

Annex:
Summary of Survey Responses

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1. CANADA

1.1 Laws and Regulations

A summary of the waste management and marine debris laws and regulations in Canada is found in Table 1.

Table 1: Laws and Regulations associated with Waste Management and Marine Debris in Canada

Laws and Regulations	Brief Description	Waste Management Processes	Sources
Canada Shipping Act and the Canadian Environmental Protection Act, 1999 (CEPA 1999)	<ul style="list-style-type: none"> Prohibit the discharge or disposal of litter in Canadian waters or by Canadian vessels. 	Disposal	Waste from ships
The Fisheries Act	<ul style="list-style-type: none"> Prohibit the deposit of deleterious substances into domestic waters frequented by fish. Prohibit serious harm to fish and their habitat. 	Disposal	Waste from ships
Species at Risk Act	<ul style="list-style-type: none"> Protect critical habitat for listed species, including the marine environment for aquatic species at risk. 	Disposal	Any debris or rubbish
The Migratory Birds Convention Act, 1994	<ul style="list-style-type: none"> Prohibit the deposit of harmful substances in waters of areas frequented by migratory birds or in places where the deposit can reach such waters or areas. 	Disposal	Any debris or rubbish
The Microbeads in Toiletries Regulations under CEPA	<ul style="list-style-type: none"> Prohibit the manufacture, import and sale of toiletries containing plastic microbeads to reduce plastic microbeads entering Canada's freshwater and marine ecosystem. 	Disposal	Waste from the manufacture, import and sale of toiletries
Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations	<ul style="list-style-type: none"> Regulate hazardous waste and hazardous recyclable materials transported across international borders.¹ 	Disposal	Any hazardous waste of recyclable material

1.2 International Conventions

Canada has endorsed a number of international conventions for the management of marine debris, which include:

- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal: Includes binding commitments to increase transparency, tracking as well as control over the global trade of non-recyclable plastic waste. It also aims to strengthen the transboundary movement of plastic waste globally.

¹ 'Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations - Guide to Hazardous Waste and Hazardous Recyclable Material Classification', Government of Canada, accessed 20 November 2019, <https://ec.gc.ca/gdd-mw/default.asp?lang=En&n=A8D9E099-0&offset=1&toc=show>

- Convention on Biological Diversity: Aims to: (1) conserve biological diversity; (2) ensure sustainable use of the components of biological diversity; and (3) ensure fair and equitable sharing of benefits that arise from the use of genetic resources.²
- Stockholm Convention on Persistent Organic Pollutants: Protects humans and the environment from detrimental chemicals that are widely distributed and accumulated in the environment for long periods, posing health risks to humans and wildlife.³
- Rotterdam Convention: Aims to facilitate cooperation and shared responsibility between parties for the trade of hazardous chemicals and contribute toward environmentally sound use of these hazardous chemicals.⁴
- International Convention for the Prevention of Pollution from Ships (MARPOL) Annexes I to VI: Addresses the prevention of marine environment pollution by ships from operational or accidental causes. It requires economies to ensure that vessels are able to dispose waste in ports and that the disposal is in compliance with MARPOL Annex V. Canada has implemented this through regulations such as The Canada Shipping Act (2001) and the Vessel Pollution and Dangerous Chemicals Regulation, among others.
- London Convention (1972) and Protocol (1996) to prevent marine pollution by dumping at sea: Prohibits dumping of certain hazardous material to prevent marine pollution.

Relevant non-legislated international commitments include:

- Ocean Plastics Charter: Aims to move toward a more resource efficient and sustainable approach in the management of plastics.
- Food and Agriculture Organization of the United Nations (FAO) Code of Conduct for Responsible Fisheries: Establishes international standards to conserve, manage and develop aquatic resources with consideration for the eco-system and biodiversity.
- Strategic Approach to International Chemicals Management: Aims to ensure sound management of the lifecycle of chemicals by the year 2020 to reduce the detrimental impact on the environment and human health.⁵
- Marine litter action plan and implementation framework under G20: Conducts concerted efforts to ‘promote and initiate measures at local, economy-wide and regional levels to prevent and reduce marine litter’.⁶
- G7 Action Plan to Combat Marine Litter: Aims to reduce marine litter from land and sea-based sources.
- United Nations Clean Seas Campaign: Promotes actions to reduce the amount of plastic released into the world’s oceans.
- Global Partnership on Marine Litter: Aims to prevent marine litter, including microplastics.⁷
- United Nations Sustainable Development Goals, in particular Goals 12 and 14.

² Convention on Biological Diversity, accessed 20 November 2019, <https://www.cbd.int/intro/default.shtml>

³ Stockholm Convention, United Nations Environment Programme, accessed 20 November 2019, <http://www.pops.int/TheConvention/Overview/tabid/3351/Default.aspx>

⁴ Rotterdam Convention, United Nations Environment Programme, accessed 20 November 2019, <http://www.pic.int/TheConvention/Overview/tabid/1044/language/en-US/Default.aspx>

⁵ Strategic Approach to International Chemicals Management, United Nations Environment Programme, accessed 20 November 2019, <http://www.saicm.org/About/SAICMOverview/tabid/5522/language/en-US/Default.aspx>

⁶ ‘G20 Action Plan on Marine Litter’, Ministry of Foreign Affairs of Japan, accessed 20 November 2019, <https://www.mofa.go.jp/mofaj/files/000272290.pdf>

⁷ The Global Partnership on Marine Litter Platform, accessed 20 November 2019, <http://marinelitternetwork.com/the-partnership/>

- International Maritime Organization (IMO) Action Plan to Address Marine Plastic Litter from Ships.
- United Nations Environment Assembly resolutions on marine plastic litter and microplastics.

1.3 Preventive Measures

To prevent plastic waste and marine litter, Canada has launched the Canada-wide Strategy on Zero Plastic Waste. To implement the strategy, it has adopted phase 1 of the action plan in 2019 to develop consistent extended producer responsibility programmes, create a roadmap to address single-use and disposable plastics, support recycling infrastructure and innovation in plastic manufacturing as well as identify tools for green procurement practices. The introduction of phase 2 in 2020 will identify actions to improve consumer, business and institutional awareness; reduce waste and pollution from aquatic activities; advance science to capture and clean-up debris in the environment; and contribute to global action.

Additionally, Canada introduced the Microbeads in Toiletries Regulation in 2017, which prohibit the manufacture, import and sale of toiletries that contain microbeads. Canada has also published the Canadian Plastics Science Agenda that spans the lifecycle of plastics to inform future science and investments for detecting plastics in the environment; understanding and mitigating its impact on the environment; and advancing sustainable plastic production, recycling and recovery.

Other efforts include hosting forums to allow for information exchange (e.g., Best Brains Exchange on the Ecological and Human Health Fate, etc.) and committing \$2 million toward research on the impact of microplastics on aquatic ecosystems. Canada also aims to increase awareness of waste and pollution through engagement sessions with communities and organisations. For instance, Environment and Climate Change Canada provides funds of over \$3 million to support the reduction of plastic waste and marine litter.

1.4 Remedial Measures

Apart from preventive measures, remedial measures have also been undertaken with Canada committing over \$10 million toward innovation challenges to address plastic waste. Fisheries and Oceans Canada has also provided \$8.3 million to clear waste in the oceans, specifically fishing gear. In addition to initiatives to clean waste, Canada funds education and awareness campaigns. Environment and Climate Change Canada has provided over \$3 million to these campaigns (e.g., 10,000 Changes), shoreline clean-ups, and community projects.

1.5 Funding and Research

Funding for marine debris prevention is largely obtained from the government. Some of these initiatives include:

- A \$2 billion investment to provide communities with more reliable water and wastewater systems.
- Investments in innovative technology to tackle plastic pollution (e.g., providing \$10 million to Canadian businesses).
- Awareness campaigns and community action (e.g., Environment and Climate Change Canada provided over \$3 million to support on-the-ground projects and awareness and

education campaigns; Fisheries and Oceans Canada announced \$8.3 million in funding to get rid of fishing gear).

- Committing \$100 million toward the goals of the Ocean Plastics Charter, which brings together governments, businesses and civil society organisations to commit to take actions to eradicate plastic pollution and take a lifecycle approach to plastic stewardship on land and at sea.

Canada also conducts and invests in research related to marine debris. It has convened researchers through initiatives such as the Best Brains Exchange on the Ecological and Human Health Fate as well as the Effects of Micro-plastic Pollution and Science Symposium. The Canadian Plastics Science Agenda was published in 2019 to inform future research and science investments across the lifecycle of plastics. Efforts have also been made to disseminate this research to the public.

1.6 Land-Based Marine Debris Preventive Measures

Some initiatives Canada has undertaken to prevent land-based marine debris from entering the marine environment include:

- Implementing tax/fee or bans on single use plastics (e.g., North West Territories now implement a 25 cent fee on plastic bags).
- Providing a subsidy, rebate or incentive to encourage sustainable habits (e.g., deposit returns for bottles).
- Extended Producer Responsibility programmes (in all provinces and territories, excluding Nunavut).
- Awareness and educational programmes (e.g., 10,000 Changes and Be Plastic Wise national campaigns).
- Waste collection and recycling programmes (e.g., municipals have introduced local waste programmes and anti-litter by-laws).

1.7 Land-Based Marine Debris Remedial Measures

Some initiatives Canada has undertaken to reduce land-based marine debris from entering the marine environment include:

- Supporting community shoreline clean-ups, fishing gear removal and collecting citizen science data.
- Enforcing anti-litter laws.
- Using technologies to better trap microplastics in wastewater and advancing methods to collect and assess microplastics in the environment.
- Ensuring adequate waste management facilities, including in areas such as harbours and ports.
- Collecting data on the quantity and type of marine litter.

1.8 Sea-Based Marine Debris Remedial Measures

Canada requires commercial fishers to report lost and retrieved fishing gear. It has committed over \$8 million to support this initiative. Furthermore, Canada has joined the Global Ghost Gear initiative that aims to remove abandoned or lost gear. In the same vein, Canada has put in

place the Canadian Environmental Protection Act that deals with the disposal of waste from structures (e.g., ships, aircrafts). It also regulates the disposal of non-hazardous substances under the Disposal at Sea regulations.

Other initiatives have also been undertaken, such as the Wrecked, Abandoned or Hazardous Vessels Act to address abandoned and derelict vessels.

1.9 Marine Debris Monitoring

The marine debris monitoring methods implemented by Canada and their details are provided in Table 2.

Table 2: Marine Debris Monitoring in Canada

Monitoring Methods	Source Identification Methods	Detailed Description
Detection and Analysis		<ul style="list-style-type: none"> • Conduct and support research on the plastic economy in Canada • Launched Canada’s Plastics Science Agenda in 2019 • Currently completing a science summary on plastic pollution
Citizen Science	Visual Identification	<ul style="list-style-type: none"> • Support the Great Canadian Shoreline Clean-up

2. CHILE

2.1 Laws and Regulations

A summary of the waste management and marine debris laws and regulations in Chile is found in Table 3.

Table 3: Laws and Regulations associated with Waste Management and Marine Debris in Chile

Laws and Regulations	Brief Description	Waste Management Processes	Sources
Law No. 18695, Constitutional Organic of Municipalities	<ul style="list-style-type: none"> Establish that the cleaning and decoration of the communities is a function of the municipalities. Ensure domestic waste collection, transportation and disposal. 	Collection, transportation and disposal	Domestic waste
Law No. 2.222, (Article No. 142)	<ul style="list-style-type: none"> Prohibit the disposal of debris or rubbish or other harmful substances, of any kind, which cause damage or harm to the waters subject to the economy-wide jurisdiction, in ports, rivers and lakes. Regulate things related to navigation, ships, naval artefacts, ports, maritime terminals, navigation crew, contaminations control and preventive measures. 	Disposal	Any debris or rubbish
Regulation No. 320, Environmental Regulation for Aquaculture	<ul style="list-style-type: none"> Require aquaculture facilities to adopt measures to prevent the dumping of waste. Maintain the cleanliness of beaches and beach areas surrounding the facility of cultivation from all solid waste generated by aquaculture activities. 	Disposal, general waste management.	Aquaculture waste
Regulation No. 1.340, General Regulation of Order, Security and Discipline in the Ships and Coast of the Republic	<ul style="list-style-type: none"> Prohibit the throwing garbage or rubbish on beaches; there is no specific penalty fee, but Article 342 states that the Captain of the Port has the faculties to penalty. Any infringement of the articles in this Regulation, in which the penalty is not specified, will be subject to a discretionary fine that will be applied by the said official. 	Disposal	Waste from ships
Regulation No. 1, Regulation for the Control of Aquatic Pollution	<ul style="list-style-type: none"> Prohibit the disposal of rubbish or garbage or any waste or harmful substances, of any kind, that cause or may cause damages in the waters subject to economy-wide jurisdiction and in ports, rivers and lakes. Address the issue of Prevention of Contamination by Garbage from Ships and Naval Artifacts, consisting of five articles. 	Disposal	All rubbish, garbage and waste from ships and naval artefacts

2.2 International Conventions

Chile has adopted legislations from international conventions for the management of marine debris, including:

- MARPOL Annex V Prevention of Pollution by Garbage from Ships: Regulates the disposal of garbage from ships at port into port reception facilities and inspects the Garbage Management Plans.
- London Convention 1972 and Protocol: Deals with the Prevention of Marine Pollution by Dumping of Wastes and Other Matters.
- UN Convention on the Law of the Sea: Focuses on the environmental scope throughout the Regional Seas Programme.
- FAO Code of Conduct for Responsible Fisheries: Ensures that fisheries fleet complies with Article 8.7 on the protection of the aquatic environment, which states that ‘owners, charterers and managers of fishing vessels should ensure that their vessels are fitted with appropriate equipment as required by MARPOL 73/78’ to manage garbage.
- Other conventions include Basel Convention, Stockholm Convention and Minamata Convention.

2.3 Preventive Measures

Chile’s main sources of land-based marine debris (from most to least common) are:

1. Household and general littering
2. Tourism and coastal recreation
3. Waste management and collection
4. Toilet and sewer overflow

The main preventive measure is the passing of Law 21.100 that prohibits the provision of plastic bags by commercial establishments throughout Chile. Reducing plastic usage will decrease the amount of plastics that might end up in the sea. Another measure is to increase awareness on the impact of marine debris on the environment. This is done through campaigns organised by non-governmental organisations (NGOs) or private organisations with support from the government.

2.4 Remedial Measures

A remedial measure for marine debris is the economy-wide beach clean-up organised by the General Directorate of the Maritime Territory and Merchant Marine (DIRECTEMAR) during the International Coastal Cleanup. The programme aims to prevent garbage in beaches from entering the sea and to promote awareness on the impact of marine debris in schools and through social media.

Waste management measures that are most relevant to Chile (ranked from most to least relevant) are:

1. Ban on certain products (e.g., single-use plastics)
2. Voluntary beach clean-up programmes
3. Voluntary, centralised collection of certain products in exchange of a community benefit
4. Phase-out / ban on certain items or materials

5. Underwater clean-ups in hot spot areas (e.g., using divers or ‘Sea-Trash Collector’)
6. Improved cleaning operations in certain areas
7. Promotion of recycling campaigns

Chile’s main sources of sea-based marine debris (ranked from most to least common) are:

1. Aquaculture
2. Professional and recreational fishing
3. Shipping sector
4. Port activities
5. Offshore industries

The regulations and laws associated with sea-based marine debris from submarine emissaries, naval artefacts and aquaculture are as described in Table 3 above.

The remedial measures for marine debris include:

- Establishing programmes for identifying and mapping garbage across the coastline.
- Generating collaborative alliances (private/public/academia) for monitoring and collecting of marine debris.
- Improving enforcement of MARPOL Annex V and control of fishing nets and fishing gear like plastic in the fishing fleet, from small and medium enterprises to big fisheries.
- Increasing awareness within the shipping, aquaculture and fishing sectors.
- Ensuring that adequate port reception facilities are in place.
- Developing voluntary programmes for reducing plastic packaging on board vessels.

Chile has also established a National Work Group to address issues on marine debris and microplastics issues.

2.5 Research and Funding

Funds for marine debris research are available from the central government and at the provincial level, as well as at local universities. For example, Científicos de la Basura, a citizen science programme, has received funding from the National Commission for Scientific and Technological Research to study marine debris and microplastics throughout Chile.

2.6 Marine Debris Monitoring

Chile’s marine debris monitoring activity began in 2019 as a semestral programme led by the Maritime Authority, involving marine biologists and environmental engineers as well as help from the students.

Table 4: Marine Debris Monitoring in Chile

Monitoring Methods	Source Identification Methods	Detailed Description	Findings
Joint Group of Experts on the Scientific Aspects of Marine Environmental	Anthropogenic litter in beaches	<ul style="list-style-type: none"> • Begun in 2019 • Led by the Maritime Authority • Monitoring is conducted by marine biologists and environmental engineers who work at GESAMP; in 	Still in progress

Monitoring Methods	Source Identification Methods	Detailed Description	Findings
Protection (GESAMP)		<p>some places with the help from university students.</p> <ul style="list-style-type: none"> • Frequency: Every 6 months • Location: 13 beaches throughout Chile 	

2.7 Current Measures on Plastic Waste

Plastic waste is collected, transported and disposed of together with the rest of the waste generated at the household level, mainly into landfills. Along with the above, there are some systems of voluntary delivery, in green or clean points of polyethylene terephthalate (PET) plastic for subsequent recycling.

Chile has made a public commitment to move toward a ‘new plastics economy’. In October 2018, it signed the New Plastics Economy Global Commitment of the United Nations to implement measurable policies and report tangible progress by 2025. Some of the commitments include:

1. Take actions to eliminate single-use plastic containers and utensils that are problematic or unnecessary through redesign and innovation.
2. 100% of plastic containers and packaging must be designed to be recyclable, reusable or compostable.
3. One-third of residential and non-domiciliary plastic containers and packaging must be effectively recycled, reused or composted.
4. Plastic containers and packaging must have, in their different formats, an average of 25% recycled material.

In line with the above commitments, Chile has invited all companies and organisations including NGOs, universities, consumer associations and municipalities to voluntarily join the pact and contribute toward the development of the ‘new plastics economy’.

There is a new law (No. 20.920) that introduces the Extended Producer Responsibility for packaging, including plastic containers. It is expected to come into force in 2022.

2.8 Challenges and Opportunities

Marine debris pollution has economic implications on Chile’s aquaculture, tourism and fisheries industries. The debris blocks the uptake of water by desalination and thermoelectrical plants. Additionally, marine debris has a negative impact on marine animals due to ingestion and entanglement.

The five most relevant gaps in plastic packaging identified by Chile are listed in Table 5.

Table 5: Most Relevant Plastic Packaging Gaps in Chile

Rank	Most Relevant Gaps in Plastic Packaging
1	Lack of awareness or incentives to separate waste for recycling
2	Lack of measures to reduce the production of plastic packaging (e.g., bags, bottles, expanded polystyrene (EPS) fish boxes)
3	Production and consumption patterns based on single-use/disposable items rather than reduce and reuse
4	Deficient separate collection infrastructure for plastic packaging waste
5	Decoupling between design/production and recycling – products are designed without its whole lifecycle in view

Direct preventive measures worth considering by Chile and ranked in order of priority (from highest to lowest) are:

1. Eco-design to avoid waste generation or to enhance reuse or recyclability
2. Enhanced waste collection on land
3. Enhanced waste treatment chains, avoiding the escape of waste into the environment (e.g., daily covered or better managed landfills)
4. More public bins to avoid fly-tipping
5. Better acceptance facilities for ships

Indirect preventive measures worth considering by Chile and ranked in order of priority (from highest to lowest) are:

1. Awareness-raising and information: Measures focusing on changing behaviour, labelling and certification, communication, education, training, etc.
2. Legal and obligations: Command and control measures
3. Enhanced enforcement
4. Subsidies, taxes and levies: Direct positive and negative economic incentives
5. Other economic or market-based instruments: Green public procurement, purchase specifications, price regulation, costs for goods and services, fee-based systems and trading systems

2.9 APEC's Role in Marine Debris

Chile has proposed APEC economies to collaborate in the following areas:

1. Determine the best type of monitoring to gauge effectiveness of the measures taken to prevent marine debris.
2. Encourage all economies to adopt the APEC Roadmap on Marine Debris to put an end to marine debris in the ocean.
3. Establish a yearly workshop held by each economy to help economies establish similar measures to prevent marine debris from entering the ocean and control land-based marine debris; to compare results of monitoring programmes; and provide capacity building to economies that are less developed.

3. CHINA

3.1 Laws and Regulations

China is the most populous economy in the world with a population of 1.44 billion⁸. As a result of the large population, economic growth and rapid urbanisation, municipal solid waste generated is also on the rise. In addition, China was the world's largest waste importer for decades until the import ban on solid waste including plastic waste, unsorted paper waste and textile waste was introduced in January 2018. China has since shifted its focus on municipal waste management.

A summary of the waste management laws and regulations in China is found in Table 6.

Table 6: Waste Management Laws and Regulations in China

Laws and Regulations	Brief Description	Waste Management Processes	Sources
Law of the People's Republic of China on the Prevention and Control of Environmental Pollution Caused by Solid Waste ⁹ (Revised draft)	<ul style="list-style-type: none"> • Emphasise the importance of preventing environmental pollution during the solid waste management process through proper waste collection, storage, transportation, treatment, disposal and source reduction. • Require Governmental District/City and solid waste management organisations to report solid waste data including types, production quantity, and status of disposal, among others. Information must be publicly available. • Require to engage qualified organisations for municipal waste transportation. • Importation of restricted solid waste and interprovincial transport of solid waste are only allowed with the authorities' approval. • Solid waste treatment shall meet relevant pollution control standards including Standard for Pollution Control on the Municipal Solid Waste Incineration (GB 18485-2014) and Technical Guidelines for Solid Waste Treatment and Disposition Engineering (HJ 2035-2013). • Prevent environmental pollution caused by illegal solid waste storage, disposal or dumping. • Solid waste disposal shall meet relevant pollution control standards such as Standard of Assessment on Municipal Solid Waste Landfill. • Establish production standards to prevent over-packaging and to promote the design and manufacture of recyclables. 	Collection, storage, transportation, treatment, disposal and source reduction	Municipal solid waste; Agriculture; Livestock and farming on a large scale; Mining; Industrial solid waste; Imported hazardous waste

⁸ United Nations, accessed 20 November 2019, <https://www.un.org/en/sections/issues-depth/population/>

⁹ Ministry of Ecology and Environment of the People's Republic of China, accessed 20 November 2019, http://www.mee.gov.cn/gkml/sthjbgw/stbgth/201807/t20180717_446712.htm

Laws and Regulations	Brief Description	Waste Management Processes	Sources
Environmental Protection Law of the People's Republic of China	<ul style="list-style-type: none"> • General environmental law on environmental protection, prevention of pollution, safeguarding public health, promotion of sustainable economic and social development. • Encourage eco-friendly or recycled product to reduce waste. • Promote sorting and recycling of municipal solid waste. • Prohibit dumping waste in sea 	Collection, recycling, transportation and disposal	Municipal waste, industrial and agricultural wastes
Law of the People's Republic of China on Evaluation of Environmental Effects	<ul style="list-style-type: none"> • Require the evaluation of environmental effects or Environmental Impact Assessment (EIA) of a construction project prior to its development. • EIA report shall include impact assessment, preventive and mitigation measures as well as a monitoring plan for the project. • Public consultation and review of the EIA is required. 	Source reduction	Construction waste
Regulations for the Administration of the Recovery and Disposal of Waste Electric and Electronic Products	<ul style="list-style-type: none"> • Focus on the recovery and disposal of waste electrical and electronic products and promoting the development of a circular economy. 	Recycling, disposal and recovery	Electrical and electronic waste
City Appearance and Environmental Sanitary Management Regulations	<ul style="list-style-type: none"> • Provide guidelines for municipal solid waste disposal practices. 	Disposal	Municipal solid waste

The legal framework for marine waste management in China is the Marine Environmental Protection Law of the People's Republic of China, 2000. The law aims to reduce both land-based and sea-based debris from entering into the sea. The disposal of garbage on beaches and seashores is prohibited. All vessels and ports within China's jurisdiction need to have garbage storage facilities and measures to prevent any waste discharge into the sea. Permits need to be obtained for any vessels to dump waste within the Chinese marine environment.

The law is enforced by China's Maritime and Fishery Department, which can impose administrative penalties and provide incentives for the reporting of illegal dumping activities (Article 5 of the law). The authorities can impose penalties on the owner or operator of the ship or order a vessel to make corrections within a stipulated timeframe when:

- Pollutants or other substance prohibited under the Marine Environmental Protection Law are discharged into coastal waters.
- There is a failure to comply with the Marine Environment Protection Law which also stipulates that pollutants shall not be over-discharged into the ocean.
- Waste is being discharged into the ocean without a valid dumping permit.
- There is a failure to take immediate action after causing marine environmental pollution due to accidents or unexpected events.

China is part of the International Convention for the Prevention of Pollution from Ships (MARPOL), and has incorporated regulations from Annex V into its economy-wide legislation. One such example is the provision of sufficient waste facilities at ports and terminals to meet the needs of arriving ships.

3.2 Preventive and Remedial Measures

Waste management measures that are most relevant (ranked from most to least relevant) to China are:

1. Voluntary beach clean-up programmes
2. Improved enforcement on improper disposal into waterways
3. Improved cleaning operations in certain areas
4. Promotion of recycling campaigns
5. Awareness-raising for good waste management offshore
6. Levy or tax on certain products (i.e., frequently end up as marine debris such as plastic bags and packaging)
7. Ban on certain products (e.g., single-use plastics)
8. Improved enforcement of current maritime legislation
9. Promotion of waste collection at the port
10. Underwater clean-ups in hot spot areas (e.g., can be divers or using ‘Sea-Trash Collector’)

Good regulatory principles have been applied in developing waste management measures. Policies are standardised and fairly applied to all producers and consumers. They are first implemented as trials in one or several cities to gather feedback prior to large scale implementation. Stakeholder consultations are also conducted throughout the policy development process and all relevant feedback is taken into consideration. Feedback is monitored regularly following policy implementation. If implementation is unsuccessful, the policy is withdrawn to save resources.

China’s central and provincial governments provide funds to prevent and control marine pollution (e.g., Blue Bay Action Plan). Almost all coastal municipal governments have budgets for solid waste disposal. Some cities, such as Xiamen, Shenzhen, Weihai and Wenzhou have also formulated plans to allocate special funds in the field of marine debris.

Current research studies are focused on product substitution and solid waste management technology. The sources of funding include departmental functional funds, natural science funds and social science funds from the government.

3.3 Land-based Marine Debris Preventive Measures

China’s main sources of land-based marine debris (from most to least common) are:

1. Household and general littering
2. Waste management and collection
3. Tourism and coastal recreation
4. Toilet and sewer overflow
5. Agricultural plastic film
6. Industrial activities

The main preventive measures for land-based marine debris are enforcement by patrolling on waterways and product substitution to reduce pollution. Water policemen and cleaners are deployed to patrol the waterways to prevent illegal dumping of waste into the sea. However, this may not be effective for rural streams which are inaccessible. Garbage from the river banks will eventually flow into the ocean creating marine debris.

To prevent and mitigate marine debris at the source, restrictions on the use of disposable plastic bags and promotion of the use of biodegradable plastics are implemented. The production, sale and use of plastic shopping bags with thickness less than 0.025mm are prohibited all across China from June 1, 2008. The measure is partially effective as it is difficult to control the excessive use of plastic bags by consumers. Plastic bags are commonly used in food packaging and cannot be prohibited due to the lack of an alternative eco-friendly bags. Only larger markets can enforce the restriction on the use of plastic bags. Another mitigating measure is to encourage scientific research and produce film mulches and commodity packaging that are recyclable or biodegradable in the environment. However, there are no products that can biodegrade rapidly in the composting environment.

The key concern for China is the potential biological impact of large amounts of microplastics in the sea. Research in 2016 showed that the density of microplastics on the surface layer of the sea near China is 0.29 per square metre. Taking a case discovered by Guangdong Maritime Police as an example, 564 tons of domestic waste were dumped into the sea, resulting in an estimated economic loss of 1.65 million yuan in ecological restoration.

The most effective proposed remedial measure would be to conduct clean-ups in areas with large amounts of marine debris such as mangroves. This would require working with NGOs to conduct regular clean-up activities at these mangroves.

3.4 Sea-based Marine Debris Preventive Measures

China's main sources of sea-based marine debris (from most to least common) are:

1. Aquaculture
2. Professional and recreational fishing
3. Shipping sector
4. Port activities
5. Offshore industries

The remedial action for sea-based marine debris is to conduct submarine debris salvage at specific sea areas such as harbours, estuaries and aquaculture areas (common source of sea-based marine debris).

3.5 Marine Debris Monitoring

The marine debris monitoring methods implemented by China and their details are provided in Table 7. Monitoring enables greater public awareness on the extent of marine debris pollution in China.

Table 7: Marine Debris Monitoring in China

Monitoring Methods	Source Identification Methods	Detailed Description	Findings
Sea surface trawl	Classified Counting (plastic types)	<ul style="list-style-type: none"> • Conducted by various marine environmental monitoring stations at sea • Frequency: Annually • Location: Numerous sites around China 	Plastic bags and packaging are the most common
Submarine trawl	Classified Counting (plastic types)	<ul style="list-style-type: none"> • Conducted by various marine environmental monitoring stations at sea • Frequency: Annually • Location: Numerous sites around China 	Plastic bags and packaging are the most common
Beach survey	Classified Counting (plastic types)	<ul style="list-style-type: none"> • Conducted by various marine environmental monitoring stations at sea • Frequency: Annually • Location: Numerous sites around China 	Plastic bags and packaging are the most common

3.6 Current Measures on Plastic Waste

The current practice in China for plastic waste is to recycle valuable plastics and dispose of those with low economic value into landfills. With the development of plastic waste classification, the proportion of waste being incinerated and recycled has increased. The economy-wide measure to increase plastic recycling requires collaboration between garbage recyclers, consumers and local governments. Mandatory garbage sorting for all public institutions and companies will also be implemented across 46 cities in China by 2020. In some cities, the classification of plastic garbage is already strictly enforced. Failure to classify plastic garbage according to the requirements will result in fines.

Policies and measures relating to single-use plastic include restrictions on the use of disposable plastic bags and promotion of using recyclable or biodegradable plastics (as described in Section 3.3 above). The objective is to increase the reuse rate of plastic bags. From June 1, 2008, the production, sale and use of plastic shopping bags with thickness less than 0.025 mm has been prohibited across the economy.

The principle of waste hierarchy has been adopted in which single-use plastic production is restricted or minimised, followed by recycling or disposal into landfills. By 2020, municipal solid waste classification and treatment systems will be built in 46 key cities. On June 25, 2019, the Law of the People's Republic of China on the Prevention and Control of Environmental Pollution by Solid Waste (Revised Draft), including the Mandatory Classification of Domestic Waste, was submitted for consideration. Compulsory classification of domestic waste will be fully implemented.

3.7 Challenges and Opportunities

The main challenge faced by China when tackling marine debris issues is the inadequate waste management infrastructure in rural areas. Efforts to develop infrastructure in rural areas have also been ineffective.

The five most relevant gaps in plastic packaging identified by China are found in Table 8.

Table 8: Most Relevant Plastic Packaging Gaps in China

Rank	Most Relevant Gaps in Plastic Packaging	Explanation
1	Production and consumption patterns based on single-use/disposable items rather than reduce and re-use	Because the income of residents is still low and the demand is strong, the society has the inertia to use high-yield and low-cost disposable goods.
2	Insufficient collection coverage of municipal waste	Rural areas that are less accessible will have lesser frequency of collection of recyclables.
3	Lack of awareness or incentives to separate waste for recycling	Older generation is used to waste sorting for recycling, but there is a lack of awareness in younger generation to recycle and they would require more time to adapt.
4	Inappropriate waste collection and separation facilities (e.g., bins without lids in coastal areas)	Lack of separation facilities in most areas.
5	Inappropriate behaviour when disposing litter (e.g., during activities along the coast, particularly impact related to tourism, etc.)	As incomes rise, such behaviour is declining rapidly.

Direct preventive measures worth considering by China and ranked in order of priority (from highest to lowest) are:

1. Enhanced waste collection on land
2. Eco-design to avoid waste generation or to enhance reuse or recyclability
3. Installation of video surveillance facilities or floating debris interception activities in streams passing through residential areas
4. More public bins to avoid fly-tipping
5. Beach clean-up actions

Indirect preventive measures worth considering by China and ranked in order of priority (from highest to lowest) are:

1. Awareness-raising and information: Measures focusing on changing behaviour, labelling and certification, communication, education, training
2. Enhanced enforcement
3. Other economic or market-based instruments: Green public procurement, purchase specifications, price regulation, costs for goods and services, fee-based systems and trading systems
4. Monitoring: In function of awareness-raising, source and loophole detection and further policy planning
5. Subsidies, taxes and levies: Direct positive and negative economic incentives
6. Research oriented measures: E.g., on prevention, recyclability and biodegradability

3.8 APEC's Role in Marine Debris

As a first step to address marine debris issues, China has proposed APEC economies to collaborate on formulating uniform packaging standards for imported and exported products to prevent over-packaging. Another recommendation would be to form a list of recommended alternative materials.

4. JAPAN

4.1 Laws and Regulations

A summary of the waste management and marine debris laws and regulations in Japan is found in Table 9.

Table 9: Laws and Regulations associated with Waste Management and Marine Debris in Japan

Laws and Regulations	Brief Description	Waste Management Processes	Sources
Waste Management and Public Cleansing Law	<ul style="list-style-type: none"> Establish a clean-living environment and improve public health through the restriction of waste discharge, appropriate sorting, storage, collection, transport, recycling, and disposal of waste. 	Sorting, storage, collection, transport, recycling, disposal, incineration, composting, landfill	Municipal and industrial waste
Act on Promoting the Treatment of Marine Debris Affecting the Conservation of Good Coastal Landscapes and Environments to Protect Natural Beauty and Variety and Marine Environment	<ul style="list-style-type: none"> Provide basic principles for measures required for the smooth removal action of marine debris and effective reduction of its generation. Define the responsibilities of the economy-wide and local governments, business entities and the people of Japan, while setting out the basic policy established by the economy-wide government and other necessary matters for promoting measures against articles that drift ashore. Provide funding to municipalities to collect and process marine debris. 	Reduction at source, treatment, recycling	Marine litter
Law Relating to the Prevention of Marine Pollution and Maritime Disaster	<ul style="list-style-type: none"> Establish measures to prevent marine pollution and maritime disasters by controlling discharge of waste from ships, and offshore facilities. 	Disposal	Waste discharge from ships and offshore facilities
Container and Packaging Recycling Law	<ul style="list-style-type: none"> Establish the responsibilities of consumers, municipalities and businesses on proper handling of waste through sorting, collection and recycling. 	Sorting, collection, recycling.	General waste

4.2 International Conventions

Japan has adopted measures to address marine debris issues from treaties including:

- International Convention for the Prevention of Pollution from Ships (MARPOL)
- Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (the London Convention for short) and 1996 London Protocol
- International Convention on Oil Pollution Preparedness, Response and Cooperation
- International Convention for the Control and Management of Ships' Ballast Water and Sediments

Restrictions defined in these conventions have been incorporated in the Law Relating to the Prevention of Marine Pollution and Maritime Disaster.

4.3 Preventive and Remedial Measures

Japan has declared the National Action Plan for Marine Plastic Litter to realise a world without additional pollution by plastic litter. Some measures from the action plan include:

1. Promotion of proper waste management system
2. Prevention of littering, illegal dumping and unintentional leakage of waste into the oceans
3. Collection of scattered waste on land
4. Recovery of plastic litter in the oceans
5. Innovation in the development of and conversion to alternative materials
6. Collaboration with stakeholders
7. International cooperation for promoting measures in developing economies
8. Survey on actual situations and accumulation of scientific knowledge

4.4 Research

Japan's Ministry of the Environment is funding a marine plastic litter research conducted by Kyushu University from 2018 to 2020. The research aims to understand the distribution of marine plastic in the ocean from its coasts to a global scale and the ecological impact of marine plastics, and to improve methods to measure marine plastics.

4.5 Partnership

Partnerships and joint efforts between the government, private institutions and the public have been established for the prevention of marine debris pollution. For example, the Marine Plastic Public Private Innovation Partnership was set up to support innovations such as developing substitute materials. An economy-wide clean-up campaign to reduce marine waste, UMIGOMI Zero Week, was organised as a joint effort with Nippon Foundation and recorded the participation of more than 400,000 people.

4.6 Marine Debris Monitoring

Marine debris monitoring is implemented as required under the Act on Promoting the Treatment of Marine Debris Affecting the Conservation of Good Coastal Landscapes and Environments to Protect Natural Beauty and Variety and Marine Environment. Table 10 summarises the details of marine debris monitoring conducted by Japan.

Table 10: Marine Debris Monitoring in Japan

Monitoring Methods	Source Identification Methods	Detailed Description	Findings
Beach survey	Classification	<ul style="list-style-type: none"> • Conducted by Japan's Ministry of the Environment • Annual monitoring since 2009 • At 10 locations in Japan 	Mainly plastic bottles, fishing gear, other plastic materials and natural

Monitoring Methods	Source Identification Methods	Detailed Description	Findings
			articles such as wood (high proportion)
Floating debris survey	Classification	<ul style="list-style-type: none"> • Conducted by Japan's Ministry of the Environment • Annual monitoring since 2014 • At 2 to 3 bays and around 70 stations in offshore areas 	Mainly plastic materials and natural articles such as wood (high proportion)
Seabed debris survey	Classification	<ul style="list-style-type: none"> • Conducted by Japan's Ministry of the Environment • Annual monitoring since 2014 • At 2 to 3 bays and around 3 stations in offshore areas 	Mainly plastic and metal materials

5. KOREA

5.1 Laws and Regulations

A summary of the relevant waste management and marine debris laws and regulations in Korea is provided in Table 11.

Table 11: Laws and Regulations associated with Waste Management and Marine Debris in Korea

Laws and Regulations	Brief Description	Waste Management Processes	Sources
Marine Environment Management Act	<ul style="list-style-type: none"> • Prevention of marine pollution (discharge of pollutants) caused by ships. • Prevention of any land-based waste into the sea. • The Minister of Oceans and Fisheries shall formulate and implement an ocean waste collection and disposal plan to effectively collect and dispose of waste discharged or flowing into the sea. • Monetary rewards for reporting of certain marine pollution activities such as dumping of waste (from land or sea) into the ocean. 	Collection, storage and transportation	Land- and sea-based
Wastes Control Act	<ul style="list-style-type: none"> • Ensure the proper management of waste and safeguard public health 	Collection, transportation and disposal	General waste

Korea has adopted MARPOL Annex V in its Marine Environment Management Act to ensure that ships collect, store, and process their waste in accordance to a waste management plan and keep a record of the processed waste.

5.2 Sources of Marine Debris

Korea's main sources of land-based marine debris (from most to least common) are:

1. Tourism and coastal recreation
2. Household and general littering
3. Industrial activities
4. Waste management and collection
5. Toilet and sewer overflow

Korea's main sources of sea-based marine debris (from most to least common) are:

1. Professional and recreational fishing
2. Aquaculture
3. Shipping sector
4. Port activities
5. Other offshore activities

5.3 Preventive Measures

Korea's Management Strategy for Marine Plastic Waste was established in May 2019 to reduce 50% of the current marine plastic volume by 2030. This goal is to be achieved through

establishment of action plans, including the strategy to reduce marine plastic waste at the source, improving collection of marine plastic from ships, expediting processing and recycling of marine plastic, strengthening of foundations for plastic waste management, and improving the social perceptions of marine waste (awareness training). For example, the Comprehensive Strategy for Management of Recyclable Waste was introduced to improve the plan of a product's lifecycle including manufacturing, distribution, collection and recycling.

The main preventive measures implemented include:

1. Restriction on the use of plastic packaging (and voluntary reduction of packaging by major distribution companies).
2. Prevention of the sale of plastic bags at departmental stores, retail stores, large shopping facilities.
3. Reduction of disposable products to minimise waste generated and the collection of garbage from major streams in Korea.

These policies and measures follow a systematic approach, are tailored to local circumstances, and consider the budget as well as feedback from stakeholders (e.g., experts and environmental groups).

5.4 Remedial Measures

The main remedial actions taken by Korea are beach clean-ups and collection of floating waste from the ocean. These clean-up activities involve the local governments, voluntary groups and public institutions. An example is the implementation of the coastal clean-up programme by the Korea Ocean Environment Management Corporation (KOEM). Debris collected mainly comprises of styrofoam, fishing nets and plastics that originate from fishery-related activities. Since collected debris mostly originates from fishery-related activities, education and awareness-raising campaigns have been implemented among fishers. Fishers are also compensated for collecting debris found during fishing or voluntary collection of discarded fishing gear.

Some of the waste management measures that are most relevant (as ranked) to Korea are:

1. Improved cleaning operations in certain areas
2. Promotion of waste collection at the port
3. Improved enforcement on improper disposal into waterways
4. Ban on certain products (e.g., single-use plastics)
5. Awareness-raising targeting littering and improper disposal of fishing gear
6. Promote recycling campaigns
7. Voluntary beach clean-up programmes
8. Fishing for litter (i.e., picking up litter caught in nets during fishing activities)
9. Redesign of products (e.g., alternative biodegradable materials or reduce the use of non-biodegradable components in the product)
10. Smoking ban or zoning on beaches

5.5 Funding and Research

Korea has established the Marine Product Development Fund that allocates partial funds for marine waste-related projects. An example of a funded project is the Marine Waste Treatment Project that supports the improvement of productivity of fishing grounds in nearby waters.

An ongoing research study on the environmental risks of marine plastic, conducted by Korea Institute of Ocean Science and Technology (KIOST), aims to survey the domestic pollution caused by marine microplastics and its influence on marine organisms.

5.6 Marine Debris Monitoring

Marine debris is monitored as part of beach clean-up activities by various organisations (public or private) and voluntary groups. The details are provided in Table 12. Marine debris monitoring has revealed large amounts of discarded styrofoam buoys leading to the launch of a project to create eco-friendly buoys.

Table 12: Marine Debris Monitoring in Korea

Monitoring Methods	Source Identification Methods	Detailed Description	Findings
Beach clean-up and collection	Visual identification and classification	<ul style="list-style-type: none"> Monitored by NGO Location: 40 beaches Frequency: 6 times a year 	Mainly plastics

5.7 Challenges and Opportunities

The main challenge for Korea on marine debris pollution is the lack of relevant marine debris data (i.e., existing quantity of marine debris). Research efforts have been made to identify the quantity of current marine debris through different routes. As a result, concentrated management has been imposed on areas with large quantities of marine debris (through prediction of movement routes) to improve debris collection rates.

The five most relevant gaps in plastic packaging identified by Korea are listed in Table 13.

Table 13: Most Relevant Plastic Packaging Gaps in Korea

Rank	Most Relevant Gaps in Plastic Packaging	Explanation
1	Inappropriate behaviour when disposing litter (e.g., during activities along the coast, particularly impact related to tourism, etc.)	The most important factor is the increased interest of the public in (and willingness to put into practice) finding solutions to address marine/environmental problems.
2	Production and consumption patterns based on single-use/disposable items rather than reduce and reuse	Changes in consumption patterns (increase in single-person households, increase in online shopping, etc.), and increase in discarded disposable products due to excessive packaging.
3	Lack of measures to reduce the production of plastic packaging (e.g., bags, bottles, EPS fish boxes)	-
4	Decoupling between design/production and recycling – products are designed without a complete whole lifecycle perspective	-
5	Deficient separate collection infrastructure for plastic packaging waste	-

Direct preventive measures worth considering by Korea and ranked in order of priority (from highest to lowest) are:

1. Fishing for litter

2. Beach clean-up actions
3. Inland clean-up actions
4. Enhanced waste collection on land
5. Better acceptance facilities for ships

Indirect preventive measures worth considering by Korea and ranked in order of priority (from highest to lowest) are:

1. Legal and obligations: Command and control measures
2. Awareness-raising and information: Measures focusing on changing behaviour, labelling and certification, communication, education, training, inland clean-up actions
3. Subsidies, taxes and levies: Direct positive and negative economic incentives
4. Research oriented measures: E.g., on prevention, recyclability and biodegradability
5. Other economic or market-based instruments: Green public procurement, purchase specifications, price regulation, costs for goods and services, fee-based systems and trading systems

5.8 APEC's Role in Marine Debris

The main recommendation for APEC economies is to collaborate in the standardisation of research methodologies and in creating opportunities to present or share model examples.

6. NEW ZEALAND

6.1 Laws and Regulations

A summary of the waste management laws and regulations in New Zealand is provided in Table 14.

Table 14: Waste Management Laws and Regulations in New Zealand

Laws and Regulations	Brief Description	Waste Management Processes	Sources
Litter Act 1979 Local Government Act 2002	<ul style="list-style-type: none"> Provides a framework and powers for local authorities to decide which activities they undertake and the way they will undertake them; and promote the accountability of local authorities to their communities. General act on litter management. 	Collection	Solid waste from household
Resource Management Act 1991	<ul style="list-style-type: none"> The purpose of the Act is to promote the sustainable management of natural and physical resources. Prevent the dumping of waste in coastal marine areas (including from any ship, aircraft or offshore installation). 	Storage, disposal	All waste
Hazardous Substances and New Organisms Act	<ul style="list-style-type: none"> Purpose of this Act is to protect the environment, and the health and safety of people and communities by preventing or managing the adverse effects of hazardous substances and new organisms. This include waste (hazardous) which could enter the ocean. 	Storage, treatment, disposal	All waste
Land Transport Act 1988 Dangerous Goods Act 2005	<ul style="list-style-type: none"> Set out the requirements for the safe transport of dangerous goods on land and in New Zealand. 	Transportation	All waste
Waste Minimisation Act 2008	<ul style="list-style-type: none"> Promote the reduction of waste generation and disposal. Impose levy on all waste disposed at landfill to generate funds for the government to minimise waste. Prohibit the sale and manufacture of wash-off products that contain plastic microbeads for the purposes of exfoliation, cleaning, abrasive cleaning or visual appearance of the product. 	Treatment, disposal	All waste

New Zealand's domestic legislative frameworks and regulations associated with marine debris prevention include:

- Maritime Transport Act 1994
- Resource Management Act 1991
- Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012
- Resource Management (Marine Pollution) Regulations 1998
- Marine Protection Rules Parts 170 and 180

6.2 International Conventions

The domestic legislative frameworks and regulations associated with marine debris prevention are New Zealand's obligations under MARPOL Annex V and London Convention/London Protocol, to regulate the dumping and discharge of waste including garbage from any ships or offshore installations under New Zealand's jurisdiction.

6.3 Preventive Measures

New Zealand recently implemented a ban on single-use plastic shopping bags, preventing businesses from providing these bags. The ban applies to all new single-use plastic shopping bags with handles that are made of plastic up to 70 microns in thickness. This includes biodegradable, compostable and oxy-degradable plastics bags.

Other preventive measures adopted by New Zealand for land-based marine debris include:

- Ocean Clean Sweep – This initiative aims to help operators in the plastic industry to reduce the loss of pellets into the environment. A manual enables operators to audit their own sites and provide advice on establishing procedures to prevent pellet loss into the environment.
- Well Being Budget – The Well Being Budget provides \$4 million over four years to help the Ministry for the Environment improve resource efficiency and shift New Zealand to a zero-waste economy. It will build on work underway to improve data on waste and develop mandatory product stewardship schemes for tyres, lithium batteries and refrigerants. The new funding will also help implement economy-wide resource recovery work in response to China's waste ban, and actions on single-use and problem plastics.

6.4 Remedial Measures

Some of the remedial measures adopted by New Zealand include beach and seafloor clean-up activities. For example, Ghost Fishing New Zealand, an international organisation made up of voluntary divers, conducts seafloor clean-ups. Project Baseline, a charitable organisation, has a public database on clean-up activities containing data before and after clean-ups.

Some of the waste management measures that are most relevant (as ranked) to New Zealand are:

1. Improved enforcement on improper disposal into waterways
2. Phasing-out / ban on certain items or materials
3. Deposit-refund scheme (e.g., Extended Producer Responsibility)
4. Voluntary phasing-out or minimisation of sale of certain products
5. Promote recycling campaigns
6. Ban on certain products (e.g., single-use plastics)
7. Redesign of products (e.g., alternative biodegradable materials or reduce the use of non-biodegradable components in the product)
8. Voluntary beach clean-up programmes
9. Awareness-raising for good waste management offshore
10. Promote green procurement (e.g., purchasing of products with ecolabels)

New Zealand ensures its policies and measures are aligned with international legislations, taking into consideration public consultations and applications to all businesses.

Like other economies, New Zealand's economy to date has been based on a 'take, make and dispose' model, which treats nature and the resources it provides as 'free' and disposable. More materials recovery and local re-processing infrastructure will help New Zealand shift to a more sustainable and efficient circular economy, where products are designed to have a long life, and materials can be recovered and easily reused, recycled, remanufactured.

6.5 Implications of Marine Debris

The New Zealand Environment Committee has organised a briefing on the scale, impact, and sources of plastic pollution in New Zealand's coastal waters, and in it shared about the harmful effects of plastics or microplastics to marine biodiversity, ecosystem and the potential health impact to humans.

6.6 Funding

The Waste Minimisation Act 2008 imposes a levy on all waste disposed into landfills to generate funding to help the local governments, communities and businesses minimise waste. Half of the levy money goes to territorial authorities (city and district councils) to spend on promoting or implementing the waste minimisation activities set out in their Waste Management and Minimisation Plans. The remaining levy money (minus administration costs) is put into the Waste Minimisation Fund for waste minimisation activities. For example, projects that have received funding include:

- Keep New Zealand Beautiful – This is a non-profit organisation that focuses on keeping New Zealand's communities clean, safe and beautiful. The project increases environmental awareness through a range of sustainability and education programmes. The organisation is undertaking a three-year litter prevention project in partnership with the Ministry for the Environment. As part of the project, Keep New Zealand Beautiful is undertaking a comprehensive policy review, implementing an economy-wide litter audit, developing litter specific educational resources for schools, and creating an economy-wide litter hub website.
- Sustainable Coastlines – This is a multi-award winning New Zealand charity, whose mission is to enable people to look after the coastlines and waterways. The project will roll out a litter education curriculum for schools, establish an economy-wide litter database, and bring these programmes to communities around New Zealand. Funded by the Ministry for the Environment's Waste Minimisation Fund, the project also works alongside collaborators from the Department of Conservation and Statistics New Zealand.

Additionally, several institutions have provided funding opportunities to drive innovations in addressing marine debris issues:

- The Endeavour Fund administered by the Ministry for Business, Innovation and Employment
- National Institute of Water and Atmospheric Research
- Institute of Environmental Science and Research

- The National Science Challenges administered by the Ministry for Business, Innovation and Employment

6.7 Marine Debris Monitoring

Marine debris is monitored as part of beach clean-up activities conducted by various voluntary groups in New Zealand. The details are provided in Table 15.

Table 15: Marine Debris Monitoring in New Zealand

Monitoring Methods	Source Identification Methods	Detailed Description	Findings
Data collection of beach clean-ups	Local adaptation of the United Nations Environment Programme / Intergovernmental Oceanographic Commission Guidelines on Survey and Monitoring of Marine Litter	<ul style="list-style-type: none"> • Sustainable Coastlines have launched a 'Litter Intelligence' database. This is a long-term programme that collects litter data, provides powerful insights about the problem, and inspires widespread action for solutions • Led by New Zealand charity, Sustainable Coastlines, the programme works in close collaboration with the Ministry for the Environment, Department of Conservation and Statistics New Zealand • Locations: 69 monitoring sites 	Mainly plastics

6.8 Challenges and Opportunities

The main challenge for New Zealand regarding marine debris pollution is the lack of relevant marine debris data to understand the extent of the impact and the gaps in materials recovery and waste infrastructure.

The five most relevant gaps in plastic packaging identified by New Zealand are found in Table 16.

Table 16: Most Relevant Plastic Packaging Gaps in New Zealand

Rank	Most Relevant Gaps in Plastic Packaging
1	Production and consumption patterns based on single-use/disposable items rather than reduce and reuse
2	Lack of measures to reduce the production of plastic packaging (e.g., bags, bottles, EPS fish boxes)
3	Decoupling between design/production and recycling – products are designed without its whole lifecycle in view
4	Lack of awareness or incentives to separate waste for recycling
5	Inappropriate behaviour when disposing litter (e.g., during activities along the coast, particularly impact related to tourism, etc.)

Direct preventive measures worth considering by New Zealand and ranked in order of priority (from highest to lowest) are:

1. Eco-design to avoid waste generation or to enhance reuse or recyclability
2. Enhanced waste treatment chains, avoiding escapes of waste to the environment (e.g., daily covered or better managed landfills)

3. Enhanced waste water treatment
4. Enhanced waste collection on land
5. Better acceptance facilities for ships

Indirect preventive measures worth considering by New Zealand and ranked in order of priority (from highest to lowest) are:

1. Awareness-raising and information: Measures focusing on changing behaviour, labelling and certification, communication, education, training, inland clean-up actions
2. Research oriented measures: E.g., on prevention, recyclability and biodegradability
3. Monitoring: In function of awareness-raising, source and loophole detection and further policy planning
4. Other economic or market-based instruments: Green public procurement, purchase specifications, price regulation, costs for goods and services, fee-based systems and trading systems
5. Legal and obligations: Command and control measures

6.9 APEC's Role in Marine Debris

The main recommendation for APEC economies is to collaborate on creating an information repository and building on existing materials to develop guidelines or principles to fill the gaps.

7. PERU

7.1 Laws and Regulations

A summary of the relevant waste management laws and regulations in Peru is provided in Table 17.

Table 17: Waste Management Laws and Regulations in Peru

Laws and Regulations	Brief Description	Waste Management Processes	Sources
Legislative Decree No. 1278	<ul style="list-style-type: none"> • Aim to establish responsibilities of society to use materials efficiently and ensure sound management of waste. • Approve the Law on Integral Management of Solid Waste. 	Minimisation	Solid waste
Law on Integral Management of Solid Waste (Legislative Decree No. 1278 approved this Law and replaced Law No. 27314: General Law of Solid Waste in 2000)	<ul style="list-style-type: none"> • Emphasise the importance of circular economy, recovery and recycling of waste, extended responsibility to the producer, shared responsibility and protection of the environment and human health. • Waste collection, transportation and disposal by authorised personnel. • Waste storage and disposal by approved facilities. 	Collection, storage, transportation, treatment, disposal (landfill)	Solid waste from fishing activity and aquaculture; comprises of hazardous and non-hazardous solid waste

Peru has a specific law (Supreme Decree No. 013-2018-MINAM) which promotes the reduction of single-use plastics and responsible consumption of plastics among government entities by replacing them with reusable plastics. In order to prevent marine debris, a law (Directorate Resolution No. 0766-2003/DCG) approved various provisions to reduce the discharge of waste generated by ships and from cargos transported to the sea. The Directorate of Maritime Captancy is responsible for monitoring vessels at sea under the jurisdiction of Peru and for preventing them from disposing waste into the sea.

Funding to prevent marine debris, through the management of municipal waste and its disposal, is available at the local and provincial levels.

The Peruvian Marine Research Institute (IMARPE) is conducting research to assess the impact of microplastics on coastal species. Preliminary research has identified low levels of microplastics in marine species. Research will continue to evaluate the degree of microplastics contamination, impact on human health and sustainability of fisheries activities.

7.2 Land-based Marine Debris Preventive Measures

Peru's main sources of land-based marine debris (from most to least common) are:

1. Toilet and sewer overflow
2. Industrial activities
3. Household and general littering
4. Tourism and coastal recreation
5. Waste management and collection

To mitigate marine debris at its source, Peru has implemented Supreme Decree No. 013-2018-MINAM that promotes the reduction of single-use plastics and responsible consumption of plastics among governmental entities by replacing them with biodegradable plastics progressively. The National Service of Natural Protected Areas by the State (SERNANP) has also prohibited single-use plastics in the Historic Sanctuary of Machu Picchu and other protected natural areas.

Land-based marine debris is a growing concern across the population due to the impact of solid waste litter on beaches and at sea. Remedial measures suggested by Peru for land-based marine debris include raising awareness on the protection of the sea and prevention of marine debris pollution. The governmental authorities including the ministries and regional, provincial and local governments should lead these efforts. Sanctioning measures should also be applied on individuals who violate the law and create negative impacts on the sea. More severe sanctions could be considered. Peru's Ministry of Environment should also collaborate with other environment related entities to develop relevant management measures to address the marine debris issue. For example, the Ministry of Production has developed a programme to clean the seabed at critical places (or hotspots) with marine debris.

7.3 Sea-based Marine Debris Preventive Measures

Peru's main sources of sea-based marine debris (from most to least common) are:

1. Offshore industries
2. Professional and recreational fishing
3. Port activities
4. Shipping sector
5. Aquaculture

It should be noted that the above sources are partially ranked based on effluent (wastewater) discharge rather than entirely on disposal of solid waste creating marine debris.

Fishing plants that have installed submarine emissaries for discharging their effluents into the marine environment have to ensure that the effluents are treated before being discharged; these effluents are processed through treatment systems (in industrial establishments) approved in environmental impact studies. The environmental impact studies have to be approved by the Ministry of Production, to determine the authorisation of the use of the aquatic area granted by the Directorate of Captaincy and Coast Guard.

Remedial measures for sea-based marine debris include awareness-raising on marine protection and preventing pollution. Implementation of surveillance of fishing vessels has been suggested to prevent illegal disposal of waste into the sea. Further, surveillance of beaches should be increased to prevent illegal dumping of rubbish.

7.4 Marine Debris Monitoring

The marine debris monitoring method implemented by Peru and its details are provided in Table 18.

Table 18: Marine Debris Monitoring in Peru

Monitoring Methods	Source Identification Methods	Detailed Description	Findings
Beach survey (International Coastal Clean Up)	Sorting	<ul style="list-style-type: none"> Conducted as part of International Coastal Clean Up involving more than 200 public and private institutions supporting the campaign Frequency: Annually 100 different areas including beaches, rivers and lakes 	Plastic materials and others

7.5 Current Measures on Plastic Waste

The first measure on plastic waste taken by Peru is the implementation of laws that promote single-use plastic reduction (as described above - Supreme Decree No. 013-2018-MINAM). Governmental entities are encouraged to use biodegradable plastics, and several of Peru's natural protected areas have also prohibited the use of single-use plastics. The distribution of plastic bags to commercial stores and markets has been restricted as well. Furthermore, the Ministry of Environment of Peru has launched a website to recognise companies that sell eco-friendly alternatives to plastic products, or that avoid the use of plastics in their production processes and packaging.

The preventive measures for plastic waste from marine sources include the surveillance of fishing vessels by Peru's Captaincy Department (preventing illegal disposal) and awareness training for artisanal fishers¹⁰ on proper plastic waste management.

In cases where plastics end up on beaches and the seabed (underwater), clean-up efforts are initiated as a remedial measure.

7.6 Challenges and Opportunities

The main challenges of the marine debris issue in Peru are the lack of personnel, resources and financial support for surveillance of illegal waste disposal from vessels at sea and on beaches.

The five most relevant gaps in plastic packaging identified by Peru are listed in Table 19.

Table 19: Most Relevant Plastic Packaging Gaps in Peru

Rank	Most Relevant Gaps in Plastic Packaging	Explanation
1	Inappropriate behaviour when disposing litter (e.g., during activities along the coast, particularly impact related to tourism, etc.)	Awareness training required for people to understand the harmful effects of improper disposal of solid waste into the ocean
2	Lack of awareness or incentives to separate waste for recycling	Training required for people to sort solid waste (especially plastics) for recycling
3	Inappropriate behaviour on waste management in industries and retailers (losses of material, etc.)	Awareness training required for people to understand the harmful effects of improper disposal of solid waste into the ocean
4	Deficient separate collection infrastructure for plastic packaging waste	None

¹⁰ Artisanal fishers are those who use traditional fishing gears and are relatively low-technology for fisheries.

Rank	Most Relevant Gaps in Plastic Packaging	Explanation
5	Inappropriate waste treatment facilities (e.g., landfills close to the coast, etc.)	The competent authority should monitor these facilities

Direct preventive measures worth considering by Peru and ranked in order of priority (from highest to lowest) are:

1. Fishing for litter
2. Enhanced waste water treatment
3. Eco-design to avoid waste generation or to enhance reuse or recyclability
4. Enhanced waste treatment chains, avoiding escapes of waste to the environment (e.g., daily covered or better managed landfills)
5. Better acceptance facilities for ships
6. Promote research for the use of hydrobiological waste from artisanal fishing and direct human consumption activities. The aim is to obtain useful by-products and generate an additional activity with work opportunities.

Indirect preventive measures worth considering by Peru and ranked in order of priority (from highest to lowest) are:

1. Legal and obligations: Command and control measures
2. Monitoring: In function of awareness-raising, source and loophole detection and further policy planning
3. Research oriented measures: E.g., on prevention, recyclability and biodegradability
4. Awareness-raising and information: Measures focusing on changing behaviour, labelling and certification, communication, education, training, etc.
5. Enhanced enforcement

7.7 APEC's Role in Marine Debris

Peru's recommendations for tackling marine debris as a region are to establish regional action plans, guidelines or principles on marine debris prevention and management, and to provide training for marine debris specialists.

8. SINGAPORE

8.1 Laws and Regulations

A summary of the relevant waste management and marine debris laws and regulations in Singapore is provided in Table 20.

Table 20: Laws and Regulations associated with Waste Management and Marine Debris in Singapore

Laws and Regulations	Brief Description	Waste Management Processes	Sources
Environmental Public Health Act	<ul style="list-style-type: none"> Aim to keep Singapore clean by protecting Singapore's resources from pollution and maintaining a high level of public health. 	Collection, storage, transportation, treatment, disposal (incineration or landfill)	Waste from domestic and trade premises
Environmental Public Health (General Waste Collection) Regulations	<ul style="list-style-type: none"> Cover licensing of General Waste Collector, transportation of different classes of general waste, and disposal of waste. General waste collection, transportation and disposal must be performed by licensed General Waste Collector. 	Collection, storage, transportation, treatment, disposal (incineration or landfill)	Non-toxic waste from domestic and trade premises
Environmental Public Health (Toxic Industrial Waste) Regulations	<ul style="list-style-type: none"> Cover licensing of Toxic Waste Collector, and collection, transportation and disposal of toxic industrial waste. Toxic industrial waste collection, transportation and disposal must be performed by licensed Toxic Industrial Waste Collector. 	Collection, storage, transportation, treatment, disposal (incineration or landfill)	Toxic waste from industrial premises
Environmental Protection and Management Act (EPMA)	<ul style="list-style-type: none"> Provide protection and management of the environment and resource conservation. 	Storage, removal and disposal	Toxic waste from industrial premises

Singapore implements strict regulations that are governed by National Environment Agency (NEA) to ensure that waste is properly managed and disposed. NEA has been encouraging people and industries to reduce their waste, reuse where possible and increase their rate of recycling. Singapore currently has only one active landfill. To conserve the limited landfill space, incineration of waste is necessary to reduce the volume going into the landfill.

The domestic legislation and regulations on pollution control and waste management aim to contribute toward the prevention and reduction of marine pollution through (i) management of pollution from land-based sources; (ii) management of water pollution and quality in inland water bodies and coastal areas; and (iii) meet the obligations under the International Maritime Organization's (IMO) International Convention for the Prevention of Pollution from Ships (MARPOL), the main international convention covering prevention of pollution of the marine environment by ships.

8.2 International Convention

MARPOL is implemented under the Prevention of Pollution of the Sea Act (PPSA) and its associated regulations, which provide powers to impose fines of up to \$20,000 or an imprisonment term of up to two years, or both, for non-compliance with MARPOL. The regulations are applicable to (i) Singapore-registered ships wherever they may be; and (ii) foreign-registered ships in Singapore waters.

Singapore is also a party to the Basel Convention that aims to protect human health and the environment against the adverse effects of hazardous waste by reducing their transboundary movement between economies. Singapore implements the Prior-Informed Consent procedure for the transboundary movement (i.e., export, import and transit) of hazardous waste and other wastes that are controlled under the Basel Convention. Singapore implements the obligations of the Convention through the Hazardous Waste (Control of Export, Import and Transit) Act and Hazardous Waste (Control of Export, Import and Transit) Regulations. Companies importing, exporting or transiting hazardous waste are required to apply for a Basel Permit from NEA (Pollution Control Department, PCD) with the necessary supporting documents.

8.3 Land-based Marine Debris Preventive Measures

Singapore has a comprehensive and integrated solid waste management and collection system to minimise waste at the source and to collect all waste for proper disposal. As a result, the amount of waste that is washed into the marine environment is not significant. All other incinerable waste that is not segregated at the source for recycling is disposed of at waste-to-energy (WTE) plants fitted with modern flue gas treatment systems to remove pollutants. Ash from the WTE process, together with other non-incinerable waste, are disposed of at the off-shore Semakau Landfill.

The Singapore government adopts a multi-prong strategy (prevention, legislation and enforcement, monitoring and education) for environmental management. Industries are required to comply with the relevant NEA environmental regulations as listed in Section 3.17.1.

Singapore has a strict anti-littering enforcement regime, with first-time littering offenders being issued a \$300 monetary penalty. There are heavier penalties for recalcitrant offenders who are prosecuted in court, including fines up to \$10,000 and/or Corrective Work Orders, which require the offender to pick litter at public areas for a period of time. This enforcement regime aims to deter littering.

There is a routine cleaning regime put in place for all inland waterways to remove land-based litter and flotsam by NEA. Vertical gratings, litter traps and float booms have also been installed where appropriate as part of the drainage network to trap debris and litter. In any case, two-thirds of Singapore is a water catchment area and the drains and canals lead to a reservoir instead of the open sea. For waterways that lead to the sea, the aforementioned cleaning regime and litter traps prevent litter from flowing out into the sea.

Singapore is fostering ownership through cooperation with environmental groups such as the Public Hygiene Council, International Coastal Cleanup Singapore and the Waterways Watch Society.

8.4 Sea-based Marine Debris Preventive Measures

Ship-based pollution in Singapore is covered under MARPOL obligations and Singapore has a small commercial fishing and aquaculture industry.

Singapore has strict regulations that forbid any debris from being discarded into watercourses and the marine environment. For example, discharge from the marine outfalls of the water reclamation and desalination plants is not allowed to contain debris or flotsam. Any debris found in used water or seawater is mechanically screened and removed upstream and disposed by incineration.

In addition, Singapore conducts inspections on both Singapore-registered ships and foreign-registered ships in Singapore's port to ensure that they comply with the regulations on garbage disposal and that anti-pollution measures are in place. Ships are also required to maintain garbage records and management plans for verification by inspectors. As part of MARPOL obligations, the Maritime and Port Authority of Singapore (MPA) deploys garbage collection craft daily at scheduled timings to collect garbage from ships at the anchorages. No additional fees are collected from ships for disposal of garbage unless special requests to dispose garbage at a specific timing and location are made, in which case a fee is charged. Further, MPA's Port Inspectors patrol Singapore's port waters to ensure that ships in the Port of Singapore do not illegally discharge waste, oil, garbage and sewage. To enhance the effectiveness of patrols, the fleet of Next-Generation Patrol Craft is equipped with enhanced surveillance and response capabilities.

8.5 Marine Debris Monitoring

The marine debris monitoring methods implemented by Singapore and their details are provided in Table 21.

Table 21: Marine Debris Monitoring in Singapore

Monitoring Methods	Source Identification Methods	Detailed Description	Findings
NUS-NParks Marine Debris Monitoring Programme	Derived from literature review of publications (e.g., UNEP/IOC Guidelines on Survey and Monitoring of Marine Litter, Australian Marine Debris Initiative, GESAMP reports)	<ul style="list-style-type: none"> • When: Between December 2017 to February 2019 • Frequency: Six sites were monitored every two months for 15 months • Who: Public volunteers, schools, corporate groups, government agencies, and other organised groups • Where: Six beach locations (Lim Chu Kang, Selimang Beach, Pasir Ris Beach, Pulau Ubin, Tanah Merah Beach, Small Sister's Island) in Singapore 	The data is currently being analysed.
International Coastal Cleanup (Singapore)	Ocean Conservancy's International Coastal Cleanup data card	<ul style="list-style-type: none"> • When: Every September since 1992 • Frequency: Annually • Who: Public volunteers and organised groups • Where: 53 coastal locations in Singapore 	Top three common items in 2018 are foam pieces, cigarette butts, plastic pieces, beverage bottles

Monitoring Methods	Source Identification Methods	Detailed Description	Findings
			(plastic) and straws/stirrers. ¹¹
Singapore Reefs' Dive Cleanups – Project AWARE	Project AWARE's Dive Against Debris data card	<ul style="list-style-type: none"> • When: Since 2017 • Frequency: Quarterly • Who: Dive volunteers • Where: Southern Islands of Singapore (i.e., Lazarus Island and Sisters' Islands Marine Park) 	The most common material collected is plastics (57%), followed by metal (15%), glass and ceramics (5%). Top three plastic items collected are bottles, food wrappers and cutlery.
Establish baseline data on marine debris	Research on macro-debris and microplastics	<ul style="list-style-type: none"> • There is an ongoing research collaboration with the National University of Singapore to establish baseline data on marine debris in Singapore's shores, develop a citizen-science programme to monitor macro-debris and microplastics, and facilitate dialogue with stakeholders toward recommendations for management approaches. 	In progress

8.6 Current Measures on Plastic Waste

Singapore uses a holistic 3Rs (reduce, reuse and recycle) approach to manage plastic and packaging waste. The objective is to reduce excessive use of all disposables, including single-use plastics, and to achieve an overall recycling rate of 70% by 2030 with the participation of all sectors including public, private and people.

Starting with upstream reduction, the government, industry and NGOs jointly launched the Singapore Packaging Agreement (SPA) in 2007 to reduce packaging waste. Since its inception, SPA signatories have cumulatively reduced about 54,000 tonnes of packaging waste. To build on the foundation of the SPA, Singapore will be introducing mandatory reporting of packaging data, including plastics, and 3R plans for packaging in 2020. This also builds on an existing mandatory waste reporting framework for large malls and hotels, which will be expanded to all large industrial and commercial premises, including large convention and exhibition centres, in 2020. The mandatory packaging reporting framework will also lay the foundation for an Extended Producer Responsibility (EPR) framework for managing packaging waste including plastics. This ensures producers are responsible for the collection and recycling of the materials they use to package their products. The aim is to have the EPR system for the management of packaging waste in place by 2025.

The government also supports ground-up initiatives to reduce packaging use through funding support. One such initiative was the NGO, Zero Waste SG's Bring Your Own (BYO) campaign, aimed at encouraging consumers to use reusable bags and containers when they buy takeaway food, beverages and groceries. Since 2017, more than 400 retail outlets have joined

¹¹ Singapore 2018 Data, International Coastal Cleanup, accessed 20 November 2019, <http://coastalcleanup.nus.edu.sg/results/2018/2018.htm>

the campaign, providing incentives to customers who bring their own reusables. This has saved approximately two million pieces of plastic disposables and packaging. Leveraging on the success of BYO, the government also supported Zero Waste SG with the Partnership Fund to further develop the campaign in 2019 into Bring Your Own Bag (BYOB) to focus on reducing disposable plastic bag usage.

To encourage residents to recycle, all residential premises have convenient access to recycling services including the collection of plastic recyclables through the National Recycling Programme. Recyclables including plastics are collected through a commingled system, then sorted, baled and sent for recycling.

Singapore’s approach has been to reduce the excessive use of all types of disposables (not only single-use plastics), and to promote the use of reusable materials. Singapore does not target plastics alone, as this may simply result in their substitution by other types of materials which could be more harmful for the environment. To encourage consumers to reduce the use of disposables, NEA launched the ‘Say YES to Waste Less’ campaign in 2019 as part of the Year Towards Zero Waste movement. Fifty-nine partners operating over 1,600 premises, ranging from food and beverage establishments, supermarkets, and hotels, have come forward to partner with NEA in this economy-wide endeavour.

8.7 Challenges and Opportunities

The challenges with the marine debris issue identified by Singapore are found in Table 22.

Table 22: Key Challenges in Tackling Marine Debris Issues in Singapore

Challenges	Measures	Effectiveness
Ensuring proper solid waste management	Environmental Protection and Management Act (EPMA) and the Environmental Public Health Act (EPA)	Effective
Controlling discharges into waterways	Environmental Protection and Management Act (EPMA) and the Environmental Public Health Act (EPA)	Effective

Singapore is developing the local recycling industry to better extract resources from waste and close the waste loop domestically. NEA is currently studying recycling solutions and technologies, and assessing their suitability for adoption in Singapore, for example, mechanical recycling to turn waste plastics into plastic pellets for manufacturing new products, or chemical recycling to turn plastic waste into chemical feedstock or fuel. These are efforts that would help transform the environmental services industry, and create new opportunities that will grow local enterprises and provide better jobs for Singaporeans.

8.8 APEC’s Role in Marine Debris

The main recommendation for APEC is to consider encouraging economies to strengthen their waste management systems as well as increase the percentage of wastewater treated. This will help minimise waste at the source and the amount of waste discharged into the ocean.

9. CHINESE TAIPEI

9.1 Laws and Regulations

Table 23 highlights some laws and regulations in place to deal with waste and marine debris in Chinese Taipei.

Table 23: Laws and Regulations associated with Waste Management and Marine Debris in Chinese Taipei

Laws and Regulations	Brief Description	Waste Management Processes	Sources
Compulsory Garbage Sorting Policy ¹²	<ul style="list-style-type: none"> Household waste has to be first sorted into three categories (recyclables, food leftovers and general household waste) before it is accepted for disposal. 	Disposal	Household waste
Fishing Harbour Act	<ul style="list-style-type: none"> Prohibit the discharge of litter to the harbour areas. 	Disposal	Fishing waste
Commercial Port Act	<ul style="list-style-type: none"> Regulate waste discharge at port reception facilities. 	Disposal	Waste from ships
Marine Pollution Control Act	<ul style="list-style-type: none"> Control marine pollution Protect the marine environment Maintain the marine ecology Safeguard public health Sustainably use marine resources 	Disposal	Any waste
Waste Disposal Act	<ul style="list-style-type: none"> Regulate the collection, storage, transportation, treatment and disposal of waste. 	Collection; storage; transportation; treatment; and disposal	Household and industrial waste

9.2 Preventive and Remedial Measures

Among the measures that are most relevant to an organisation, Chinese Taipei identified promoting recycling campaigns, banning certain products (e.g., single-use plastics) and providing deposit refund schemes (e.g., extended producer responsibility). The least relevant measures are voluntary phasing out or minimisation of sale or use of certain products and the phasing out of certain items or materials.

Chinese Taipei's Environmental Protection Administration (EPA) and environmental NGOs worked together to establish a Marine Debris Governance Platform in 2017. The platform aims to enhance social collaboration and participation, research, source reduction as well as waste prevention and removal. The Ocean Conservation Administration has monitored marine debris, funded clean-ups, and encouraged fisherman to remove marine debris and properly dispose waste, among others.

As part of its preventive measures, Chinese Taipei has undertaken strategic research projects that include monitoring marine debris, evaluating microplastics pollution in salt, and researching on microplastics and its effect on biology and ecology.

¹² Chiu Yu-Tzu. (2004). 'Compulsory garbage separation starts soon', Taipei Times, accessed 20 November 2019, <http://www.taipetimes.com/News/taiwan/archives/2004/12/20/2003215926>

9.3 Land-Based Marine Debris Preventive Measures

The main sources of land-based marine debris in Chinese Taipei are tourism and coastal recreation activities, specifically from plastic bottles followed by fishery waste.

Chinese Taipei has attempted to prevent debris through several initiatives that include:

- Banning or restricting the use of plastic items (e.g., ban on microbeads and straws)
- Promoting non-plastic on remote islands (e.g., adding recycling stations at Xiao Liuqiu island)
- Restricting commercial over-packaging (e.g., cosmetics, cakes)
- Promoting the green mark in hotels on outlying islands

9.4 Land-Based Marine Debris Remedial Measures

To prevent debris from entering the ocean, Chinese Taipei has carried out several measures that include:

- Intercepting waste from the river
- Promoting environmental education
- Promoting the recycling of plastic containers
- Removing trash from remote islands
- Inspecting landfill sites
- Cleaning beaches

These measures have been found to be effective. For instance, through beach cleaning in the last 10 years more than 65,177 tonnes of trash had been collected. In the same vein, the inspection of landfill sites has not revealed any spilled trash from the river.

9.5 Sea-Based Marine Debris Preventive Measures

The main sources of sea-based marine debris in Chinese Taipei (from most to least relevant) are:

- Port activities
- Fishing (professional and recreational)
- Aquaculture
- Shipping sector
- Other offshore industries (oil, etc.)

To prevent sea-based marine debris, Chinese Taipei has introduced the Marine Pollution Control Act to: (1) control marine pollution; (2) maintain the marine ecology; (3) safeguard public health; and (4) sustainably use marine resources.

9.6 Sea-Based Marine Debris Remedial Measures

Chinese Taipei has carried out initiatives to identify marine debris hotspots, fund local governments to clean up marine debris, encourage fishing vessels to clean up floating marine waste and encourage volunteers to assist in underwater waste removal.

To ensure these regulations have their intended impact, the Chinese Taipei government has provided incentives or penalties to increase participation in debris removal. For instance, under the Fisher Harbour Act, the economy prohibits the discharge of litter in harbour areas. The Commercial Port Act regulates water discharges at port reception facilities.

9.7 Opportunities

Direct preventive measures worth considering by Chinese Taipei and ranked in order of priority (from highest to lowest) are:

- Enhanced waste collection on land
- Beach clean-up actions
- Fishing for litter
- Better acceptance facilities for ships
- Inland clean-up actions

In the case of indirect preventive measures, Chinese Taipei identified legal and obligations as the highest priority, followed by awareness-raising and information, enhanced enforcement, research oriented measures, and other economic or market-based instruments.

9.8 APEC's Role in Marine Debris

Chinese Taipei's belief is that tackling marine debris will require a concerted response by more than one economy. A suggestion is to establish a new international instrument to target the plastic marine litter problem. Additionally, there is a need to enhance participation and cooperation of economies in international or regional initiatives.

10. UNITED STATES

10.1 Laws and Regulations

Table 24 shows the laws and regulations relating to waste management and marine debris that are in place in the United States.

Table 24: Waste Management and Marine Debris Laws and Regulations in the United States

Laws and Regulations	Brief Description	Waste Management Processes	Sources
Resource Conservation and Recovery Act (RCRA)	<ul style="list-style-type: none"> • Introduce a framework for the management of non-hazardous solid waste. • Set minimal technical standards for the design and operation of disposal facilities. 	Collection; storage; transportation; treatment; and disposal	Municipal solid waste
Solid Waste Disposal Act	<ul style="list-style-type: none"> • Set minimal economy-wide criteria for solid waste facilities. 		
Save our Seas Act	<ul style="list-style-type: none"> • Re-authorise the National Oceanic and Atmospheric Administration (NOAA) Marine Debris Program until 2022. • Reduce marine debris through research, prevention and reduction. • Allow federal agencies to work internationally with other economies. 	Disposal	Any waste

10.2 International Conventions

The United States has ratified several international conventions that include:

- MARPOL Annex V: Incorporated into the United States under 33 CFR 158.410.
- London Convention: Implemented the regulation under the Marine Protection, Research and Sanctuaries Act (MPRSA).
- Land-Based Sources (LBS) Protocol to the Cartagena Convention for the wider Caribbean: Marine debris is one of the priority pollutants listed in the protocol.

10.3 Preventive and Remedial Measures

The measures that are most relevant to the United States (as ranked) are:

- Promote recycling campaigns
- Voluntary beach clean-up programmes
- Voluntary phasing-out or minimisation of use of certain products
- Awareness-raising in specific sensitive areas or targeting specific items

Initiatives undertaken to tackle marine debris include the National Oceanic and Atmospheric Administration (NOAA) Marine Debris Program that aims to investigate and prevent the detrimental effects of marine debris through prevention, research, removal, regional coordination and emergency response. Examples of activities it supports include regionally focused emergency response planning efforts and coordinating with partners during an acute marine debris event.

Additionally, the United States Environmental Protection Agency (EPA) has implemented the Trash Free Waters Program. Trash Free Waters works with a variety of stakeholders to identify problems and prioritise low-tech, low-cost solutions to prevent and reduce marine litter and debris.

10.4 Good Regulatory Practices

The United States has applied good regulatory practices in the following areas:

Good Regulatory Practices	Description
Standards	<ul style="list-style-type: none"> • Minimum criteria for solid waste facilities have been established. • Facilities that do not meet the criteria are required to be closed.
Flexibility	<ul style="list-style-type: none"> • There is a degree of flexibility that allows various levels of governments to set more stringent requirements as long as the federal criteria is met.
Efficiency	<ul style="list-style-type: none"> • To increase efficiency, States modify their funding mechanisms to support their solid waste disposal and diversion programmes.
Monitoring and Evaluation	<ul style="list-style-type: none"> • The Environmental Protection Agency (EPA) published a fact and figures report that includes economy-wide data on generation, recycling, composting, combustion with energy recovery and landfilling.
Stakeholder Consultation	<ul style="list-style-type: none"> • The EPA facilitates communication and collaboration with stakeholders, developing economy-wide guidelines, best practices and technical support to manage materials and waste.

10.5 Funding and Research

Funding in the United States is provided through NOAA for local-level activities. Under this mechanism, the projects are generally awarded on a two-year cycle but others may be awarded through grant competitions that are usually more long-term. In 2018 alone, NOAA provided \$1.1 million in funding through 11 grant awards.

Apart from these initiatives, NOAA also funds research to understand the fate and transport of debris, impacts of debris on species, and impacts on coastal and marine habitats. It has allocated \$1.2 million to research projects in 2019.

10.6 Land-Based Marine Debris Preventive Measures

When mitigating land-based marine debris at its source, the United States has carried out measures that include:

- **Public participation:** NOAA creates materials to increase awareness on the issue among the public and offers suggestions on how they can do their part to reduce marine debris.
- **Fishing for Energy Partnership:** As a partnership between NOAA, Covanta, the National Fish and Wildlife Foundation and Schnitzer Steel Industries, the initiative aims to prevent and reduce the impact of derelict fishing gear in the marine environment. Without any cost, the initiative converts old or unwanted fishing gear into energy.
- **EPA Urban Waters Federal Partnerships:** The partnership improves coordination among federal agencies and provides small grants to protect waterways. Much of the grants are directed toward trash capture and urban water management.

10.7 Land-Based Marine Debris Remedial Measures

The most common sources of land-based marine debris in the United States are litter in storm water runoff as well as household and general littering. Tourism and coastal recreation, toilet and sewer overflow, as well as waste management and collection are the least common sources of debris.

To address land-based marine debris, the United States has created the NOAA prevention project fund, introduced state and local laws or ordinances, and initiated projects such as the Trash Free Waters. Additionally, the EPA supports marine litter initiatives such as the use of trash capture devices in rivers and streams to clear trash and facilitate its removal. These removal projects aim to clean up shorelines and coastal areas as well as to educate the public.

10.8 Sea-Based Marine Debris Remedial Measures

In the case of sea-based marine debris, the main source is the shipping industry followed by the fishing and aquaculture industries.

To tackle these issues, NOAA partners with the industry through the Fishing for Energy Partnership to help the fishing industry dispose retired or discarded fishing gear. Since 2008, the partnership has collected over 4 million pounds of fishing gear through 52 collection bins at several ports in the United States. More than 1000 fisherman have participated in retrieving nets from the ocean. Additionally, grants have been provided to remove fishing gear from coastal waters in the United States.

10.9 Monitoring of Marine Debris

To better monitor marine debris, the United States has introduced:

- NOAA Shoreline Monitoring Field Guide.
- NOAA Marine Debris Monitoring and Assessment Project: An initiative that compiles the amount and types of debris in the environment. The aim is to be able to identify targets for future mitigation efforts through such monitoring.
- Microplastics monitoring: Provides sediment trawl and water column sampling.
- EPA Escaped Trash Assessment Protocol (ETAP): Provides a methodology to identify clean-up sites, track clearing and cataloguing to produce data on the characteristics of trash.

These monitoring efforts allow for the amount and types of debris to be recorded such that marine debris can be tracked and prevented and future targets can be identified.

10.10 Opportunities

Direct preventive measures worth considering by the United States and ranked in order of priority (highest to lowest) are:

- Enhanced waste collection on land
- Enhanced waste treatment chains, avoiding escapes of waste to the environment
- Beach clean-up actions

- Eco-design to avoid waste generation or to enhance reuse of recyclability
- Enhanced waste water treatment

Indirect preventive measures worth considering by the United States and ranked in order of priority (highest to lowest):

- Awareness-raising and information
- Research oriented measures
- Monitoring
- Enhanced enforcement
- Other economic or market-based instrument

10.11 APEC's Role in Marine Debris

The United States has identified that APEC could potentially serve as a convenor for the region in compiling challenges related to marine litter and debris faced by the economies. There is yet to be a regional body collecting such information in the Asia-Pacific region.

Additionally, the United States has suggested that APEC could coordinate its efforts with other entities such as Circulate Capital and Ocean Conservancy. To do this more effectively, APEC could build stronger partnerships with the private sector.