientific based strategies to reverse environmental damage and land-based and marine sources of pollution (UNDP, 2019). The implementation plan states there is a lack of a strong regional mechanism for collective regional action and transboundary management of the ATS region (UNDP, 2019). To combat this, ATSEA-2 is updating the earlier (2011) Transboundary Diagnostic Analysis (TDA) of the Arafura and Timor Seas. This is on ongoing project, but preliminary results demonstrated in

the September 2022 workshop series, 'Causal Chain Analysis of Priority Transboundary Issues: Key process and results' emphasise the root cause of pollution and the government response required to stop it at the source (Narcise, 2022). The Causal Chain Analysis Country Synthesis Report for Timor-Leste will be available later this year (2023).

- The Association of Southeast Asian Nations (ASEAN) is an intergovernmental organisation promoting political, economic, social, and environmental integration amongst the region. Timor-Leste's status is that of an 'observer', awaiting acceptance of a formal membership application that dates back to 2011. Several participating countries have supported Timor-Leste's potential membership as it would foster regional unity, but others have expressed their objections, concerned that entering ASEAN could lead to a decrease of collective resources (Ortuoste, 2019; Foreman, 2021). In November 2022, countries agreed to 'In-principle' admit Timor-Leste to be the 11th member of ASEAN (ASEAN, 2022b). The benefits of an ASEAN membership for Timor-Leste's plastic pollution prevention aspirations remain questionable. The United Nations Environment Programme report (UNE, 2019), reviewing the current packaging policy interventions of all ASEAN members concluded the efforts undertaken are fragmented; no country has made a comprehensive approach to addressing plastic packaging, attempts have so far been limited and incomplete (UNEP, 2019). In September 2022 ASEAN and the United Nations Office for Project Services (UNOPS) signed an agreement to support ASEAN Member States (AMS) in combating marine plastic pollution through the joint implementation of the World Bank's US$20 million grant project: Southeast Asia Regional Program on Combating Marine Plastics (SEA-MaP) (ASEAN 2022a). The five-year project aims to reduce plastic consumption, increase recycling, and minimise leakages to prevent land and sea-based marine plastic pollution. The project activities aim to contribute to the implementation of the ASEAN Regional Action Plan on Combating Marine Debris and the ASEAN Leaders' Declaration on Blue Economy, to realise ASEAN's commitment towards sustainable, resilient, and inclusive use, management, conservation and governance of oceans, marine and coastal resources, and ecosystems. Unfortunately, however, the aims and activities are too focused on management and not on preventing plastic pollution by stopping it at the source, and therefore, will have little impact on the health of Timor-Leste's oceans, marine and coastal resources, and ecosystems. Through the ATSEA-2 program (above) there is now greater focus on stopping pollution at the source.
- The Coral Triangle Initiative on Coral Reefs, Fisheries and Food security (CTI-CFF) developed the Coral Triangle Regional Plan of Action, a non-legally binding document, that acknowledges the environmental impacts of solid waste but does not specifically address the issue of plastics (CTI, 2019). Timor-Leste has been a member of CTI-CFF since its formation in 2009.
- The Archipelagic and Island States (AIS) Forum is a strategic platform for 47 archipelagic and island nations to take part in a collective action addressing challenges of ocean resource usage for sustainable economic growth, climate change resiliency, ocean pollution, emergency management, and the enhancement of sustainable fisheries. TL is a participating country.
- Through the acceptance of the Manado Joint Declaration, the delegates of the archipelagic and island states agreed to strengthen commitments to be part of a collaborative action to address their common challenges. The Declaration focuses on four collaborative areas: climate change mitigation and adaptation; blue economy and ecotourism; marine plastic debris; and good maritime governance.

- PacWaste Plus: The Pacific – European Union (EU) Waste Management Programme, aims to generate improved health, social, economic, and environmental benefits by enhancing existing activities and building capacity and sustainability into waste management practices (SPREP, 2020). Funded by the European Development Fund, Timor-Leste is included in the Pacific region of the PacWaste Plus Programme as a strategy to provide the country with greater waste management support.

Table 3: *Regional Instruments ratified signed or acceded by Timor-Leste. Green represents Timor-Leste is party to the agreement, yellow that it has participated and/or acknowledged they will sign (but have not yet).*

Policy Instrument	**Description**	**Pollution source**	**Timor-Leste**
Noumea Convention	Legally binding regional agreement to prevent marine pollution from ships in the South Pacific	Marine	
Bangkok Declaration on Combating Marine Debris in the ASEAN Region	ASEAN's commitment to protect the marine environment and strengthening regional cooperation in addressing marine debris issues	Marine	
Ha Noi 3R Declaration	Voluntary commitment supporting sustainable actions and measures for achieving resource efficient society and a green economy in the Asia-Pacific region through the implementation of the 3Rs (reduce, reuse, and recycle),	Land & Marine	
Strategy/ Programme	**Description**		
COBSEA Regional Action Plan on Marine Litter (2019)	Seeks to consolidate, coordinate, and facilitate cooperation, and implement the necessary policies, strategies, and measures for sustainable, integrated management of marine litter in the East Asian Seas region.		
PEMSEA Sustainable Development Strategy for the Seas of East Asia (SDS-SEA) (Working doc, 2015)	Contains strategies and related objectives and action programs for sustainable development of coasts and oceans - signed in 2006		
ATSEA-2 Implementation of the Arafura and Timor Seas Regional and National Strategic Action Programs - UNEP	To enhance sustainable development of the ATS region to protect biodiversity and improve the quality of life of its inhabitants through conservation and sustainable management of marine-coastal ecosystems.		
ASEAN Framework of Action on Marine Debris	Recognizes the urgent need to act and prioritises; policy support and planning; research, innovation and capacity building; public awareness, education and outreach; private sector engagement.		
AIS Forum	Strategic collaboration of 47 Archipelagic and Island nations across four areas: 1) climate change mitigation and adaptation; 2) blue economy and ecotourism; 3) marine plastic debris; and 4) good maritime governance.		
CTI-CFF Regional Plan of Action (RPOA) Coral Triangle Initiative	Non-legally binding document to conserve and sustainably manage coastal and marine resources within the Coral Triangle region.		
PacWaste Plus	To ensure the safe and sustainable management of waste with due regard for the conservation of biodiversity, health and wellbeing, and climate change mitigation and adaptation requirements.		

Findings

Global Objectives

Here, 'global objectives' refer to cross-cutting themes in plastics pollution prevention and the potential of national legislation, policies and plans to meet these common targets (Farrelly, Borrelle & Fuller 2021, p. 4).

Long-term Elimination of Discharges

The long-term elimination of discharges includes sustainable solutions that prevent plastic pollution leakage and is referred to in two pieces of legislation. The annexes of the *Ministerial Diploma 46/2017 for the Regulation of Environmental Evaluation* make it mandatory 'to disclose any possible discharges that can cause water pollution'. However, it is unclear how this is enforced. Article 25 of the *Decree-Law 26/2012 - Establishing the Environmental Basic Legislation* states 'the definition of an integrated management plan for the marine coastline must take into account the limits of natural processes and the long-term balance of environmental, economic, social, cultural and recreational components, including the control and prevention of pollution and the discharge of waste from land or sea sources'. However, there is no specific mention of plastics in this legislation. Therefore, current legal instruments are unlikely to capture sustainable long-term solutions in the elimination of plastic pollution discharges without revision (Farrelly, Borrelle & Fuller, 2021). Marine debris analysed in 5 Southern Coast hotspots in Timor-Leste shows a significant plastic composition: 42% plastic, 21% fishing gear, and 33% rubber (e.g., shoes) (Fonseca & Spiller 2021, p. 24).

The *Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics* is the most recent and robust plastic pollution prevention legislation in Timor-Leste. Article 4 bans single use plastics that are not biodegradable and unable to be composed, such as plastic polymer-based cups and cutlery; Article 9 addresses safety requirements, for instance, that plastic objects and materials must not present a threat to human health; Articles 19 to 21 are concerned with prohibiting hazardous substances and materials; and Articles 25 and 26 are concerned with prohibiting problematic multilayers of plastics.

The Decree Law, however, does not mention the long-term elimination of discharges but it is incisive on standardisation which may positively impact waste production and consumption, and consequently, final disposal. This law has, therefore, been categorised as yellow.

The national *Strategic Development Plan 2011- 2030* of Timor-Leste provides directions for the integrated management of the environment and sets a pathway to expand and upgrade the country's waste management system to reduce plastic waste and minimise plastic burning, thus eliminating discharges. However, without reducing the increasing volumes of plastics entering the economy, addressing the methane and other off-gassing toxic leaching, and microplastics leakage through the waste management process, Timor-Leste is unlikely to transform all plastics into a safer circular economy. It is certain that it cannot become 'the first plastics-neutral economy in the world' as declared by the University of Sydney in the Mura Technology partnership project launch in 2019. It is likely the potential of Mura Technology to transform Timor-Leste's economy was exaggerated for commercial gain. Furthermore, it is unclear how the University of Sydney defines 'plastics-neutral'.

Safer Circular Economy

A circular economy is based on regenerating natural systems, keeping materials and products in use, and designing out pollution and waste (EMAF, 2020). Conventional fossil fuel-based plastics cannot regenerate natural systems, nor can current bioplastics and conventional waste management systems. Here, therefore, 'safe' refers distinctly to a *safer* circular economy (***Figure 1***), recognising that a plastics economy can never be truly safe for human health and the environment. The aim of a safer circular economy for plastics is to ensure all materials circulating in the economy are non-toxic, reusable, and safe by design, and that their introduction into the economy and their reuse comes without risks to human health and the environment. This involves eliminating all toxicants, including carcinogenic monomers, toxic additives, and persistent organic pollutants such as per- and polyfluoroalkyl substances (PFAS) from the economy. For example, the safer reuse of products would replace plastic with glass, stainless steel, or ceramic food contact materials.

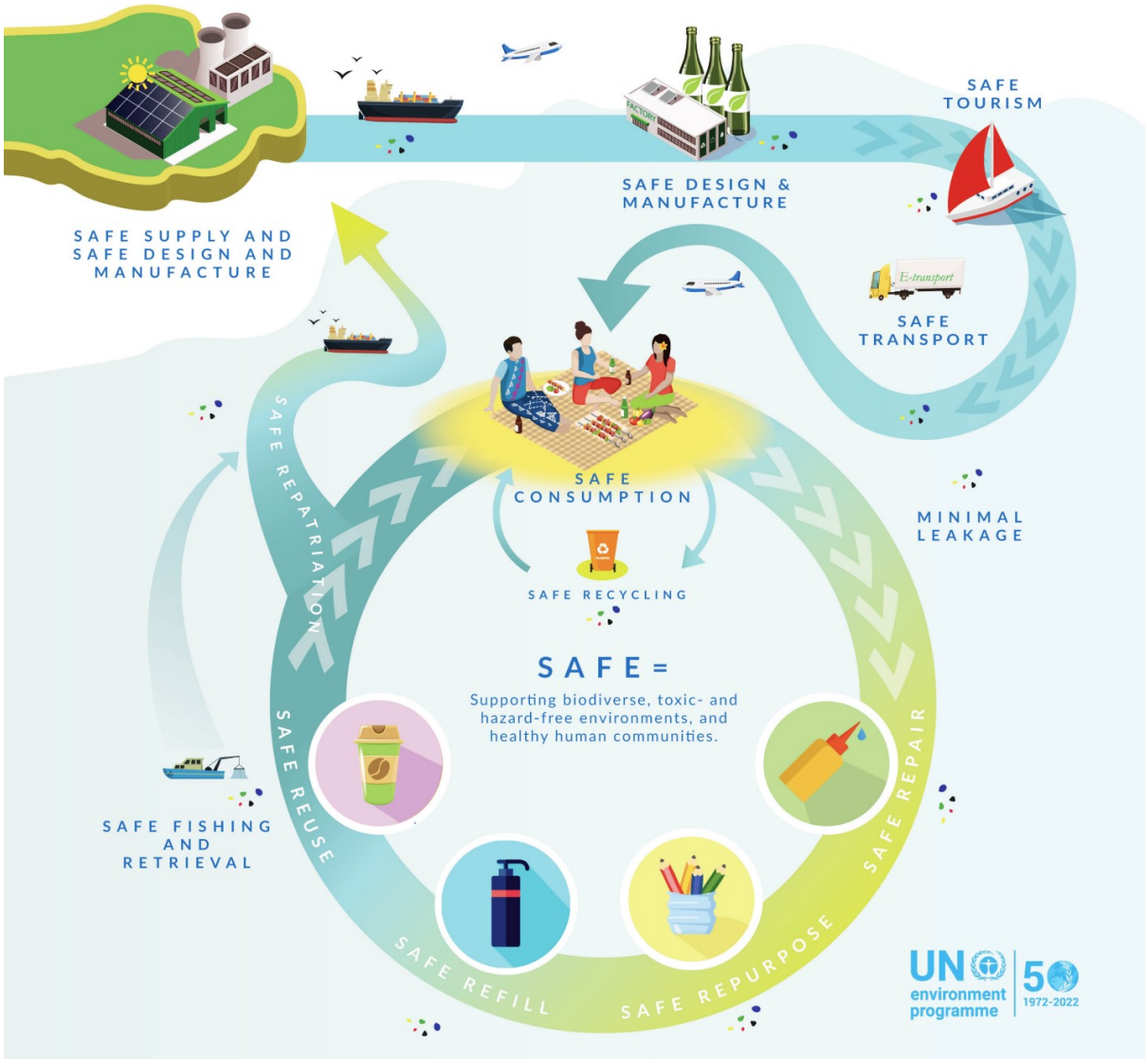


Figure 1. A safe(r) circular economy for plastics in the Pacific region (Farrelly and Fuller, 2021).

In general, across all policy documents in Timor-Leste, the term 'recycling' is often incorrectly associated with the concept of a circular economy. The *Strategic Development Plan 2011 – 2030,* for example, refers to recycling in the following way: 'There are also plastic bottles clogging our drains and being washed up on otherwise pristine beaches around Timor-Leste. A recycling scheme will be developed for plastic bottles'. The *Investment Strategy for Managing Urban Solid Waste in Dili*, which is covered in *Government Resolution 32/2016,* promotes investments in recycling cages and the collection of green waste at Community Collection Points (Compartimentos Comunitários Murados [CCM]) to increase the recovery of recyclables.

While recycling may have a positive effect on the environment, the concept of recycling is associated with growing volumes of waste, rather than eliminating plastics from waste streams. Recycling has been proven as a waste management failure, where only 9% of 'recyclable' plastics are recycled, doing little to offset the predicted growing volumes of plastics (Geyer, Jambeck, & Law, 2017). Furthermore, recycled plastics are hazardous to human health when used for food and beverage contact (Alaranta & Turunen, 2021) and a 2022 study found that recycled PET bottles were more hazardous to human health than those made from virgin PET (Gerassimidou et al., 2022). The myth of recycling as a panacea to the plastics crisis also permits a dangerous pivoting from energy production to plastics production by fossil fuel industries who are keen to recoup losses in an increasingly renewable energy market (Wagner & Schlummer, 2020).

Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics explicitly relates to the concept of a circular economy (but not to a safer circular economy):

> *It is necessary to reconcile the economy with the environment and, therefore, move to a circular economy, capable of valuing the different types of waste, in order to be, in the short-term, composted, recycled and/or incinerated, and not simply put into discharges, because the negative local effects and energy loss are incompatible with the agreed international climate goals.*

The circular economy promoted here is not a safer circular economy. Incineration is also incompatible with agreed international climate goals.

Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics applies to all sectors of economic activity and to all stages of manufacturing, processing and distribution of plastic materials and objects, with exceptions in the areas of health and cosmetics. For example, Article 9, which discusses general safety requirements states the following:

- Plastic materials and objects are manufactured following good manufacturing practices, so that, under foreseeable conditions of use, they do not transfer their constituents to the content in quantities that may: a) Represent a danger to human health; or (b) cause an unacceptable change in the composition of the food; or (c) cause its organoleptic characteristics to deteriorate.
- Plastic materials and objects cannot produce hazardous waste at the end of its life cycle.
- The labelling, advertising and presentation of plastic material or object must not mislead the consumer.

The issue with Article 9 is that it is far too arbitrary. Independent peer reviewed science shows that even under the best manufacturing practices these transfers and leakages from plastic products with impacts on human health cannot be avoided (Tang et al., 2020). Regarding labelling, there are no mandatory labelling standards associated with this Decree-Law. An independent assessor would be needed to determine what information is misleading and what is not. The main independent consumer protection association in Timor-Leste, Tane Konsumidor, was established in 2018 and doesn't currently advocate for plastics manufacturing, information and labelling standards (Tane Konsumidor, 2023). There is opportunity here for capacity development of Tane Konsumidor to fulfil a plastics standards watchdog role.

Article 4 addresses many impositions, such as the ban on introducing any single-use plastic packages or objects to consumers that cannot be recycled or biodegradable. The same applies to Article 6.3, establishing that 'after the usage and completion of its rotation cycle, the commercial company operator must accept the return of the plastic object and becomes responsible for the subsequent waste management.' This extended producer responsibility (EPR) is a strength of this Decree Law.

Article 17 of *Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics* 'allows additives and adjuvants (listed in ***Annex 1*** as the list of Authorised Substances in the Manufacture of Layers) in plastic materials and objects.' Therefore, this Decree-Law is indicated yellow as it cannot meet the full realisation of a safer circular economy for plastics.

Overall, *Decree Law 37/2020 or the Disposal, Import and Production of Bags, Packaging and other Plastics* is progressive and addresses important components of managing plastic pollution. However, gaps remain. *Decree Law 37/2020* begs the question, what are the safe limits for toxic chemicals, particularly endocrine disrupting chemicals (EDCs) when the Endocrinology Society places the safe limits for EDCs at zero precisely because these hormone mimickers threaten human health at extraordinarily low doses (parts per million, billion, and trillion) (Vandenberg et al., 2013). The articles in *Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics* are sometimes too generalised. Rather than refer to 'good manufacturing' in general, explicit statements must be made to stipulate actions. For example, it would be more effective to state, 'labelling must provide all information regarding the toxic content of the product and its packaging, safe use, and responsible disposal. To reduce volumes of plastics (particularly problematic plastics) in circulation, the aim must be to reduce the overall size of the circular plastics economy by reducing the volumes of materials entering and circulating around the economy. Therefore, a focus on management will not suffice. In addition, *Decree Law 37/2020* fails to address Timor-Leste's obligations for prohibiting POPs under their Stockholm Convention obligations. Domesticating Timor-Leste's obligations to the Stockholm Conventions into a coherent national plastic pollution policy framework would strengthen Timor-Leste's ability to enact a significantly safer circular economy for plastics.

Intergenerational Equity and Justice

The principle of intergenerational equity and justice is inferred in five documents. The *Basic Law for the Environment* is based, *inter alia*, on the principle of solidarity between generations and on the principle of integration.

It reiterates the State's responsibility concerning the environment, namely the improvement of the environmental performance, and the development of coordination and cooperation actions between public and private entities, promoting a healthy and ecologically balanced environment. The *Strategic Development Plan 2011 – 2030* refers to Article 61 of the Constitution of Timor-Leste in its principle of environmental protection: 'Everyone has the right to a humane, healthy and ecologically balanced environment and the duty to protect it and improve it for the benefit of the future generations' (p. 55). This principle is now reflected globally with the United Nations' recent recognition of the Human Right to a Clean, Healthy, and Sustainable Environment. However, as intergenerational equity and justice is only mentioned in general through this principle in the Plan, with no specific measure or targets provided, it is indicated as yellow in the table. Without legislation, plans or policies making specific provisions for actions oriented towards protecting future generations, Timor-Leste's policy framework cannot ensure they will flourish.

One exception is *Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics.* Article 5.1 states, 'When disposing of, importing and producing a substance, mixture of substances, material or single-use plastic material, economic operators take all necessary measures to ensure that, when they become waste, environmental impacts are reduced, in order to preserve the quality of life of future generations'. This has been indicated green in the table.

There are no formal provisions made for protecting waste pickers in Timor-Leste. The *Government Resolution 32/2016 - Investment Strategy for Managing Urban Solid Waste in Dili,* states that approximately 40-60 families make a living at the Tibar Dumpsite as garbage collectors/ waste pickers. With the planned upgrade of the Tibar Dumpsite access to the landfill will be restricted for these families. This is despite the annex of this plan recommending the development of a system whereby people in the informal recycling sector can continue to make their livelihoods out of the landfill, with conditions such as identity cards, usage of safety gear, and no burning of the waste. Again, there is a chasm here between law and recommendations and what is happening in practice. In general, there is no protection of the rights and welfare of waste pickers, demonstrating a significant legislative gap across all documents analysed. Furthermore, it is unclear from *Government Resolution 32/ 2016* whether the waste pickers referred to self-identify as such. This requires further investigation. Self-identification is an important consideration for the recognition of waste pickers rights (International Alliance of Waste Pickers, 2023). The inclusion of 'just transitions' into Timor-Leste's plastic pollution prevention policy framework would protect workers and communities from any burdens associated with a move away from a plastics economy (Nagarajan, 2022).

Sustainable Development Goals (SDGs)

The GoTL adopted the Sustainable Development Goals (SDGs) through *Government Resolution No. 34* of 2015 on 23 September 2015, mandating the creation of a working group to oversee the implementation of the SDGs. The working group published Timor-Leste's SDG Roadmap in 2017, during the Global Conference on the Roadmap for the Implementation of the 2030 Agenda and the Sustainable Development Objectives. The SDG Roadmap outlines how the GoTL plans to align the SDGs with its *Strategic Development Plan 2011 – 2030 (*GoTL, 2018).

The *Strategic Development Plan 2011 – 2030* is an integrated three-phase policy package (IMF, 2019) and was initially aligned with the Millennium Development Goals (MDGs).

The Voluntary National Review of SDGs implementation in Timor-Leste demonstrated that data availability is low. However, the SDGs are noted in annual budgets and plans, as mandated through *Government Decree No. 1*, 1 February 2016 (ADB, 2017).

The SDGs are not explicitly mentioned in Timor-Leste's latest *Decree-Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics*. This is a missed opportunity as, incidentally, this law could work towards meeting several targets set in the SDGs; it has provisions made for safety, recycling (including the ban on hazardous waste), the polluter-pays principle and EPR, which address SDG3 'Good health and well-being'; SDG11 'Sustainable cities and communities'; and SDG12 'Responsible consumption and production'. While it contains provisions that work toward SDG6 'Clean water and sanitation' and SDG13 'Climate Action', it does not explicitly align these to the SDGs. This Decree-Law is, therefore, categorised yellow.

The now out-dated MDGs are referred to in three documents. Timor-Leste's ability to implement plastic pollution prevention policies as well as a global framework may be hindered by this delay in aligning legislation, plans, and policies with the sustainable development objectives.

SDGs should be reflected in a policy framework for plastics for an integrated approach that can address the full lifecycle of plastics (Kandziora et al., 2019).

There is increasing evidence that Timor-Leste is incorporating the SDGs into future environmental policies. PEMSEA is working with the GoTL on a National Oceans Policy (NOP) which aims to create an integrated participatory ocean governance system. The system is intended to facilitate collaboration between jurisdictions while recognizing customary law and international and regional commitments. SDG14 'Life below water' has been recognized as critical in this process. The National Ocean Policy is currently under review by the Inter-ministerial Working Group. However, it is not yet an official policy and, therefore, has not been included in this gap analysis. It is likely that Timor-Leste will require more time to adopt and implement national coastal and ocean policies with supporting legislation and institutional arrangements (PEMSEA, 2020). There is potential that the upcoming Ministry of Agriculture and Fisheries/ PEMSEA Project 'Reducing Marine Plastics in the East Asian Seas Region 2023-2036' will go some way to addressing this. With a Budget of approximately US$9 million, the project objectives include enhancing governance on marine plastics management at selected sites and strengthening capacity and awareness of marine plastics management at the local level. Project sites in Timor-Leste include Dili, Atauro, Liquiça, and Manatuto (Barique-south coast). For this project to be a success, however, attention will need to be paid to preventing plastic pollution, not solely marine plastics. Capacity and awareness raising activities at the local level should be aimed at those who operate at the top of the zero-waste hierarchy.

Protection of Human Health

The *Decree-Law 2/2017 Urban Solid Waste Management System* sets the foundation for a modern waste management system, including requirements for collection and disposal. It addresses the protection of human health in its preamble which notes the need for clear rules securing waste management to secure well-being for the citizens, in an integral managed way.

The *National Strategy of Sea Waste Management, Government Resolution 15/2016,* states that marine litter presents itself as a particularly serious threat to human health, biodiversity, and the environment. Similarly, the *Parliament Resolution 9/2016 – Adoption of Urgent Information and Awareness Measures for the Preservation of the Environment* recommends the Government adopt 'urgent information and awareness measures for the preservation of the environment', noting the increasing accumulation of waste at sea as a serious threat to the 'health and life of people'. Other than these very broad-sweeping statements, however, no document notes the physical and chemical harms plastics and associated toxicants pose to human health.

While previous examples refer to human health in relation to waste and pollution control, people are exposed to plastics along the full supply chain from extraction of fossil fuels all the way to toxic chemical exposure from legacy plastics, contaminating soils and water (Weber, Bell & Watson, 2019). Human exposure to plastics and related toxicants can subsequently lead to, *inter alia*, reproductive disorders, increased mortality, hypertension, increased cancer risk and increased birth defects (WHO, 2016; Aerts et al., 2019).

Waste pickers and families living on the Tibar dumpsite are particularly vulnerable as they are exposed to frequent burning of wastes and plastics (ADB, 2014). In Dili, waste pickers set piles of waste alight and sift through the remains to recover metals and other items that can be sold, a practice which poses a significant and immediate risk to these workers due to the chemical composition of the emissions from the burning material (Rajmohan et al., 2019; Velis, 2017). In a study conducted by De Corte Real Araujo et al. (2015) on the livelihood and environmental impacts of families living on the Tibar dumpsite, ninety-six percent of respondents claimed that the burning of waste, mainly to reduce waste volumes caused difficulties in breathing, coughing and skin irritations (De Corte Real Araujo et al., 2015). The burning of plastics is well documented to expose the environment, humans, and animals to dioxins, furans, mercury, and polychlorinated biphenyls (better known as BCPs). As mentioned above, there is no article nor policy that protects the health of Timor-Leste's waste pickers from these contaminants.

Timor-Leste imports $18.3M and exports $120K worth of plastic and rubber goods (OEC, 2019). The newly introduced *Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics* is a solid step forward in preventing plastics entering the economy. For example, Article 12 addresses the quality control system, stating that 'producers establish and maintain an effective quality control system' (12.1) and that 'the quality control system ensures the monitoring of application and compliance with good manufacturing practices and identifies corrective measures in non-compliance' (12.2). Furthermore, 'the government department responsible for the environmental area and the inspection and inspection authority for economic activity monitor the implementation of the quality control system and adopt the corrective measures referred to in the previous paragraph' (12.3). These corrective measures vary from simple infractions; 'constituting against an order will be punishable by a fine of $US 100', up to $US 1000 for the violation of the provisions of Articles 4, 9, 10, 19, 20, 21, 23, 25 and 26. Articles 19-21 refer to the content of the substances and materials. Articles 25 and 26 are about objects with multilayers of plastic. Article 9 addresses safety requirements, for instance, that plastic materials/objects cannot present a threat to human health (9.1.a) and Article 4 refers to single-use plastic, banning objects that are not biodegradable/cannot be composted, such as cups and cutlery.

Article 5.2 states that 'Economic operators must give special attention to the quantity and harmfulness to the environment of materials and substances used in bags, packaging and other plastic objects'. Article 5.3 provides further explanation, 'When an economic operator becomes aware of, or suspects the risk to health and/or the environment associated with the production of a particular substance, mixture of substances, material or plastic object, the activity is suspended.'

While *Decree Law 37/2020* paves the way forward for plastic pollution prevention, it is important to note that biodegradable, compostable, degradable plastics should not be presented as an alternative to conventional fossil-fuel based plastics (Mastrolia et al., 2022). Bioplastics have perverse impacts on environments, human health, and the economy; the production process of bioplastics is energy intensive and requires non-renewable energy, the disposal of bioplastics releases pollutants, the chemicals required for recycling are costly, and when they end up in landfill, bioplastics have the same impacts as conventional plastics - 'high costs, gas, and pollutant emissions' *(*Mastrolia et al., 2022). It is also problematic to have economic operators policing themselves without a clear set of standards in place, i.e., how do they measure a suspected risk to health and/or the environment? Without mandatory product design standards and labelling being made explicit, *Decree Law 37/2020* cannot effectively prevent Timor-Leste citizens from the hazards posed by conventional plastics and emerging bioplastic alternatives.

Vertical Integration

Vertical policy integration ensures that national policies are optimally aligned with regional and international policies (Hsu et al., 2017).

The *National Strategy of Sea Waste Management, Government Resolution 15/2016*, is one of two documents that specifically relates to the Interministerial Technical Commission on Maritime Affairs, concerning marine litter, to ensure that the relevant ministries account for the matter will

> *'...[c]ollaborate with regional organisations that are dedicated to the theme of marine litter in the context of protecting the oceans and study the impact of adherence to international instruments related to the repression and combat of marine garbage, namely: MARPOL, the London Convention and the Basel Convention.'*

While *Government Resolution 15/2016*, references these international conventions there is no clear evidence of intention of sound implementation of these international policies in the documents analysed. Problems of vertical integration are common in Timor-Leste legislation, plans and policies. The Arafura & Timor Seas Action Programmes (ATSEA 2) implementation plan states there is a lack of a strong regional mechanism for collective regional action and transboundary management of the ATS region (UNDP, 2019). Future research would be required to understand compliance and implementation of *Government Resolution 15/2016.*

Decree Law no 87/2022 introduces amendments to *Decree Law 14/2017 Customs Code*, aiming to align national legislation with the requirements of the legal framework of the World Trade Organisation (WTO).

The WTO plays a key role in implementing the Basel Convention and in preparation for the plastics treaty negotiations hosts the 'Informal Dialogue on Plastics Pollution and Environmentally Sustainable Plastics Trade (IDP)'. The IDP was first launched in 2020, yet, in Timor-Leste's amended Customs Code there are no articles or provisions related to the trade in waste or plastic pollution.

There is intention towards vertical integration in *the Program of the VIII Constitutional Government* which aims to 'strengthen national and international partnerships for better environmental management'. However, the document does not adequately address the obligations of MARPOL. The newest *Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics,* acknowledges the importance of moving to a circular economy in order to meet 'international climate goals'. However, it does not make specific legislative provisions in relation to international agreements and therefore, does not exhibit vertical integration in practice. Furthermore, even if MARPOL, the London Convention and the Basel Convention were vertically integrated and implemented in practice, this would still not be enough to prevent problematic plastics in practice - a standalone global plastics treaty that takes a full life cycle approach is needed.

Horizontal Integration

Timor-Leste's national plans face 'ego-sectoral' challenges (Pisano & Da Costa, 2020): the sense of ownership over each sector expressed by each ministry. This hinders the development of a cohesive and integrated policy framework involving relevant sectors. Inter-ministerial cooperation is essential and effective horizontal integration is needed to achieve a safe(r) circular economy (***Figure 1***).

In Timor-Leste, any horizontal integration is clearly focused on waste management, not on prevention. For example, the Ministry of State Administration is the incumbent for the development of collection systems and the treatment of solid urban waste, yet the Municipal Administration is responsible for the collection, transport, and treatment of urban solid waste. This duplication results in potential multiple administrative gaps. Funding of waste management is described in *Decree-Law 2/2017 - Urban Solid Waste Management System* and is predominantly ascribed to the public sector.

The *National Strategy of Sea Waste Management* better aligns legislation, policies, and plans across ministries. The guiding document for national policies emphasises that

> *'[p]ublic authorities must promote, in a perspective of sectoral transversality and regional harmonisation, the adoption of public policies to prevent and combat the proliferation of marine garbage and that human and financial resources are available to ensure that public policies on marine garbage are effectively implemented, namely, through the inclusion of specific activities to combat the problem of marine garbage in the annual action plans of the relevant ministries' (p.2).*

The new *Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics* does not discuss other national law or policies. One exception is Article 37 which states that the monitoring of what has been established in the decree will occur according to the law.

It also notes that the government department responsible for environmental matters can create a provisional list of authorised substances, which must be updated regularly. However, this does not come with specific timeframes, guidelines, nor targets and it is unclear whether this inventory exists in practice.

The *Strategic Development Plan 2011 – 2030* explains, 'urban waste management guidelines will be introduced based on environmental laws and regulations to set standards for waste treatment in Dili and other main cities.' This is particularly important since there are over ten ministries charged with waste governance and horizontal integration of these policies will be essential for success.

Overall, there is a lack of horizontal integration that supports a safer circular economy and prioritises prevention, meaning Timor-Leste communities are not protected from the impacts of plastic pollution.

Precautionary Principle

As we begin to understand more about the emerging risks posed by plastics, it is critical that legislation and policy include measures to prevent possible harm to the environment and human health (Steele, 2006; Preston, 2018). The precautionary principle is an approach whereby policy precautions and preventive measures are taken based on the acknowledgement of the potential for harm to the environment and society, even if conclusive evidence is unavailable (Meidl, 2019). While the precautionary principle is acknowledged at the global level, it is not believed to be widely implemented. Based on the documents analysed, decision-making in Timor-Leste is not based on the precautionary principle and there are no guidelines for its implementation.

One document refers to the precautionary principle specifically and only three documents refer to it indirectly. For example, *Government Resolution 15/2016 - National Strategy for Sea Waste Management*, sub-paragraph 3c, promotes 'the strengthening of the relevant legal framework to guarantee adequate management of solid waste, namely marine litter, by encouraging the adoption of preventive and corrective measures.' The *Ministerial Diploma 46/2017 for the Regulation of Environmental Evaluation* states that studies must have sufficient information and detail to identify or predict and assess all potential environmental, social, economic, and cultural impacts.

Article 5 of *Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics* is based on the principle of prevention. It states that 'at the time of the disposal, import and/or production of a single-use plastic material, object or mixture of substances, economic operators are to do all that is possible to ensure, when the product turns into waste, that the environmental impacts are reduced (5.1). For example, when they suspect or have knowledge of any risk to health and/or the environment associated with the production of a particular substance, mixture of substances, material, or plastic object, they suspend the activity (5.3).

Zero Waste Hierarchy

The zero-waste hierarchy (***Figure 2***.) prioritises designing and managing products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them (Zero Waste Europe, 2019), that is, it prioritises prevention over management.

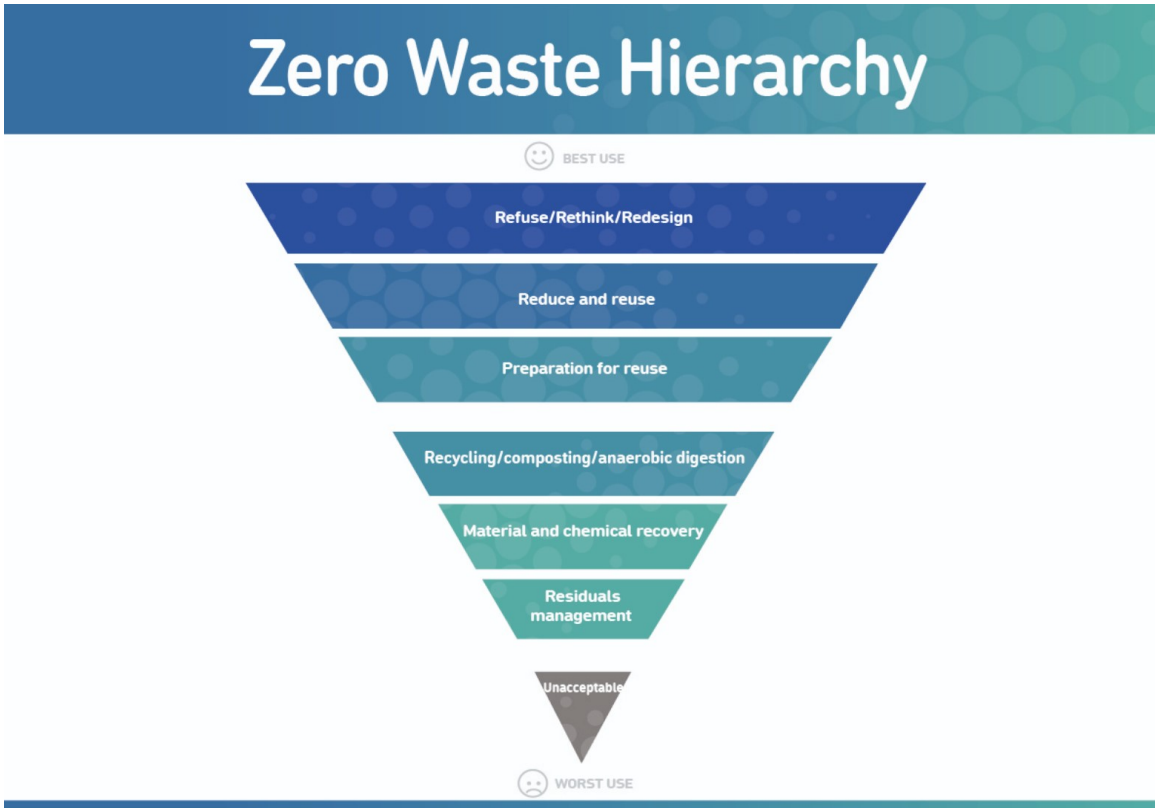


Figure 2. Zero waste hierarchy (Zero Waste Europe, 2019)

The focus of zero waste is on changing the way we produce, distribute, and consume by reorganising our business models, goods, and packaging, in order to reduce resource use and waste (Zero Waste Europe, 2019). Key words like recycle, refuse, and reduce, which relate to the waste hierarchy appear in several legislative and policy documents in Timor-Leste. For example, *Decree Law 2/2017 - Urban Solid Waste Management System* points out the need for an environmentally safe, sustainable, and rational management of waste according to the need to reduce, reuse and recycle.

Article 39 of *Decree-Law 26/2012 - Establishing the Environmental Basic Legislation*, which is focused on solid waste management, states, 'it is the responsibility of public entities to collect, transport, store, process, reduce, reuse and recycle solid waste of domestic and commercial origin.' Despite a focus on reduce and reuse this is problematic as it requires, by law, public entities (taxpayers and struggling municipalities that lack the necessary resources) to bear the burden of prevention and reduction. Rather, the responsibility for prevention and reduction under the zero-waste hierarchy should lie with producers, particularly when the plastics pollution is a result of commercial origin.

In most documents analysed, the focus remains on waste management and not on prevention. *Government Resolution 32/2016 - Investment Strategy for Managing Urban Solid Waste in Dili*, addresses the poor conditions of waste management in Dili through a focus on recycling and landfilling. A focus on the top of the waste hierarchy – in curbing the production and consumption of plastics – means that Timor-Leste would need to re-evaluate and appropriately legislate the extraction of fossil fuels to produce pre-production pellets as well as the manufacture of plastic products.

Climate Change

Building blocks for plastics are fossil fuels such as coal, oil, and gas, and therefore, climate change impacts are related to the full life cycle of plastics: from extraction and transportation, refining and manufacturing to waste management solutions like landfilling and incineration and ultimately, the plastics that end up in the environment (Royer et al., 2018; CIEL, 2019).

The Centre for International Environmental Law (CIEL) report, 'Plastic & Climate: The Hidden Costs of a Plastic Planet' (2019), estimates that by 2050 greenhouse gas emissions from the full life cycle of plastics could reach 56 gigatons, which is equivalent to 10 to 13 percent of the entire carbon budget. This poses a significant barrier to ensuring the global temperature does not rise above the critical 1.5 degrees Celsius.

The outdated *Government Resolution 33/2011 - National Programme of Action for Climate Change* and the *Strategic Development Plan 2011 – 2030* identify climate change as one of the greatest environmental challenges of our time. Regardless, explicit links between climate change and plastics are absent from the study documents. Even in recently introduced legislation, such as *Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics*, while climate change is mentioned in relation to waste, no link is made to plastics specifically.

Table 4: *Global objectives gap analysis of key documents using the analytical framework. Green indicates explicit mention of the theme in the Document; yellow indicates that the document either partially includes the theme or that it is inferred; and red indicates that the theme is absent in the document.*

	Long-term elimination of discharges	Safer circular economy for plastics	Intergenerational equity and justice	SDG's	Protection of human health	Vertical Integration	Horizontal Integration	Precautionary approach	Zero waste hierarchy	Climate Change
LEGISLATION										
Decree-Law 37/2020 - The Disposal, Import and Production of Bags, Packaging and other Plastics										
Decree-Law no. 6/2020 - Legal Regime for Protection and Conservation of Biodiversity										
Decree-Law no. 2/2017 - Urban Solid Waste Management System										
Ministerial Diploma no. 46/2017 - For the Regulation of Environmental Evaluation										
Decree-Law no. 5/2016 – National System of Protected Areas										
Decree-Law no. 26/2012 - Establishing the Environmental Basic Legislation										
Decree-Law no. 14/ 2017 - Customs Code (Decree-Law 87/2022 Amendments to Customs Code)										
POLICIES AND PLANS										
Strategic Development Plan 2011 - 2030										
National Biodiversity Strategy and Action Plan 2011 – 2020										
National Plan of Action for the Coral Triangle Initiative										
Program of the VIII Constitutional Government										
Parliament Resolution 12/2018 - Action on the Protection and Conservation of the Environment										
Government Resolution 32/2016 - Investment strategy for the management of solid urban waste in the city of Díli										
Government Resolution no. 15/2016 – National Strategy for Sea Waste Management										
Parliament Resolution no. 9/2016 - Adoption of Urgent Information and Awareness Measures for the Preservation of the Environment										
Government Resolution no. 33/2011 - National Adaptation Programme of Action (NAPA) for Climate Change										

Waste Prevention

Trade in Non-hazardous, Recyclable and Reusable Plastics

Timor Leste's *Decree Law 14/2017 Customs Code* has no articles or provisions directly related to the prevention of plastic pollution and is indicated red in ***Table 5***. As it currently stands, the C*ustoms Code* makes it easier to import and manufacture of plastics products. Section 2, Article 242.1 relates to drawbacks (reimbursements). The *Customs Code* allows drawbacks of customs duties and taxes paid on foreign goods introduced into free circulation if exported from the customs territory in the form of processed productions. Article 244 states the general principles for active processing: 'The active processing procedure allows the importation of foreign goods for use in processing operations with relief from import customs duties and other taxes'.

Decree-Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics is the only document that refers to import and export bans and restrictions on plastics. It has environmental standards for plastics imports and exports (e.g., taxes and traceability) and places fees on problematic imported plastic related to trade in non-hazardous, recyclable, and reusable plastics. Article 38 states the following:

- A fee is applicable on single-use plastic bags and packaging, as primary or secondary packaging, regardless of weight and composition, imported or purchased in the national territory.
- The environmental tax on single-use plastic bags and packaging is applicable, in the national territory, at the time of their entry into the territory, when imported, or at the time of their release for consumption, when produced and sold in the national territory.

Article 40 provides further explanation:

- The taxation unit is the kilo of a plastic bag or plastic packaging for single-use, empty and recyclable.
- The environmental fee applicable to recyclable, non-biodegradable, or compostable single-use plastic bags and packaging is 30% (thirty per cent) of the net price.
- The environmental fee for recyclable, non-biodegradable, or compostable single-use plastic bags and packaging, which, in their composition, contain at least 30% recycled plastic, is equivalent to 1/5 of the fee set out in the preceding paragraph.

Article 39 states, 'The environmental tax is liable to importers or purchasers of single-use plastic bags and packaging, with headquarters or commercial establishment in the national territory', however, there are no explicit bans or restrictions in place.

Sustainable financing mechanisms and market-based instruments

The Environment Investigation Agency (EIA, 2020, p. 11) states, 'In order to achieve sustainable financing for plastic waste management, economic and other fiscal measures will need to be adopted by municipal and national governments.'

Mandatory, fee based EPR schemes, whereby 'whoever introduces packaging or packaged goods into a country's market, remains responsible for that packaging also after use' (Ellen Macarthur Foundation, 2021, p.7) are recognised as a necessary financial mechanism in the plastics pollution solution. Despite ambitions towards zero waste, in their 2019 3R Country progress report the GoTL acknowledges there has been no response nor progress in relation to EPR (GoTL, 2019), meaning there can be little headway towards eliminating and reducing plastics in the nation.

The introduction of *Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics* aims to change this. *Decree Law 37/2020* specifically mentions sustainable financing/ market-based instruments in Article 6. 'Principle of Polluter Pays and Extended Producer Responsibility'. This means any economic operator that develops, manufactures, or processes plastic materials becomes subject to the principle of EPR and the commercial company operator must accept the return of the plastic materials and becomes responsible for the subsequent waste management after use. The initial producer of the plastic product incurs an environmental fee that contributes to the costs of waste management. This environmental fee aims to reinforce reuse, prevention, recycling and other types of valorisations of single-use plastic bags, packaging and objects.

Other than *Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics*, sustainable financing mechanisms are not mentioned in any of the key documents analysed. Moreover, *Decree-Law 2/2017 – Urban Solid Waste Management System* refers to user pays for services instead of shifting responsibility and liability to producers. Polluter pays principles are necessary to prevent plastic pollution, however, it is important that these financial mechanisms not be interpreted or promoted as 'it is ok to pollute as long as you pay'.

Government Resolution 15/2016 - National Strategy for Sea Waste Management makes relevant ministries responsible for approving planned approaches, including financial mechanisms to deter the use of materials that are particularly harmful to the environment, namely plastics, and for developing incentives for the use of biodegradable materials (which may or may not include bioplastics). Without financial incentives funding, tailored to the needs of the country, incentives and discouraging measures can only contribute to a limited extent.

On sustainable financing mechanisms, *Government Resolution 32/2016 - Investment Strategy for Managing Urban Solid Waste in Dili*, section B4.c) Financing of Operating & Maintaining Costs states that 'The main options for financing the costs of operating and maintaining MSW [municipal solid waste] may be carried out by applying fees to users and subsidies.' However, to ensure all consumers can access the service, it is often necessary to resort to cross-subsidisation and/or financing from the State Budget. The Resolution further specifies that, in general, it is possible to increase the percentage of paying users if the solid waste fee is built into charges for other services such as electricity. This means that families that have a higher environmental impact (i.e., that use more energy or produce more waste, will pay more. However, again, this is too generalised as it is specified only as a possibility, and therefore indicated as yellow. It is also indicated as yellow because the measures here do nothing to reduce the volume of waste, particularly at source (producers), nor do these measures incentivise alternative zero waste products, services, and systems. It is also unclear whether the rate proposed would be high enough to disincentivise polluters.

Government Infrastructure Investments

Much of Timor-Leste's waste collection and transportation infrastructure is underdeveloped. Currently, waste in the Dili municipality is collected by forty vehicles operated by the private sector and approximately 15 vehicles operated by the Government (JICA, 2016). Waste from collection points must be loaded manually, which takes time and exposes workers to health risks. Services are irregular, often resulting in waste left on footpaths and roads (PRIF, 2018). Approximately 115 trips to Tibar dumpsite, located 25 km out of Dili, are required daily, contributing to the increase in traffic and carbon emissions *(*JICA, 2016).

In response, the government introduced *Government Resolution 32-2016*, the Investment strategy for the management of solid urban waste in the city of Dili through the Tibar Dumpsite Rehabilitation and Upgrading Project (TDRUP). The Resolution aims to rehabilitate the current waste disposal site, upgrade it to a sanitary landfill operated and managed to modern international standards by the private sector. However, this work is still in the early design phase (OASIS, 2020, p. 7-1), and targets related to this are not currently reflected in national policy, plans or legislation. This is indicated yellow in the table.

The passing of *Decree-Law 2/2017 - Urban Solid Waste Management System* is an important step forward, stipulating the legal framework for the urban SWM system, including collection and disposal requirements, for the municipality of Dili and the regional territories (SPREP, 2020). This is marked as yellow in the table as it doesn't fully cover the preventative, reuse, and recycling measures that require investment from the government.

Investment in accessible and regular separate waste collection, recycling, reuse, and preventative measures by the government are mentioned in the *Strategic Development Plan 2011 – 2030*, encouraging the recycling of glass, paper and plastic and committing to provide household rubbish bins for waste collection. The *Program of the VIII Constitutional Government* indicates investments in waste infrastructure as one of the determining drivers of national economic development, and further aims to operationalise, strengthen, and expand the plastic recycling industry in Timor-Leste.

Article 39 in *Decree-Law 26/2012* – Establishing the Environmental Basic Legislation defines the mechanisms and responsibility of public entities for the collection, transportation, storage, processing and the reduction, reuse, and recycling of solid waste.

While substantial policies are in place, most household waste is burned or discarded, recycling is below capacity, and the Tibar dumpsite is still an open dump, causing harm to the environment and human health (ADB, 2014; OASIS, 2020).

Recognised Impact on Economic Development

Little attention is given to the impact of plastic pollution on economic development across all sectors (e.g., the agriculture sector). However, some documents acknowledge the threat of plastic pollution on Timor-Leste's tourism potential.

The *Parliament Resolution 9/2016 – Adoption of Urgent Information and Awareness Measures for the Preservation of the Environment* highlights the importance and imperative need for protection of the environment for a healthy existence, for the sustainable development of the country and the development of tourism as an activity that fosters economic growth. It recommends measures be put in place requiring economic operators to replace plastic bags and packaging with others made from reusable and recyclable materials, demonstrating not only the economic risks of plastic but also the economic opportunities of alternatives.

Government Resolution no. 15/2016 - National Strategy for Sea Waste Management highlights the economic impacts of marine litter, and its harmful impacts on the tourism sector. The linkage between economic development and plastic pollution is explicit in the recommendation to 'consider that the preservation of biodiversity and the conservation of the environment can contribute to the development of a sustainable tourism sector in Timor-Leste. The Strategy emphasises the natural value of beaches as an added value in the context of ecological and maritime tourism. *Parliament Resolution 12/2018 - Action on the Protection and Conservation of the Environment* implores the government to take action to protect and preserve the environment. This legislation builds on the recommendations for reducing the use of plastic and preserving the environment through the *Government Resolution 9/2016 - Adoption of Urgent Information and Awareness Measures for the Preservation of the Environment*.

Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics aims to increase the economic power of the Timorese nation, while conserving and protecting natural resources and biodiversity, and ensuring a firm position to combat climate change and the respective impacts. Due to its small productive economy the country relies heavily on imports and the intention is to encourage private capital to invest in Timor-Leste and create jobs to diversify the economy. However, the gap analysis demonstrates that only five out of thirteen documents are linking plastic pollution and/or waste to impacts on economic development, with the majority indicating the tourism sector as the main threat. Implications related to safe and secure employment or other potential business risks are mentioned once but plastic implications on agriculture as a threat remains underexposed.

National Reduction Targets and Virgin Plastic Use

Timor-Leste does not produce virgin plastics, however, they do extract and export the oil that produces them and they import virgin plastics to manufacture plastic water bottles. The gap analysis reveals there is no mention of measurable plastic pollution reduction targets and timelines in general, nor regarding controls and standards to reduce virgin plastics entering the economy. Restricting and monitoring the import of virgin plastics into the economy will reduce production of plastic bottles in the country. Focusing on the provision of potable water at the household level would also lessen the demand for plastic bottled water.

Currently, no legislation refers to national reduction targets, import bans, nor restrictions on virgin plastic use.

Market Restrictions

Government Resolution no. 15/2016, the *National Strategy for Sea Waste Management* partially refers to market restrictions. This Resolution defines incentives for the use of biodegradable materials and mechanisms to disincentivise the use of materials that are particularly harmful to the environment. However, providing incentives for the use of biodegradable materials is premature given the current country context where plastic pollution prevention and reduction legislation first needs to be strengthened.

Article 4.6 from *Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics* bans trading fruit and vegetables in disposable plastic or expanded polystyrene tubes. However, chemical additives (substances such as bisphenols, phthalates, and polybrominated diphenyl ethers - PBDEs - that are intentionally added to plastics to alter the properties of plastics) are allowed in Section IV of the *Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics*, introducing specific provisions, *inter alia* those listed in Article 25 *Multilayer plastic materials and objects.*

Sub-paragraph 2b of Article 25 states that a plastic layer that is not in direct contact with food and is separated from it by a functional barrier can be manufactured with substances that do not appear on the 'List of Authorised Substances'. Sub-paragraph 5 states,

> *'The substances referred to in paragraph 2(b) may not belong to any of the following categories: a) Substances considered to be mutagenic, carcinogenic or toxic to reproduction; b) Substances in nanoforms.'*

This definition does not capture ozone depleting chemicals. For this reason, and those mentioned above, *Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics* is marked as yellow in Table 5, as it only partially meets the market definition in the analytical framework - to prohibit certain polymers (including bioplastics) and additives, and controls on the use of Endocrine Disrupting Chemicals (EDCs), Persistent Organic Pollutants (POPs), and carcinogens.

Promotion of Traditional Solutions

There has been a resurgence of *Tara Bandu* in Timor-Leste recently. The customary law of Tara Bandu aims to manage natural resources while simultaneously preventing conflict and regulating social interactions. As an environmental peacebuilding mechanism (Ide, Palmer & Barnett, 2021), Tara Bandu presents an opportunity to deepen the connection between Timorese communities and the environment, including providing a greater understanding of plastics pollution and alternative Indigenous solutions, thus expanding the relationship between the community, government and non-government.

Article 8 of the *Decree-Law 6/2020 - Legal Regime for Protection and Conservation of Biodiversit*y makes explicit the requirement of the State to support and promote Tara Bandu or any another traditional practice, under the terms of the *Law of Bases of the Environment*, aimed at ensuring conservation of biodiversity and sustainable use of its components. This is an important shift for Timor-Leste. Local traditions and customary law are crucial to strengthen and foster effective implementation of the national policy frameworks in addressing regional and international obligations (Tobin, 2014; Farrelly, Borrelle & Fuller, 2021).

Multiple documents promote traditional and local solutions to address plastics pollution. The *Parliament Resolution 12/2018 – Action on the Protection and Conservation of the Environment* specifically recommends taking necessary measures to reduce the use of plastics products, particularly plastic bags, and to replace them with local and nature-based alternatives. In considering the harm to human health, the environment and infrastructure because of the accumulation of waste, the *Parliament Resolution 9/2016 - Adoption of Urgent Information and Awareness Measures for the Preservation of the Environment* recommends the government encourage and support the national production of bags and packaging made from reusable and recyclable materials, however it doesn't explicitly promote organic/ bio-based products - this is assumed.

The *Strategic Development Plan 2011 – 2030* states:

> *We need to celebrate and promote our unique culture, and the important role of traditional arts such as tais weaving, pottery and wood carving. In order to protect our identity, we need to encourage and promote Timorese culture and embed the creative arts in our economic development. (p. 61)*

Education and Capacity Development

We argue here that the focus on education and capacity development should be on scaling up capacity development to meet the massive scale of the problem at the national and global level, including government and 'big plastics' producers, manufactures, importers, exporters, distributors, and retailers. It should not be limited to enhancing capacity at the community level as this will have limited effect on preventing plastics pollution. The plastics pollution crisis is not a result of consumer behaviour, but rather a result of large-scale plastics production and supply. To prevent plastics pollution in Timor-Leste, the volume of plastics entering Timor-Leste must be reduced. Therefore, education and awareness raising campaigns to meet this objective must be squarely focused on the producers, suppliers and policy makers who can make this a reality.

Furthermore, educational programmes offered at different levels of governance, for example, will empower citizens with the knowledge to object to actions of polluters and the policies that support pollution-increasing practices. Legislative tools are needed to hold polluters accountable and ensure they are educated about the latest plastics and plastic pollution science, best practices mechanisms and strategies.

The United Nations Environment Programme (UNEP) argues legislative tools are needed to support education and capacity development around plastic pollution and its prevention (UNEP, 2020). This must include awareness raising campaigns focused on the health and environmental impacts of plastics.

Transparent and open-access knowledge sharing about the potential harms, pathways, and impacts of plastics is critical here and should include, for example, ecolabelling (so consumers are aware of the toxic content of the plastic products they purchase).

In Timor-Leste, environmental education recommendations are focused on the community/consumer level. For example, *Decree-Law 2-2017 - Urban Solid Waste Management System*, establishes the foundation for the treatment of solid waste in Dili and other municipalities in Timor-Leste.

It emphasises the need to implement 'civic education campaigns, capable of influencing habits and consumption patterns of citizens, in order to reduce the use of materials whose impacts are negative and long-lasting.' In relation to plastics, sub-paragraph 3f of the *National Strategy for Sea Waste Management* explicitly recognizes the impact of plastics pollution on marine life and beaches in the country and stresses the need for the development and implementation of environmental education programs in schools, civil society, and communities, with special attention to coastal areas.

The *Parliament Resolution 12/2018 - Action on the Protection and Conservation of the Environment* explicitly aims to promote consumer awareness and reduction of waste production, including plastic bags and to take actions towards the replacement of plastic bags and packaging with other requisites made from reusable and recyclable materials.

Similarly, the *Program of the VIII Constitutional Government* emphasises the promotion of campaigns on environmental issues and specifically aims to develop awareness programs focussing on the harms of using plastic, especially for the degradation of the seas around Timor-Leste. The consumer/community level focus of these policies will have little effect on the prevention of plastics pollution as they do nothing to address the global scale of the problem, therefore, these key documents are marked as red in the analytical framework.

Table 5: *Waste Prevention gap analysis of key documents using the analytical framework. Green indicates explicit mention of the theme in the document; yellow indicates that the document either partially includes the theme or that it is inferred; and red indicates that the theme is absent in the document.*

	Trade in non-hazardous, recyclable, and reusable plastics	Sustainable financing mechanisms/ market-based instruments	Government Infrastructure investments	Recognised impact on economic development	National reduction targets	Virgin plastic use	Market restrictions	Promotion of traditional solutions	Education and capacity development
LEGISLATION									
Decree-Law 37/2020 - The Disposal, Import and Production of Bags, Packaging and other Plastics									
Decree-Law no. 6/2020 - Legal Regime for Protection and Conservation of Biodiversity									
Decree-Law no. 2/2017 - Urban Solid Waste Management System									
Ministerial Diploma no. 46/2017 - For the Regulation of Environmental Evaluation									
Decree-Law no. 5/2016 – National System of Protected Areas									
Decree-Law no. 26/2012 - Establishing the Environmental Basic Legislation									
Decree-Law no. 14/ 2017 - Customs Code (Decree - Law 87/2022 Amendments to Customs Code)									
POLICIES AND PLANS									
Strategic Development Plan 2011 - 2030									
National Biodiversity Strategy and Action Plan 2011 – 2020									
National Plan of Action for the Coral Triangle Initiative									
Program of the VIII Constitutional Government									
Parliament Resolution 12/2018 - Action on the Protection and Conservation of the Environment									
Government Resolution 32/2016 - Investment strategy for the management of solid urban waste in the city of Díli									
Government Resolution no. 15/2016 – National Strategy for Sea Waste Management									
Parliament Resolution no. 9/2016 - Adoption of Urgent Information and Awareness Measures for the Preservation of the Environment									
Government Resolution no. 33/2011 - National Adaptation Programme of Action (NAPA) for Climate Change									

Waste Management

A solid waste management system, including its infrastructure, is essential and is considered most successful when its processes remain invisible (Reno, 2015). Lack of management infrastructure might lead to an unhealthy mix of people, place and waste threatening human health and the environment; therefore, the infrastructure of waste management is biopolitical as it takes care of the well-being and vitality of the people (Reno, 2015).

Closed-loop Recycling

> *As of 2015, approximately 6300 Mt of plastic waste had been generated, around 9% of which had been recycled, 12% was incinerated, and 79% was accumulated in landfills or the natural environment (Geyer, Jambeck and Law, 2017, p. e1700782).*

Closed-loop recycling refers to the process where the same product can be produced by using recycled materials as substitutes for the original virgin material (Larrain et al., 2020). The dangerous myth is that this can be done in perpetuity for polymers. This is not the case. For example, polyethylene terephthalate (PET) is the most recyclable but is severely limited by the number of cycles it can go through before the product is no longer usable and sent to landfill (Schyns & Shaver, 2021). There is also no such thing as a truly 'closed loop recycling' for plastics due to the leakage of microplastics and off-gassing that occurs at all phases of the plastics lifecycle (Shen et al., 2020).

In Timor-Leste, *Decree-Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics* is the only document to mention closed loop-recycling. This decree promotes reuse and recycling activities, with Article 7 emphasising the need for plastic products to be designed for reuse: ‘plastic bags, packaging and other objects are designed in such a way that, with or without the support of auxiliary products, they can be reused for the same or different purpose.’

Article 8 addresses the principles of recycling and energy recovery stating: ‘plastic objects must be able to be transformed again into raw materials for new objects.’ It recommends that when plastic objects do not meet the requirements to be reused and/or recycled, they must be capable of use in such a way as to produce energy, through waste to energy incineration, with or without other types of waste and heat recovery. Critical attention needs to be paid to the provision of waste to energy as a solution for plastics pollution prevention.

Incineration, including energy recovery, is less resource efficient than the process of closed loop recycling due to the increase in toxic burden at every cycle and the micro and nanoplastic releases (Huysman et al., 2015; Brown et al., 2023). It has dire environmental and human health impacts, making it a 'false solution' for plastic pollution prevention (Helm et al., 2022)

In all other documents analysed, the recycling focus is on plastic pollution management rather than prevention. Here ‘recovery’ simply means return where broad statements in policies promote recycling schemes as the ‘silver bullet’ solutions to the plastic pollution problem.

For example, the Strategic Development Plan 2011 – 2030 states, 'with plastic bottles clogging our drains and being washed up on otherwise pristine beaches around Timor-Leste, a recycling scheme will be developed for plastic bottles.'

The outcomes of establishing Community Collection Points (Compartimentos Comunitários Murados (CCM)) are described in the Investment Strategy for the Management of Solid Urban Waste in Dili (Government Resolution 32/2016): 'with the supply of recycling cages the recovery of recyclables is expected to increase significantly.'

Despite these investments in infrastructure, the only proven effective method of ensuring bottles and other containers are returned is by giving them monetary value through container deposit/return schemes. Simply providing collection cages for 'citizens' to use is a small part of a potentially powerful solution. In Government Resolution 2/2017 - Urban Solid Waste Management System, 'recovery' is introduced as a citizen responsibility. Yet, producers, retailers, recyclers, local government, and other stakeholders all need to be involved in the design of a national container deposit scheme for it to work effectively.

Remediation and Legacy Pollution

Remediation and legacy pollution are not effectively addressed in the key documents demonstrating specific guidelines or protocols are needed to recover legacy plastics (including marine debris and landfills) in the policy framework for Timor-Leste. Once marine plastic pollution is recovered it should be safely reused, recycled, or repurposed. Landfill remediation should take place following storm damage.

Removal and remediation should also be undertaken following safety and sustainability guidelines to avoid additional harms to environment.

This requires precise technical capacity and resourcing. Although the Dili Municipality are responsible for the management and implementation of the Tibar Dumpsite Rehabilitation and Upgrading Project (TDRUP) at all stages, including the remediation of the Waste Disposal Area at all three landfill cells (OASIS, 2020), remediation in relation to landfills is not specified in any of the key documents analysed. Costs for remediation of landfills are significant and moreover, unlikely to address the issue of plastics and microplastics pollution (OECD, 2018).

Environmental clean-ups require different technical capacities and resourcing to address legacy pollution and landfill remediation. For example, beach clean ups are promoted as an important activity in Timor-Leste's *National Strategy for Sea Waste Management,* however, plastics pollution impacts are not limited to beaches - rivers and terrestrial areas require 'cleaning-up' too. Further, without adequate protocols, technical capacity and resourcing that ensures legacy plastics are reused or recycled, clean-ups may not be effective.

Transport

A new container terminal in the Bay of Tibar, about 10 km west of Dili was opened in November 2022. Hailed as the country's first public-private partnership (PPP) project, with the PPP is Bollore Group, a French owned, transnational corporation, one of the top 500 in the world - currently operating 16 container terminals worldwide. Tibar Bay Port is now able to handle a larger capacity and has expanded Timor-Leste's global access.

This means there is an increased capacity for reverse logistics (WorldBank, 2019). Reverse logistics, the shipping of the products back to producers' post-consumption for responsible recycling or reuse is not mentioned in any of the key documents. However, Article 6.3 in *Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics* relates to reverse logistics as it states that 'after the usage and completion of its rotation cycle, the commercial company operator must accept the return of the plastic object and becomes responsible for the subsequent waste management'.

It is not clear if reverse logistics happens in practice in Timor-Leste, and if so, who the commercial company operators are. While Article 39 of the *Base Law for Environment (Decree-Law 26/2012*) defines the mechanisms for the collection, transportation, storage, processing, reduction, reuse and recycling of solid waste, there is no mention of access, port capacity, nor reverse logistics of plastics.

Table 6: *Waste Management gap analysis of key documents using the analytical framework. Green indicates explicit mention of the theme in the document; yellow indicates that the document either partially includes the theme or that it is inferred; and red indicates that the theme is absent in the document.*

	Closed loop recycling (primary market) or secondary markets	**Remediation and legacy pollution**	**Transport**
LEGISLATION			
Decree-Law 37/2020 - The Disposal, Import and Production of Bags, Packaging and other Plastics			
Decree-Law no. 6/2020 - Legal Regime for Protection and Conservation of Biodiversity			
Decree-Law no. 2/2017 - Urban Solid Waste Management System			
Ministerial Diploma no. 46/2017 - For the Regulation of Environmental Evaluation			
Decree-Law no. 5/2016 – National System of Protected Areas			
Decree-Law no. 26/2012 - Establishing the Environmental Basic Legislation			
Decree-Law no. 14/ 2017 - Customs Code (Decree -Law 87/2022 Amendments to Customs Code)			
POLICIES AND PLANS			
Strategic Development Plan 2011 - 2030			
National Biodiversity Strategy and Action Plan 2011 – 2020			
National Plan of Action for the Coral Triangle Initiative			
Program of the VIII Constitutional Government			
Parliament Resolution 12/2018 - Action on the Protection and Conservation of the Environment			
Government Resolution 32/2016 - Investment strategy for the management of solid urban waste in the city of Díli			
Government Resolution no. 15/2016 – National Strategy for Sea Waste Management			
Parliament Resolution no. 9/2016 - Adoption of Urgent Information and Awareness Measures for the Preservation of the Environment			
Government Resolution no. 33/2011 - National Adaptation Programme of Action (NAPA) for Climate Change			

Microplastics

Microplastics are plastic particles <5 mm in diameter. They can be categorised as primary (intentionally added and specifically designed for commercial use like cosmetics), or as secondary (broken down from larger items, such as tyre dust) (Hidalgo-Ruz, Gutow, Thompson & Thiel, 2012; Lehtiniemi, 2018). Microplastics are found in a wide range of colours, shapes and sizes, and are made of a variety of polymer types (Rochman et al., 2019). Microplastics enter the environment via multiple and diverse pathways. Once they are in the environment they absorb and transfer countless chemical contaminants such as POPs, endocrine disruptors, and heavy metals with negative impacts for the environment and for human health (EMAF, 2018; Rochman et al., 2019).

There is a great deal we still do not know about plastics, due, in part, to the range of chemicals associated with them and the often-unpredictable ways plastics interact with biomes, environmental conditions, and other chemicals. Current scientific research is focusing on the risks of microplastics transferring via food chains and the impacts to marine organisms (EMAF, 2017; Gallo et al., 2018).

A recently published UNEP report on 'Tackling Plastic Pollution: Legislative Guide for the Regulation of Single-Use Plastic Products' demonstrates that microplastics pollution (and meso- macro- and mega-plastic pollution) can be exacerbated by misleading information about the ability of biodegradable and oxo-degradable plastics to prevent plastic pollution. Biodegradable implies the product can be discarded in nature; however, this generates more microplastics in the natural environment because oxo-degradable products simply break down into smaller pieces (UNEP, 2020).

Microplastics are problematic, yet there are no provisions, nor mention of microplastics in any of the key documents analysed (***Table 7***), including the strongest and most recent piece of legislation, *Decree-Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics*.

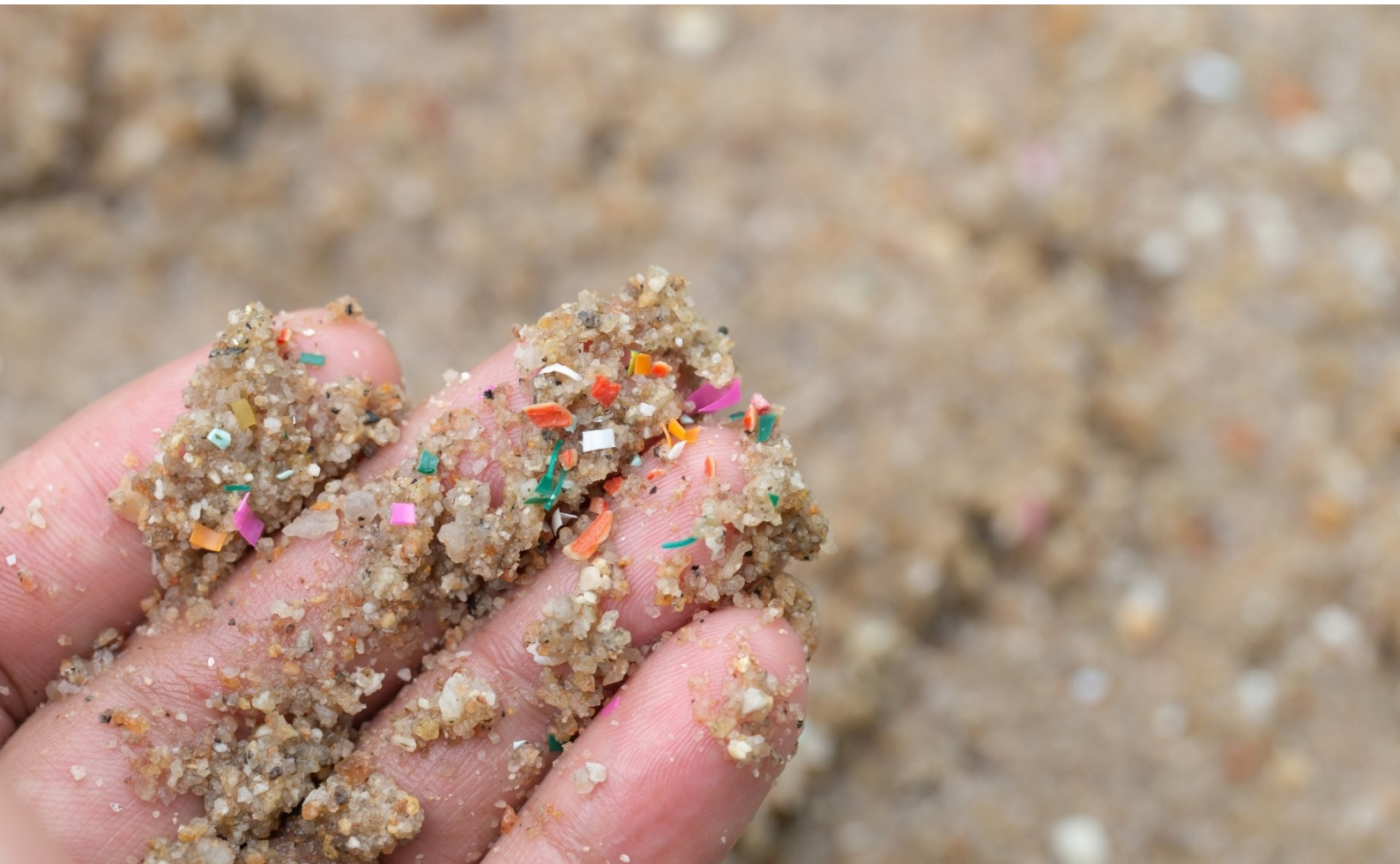


***Table 7**: Microplastic gap analysis of key documents using the analytical framework. Green indicates explicit mention of the theme in the document; yellow indicates that the document either partially includes the theme or that it is inferred; and red indicates that the theme is absent in the document.*

	Intentionally added (e.g., microbeads)	Wear and tear (e.g., tyres, textiles)	Agri plastics	Management (e.g., pallets)
LEGISLATION				
Decree-Law 37/2020 - The Disposal, Import and Production of Bags, Packaging and other Plastics				
Decree-Law no. 6/2020 - Legal Regime for Protection and Conservation of Biodiversity				
Ministerial Diploma no. 46/2017 - for the Regulation of Environmental Evaluation				
Decree-Law no. 2/2017 - Urban Solid Waste Management System				
Decree-Law no. 5/2016 – National System of Protected Areas				
Decree-Law no. 26/2012 - Establishing the Environmental Basic Legislation				
Decree-Law no. 14/ 2017 - Customs Code (Decree -Law 87/2022 Amendments to Customs Code)				
POLICIES AND PLANS				
Strategic Development Plan 2011 - 2030				
National Biodiversity Strategy and Action Plan 2011 – 2020				
National Plan of Action for the Coral Triangle Initiative				
Program of the VIII Constitutional Government				
Parliament Resolution 12/2018 - Action on the Protection and Conservation of the Environment				
Government Resolution 32/2016 - Investment strategy for the management of solid urban waste in the city of Dili				
Government Resolution no. 15/2016 – National Strategy for Sea Waste Management				
Parliament Resolution no. 9/2016 - Adoption of Urgent Information and Awareness Measures for the Preservation of the Environment				
Government Resolution no. 33/2011 - National Adaptation Programme of Action (NAPA) for Climate Change				

Standardisation

Another key issue impeding progress towards achieving circular-economy objectives is a lack of global criteria and standards on products and recycled materials, undermining secondary markets and the circular economy. (EIA, 2020, p. 8).

The prevention of plastic pollution in Timor-Leste will rely upon production, manufacturing, management, and retrieval standards and protocols. Timor-Leste produces and exports plastic feedstocks, plastic precursors, and plastics materials resins, and therefore, production standards should precede manufacturing (the design and manufacture of plastics products from plastic resins). Timor-Leste's current legislation addresses imports of plastic products but does not address its own production and export standards of plastic feedstocks, plastic precursors, and plastic material.

Product Design

In order to reduce the volume of imported plastics, Article 4.2 of *Decree-Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics* establishes the principle of reuse, banning, 'plastic bags, packaging and other objects are designed in such a way that, with or without the support of auxiliary products, they can be reused for the same or different purpose.' It bans 'any single-use plastic package or object that cannot be recycled or is not oxo-biodegradable and oxo-degradable'. However, oxo-degradable products are a false solution in efforts to prevent plastic pollution. Oxo-degradable plastic products see the plastic product break down into tiny fragments (microplastics) that are harmful to human health and the environment (Schiavo et al., 2020), and more difficult to address through legacy pollution and remediation efforts. Oxo products should be banned across plastic pollution prevention legislation in Timor-Leste and elsewhere. Article 4.1 bans the 'packaging and other single-use plastic objects that do not comply with general safety requirements and in accordance with good manufacturing, labelling, traceability and composition practices'. Article 4.6 bans trading fruit and vegetables in disposable plastic or expanded polystyrene vials. Article 9 makes general provisions about safety requirements:

- Plastic materials and objects are manufactured in accordance with good manufacturing practices, so that, under foreseeable conditions of use, they do not transfer their constituents to the content in quantities that may: a) Represent a danger to human health; or (b) cause an unacceptable change in the composition of the food; or (c) cause its organoleptic characteristics to deteriorate.
- Plastic materials and objects cannot produce hazardous waste at the end of its life cycle.
- The labelling, advertising and presentation of a plastic material or object must not mislead the consumer.

Article 25 relates to multilayer plastic materials and objects. Sub paragraph 2 permits the use of unauthorised substances for packaging when a plastic layer that is not in direct contact with food and is separated from it by a functional barrier, as in another layer of plastic.

Polymer and Additive Restrictions

Article 17 of *Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics* establishes is, in general terms, a list of authorised substances. This extensive list contains over 800 substances and is divided into four subcategories; monomers (17.a), additives on plastics (17.b), polymerisation aids/adjuvants, excluding solvents (17.c) and macromolecules obtained by microbial fermentation (17.d).

This is further expanded in Article 18 where the derogations for unlisted substances are explained:

> c) When used as additives, natural or synthetic polymeric substances with a molecular weight greater than 1000 Da are permitted and, macromolecules obtained by microbial fermentation are not permitted.
>
> d) When used as monomers or other starting substances, prepolymers and natural or synthetic macromolecular substances, as well as their mixtures, except for macromolecules obtained by microbial fermentation, if the monomers or starting substances required for their synthesis are on the List of Authorised Substances.

By authorising a list of plastics that includes toxic substances that are harmful to human health and the environment people are exposed to chemicals that have been associated with serious health problems and the Government is contravening the human right to a clean, healthy, and sustainable environment for its population.

The assessment of compliance with the provisions of Article 9 (requirements for safety) and concerning the substances referred to in Article 18 (exceptional permission of substances not on the list) is carried out in the light of the scientific standards contained in the *Codex Alimentarius*. This 'Food Code' is a collection of guidelines, standards, and codes of practice to ensure that packaged food is safe and can be traded. The list of authorised substances is therefore subject to change and can accordingly be adjusted, however, there is no mention of an annual review to ensure compliance.

Besides *Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics,* there is no mention of restrictions on the importation and trade of certain polymers in any other analysed documentation.

Voluntary Certification Schemes and Industry Standards

This theme defines the compliance to certification schemes such as International Organisation of Standardization (ISO) for products and services certified as 'zero waste to landfill' (ISO14001: 2015) and mandating business compliance to commit to reducing plastics throughout their supply chain.

It is worth noting that the testing, protocols, and safe limits for many substances that are set out in the ISO are archaic (not based on non-monotonic dose-response) and these standards are currently under negotiations as part of the International Negotiating Committee (INC) plastic treaty process (Shugg et al., 2013; European Commission 2023).

There is no evidence of national voluntary certification schemes or mandatory product stewardship schemes in Timor-Leste in the documents analysed.

In relation to industry standards, the *Strategic Development Plan 2011 – 2030* sets the pathway for urban waste management guidelines to be introduced, based on environmental laws and regulations, in order to set the standards for waste treatment in Dili and other cities. This plan laid the foundation for the introduction of *Decree-Law 2/2017 Urban Solid Waste Management System.* Here, composting, plastic recycling, paper recycling and glass recycling plants are only 'encouraged' in this decree law. There is no introduction of voluntary certification, industry compliance, nor mandatory product stewardship schemes.

While there is no mention of certification schemes or ISO standards in any of the documents analysed, there is a system of quality control, as per *Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics,* Article 12*,* where the responsibility lies with producers:

- Producers to establish and maintain an effective quality control system.
- The quality control system ensures the monitoring of application and compliance with good manufacturing practices and identifies corrective measures in case of non-compliance.
- The government department responsible for environmental matters and the inspection authorities for economic activities should monitor the implementation of the quality control system and the adoption of the corrective measures.

Unfortunately *Decree Law 37/2020* does not stipulate at whose cost the monitoring and implementing of a quality control system comes at, nor what reporting mechanisms are in place. Article 12.c does refer to shared responsibility between the Department of Environment and inspection authority, but again, what responsibilities and at whose cost is not specified. The onus of responsibility, including the costs of monitoring and reporting by the State, should lie with plastics producers. Further, compliance and non-compliance measures are arbitrary. Who deems what is an 'effective quality control system', who deems what is an 'effective corrective measure', and who enforces this? This highlights the need for national and international standards for monitoring and reporting.

National Monitoring and Reporting, National Inventories and Reduction Targets

The *Strategic Development Plan 2011 – 2030*, as the leading policy document, states:

> *We will build human resources capacity in the area of environmental quality control, including methodologies used for environmental tests. This will involve establishing an environmental laboratory to conduct tests and carrying out environmental auditing, monitoring, and evaluation of pollution for all activities in all districts.*

Again, this remains open to interpretation. Which activities will require quality control? At whose expense is auditing, monitoring, evaluation, and reporting occurring? There is a clear need to develop harmonised protocols in quality control practices, auditing, monitoring, and reporting in Timor-Leste to effectively protect the environment and human health from the impacts of plastics across the plastics lifecycle.

The other main issue here is limited data on plastics pollution. Strengthened monitoring and reporting protocols that include plastics could help rectify this. Data on waste density, including data on the quantity and composition of waste, volumes, and high concentration points ('hotspots') are not currently available in Timor-Leste. Documents refer to pollution and waste in general, but they do not specifically address plastics. For example, Article 16 of *Decree-Law 26/2012 - Establishing the Environmental Basic Legislation* refers to the monitoring and evaluation of waste and/or pollution:

> *'It is incumbent upon the State to create a transparent, comprehensive and decentralised system of environmental monitoring that can implement integrated pollution control, assess the quality of environmental components, the state of use of natural resources and environmental impacts caused by economic activities, and gather the information necessary to comply with the present law.'*

At best, we can only assume plastics are included in the statement above, although they are not specifically mentioned. However, the toxic chemicals in plastics mean that the impacts of plastic pollution on the environment and human health differ from other waste streams. For these reasons too, the management and remediation activities required as a result of plastic pollution differs from other forms of waste. It is crucial that plastics, as a particular waste category, are specifically addressed in national legislation, plans, and policies if plastics pollution is to be prevented.

Compliance to national legislation is a critical issue. PacWaste Plus (2020) describes the administrative compliance and performance of relevant legislation, policies and plans in relation to waste management in Timor-Leste as low-to-medium level.

Support is urgently needed in regard to the implementation, compliance, and enforcement of these laws. For instance, in *Government Resolution 32/2016 - Investment Strategy for Managing Urban Solid Waste in Dili*, the Resolution and the annex provide a new strategy to increase recycling and enhance landfilling through investments in recycling cages and the collection of green waste at Community Collection Points and upgrading to a sanitary landfill operated and managed to international standards. However, there are no national waste and littering reduction targets with agreed timelines and there is no consideration of tracking production, trade or otherwise. The *National Biodiversity Strategy and Action Plan 2011-2020* (NSBAP) includes a coordinating mechanism and monitoring system and is a guiding document focussing on broad consolidated biodiversity laws instead rather legal measures under specified subject sectors (IDLO, 2017). Plastic is only mentioned once in this document and the establishment of a national biodiversity monitoring and reporting system has not been achieved (GoTL, 2015).

Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics is a step forward, with Article 15 referring to the tracking of the production, trade and consumption of plastic objects and materials:

> *[t]he traceability of materials and objects is ensured at all stages in order to facilitate control, the withdrawal of defective consumption products, foster information to consumers and the assignation of responsibilities.*

To strengthen this Article further, the withdrawal of hazardous consumption products to prioritise consumer safety at all stages could be considered.

In all documents analysed there is no mention of any national reduction targets with agreed timelines. For this, and reasons mentioned above, this theme is indicated yellow in ***Table 8***.

Transparency and Freedom of Information

Citizens have the right to access environmental information from the public authorities. It is therefore important for the government to facilitate this by the implementation of labelling and certification schemes and information about the impacts of plastics, including product and lifecycle, thereby helping consumers make safer choices. Until affordable and safe alternatives exist widely, transparency and freedom of information alone cannot ensure the protection of human health and the environment.

Article 12 of the *Decree Law 2/2017 – Urban Solid Waste Management System* refers to the right to information, but it is solely focussed on the economic and financial aspects of solid waste management (SWM):

> *Users have the right to be informed in a clear and convenient manner of the conditions under which the service is provided, in particular regarding the applicable fee.*

Labelling is addressed in Article 14 of *Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics* and requires producers to label the plastic materials and products produced. This is so that they can be easily identified as reusable, recyclable, biodegradable or compostable. It further states that information must be easily visible, legible, indelible, and intelligible. To strengthen labelling legislation, information about additives, monomers and other toxicants associated with packaging such as adhesives and printer ink should be included, as well as percentage of recycled content and directions of how the plastics can be responsible and safely managed after use.

Besides *Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics* no other key documents refer to information availability. Moreover, freedom of information

should not only relate to consumers but be available for all relevant stakeholders along the supply chain in order to apply best practice for all plastics and plastic products.

Compliance Measures and Enforcement

The United Nations Environment Program (2020) states in its *Legislative Guide for the Regulation of Single-Use Plastic Products* that one of the core components in preparing legislation to ban single-use plastics, is defining the enforcement mechanisms and naming the responsible authorities.

Of all documents analysed, enforcement provisions relating to plastics are specified only in *Decree-Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics.* Articles 41 to 44 provide the following enforcement measures:

- Simple infractions, as constituted against an order, is punishable by a fine of US$100 up to US$1000 for the violation of the provisions of Articles 4, 9, 10, 19, 20, 21, 23, 25 and 26…
- Serious offences, such as violation of the provisions of Articles 13 (documentation), 14 (labelling), 27 (quality and safety) and 28 (supporting documents), will be punishable by a fine of US$500 to US$5000.

For plastics pollution prevention legislation to be effective it must include compliance and enforcement measures that clearly articulate how enforcement should be carried out in practice. Currently, there are two government departments responsible for enforcement of the plastic bans. Article 44 states the Secretary of State of the Environment under the Ministry of Economic Affairs is responsible for inspection and supervision of economic activity and the processing of administrative offences, whereas the Ministry of Commerce, Industry and Environment is responsible for the application of fines. However, perhaps in part due to confusion over who should be doing what when it comes to compliance and enforcement activities, single-use plastics bans have had very little impact in Timor-Leste (UNEP, 2020). One year after the *Decree-Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics* came into effect, plastic bags still widely available in retail stores and supermarkets in Timor-Leste, and plastic food packaging was still being imported (De Sousa, 2022), demonstrating challenges of implementation and enforcement in practice.

In addition, some documents do enforce compliance for general waste, e.g., for waste dumping, and although plastics are not specified, this legislation can potentially prevent plastic pollution and toxins entering the environment and impacting human health. For example, *Decree Law 2/2017 - Urban Solid Waste Management,* legislates enforcement through fines for non-compliance to its Articles. The issue here, again, is whether these Articles are being enforced in practice.

Definitions

Providing standardised and specific definitions related to plastic pollution avoids ambiguity in the interpretation of legislation and minimises loopholes. Standardised definitions also support effective monitoring, evaluating, and reporting of the impacts of plastics pollution as well as the impact of legislation, plans, and policies. The documents analysed do not provide definitions of plastics or plastics pollution.

However, five of the key documents do offer a waste or hazardous material definition that could encompass plastic pollution. The issue is these definitions are not consistently applied, and the extent to which these definitions apply to plastics is unclear.

For example, Article 1 of the *Decree-Law 26/2012 - Establishing the Environmental Basic Legislation* defines waste as including any solid, liquid, or gaseous effluent, substance, or object, considered useless, superfluous or worthless, generated by human, commercial, and industrial activity and which need to be disposed of, or recycled. Plastics pollution refers both to the material substance and the toxic chemicals it off-gases, and requires safe disposal and recycling where possible, so one must assume plastics fall under this definition of waste. Article 3 of *Decree Law 37/2020 for the Disposal, Import and Production of Bags, Packaging and other Plastics* provides several definitions relevant to plastics pollution: waste, eco-toxic, and toxic. Waste is defined as 'any substances or objects that the holder disposes of or intends to dispose of.

Eco-toxic is defined as 'waste that represents or can represent an immediate or deferred risk for one or more sectors of the environment'. Toxic is defined as, 'a substance, a mixture of substances or waste whose inhalation, ingestion or cutaneous penetration may represent a serious, acute or chronic health risk or even cause death'. Plastics comprise toxins that are hazardous to human health along their lifecycle. They are endocrine disruptors and lead to serious and life-threatening diseases such as cancer, diabetes (Types 1 and 2) and obesity (Sendra et al., 2021).

Decree-Law no. 2/2017 - Urban Solid Waste Management System divides waste into two categories: waste and urban solid waste. Here, 'waste' refers to 'any substance or object which the producer or holder discards or intends or is required to discard', or 'urban solid waste (USW)' which is defined as waste originating from a property or from commercial or industrial establishments and health-care establishments (not exceeding 1,100 litres per product), including: urban green waste, cleaning waste, animal waste, demolition and construction waste, hazardous waste, and hospital waste. The extensive categories under urban solid waste, including hazardous waste, are not further defined in this Decree-Law 2/2017 Urban Solid Waste Management System. Article 7 includes litter, paper and cardboard, glass, and used tyres in its definition of recoverable waste but does not include plastics.

The variety of definitions related to waste throughout key legislation, policies and plans have contributed to an incoherent set of standardised definitions, hampering a harmonised system for monitoring, evaluating, and reporting.

Table 8: *Standardisation gap analysis of key documents using the analytical framework. Green indicates explicit mention of the theme in the document; yellow indicates that the document either partially includes the theme or that it is inferred; and red indicates that the theme is absent in the document.*

	Product design	Polymer restrictions	Additive restrictions	Voluntary certification & Industry standards	Mandatory product stewardship	National monitoring, reporting & inventories	Transparency & Freedom of Information	Compliance measures and enforcement	Definitions
LEGISLATION									
Decree-Law 37/2020 - The Disposal, Import and Production of Bags, Packaging and other Plastics									
Decree-Law no. 6/2020 - Legal Regime for Protection and Conservation of Biodiversity									
Decree-Law no. 2/2017 - Urban Solid Waste Management System									
Ministerial Diploma no. 46/2017 - For the Regulation of Environmental Evaluation									
Decree-Law no. 5/2016 – National System of Protected Areas									
Decree-Law no. 26/2012 - Establishing the Environmental Basic Legislation									
Decree-Law no. 14/ 2017 - Customs Code (Decree -Law 87/2022 Amendments to Customs Code)									
POLICIES AND PLANS									
Strategic Development Plan 2011 - 2030									
National Biodiversity Strategy and Action Plan 2011 – 2020									
National Plan of Action for the Coral Triangle Initiative									
Program of the VIII Constitutional Government									
Parliament Resolution 12/2018 - Action on the Protection and Conservation of the Environment									
Government Resolution 32/2016 - Investment strategy for the management of solid urban waste in the city of Díli									
Government Resolution no. 15/2016 – National Strategy for Sea Waste Management									
Parliament Resolution no. 9/2016 - Adoption of Urgent Information and Awareness Measures for the Preservation of the Environment									
Government Resolution no. 33/2011 - National Adaptation Programme of Action (NAPA) for Climate Change									

Recommendations

Global Objectives

- Due to its geographical positioning Timor-Leste is considered part of both Asia and the Pacific. While the country is party to several regional partnerships (***Table 3***), there is potential for it to fall through gaps in plastics pollution prevention programmes where it may not be involved in programs in Asia or the Pacific. It is for this reason that Timor-Leste may consider forging regional private-public partnerships, growing economies of scale for container return schemes and other reduction, refill, reuse, and recycling programmes.
- Timor-Leste should consider committing to the development of national plastic pollution elimination plans which include measurable reduction/ prevention targets, as well as commit to international, and regional (both to those in Asia and the Pacific) plastic pollution prevention and elimination agreements and programmes.
- The following international goals and instruments, including measurable targets need to be captured and/or ratified and included in national legislation, policies and plans to ensure a full life cycle approach to the prevention of plastics, including the prevention of the transboundary movement of plastics;
  - Sustainable Development Goals (SDGs) including SDG 3 - Good Health and Wellbeing, SDG - Clean Water and Sanitation, SDG 8 - Decent Work and Economic Growth, SDG 10 - Reduced Inequalities, SDG 11- Sustainable Cities and Communities, SDG 12 - Responsible Production and Consumption, SDG 13 - Climate Action, SDG 14 - Life Below Water, SDG 15 - Life on Land, SDG 16 - Peace, Justice and Strong Institutions, SDG 17- Partnership for the Goals.
  - Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel Convention)
  - Stockholm Convention on Persistent Organic Pollutants (Stockholm POPs Convention)
  - Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam Convention)
  - United Nations Framework Convention on Climate Change (UNFCCC)
  - The Human Right to a Clean, Healthy, and Sustainable Environment for all people.
- Timor-Leste can strengthen existing and future plans and policies through horizontal integration, creating legislative links in the policy framework for action to address plastic pollution. Immediate investments in the development of plastic pollution prevention governance frameworks that support Timor-Leste in meeting their international obligations should be considered.
- The upcoming East Asian Seas Region Reducing Marine Plastics (2023-2027) project component 1: Improving local governance on marine plastics management, will go some way to addressing this but should consider focusing efforts on plastics pollution governance more broadly instead of on a narrow definition of marine plastics.
- Reducing the country's oil and gas extraction and import dependency by diversifying the economy is needed to prevent plastic pollution and reduce resulting climate change impacts.

Waste Prevention

- Introduce, review, and update national legislation, plans and policies to include obligations and control measures along the lifecycle of plastics - upstream, midstream, and downstream. The Center for International Environmental Law's (CIEL) IINC 2 submission 'Proposed responses on the potential options for elements towards an international legally binding instrument' (CIEL 2023) focuses on upstream measures to prevent plastic pollution and is a useful reference document. We draw on CIEL's submission in making these upstream waste prevention recommendations.
  - Consider control measures to reduce and phase out the production and consumption of the most problematic plastic precursors and materials.
  - Consider phasing out petrochemical drawbacks/ subsidies for plastic feedstocks and precursors.
  - Consider reduction targets on the production, consumption and use of fossil-based plastics feedstocks, precursors, and materials.
  - Consider specific provisions related to microplastic given the unique challenges they pose because of their impossibility to clean up and their biological availability.
  - Ensure compliance of plastics feedstocks, precursors and materials production with human rights and environmental justice standards and protection of environmental justice.
  - Ensure production, collection, and reporting of data on plastics feedstocks, precursors, and materials.
  - Consider trade restrictions on plastic feedstocks, precursors, and materials.
  - Consider financial mechanisms, taxes, charges, and fees to be levied on plastic precursors and materials production, and/or on certain plastic products.
- Introduce policies and plans that prevent the flow of plastics into the region via fisheries, shipping, and tourism.
- Market based instruments and sustainable financing mechanisms, embedded in national legislation and policies, can dramatically reduce the volume of imported plastics; ensure producers internalise the full costs of their products through product stewardship schemes, or that all stakeholders are held responsible for plastic products with the development of EPR schemes.
- Introduce policies and plans to support educational and awareness raising campaigns with producers, importers/ exporters, suppliers, retailers, and the fisheries and tourism industry for futureproofing and the fostering of sustainable production and consumption of plastics.
- The customary law of *Tara Bandu* has been effective in coastal and marine resource management and has the potential to be similarly effective when enacted to address plastic pollution. *Tara Bandu* presents the opportunity to deepen the connection between Timorese communities and the environment as well as strengthening the relationship between the community, government, industry, and non-government agencies.

Waste Management

- With the current level of waste management in Timor-Leste being informal and with few resources directed at an integrative waste management system, priority should be given to strengthening SWM collection infrastructure and services by extending the network of SWM throughout the national territory.
- At the same time, the rights of people working in the informal waste sector must be protected in relevant legislation, policies, and plans.
- With the upgrade of the Tibar dumpsite still at an early design phase, a comprehensive legislative framework should be developed to support landfill design, monitoring, management, and remediation that ensures safe and effective disposal of plastic pollution.
- Tibar Bay port became operational at the end of 2022. This increases Timor-Leste's capacity for reverse logistics/backloading (e.g., filling empty trucks and/or shipping containers with waste on their return to point of origin/production), especially when combined with legislated container deposit schemes (CDS). Priority should be given to plans, policies and legislation that support reverse logistics.
- For plastic products that are difficult to ban due to import dependency, the introduction of container deposit legislation (CDL) has proven to significantly increase circularity and decrease leakage. Enacting CDL should be prioritised.

Microplastics

- Consider placing import restrictions on primary microplastics and products containing intentionally added microplastics.
- Place manufacturing restrictions on products to include no intentionally added microplastics.
- Design protocols to reduce microplastics leakage at each stage in the supply chain.
- Develop manufacturing standards for durability of plastics including tyres to reduce shedding.
- Design protocols to prevent pre-production pellet spills and for the safe recovery of pre-production pellet spills. This should include polluter pays mechanisms.
- It is recommended that factsheets on the impact of plastics including microplastics on human health and environment be developed by UNEP and plastics scientists in partnership with the Government of Timor-Leste and distributed by the Government to key policy makers and relevant government departments.

Standardisation

- To work towards achieving the 'Zero Plastic' goal, it is recommended the Government of Timor-Leste:
  - Assure compliance with (international) standards through third-party certification such as ISO, (eco-)labelling and marking.
  - Execute regular inspections on imported goods (audits).
  - Prioritise eco-labelling for consumers to access transparent information to make informed consumer choices.
  - Create access to records, targets, data for public use through well implemented monitoring and reporting systems.
  - Implement a coherent set of standardised definitions to ensure a harmonised system for monitoring, evaluating, and reporting.
- For Timor-Leste to effectively prevent plastic pollution they must be provided with open access to the latest science and best practice by the international community.

Conclusion

This gap analysis highlights the strengths and limitations in Timor-Leste's national legislation, plans and policies in preventing plastic pollution. Findings demonstrate there is currently no national-level waste prevention or waste management legislation in place that could reduce plastics entering the country and polluting its ecosystems and contaminating its people. This is largely because measurable and timebound national plastic pollution reduction targets and mandatory mechanisms to meet those targets have not been established; there is an absence of trade restrictions (importation bans on problematic polymers and plastic products), financial mechanisms to disincentivise plastic pollution and incentivise the production of toxic-free alternatives, and links between plastic pollution and climate change in Timor-Leste's policy framework. Legislative and policy gaps are most evident under the themes of waste prevention, waste management and microplastics, all which pose extreme risks to human and environmental health.

The *Program of the VIII Constitutional Government* meets only four out of thirty-five themes in the analytical framework, indicating it would be infeasible for this plan to meet its Zero Plastics aspirations. Overall, there have been several missed opportunities for the country to strengthen and integrate newer plastics pollution prevention provisions into policies, legislation, and plans to meet its plastics pollution prevention aims.

The addition of the theme 'education and capacity development' under the Waste Prevention category demonstrates the importance of educating extracting industries, plastics producers, manufacturers, suppliers, retailers, and policy makers on the environmental and human health harms of the full life cycle of plastics and the actions necessary to mitigate against these and prevent plastic pollution in Timor-Leste. The responsibility of plastic pollution must lie at the top of the zero-waste hierarchy – with producers, not with consumers. With increased awareness aimed at transnational corporations, businesses, and industries at the top of the zero-waste hierarchy there is potential for future plastic pollution measures to be implemented.

The introduction of *Decree-Law 37/2020* on plastics, is a move in the right direction. It places responsibility on importers, highlights intergenerational equity and justice in its aims to conserve environments for future generations, and promotes standardisation in the design, production, and marketing of plastic products. The *Decree Law* makes provisions for the reuse, recycling, composting, biodegradability, or energy recovery of plastics. However, there is scientific consensus that biodegradability and energy recovery of plastics are 'false solutions' and will likely do further harm to Timor-Leste's environment and the health of its people.

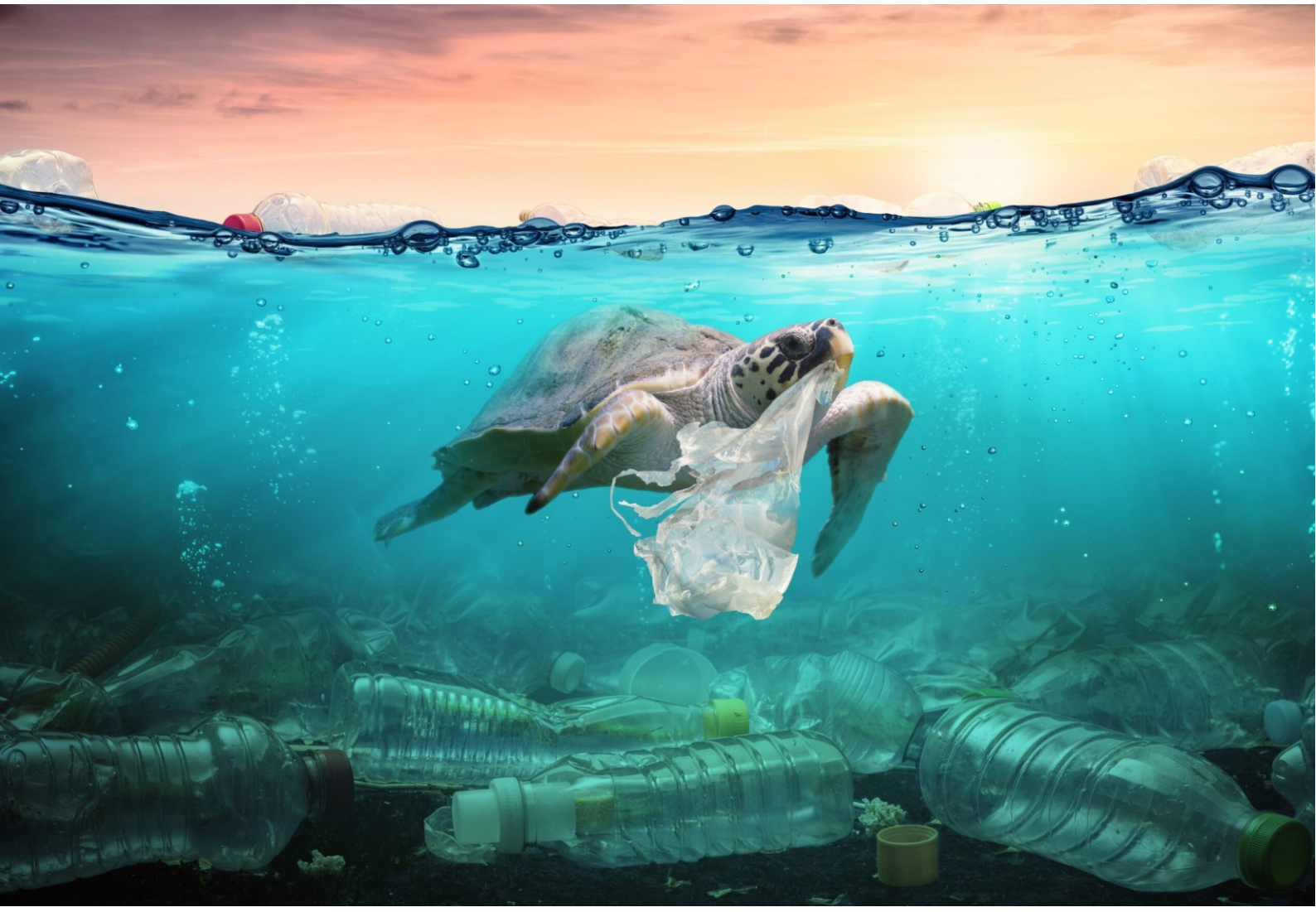
Further, by permitting toxic plastic materials, products, and substances, and without timebound and measurable national reduction targets, enforcement, and the vertical and horizontal integration of national legislation, plans and policies, plastic pollution cannot be prevented and the goal of a 'Zero Plastic Timor-Leste' will remain unmet.

Timor-Leste has local and traditional governance and knowledge systems that could support plastic pollution prevention and protect the human right to a clean, healthy, sustainable environment for all peoples.

Due to the potential for Timor-Leste's priorities and concerns to remain unheard and addressed in regional and global negotiations (as part of both Asia and the Pacific), it will be crucial for the Government of Timor-Leste to actively engage in the current global treaty negotiations to support action oriented to their plastic pollution prevention and 'Zero Plastic Timor-Leste' ambitions.

If Timor-Leste does not put in place and enforce the legal and policy frameworks needed to effectively regulate the operations of production and manufacturing companies, the health and rights of its people will be increasingly negatively impacted as global plastic production volumes rise, along with the social and economic costs of remedy (including landfill remediation, clean-ups from polluting events, and legacy pollution).

A legally binding international treaty that mandates a set of obligations and control measures for plastics along their full life cycle starting with extraction, petrochemical and polymer production, and plastic production design standards will help prevent plastic pollution in Timor-Leste.



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Appendices

***Appendix 1**: Overview of all publicly available online national legislation, policies and plans relevant to plastic pollution in Timor-Leste.*

Environmental Policy and Legislation	Decree-Law no. 41/2022 – creating the National Environmental Licensing Authority
	Decree-Law 37/2020 - The Disposal, Import and Production of Bags, Packaging and other Plastics
	Decree Law no. 6/2020 – Legal Regime for Protection and Conservation of Biodiversity
	Enacted text of Decree-Law no. 6/2020 on Biodiversity
	Decree-Law no. 15/2019 - Organic law for the State Secretary for Environment
	Ministerial Diploma no. 44/2017 - Regulation on Impact and Benefits Agreement;
	Ministerial Diploma no. 45/2017 - Regulation on the Statute and Rules of procedure for the Evaluation Committee for the Management of the Environmental Assessment Process for Category A projects;
	Ministerial Diploma no. 46/2017 - Regulation on the Detailed Requirements for Screening, Scoping and the Terms of Reference, Environmental Impact Statements and Environmental Management Plan for Environmental Assessment;
	Ministerial Diploma no. 47/2017 - Regulation on the Public Participation Procedures and Requirements During the Environmental Assessment Process.
	Decree-Law 5/2016 – National System of Protected Areas
	Government Resolution no. 05/2012 – Environmental Policy
	Decree-Law no. 26/2012 - Establishing Environmental Basic Legislation
	Decree-Law no. 05/2011 - Environmental Licensing
	Government Resolution no. 16/2016 – National Policy on Urban Mobility
	National Parliament Law no. 6/2017 – Base Law for Planning
Water and Sanitation	Decree-Law no. 04/2004 – Approving the Water Distribution Regime for Public Consumption
	Decree-Law no. 33/2008 – Hygiene and Public
	Government Resolution no. 08/2012 – Sanitation Policy
	Ministerial Order no. 23/MOP/2013 - Establishing and regulating the structure of the Directorate General for Water and Sanitation (DGAS) of the Ministry of Public Works.
	National Parliament Resolution no. 9/2016 - Recommends to the Government the Adoption of Urgent

Water and Sanitation	Information and Awareness Measures for the Preservation of the Environment
	Government Resolution no. 32/2016 – Investment Strategy for the management of Urban Solid Waste in Dili
	Ministerial Diploma no. 32/2016 – Sewerage Cleaning Program
Culture and Heritage	Government Resolution no. 24/2009 – National Policy for Culture
	Decree-Law no. 33/2017 - Legal Regime for Cultural Heritage
Tourism	Decree-Law no. 24/2014 – Legal Framework for the Tourism Policy
Solid Waste Management	Law no. 3/2012 - Legislative Authorisation on Environmental Matters
	Decree-Law no. 3/2016 - Statute of Municipal Administrations (municipal administrations and authorities to develop solid waste management systems)
	Decree-Law no. 2/2017 – Urban Solid Waste Management System
	Joint Ministerial Diploma no. 43/2017 - Solid waste treatment systems
Human Rights	Law No. 7/2004 Approving the Statute of the Office of the Ombudsman for Human Rights and Justice.
Labour Laws	Decree Law no 4/2012 on Labour
Customs (Imports/ Exports)	Decree-Law no. 14/ 2017 - Customs Code
	Decree -Law 87/2022 Amendments to Customs Code
National Policies, Plans and Programs	National Plan of Action for the Coral Triangle Initiative
	Strategic Development Plan 2011-2030
	National Biodiversity Strategy and Action Plan 2011 – 2020
	Government Resolution no. 33/2011 - National Adaptation Plan of Action (NAPA) for Climate Change
	Government Resolution no. 8/2012 - National Sanitation Policy
	Government Resolution no. 15/2016 – National Strategy for Sea Waste Management
	Parliament Resolution no. 12/2018 - Recommends the Government to take measures for the protection of Environmental Conservation
	Program of the VIII Constitutional Government
	Timor-Leste Disaster Management Reference Handbook
	Timor-Leste National Health Strategic Plan 2011-2030

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