

*Output 3.4.1 procedures in place to control and remove marine litter at demonstration sites*

**Deliverable 10:  
Policies and Regulations regarding solid waste  
disposal in PR China**

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# **Regional review of existing policies and regulations regarding solid waste disposal as well as technologies for reducing production including recycling opportunities**

*Output 3.4.1 procedures in place to control and remove marine litter at demonstration sites*

*Deliverable 17: baseline survey report of marine litter*

## **1. Introduction**

In recent years, the growing amount of marine plastic has emerged as a problem we cannot afford to ignore. Studies indicate, since 1950s, humans have produced 8.3 billion tons of plastics, of which 6.3 billion tons have become trash. Only 9% of plastic waste is recycled, 12% is burned, and 79% goes to landfills or natural environment. If we fail to change the ways of plastics manufacture and improve solid waste management, 12 billion tons of plastic waste will be generated by 2050<sup>[1]</sup>.

A large amount of plastic waste enters the ocean through various ways. One of the studies shows that in 2010, 4.8-12.7 million tons of plastic waste was discharged from 192 coastal countries in the world<sup>[2]</sup>. A report from the Secretary-General of the United Nations (UNSG) indicates that marine plastic waste is a global issue affecting the world's oceans. Plastic has been found from the coastal waters to the oceans, from surface waters to deep seawater and oceanic sediments, from poles to the equator and sea ice. As plastics are durable and degrade very slowly, plastics can gradually accumulate in the oceans. It is estimated that more than 5 trillion plastic pieces weighing over 250,000 tons are floating at sea. The World Economic Forum predicts that there will be more plastic than fish in the world's oceans by 2050 (by weight)<sup>[3]</sup>.

According to the report of Secretariat of the United Nations Convention on Biological Diversity, marine debris affects at least 817 species worldwide, 23% up from a review conducted in 2012<sup>[4]</sup>, varying from all known sea turtles to about half of all of marine mammals. More than 80% of these impacts were associated with plastic debris. Microplastics less than 5mm are referred to as "PM2.5" in the ocean, because it can be eaten by marine organisms such as zooplankton, shellfish, fish, seabirds and mammals, and have adverse effects on their growth, development and reproduction.

Marine plastic pollution not only poses a potential threat to marine life and human health, but also triggers such issues as causing trans-boundary pollution, hampering industrial development, and challenging international pollution management. The problem of marine plastic pollution has proved to be a complex issue both environmentally challenging and politically alarming. This research reviews the existing policies and regulations regarding solid waste disposal as well as alternative technologies for plastic production reduction.

## **2. Review of existing policies and regulations regarding solid waste disposal**

### **2.1 International Marine Litter Legislation**

#### **2.1.1 Global legislation and multilateral agreements**

The United Nations Convention on the Law of the Sea (UNCLOS) provides a broad legal framework for ocean-related issues<sup>[5]</sup>. Although UNCLOS does not explicitly mention marine litter, it sets out the general obligation of States to protect and maintain the marine environment. The general obligation of the environment can be used for marine litter regulation. The *International Convention for the Prevention of Pollution from Ships* (MARPOL 73/78) is an important international instrument for dealing with marine pollution of ships, including provisions for preventing and mitigating pollution from ships, accidental pollution and pollution during daily operations<sup>[6]</sup>. MARPOL Annex V (Regulations for the Prevention of Pollution by Litter from Ships) came into force on 31 December 1988. It specifies the distances from land in which materials may be disposed of and subdivides different types of litter and marine debris. The *London Dumping Convention* (LC) aims to prevent marine pollution by restricting dumping waste and other substances into the marine environment, while the 1996 Protocol to the London Convention introduces the dumping aspect which is more restrictive than the Convention, and plastics are not included in the “reverse list”, so it is forbidden to dump plastic products at sea<sup>[7]</sup>. The *Basel Convention*<sup>[8]</sup> of the Conference of the Parties in May 2019 adopted an

amendment to the Plastic Wastes Annex, which imposes stricter control requirements on the transboundary movement of plastic waste.

The term “soft law” refers to quasi-legal instrument which does not have any legal binding force, or whose binding force is somewhat weaker than the binding force of law which is often referred to as “hard law”. There are several global soft laws related to marine debris. The *Code of Conduct for Responsible Fisheries*, which was released in 1995 by the World Food and Agriculture Organization (FAO)<sup>[9]</sup>, requires States to take appropriate measures to address the issue of discarded, lost or otherwise discarded fishing gear, including use of alternatives, research and development of the technology of environmentally sound and efficient fishing gear. *Global Programme of Action for the Protection of the Marine Environment from Land-based Activities* (GPA) is currently the only global intergovernmental mechanism for terrestrial pollution, requiring countries to adopt national action plans to address land-based pollution problems.

The *Honolulu Strategy*, global framework for Marine Litter Prevention and Management, proposes ways to reduce land-based and marine debris, but does not provide measurable targets or timelines. Based on the *Honolulu strategy*, the United Nations Environment Programme (UNEP) established the Global Partnership for Marine Litter (GPML) in 2012. GPML serves as a voluntary coordination body of international agencies, governments, NGOs, academia, private sector, and civil society to work together to reduce and prevent marine litter and trash.

In 2012, United Nations Conference on Sustainable Development adopted the outcome document entitled “The future we want”<sup>[10]</sup>, paragraph 163, which describes the hazards posed by marine debris, including sea and land sources, and requires member states to implement relevant conventions and plans, achieving the goal of drastically reducing marine debris by 2025. Resolution 70/1 adopted by the UN General Assembly approved the 2030 Sustainable Development Goals, Goal 14 Target requires “prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution by 2025”.

### **2.1.2 Regional Laws and regulations**

In addition to global agreements and soft law instruments, there are a number of regional agreements and instruments dealing with marine debris

management. The UNEP Regional Oceans project successfully organized and implemented regional marine litter activities around the world, including 14 regional marine projects (including the Northeast Pacific, the ROPME waters of the Gulf, the South East Pacific, the Northeast Atlantic, the Mediterranean Sea, the Black Sea, the Great Caribbean, The Red Sea and the Gulf of Aden, East Africa, West Africa, the Caspian Sea, the South Pole, the Baltic Sea, etc.) some of these regional organizations adopted instrument to assess marine debris issues, release regional marine litter management action plan, and organize the International Coastal Cleanup (ICC) activities, etc.

There are several initiatives in the EU to address the issue of marine litter. *The Marine Strategic Framework Directive (MSFD)*<sup>[11]</sup>, which is the backbone of the EU's marine policy, is most relevant to marine litter management. MSFD requires member countries to achieve or maintain good marine environmental conditions (GES) by 2020. Marine debris ranks among the 11 GES targets, requiring marine debris pollution not to cause harm to nearshore and offshore environment, and to set specific monitoring indicators.

The Baltic Sea Marine Environmental Protection Committee (HELCOM) adopted the Baltic Action Plan in 2007<sup>[12]</sup>. In 2013, the HELCOM Copenhagen Ministerial Conference adopted a ministerial declaration. The declaration agreed to prevent and reduce solid waste from land and sea and decided to develop a regional action plan by 2015. The latest goal is to achieve a significant reduction in the amount of marine litter by 2025 and to prevent damage to the coastal and marine environment. The Declaration specifically agreed on a regional action plan for marine litter, including: taking specific measures to prevent and reduce marine litter from its main sources, and developing and testing technologies for removing microplastics and nanoparticles from municipal wastewater treatment plants by 2020, common indicators and related targets for the quantity, composition, sources and pathways of waste.

In 2007, the Northeast Atlantic Marine Environmental Protection Convention (OSPAR) issued a "Litter Capture Project" (FFL) implementation guide<sup>[13]</sup>. There are two main objectives: one is to physically remove the marine debris from the seabed; the other is to raise awareness of the fishermen and encourage them to participate in the activity of vessels to store marine debris caught by normal fishing nets.

More and more ships are participating in this activity. From 2011 to 2014, 210 ships engaged in FFL operations in Scotland cleared more than 700 tons of marine debris. The FFL initiative is currently being implemented in the Netherlands, Belgium, Germany, the UK, Ireland, Italy and Sweden.

### **2.1.3 National Marine Litter Management**

Local and national actions have been the primary means of reduction of plastic pollution, including the establishment of special mechanisms such as the banning of certain plastics (microbeads, plastic bags, etc.), fishing gear recycling incentives, and positive and measurable program.

As a result, at the national level, marine litter is usually addressed across a variety of statutes, including by laws governing solid waste more broadly. Only a few countries that have specific overarching legislation to address marine litter. For example, Japan issued the *Law for the Promotion of Marine Litter Disposal* (LPMLD) on July 8, 2009. The purpose of this law is to control and reduce generation of marine litter. The law authorises that the prefectural governments formulate regional plans, and prefectural governments have established councils to undertake their mandated activities. In addition, the law emphasizes cooperation among private, public, and international sectors.

Other countries address marine litter through the inclusion of relevant provisions within broader legislation. In such situations, while a country does not have a law focusing specifically on marine litter, it does have a section of a broader law that provides an overarching mandate and framework for addressing the particular problem of marine litter. South Korea provides an example this approach. The South Korean Marine Environmental Management Act of 2009 includes a mandate to develop a Marine Litter Management Plan. This statute defines the obligations of the State, local governments, and people to prevent marine pollution.

Some countries do not address marine plastic waste through legislation, but through establishment of a comprehensive national policy framework to tackle the marine debris pollution. The policy can promote the adoption and revision of laws and regulations. This is the case in the Netherlands, which has established its own marine litter policy based on the EU and other regional and international policy frameworks. For the Netherlands, the key legal framework for policy development is the EU Marine Strategic

Framework Directive. In addition, the Dutch marine litter policy covers solid waste management, raw material chain management, new material management and producers' claiming accountability, and strives to shift from solid waste management to source management.

In June 2010, the Scottish Government launched Scotland's Zero Waste Plan<sup>[14]</sup>, which sets out a vision for a zero waste society. The plan seeks to minimize wastes and maximize reuse of resources, leaving only limited amounts of wastes to be treated. By 2025, 70 percent of all wastes should be recycled, while no more than 5 percent will go to a landfill. Implementing the MSFD, the Scottish Government adopted a national litter strategy and a marine litter strategy in 2014. Based on broad consultations and environmental assessments, both strategies cover the period up to 2020. The national litter strategy identifies ways to encourage people to take personal responsibility. Actions include awareness-raising measures, improvement of product and service design through a close collaboration with the business sector, the provision of opportunities for recycling, and the establishment of a strong enforcement system. In order for people to change their behavior and stop littering, the Scottish Government has developed a communications toolkit, launched a marketing campaign and adapted legislation to increase the fixed penalties for litter. In 2014, a charging scheme for single-use carrier bags was introduced.

Government of Indonesia has adopted various National Laws regarding Waste Management, Coastal Areas and Small Island Management, Tourism, including those related to the Ocean itself as well as the Local Governments as the principal Authorities. In order to cope with the problem, the Indonesian government has setup the National Plan of Action on Combating Marine Plastic<sup>[14]</sup>. Debris to minimize the impact of marine debris. The government regulates the action plan at the sub national level, national, international and even regional, as well as through the research and development community. The major principles for controlling marine debris are improving the awareness of all stakeholders, waste plastics managements from land to the coastal area, marine plastic debris management and enhance institutional strength and funding supports. By adopting 5 main pillars and applying 5 strategy programs, the final goal for reducing marine plastic debris by 70 % in 2025.

At the global level there are numerous initiatives and frameworks such as the Global Partnership on Marine Litter (GPML) and the Honolulu

Strategy.<sup>59</sup> Similarly, on the regional and national levels, there are a diversity of marine litter projects and initiatives. For example, the Gulf of Mexico Marine Debris Project was established in 2006 under U.S. law. This project created debris maps and was implemented to address the marine litter left behind by Hurricane Katrina. The National Oceanic and Atmospheric Administration (NOAA) Office of Coast Survey and Office of Response and Restoration surveyed and mapped the Gulf coast area and posted the results on the project website that were used by boaters and for marine litter removal activities.

Increasing efforts to address and improve marine litter management have been seen worldwide. Overarching national legislation is found in some countries but remains uncommon. To date, the more common practice is to adopt overarching policy, strategies, plans, and programs under international or regional cooperation frameworks, and to adopt or amend targeted provisions in multiple laws. For those countries that have overarching legislation, it often serves as a coordinating and planning mechanism to help integrate the existing laws and programs already in place and design strategies for priority actions.

## **2.2 Laws and Policies on Marine Litter Management in China**

### **2.2.1 Laws concerning the management of marine litter in China**

Although there are no laws or regulations specifically issued for marine litter in China, to prevention and control of marine litter pollution, China government has gradually formulated a series of relative laws and regulations.

#### *(1) Environmental Protection Law*

The *Environmental Protection Law of the People's Republic of China* is a national law enacted in 1989 to protect and improve the environment, prevent and control pollution and other public hazards, safeguard public health, promote the construction of ecological civilization, and promote sustainable economic and social development<sup>[15]</sup>. It was revised in 2014.

Article 49 of the *Environmental Protection Law* stipulates that "The people's governments at various levels and agricultural science and related departments and agencies shall be disposing of agricultural film, crop straw and other agricultural waste, prevent agricultural non-point source

pollution, the pollution of agricultural waste, especially agricultural film for the regulation, put forward by the people's governments at the county level shall be responsible for the organization of rural life waste disposal work. Article 51 stipulates that "people's governments at all levels shall coordinate urban and rural construction sewage treatment facilities and supporting pipe networks, environmental sanitation facilities such as the collection, transportation and disposal of solid waste, and other public facilities for environmental protection, and ensure their normal operation".

### *(2) Marine Environmental Protection Law*

*The Marine Environment Protection Law of the People's Republic of China* is a law enacted to protect and improve the Marine environment, protect Marine resources, prevent and control pollution damage, maintain ecological balance, protect human health, and promote sustainable economic and social development<sup>[16]</sup>. The law was passed in 1982 and amended for the third time in 2017.

Article 62 of the *Marine Environmental Protection Law* stipulates that "No vessels and their related operations shall, in the sea areas under the jurisdiction of the People's Republic of China, discharge pollutants, wastes, ballast water, vessel litter and other harmful substances into the sea. Those who engage in the business of collection of pollutants, wastes, litter from vessel, and the operation of vessel cabin cleaning and washing must possess corresponding capacities of pollutant collection and treatment". However, article 38 stipulates: "if tailings, slag, coal ash, litter and other solid wastes are abandoned, stacked or disposed of along beaches or beaches, the relevant provisions of the *Law of the People's Republic of China on the Prevention and Control of Environmental Pollution by Solid Waste* shall be followed".

### *(3) Law on the Prevention and Control of Environmental Pollution by Solid Waste*

The law of the People's Republic of China on the Prevention and Control of Environmental Pollution by Solid Waste is formulated to prevent and control environmental pollution by solid waste, protect human health, maintain ecological safety and promote sustainable economic and social development<sup>[17]</sup>. The law was passed in 1995 and revised in 2019.

April 1, 1996, "*Law on the Prevention and Control of Environmental Pollution by Solid Waste*" came into force. It stipulates the prevention and control of

solid waste (including industrial waste, household waste) and hazardous waste, but there is no specific provision for Marine litter. Article 2 stipulates that "this law shall not apply to the prevention and control of Marine environmental pollution by solid waste". Compared with the content of "*Marine Environmental Protection Law*", it can be seen that there are contradictions in the provisions of these two laws on marine litter, which need to be revised and improved.

#### (4) *Law on Prevention and Control of Water Pollution*

*The Law on Prevention and Control of Water Pollution of the People's Republic of China* is a law enacted to protect and improve the environment, prevent and control water pollution, protect water ecology, guarantee drinking water safety, maintain public health, promote ecological civilization construction, and promote sustainable economic and social development<sup>[18]</sup>. The law was passed in 1984 and amended in 2017.

Article 38 of the *Law on Prevention and Control of Water Pollution* stipulates: "it is forbidden to pile up or store solid wastes and other pollutants in beaches and bank slopes below the highest water level of rivers, lakes, canals, channels and reservoirs."

#### (5) *Environmental protection Tax Law*

In order to protect and improve the environment, reduce the emission of pollutants, and promote the construction of ecological civilization, the *Environmental protection Tax Law* has been formulated<sup>[19]</sup>. The law was passed in 2016 and took effect in 2018.

Article 5 of the *Environmental protection Tax Law* stipulates that "any legally established urban and rural centralized sewage treatment and household litter treatment sites that discharge taxable pollutants into the environment in excess of the national or local standards shall pay an environmental protection tax".

#### (5) *Island Protection Law*

*The Island Protection Law of the People's Republic of China* is formulated to protect the ecological system of islands and their surrounding sea areas, rationally develop and utilize the natural resources of islands, safeguard national maritime rights and interests, and promote sustainable economic and social development<sup>[20]</sup>. The law was passed in 2009 and took effect in 2010.

Article 33 of the *Island Protection Law* stipulates that "solid waste generated in the utilization of uninhabited islands shall be innocently treated and disposed of in accordance with regulations, and it is forbidden to abandon or dump into the surrounding sea areas on uninhabited islands".

## **2.2.2 Regulations concerning the management of marine litter in China**

(1) Regulations on the prevention and control of pollution by land-based pollutants

*Regulations on the prevention and control of pollution by land-based pollutants* came into force on 1, August, 1990<sup>[21]</sup>. This regulation focused on land-based pollutants (mainly liquid, such as wastewater) discharged through river or outlet. There are only two Articles relating to solid waste. Article 11 Without authorization, it is forbidden to stack, treat and dispose of solid wastes in coastal beaches. Article 12 Approved waste yards, treatment units and individuals must build leakage protection dam, dust protection and other facilities, etc.

(2) *Regulations of the people's republic of china on control over dumping of wastes in the ocean*

In the *Regulations of the people's republic of china on control over dumping of wastes in the ocean*<sup>[22]</sup>, the Annex I stipulates the substances Forbidden to be Dumped, including fishing net, ropes, plastic products and other artificial synthesis which can float on the surface or suspend in the water to seriously affect navigation, fishing and other activities endangering the ocean life.

(3) *Regulations of the People's Republic of China Concerning Environmental Protection in Offshore Oil Exploration and Exploitation*

*Regulations of the People's Republic of China Concerning Environmental Protection in Offshore Oil Exploration and Exploitation* stipulates the disposal of industrial litter in large quantities shall be controlled according to provisions concerning marine dumping, and scattered industrial litter may not be dumped into fishing areas and navigation channels<sup>[23]</sup>.

(4) *Administrative Regulations on the Prevention and Treatment of the Pollution and Damage to the Marine Environment by Marine Engineering Construction Projects*

*Administrative Regulations on the Prevention and Treatment of the Pollution and Damage to the Marine Environment by Marine Engineering Construction Projects stipulates plastic products shall not be directly discharged in the sea, and shall be stored in a special container and transported back to the land for disposal*<sup>[24]</sup>.

(5) *Regulations on the Regulation on the Prevention and Control of Vessel-induced Pollution to the Marine Environment*

*Article 15 of the Regulations on the Regulation on the Prevention and Control of Vessel-induced Pollution to the Marine Environment stipulates that the vessel litter, sewage, oily waste water, waste water containing toxic and hazardous substances, waste gas and other pollutants and ballast water discharged by vessels to the ocean within the sea areas of the People's Republic of China shall meet the requirements of the laws, administrative regulations, the international treaties*<sup>[25]</sup>.

(6) *Regulations for the prevention and control of pollution damage to the Marine environment by coastal construction projects*

In order to strengthen the environmental protection and management of coastal construction projects, strictly control new pollution and protect and improve the Marine environment, *Regulations on the prevention and control of pollution damage to the Marine environment by coastal construction projects* were promulgated in 1990<sup>[26]</sup>.

Article 16 stipulates that the construction of shore-based shipyards and repair yards shall be equipped with industrial and ship waste reception and treatment facilities commensurate with their nature and scale.

Article 20 stipulates that the construction of coastal litter dump shall include the construction of protective dykes and the sealing layer at the bottom of the site, and the installation of seepage collection, export and treatment systems and inflammable gas explosion-proof devices.

(7) *Regulations for the prevention of environmental pollution by ship dismantling*

In order to prevent shipbreaking from polluting the environment, protect the ecological balance, protect human health and promote the development of shipbreaking, the *regulations on the prevention of shipbreaking from polluting the environment* were promulgated in 1988<sup>[27]</sup>.

Article 10 stipulates that shipbreaking units must be equipped with or equipped with waste recycling disposal sites.

Article 11 stipulates that waste, such as litter, must be sent to shore for centralized disposal before the vessel is dismantled.

Article 14 stipulates that the parts or wastes of a ship removed shall not be discarded or stored in water; Any ship parts or wastes containing pollutants shall be prohibited from entering any water body.

#### *(8) Integrated Reform Plan for Promoting Ecological Progress*

The *Integrated Reform Plan for Promoting Ecological Progress* has been formulated for putting systematic and complete systems for improving the ecosystem in place more quickly; achieving faster ecological progress; and making the reform for promoting ecological progress more systemic, more holistic, and better coordinated<sup>[28]</sup>.

Article 26 of the plan proposes improving the system of resource recycling. An effective system will be established to record resource-output ratio statistics. The extended producer responsibility (EPR) system will be put into effect, pushing producers to perform their responsibilities for take-back and disposal of their end-of-life products. A system will be established to utilize farming, livestock, and aquaculture waste and achieve the organic integration and circular development of farming, husbandry, and aquaculture. The establishment of a system for making the separation of waste compulsory will be accelerated. A list of renewable resources to be recycled will be worked out and the mandatory recycling of composite packaging, batteries, agricultural plastic sheeting, and other low-value waste will be required. Efforts will be accelerated to develop standards for the recycling and reuse of resources by type. A system for promoting the use of products and raw materials made of recycled resources will be established to require enterprises consuming related raw materials to use a certain proportion of recycled products. The system for restricting the use of single-use disposable products will be improved. Taxation policies will be implemented and improved to promote the comprehensive utilization of resources and the development of the circular economy. A list of circular economy technologies will be formulated and policies such as priority government procurement and discounted interest on loans will be implemented.

Article 37 of the plan proposes establishing systems and mechanisms for rural environmental governance. An eco-oriented system of agricultural subsidies will be created. Efforts to formulate and improve relevant technical standards and specifications will be accelerated. Reductions to the use of chemical fertilizers, pesticides, and plastic sheeting and the recycling or safe disposal of animal husbandry waste will be carried out quickly. The production and use of biodegradable plastic sheeting is encouraged. The system for comprehensively utilizing crop straw will be improved. Networks for recycling, storing, transporting, and processing plastic sheeting and chemical fertilizer and pesticide packaging will be improved. Development of environmental protection facilities, such as those for handling rural wastewater and refuse, will be bolstered by subsidies from governments and village collectives, fee payments from residents, and the participation of non-government capital. A variety of assistive measures, including government procurement of services, will be adopted to foster and develop market entities for the control of all types of agricultural pollution from non-point sources and for the handling of rural wastewater and refuse. County- and township-level governments will carry greater responsibility for environmental protection, and efforts to build their capacity for environmental regulation will be boosted. In allocating government funds for supporting agriculture, full consideration should be given to improving overall agricultural production capacity and to preventing and controlling rural pollution.

Article 41 of the plan proposes fostering market entities for environmental governance and ecological conservation. Systems, mechanisms, policies, and measures that encourage energy efficient and environmentally friendly industries will be adopted. Regulations and practices that hinder fair competition and the creation of a nationally unified market will be discontinued, and all types of investment will be encouraged to enter the environmental protection market. Non-government investors may participate in the development and operation of any environmental governance or ecological conservation program where cooperation between government and non-government investment is viable. By means of government procurement of services and other methods, more support will be provided for third-party governance of environmental pollution. The transformation of organizations in charge of the operation and management of wastewater and refuse treatment facilities into companies that exercise independent accounting and management will be accelerated. Companies

that take investment from or are operated with state capital will be set up or created through reorganization in order to encourage greater investment of state capital into environmental governance and ecological conservation. Support will be given to state-owned firms in fields of ecological and environmental protection to reform toward a mixed-ownership system.

*(8) Opinions on Accelerating the Construction of Ecological Civilization*

The level of China's ecological civilization construction still lags behind economic and social development, resource constraints are tightening, environmental pollution is serious, ecosystems are degraded, and the contradiction between development and population resources and environment is increasingly prominent. In order to solve the above problems, in 2015, the CPC Central Committee and the State Council issued the "*Opinions on Accelerating the Construction of Ecological Civilization*"<sup>[29]</sup>.

The document proposes to vigorously promote green urbanization. All county towns and key towns must have sewage and litter disposal capacity to improve construction, operation and management. Strengthen rural infrastructure construction and carry out special treatment of rural litter.

Strengthen the scientific development of marine resources and ecological environment protection. Strengthen marine environmental management, comprehensive improvement of sea islands, and ecological protection and restoration. Strengthen pollution control of ship ports, actively control ship pollution, and enhance the ability of port terminal pollution prevention and control.

Develop a circular economy. In accordance with the principles of reduction, reuse, and resource utilization, we will accelerate the establishment of a recycling-oriented industrial, agricultural, and service industry system and increase the resource output rate of the whole society. Improve the recycling system of renewable resources, implement waste separation and recycling, develop and utilize "urban minerals", develop remanufactured and recycled products, and encourage the recycling of waste materials such as textiles and automobile tires. Organize the demonstration of circular economy and vigorously promote the typical model of circular economy. Promote the industrial cycle combination, promote the cyclical links of production and living systems, and build a resource recycling system covering the whole society.

(9) Opinions on comprehensively strengthening ecological and environmental protection and resolutely fighting against pollution prevention and control

In order to comprehensively strengthen ecological and environmental protection, fight against pollution prevention and control, promote ecological civilization and build a beautiful China, the *Opinions on comprehensively strengthening ecological and environmental protection and resolutely fighting against pollution prevention and control* were put forward<sup>[30]</sup>.

The opinions were put forward to improve the mechanism of environmental protection supervision. We will improve the system of environmental protection inspectors at the central and provincial levels, formulate regulations on the work of environmental protection inspectors, and carry out special inspectors in key areas, areas and industries, with the focus on solving prominent ecological and environmental problems, improving the quality of the ecological environment and promoting high-quality development.

The overall goal of the guideline is that by 2020, ecological and environmental quality will be generally improved, total emissions of major pollutants will be significantly reduced, and environmental risks will be effectively controlled. We will ensure that by 2035, the overall spatial pattern, industrial structure, mode of production and way of life for conserving resources and protecting the ecological environment will be in place, and that the quality of the ecological environment will be fundamentally improved. By 2050, China will promote ecological progress in all respects and modernize its national governance system and capacity in the field of ecological environment.

The opinions calls for further implementation of the action plan for preventing and controlling water pollution, speeding up the improvement of industrial, agricultural and domestic pollution sources and water ecosystems, ensuring the safety of drinking water, eliminating black and smelly water bodies in cities, and reducing severely polluted and substandard water bodies. We will improve urban black and smelly water bodies, and accelerate the construction of urban sewage collection and treatment facilities. By 2020, more than 90 percent of the black and smelly water bodies in built-up urban areas at or above the prefecture level will be eliminated. We will carry out comprehensive treatment of the bohai sea,

comprehensively renovate sources of pollution that enter the sea, clean up all illegal sewage outlets, strictly control Marine pollution caused by mariculture, and work to prevent, control and clean up Marine wastes. We will carry out pollution control in agriculture and rural areas, continue to carry out actions to improve the living environment in rural areas, and improve the environment in all administrative villages across the country. By 2020, the living environment in rural areas will be significantly improved. In the central and western regions that have a good foundation and are basically qualified, efforts will be made to treat about 90 percent of rural household waste, and improve the recycling and treatment system of waste plastic film and packaging waste.

The opinions put forward an action plan for the comprehensive implementation of soil pollution prevention and control. We will accelerate the classification and treatment of litter, and by 2020, all cities and counties will have the capacity to handle household litter, and basically complete the renovation of non-regular litter storage sites. Demonstration cities have basically completed the classification and treatment system of household waste. We will promote the utilization of waste resources and vigorously develop the incineration of waste to generate electricity. We will promote the local classification, recycling and treatment of rural waste, and establish a rural organic waste treatment system. We will strengthen prevention and control of pollution by solid waste. We will ban all foreign litter imports, crack down on smuggling, significantly reduce the types and quantities of solid waste imports, and strive to basically achieve zero import of solid waste by the end of 2020. We will launch trials of "waste-free cities" and promote the recycling of solid waste. We will further promote the large-scale investigation of solid waste along the Yangtze river economic belt.

### **2.2.3 Policies and Activities of marine litter prevention and control in China**

In recent years, to promote addressing marine litter pollution problem, the relevant departments launched series of policies and activities, such as agricultural waste management, beach environment improvement, river waste management, etc., which is conducive to reducing the entry of plastic waste into the marine environment from the source.

### **2.2.2.1 Agricultural waste management**

#### *(1) Action Plan for Soil Pollution Prevention and Control*

On July 11, 2016, State Council of China issued the *Action Plan for Soil Pollution Prevention and Control*<sup>[31]</sup>. It clearly points out that a coordination mechanism among government, community, enterprises, and residents shall be established. The implementation of litter classification and waste recycling proved to be immensely effective. Through establishing village cleaning system and promoting the treatment of rural domestic waste, a rural sewage treatment project is implemented. In addition, remediation of non-regular landfill sites is activated and recycling of agricultural film is under way. By cracking down on illegal production and sale of substandard agricultural film, a comprehensive utilization network for recycling, storage and transportation of abandoned agricultural film has been established, and pilot projects for recycling and utilization of abandoned agricultural film have been carried out. By 2020, Hebei, Liaoning, Shandong, Henan, Gansu, Xinjiang and other provinces with high use of agricultural film will strive to achieve full recycling of abandoned agricultural film. These activities contribute to the control of agricultural waste, especially preventing agricultural plastic from entering the environment.

#### *(2) Action plan for combating pollution in agriculture and rural areas*

This action plan is formulated in order to speed up the settlement of prominent environmental problems in agriculture and rural areas and to fight the battle against pollution in agriculture and rural areas. One of the main tasks is to strengthen rural household waste management<sup>[32]</sup>. We will give overall consideration to the utilization and treatment of household waste and agricultural waste, and establish a sound household waste collection, transportation, and disposal system that conforms to rural conditions and is diverse in form. In areas where conditions permit, we will carry out trials to classify and reduce rural household waste, and carry out local classification and recycling of waste. By 2020, all rural household waste disposal systems will be covered by the eastern region, urban suburbs in the central and western regions and other areas that have the foundation and conditions. In the central and western regions, where there is a good foundation and basic conditions are available, we will strive to bring about 90 percent of rural household waste under control. We will basically complete the investigation and control of irregular litter dumping sites, implement supervision over the whole process of cleaning up, and

crack down on random dumping and dumping of litter in rural areas. By the end of 2019, centralized drinking water source protection zones at or above the county level and informal litter dumping sites with strong public complaints should be improved.

*(3) Three-Year Action Plan for the Rehabilitation of Rural Human Settlements*

In February 2018, the General Office of the State Council of the CPC Central Committee issued the "Three-Year Action Plan for the Rehabilitation of Rural Human Settlements"<sup>[33]</sup>. Through the promotion of rural household waste management. We will give overall consideration to the utilization and treatment of household waste and agricultural waste, and establish and improve a system for the collection, transportation and disposal of household waste that is in line with rural conditions and in various ways. In areas where conditions permit, local litter classification and recycling methods suitable for rural characteristics should be implemented. We will carry out inspections and renovations at irregular litter storage sites, focusing on litter mountains and surrounding villages. By 2020, the living environment in rural areas will be significantly improved, and basic and qualified areas such as the eastern region and urban suburbs in the central and western regions will be basically covered by the rural household waste disposal system, and a long-term mechanism for management and protection will be initially established. In the central and western regions, where there is a good foundation and basic conditions are available, we will strive to bring about 90 percent of rural household waste under control.

*(4) Guidance on comprehensively promoting the management of rural litter*

In order to comprehensively control rural litter, solve the current problems of rural litter littering and lagging governance, the guidance on comprehensively promoting rural litter governance was issued in 2015<sup>[34]</sup>. The goal is to establish a mode of "village collection, town transfer and county disposal" according to local conditions, so as to effectively control agricultural production and household waste, construction waste and rural industrial waste. By 2020, when China completes the building of a moderately prosperous society in all respects, more than 90 percent of the country's villages will have their household waste under effective control, with complete facilities and equipment, mature treatment technologies, stable cleaning teams, long-term financial guarantee and sound supervision system.

### 2.2.2.2 Prevention and control of river waste discharge

#### (1) Water pollution prevention and control action plan

At present, some areas in China are faced with serious problems such as poor water environment quality, heavy damage to water ecology and many hidden environmental hazards, which affect and damage the health of the people and are not conducive to sustainable economic and social development. This action plan is formulated in order to effectively strengthen the prevention and control of water pollution and ensure national water security<sup>[35]</sup>.

The action plan calls for strengthening pollution control at ship ports and speeding up construction of facilities to receive, transfer and treat waste. We will vigorously develop environmental protection industries, with the focus on sewage and waste treatment and industrial parks, and implement third-party treatment of environmental pollution. Efforts have been made to improve the black and smelly water bodies in the city, including pollution control, waste removal, dredging and ecological restoration. By the end of 2017, there will be no large areas of floating objects on the river surface and no litter on the banks.

#### (2) *Opinions on Overall Implementation of River Chief System*

On November, 2016, the General Office of the CPC Central Committee and the General Office of the State Council issued the *Opinions on Overall Implementation of River Chief System*; it has been made clear that the major leaders of Party and government organizations need to shoulder the posts as river chiefs<sup>[36]</sup>. These decisions are made in light of China's conditions, and their aim is to solve the environmental problems beyond relevant legal provisions. According to the Environmental Protection Law, the Party and government organizations should jointly take the responsibility to solve environmental problems, which serves as the legal basis for the formation of river chief system. The river chief system is being implemented step by step. The river chief system has been in place respectively at provincial, city, county and township levels. The management and control of river wastes is an important part of "River Chief System", which is beneficial to prevention and control of river basin waste, and thus reducing solid waste discharged into the marine environment.

#### (3) *Guiding Opinions on Implementation of Lake Chief System*

In November 2017, the General Office of the CPC Central Committee and the General Office of the State Council unveiled the *Guiding Opinions on Implementation of Lake Chief System*<sup>[37]</sup>. It is proposed to strengthen the protection of lake water resources and the prevention and control of water pollution, and to crack down on illegal activities such as waste water directly entering lakes and waste dumping.

#### *(4) Implementation plan for urban black and smelly water body control*

Since the state council issued the *Action plan on water pollution prevention and control* in 2015, all regions have made positive progress in the treatment of urban black and smelly water bodies<sup>[38]</sup>. In order to further promote the treatment of urban black and smelly water bodies and accelerate the improvement of urban water environment quality, this plan is formulated.

The plan calls for strengthening pollution control in agriculture and rural areas and prohibiting the transfer of urban waste and industrial pollution to agriculture and rural areas. Actively improve the rural waste collection and transfer system, prevent litter directly into the river or in the water randomly stacked. Strengthen the waste treatment of water body and its coastline. The blue line and river and lake management scope of the city shall be defined comprehensively, and the irregular litter stacking points within the scope shall be improved, and the litter cleaned up shall be disposed of in a harmless way. Standardize the management of refuse transfer stations to prevent the direct discharge of landfill leachate into rivers. In time, the waste and floating objects in the water should be cleaned and properly treated. It is forbidden to use them as backfilling materials for water treatment projects. We will establish and improve the litter collection (salvage) and transfer system, and incorporate funds for litter removal and surface litter salvage along the Banks of rivers (lakes and reservoirs) that meet relevant regulations into local budgets.

#### *(5) Special action against environmental violations of solid waste*

In order to curb cases of illegal transfer and dumping of solid waste and ensure the ecological and environmental safety of the Yangtze river, the "*special action against environmental violations of solid waste*" was launched in 2018. The campaign began on May 9 and ended at the end of June. The ministry of ecology and environment conducted a thorough investigation

and verification of the dumping of solid waste in the Yangtze river economic belt.

### **2.2.2.3 Ship waste management**

#### *(1) Special Action Plan for Ship and Port Pollution Prevention and Control (2015-2020)*

The Ministry of Transport issued the *Special Action Plan for Ship and Port Pollution Prevention and Control (2015-2020)* in 2015 to explore and establish a new mechanism for the reception and disposal of ship pollutants, and promote the construction of receiving facilities for pollutants such as ship oily sewage, domestic sewage and litter, and make a good connection between the facilities for transferring and disposing of pollutants between shipyards and between ports and cities, and improve receiving and disposing capabilities to meet the demand for receiving and disposing pollutants from ships<sup>[39]</sup>.

#### *(2) Notice of the maritime safety administration of the People's Republic of China on the implementation of the 2016 amendment to annex V of the international convention for the prevention of pollution from ships*

*The 2016 amendment to annex V of the international convention for the prevention of pollution from ships* was adopted by IMO in 2016, which applies to international navigation ships, coastal navigation ships and fixed or floating platforms. In order to prevent pollution from ship litter and protect the Marine environment, the Maritime Safety Administration of the People's Republic of China has issued a notice to implement the amendment, which sets stricter requirements on ship waste pollution.

#### *(3) Regulations on the prevention and control of Marine environmental pollution caused by ships and their related operations*

In order to prevent and control marine environmental pollution caused by ships and their related operations, *regulations on the prevention and control of Marine environmental pollution caused by ships and their related operations* were promulgated in 2010<sup>[40]</sup>.

Article 12 provides that the discharge of ship litter by vessels sailing, berthing or operating in the sea areas under the jurisdiction of the People's Republic of China shall comply with laws, administrative regulations, relevant standards and the provisions of international treaties concluded or acceded to by the People's Republic of China.

Article 22 stipulates that ships shall be equipped with covered litter storage containers that are impervious to leakage or overflow, or carry litter in bags. Ships shall collect and store litter separately, and litter containing toxic or harmful substances or other dangerous ingredients shall be stored separately.

#### **2.2.2.4 Pollution control in offshore sea area**

##### *(1) Plan for prevention and control of coastal sea pollution*

In order to implement the *Action plan for prevention and control of water pollution*, improve the environmental quality of coastal waters, maintain marine ecological security, and effectively strengthen environmental protection in coastal waters, the Ministry of Environmental Protection issued the *Plan for prevention and control of coastal waters pollution* in 2017<sup>[41]</sup>.

The plan proposes to strengthen the prevention and control of pollution from ships and ports. Coastal ports, wharves, loading and unloading stations and ship repair and construction factories should have the capacity to receive ships' litter, and link up with municipal public treatment facilities to realize the disposal of pollutants from ships according to regulations. We will encourage offshore Marine aquaculture, and support the promotion of deep-water storm-wave resistant aquaculture cages.

##### *(2) National island protection plan (2011-2020)*

In order to protect the island and its surrounding sea ecosystem, rationally develop and utilize island resources, safeguard national Marine rights and interests, and promote sustainable economic and social development, the *National island protection plan* has been formulated, with the planning period of 2011-2020 and the expectation of 2030<sup>[42]</sup>.

According to the plan, China's islands are currently suffering from serious ecological damage. Dumping of litter and hazardous waste on islands has led to the reduction of biodiversity and deterioration of ecological environment in islands and surrounding waters.

The plan proposes to strengthen ecological protection of inhabited islands. Develop island main water pollutants reduction (including vessel litter) planning and solid waste pollution prevention planning, select part of the population is concentrated island building distributed sewage treatment

and solid waste disposal project, to carry out the Marine litter clean-up, prevent pollution island freshwater and seawater resource, strengthen the island residents' awareness of Marine environmental protection. Infrastructure construction, such as litter and sewage treatment, has been carried out in some islands.

#### **2.2.2.5 Policies on development of the plastic industry**

##### **(1) Plastic limit order**

On December 31th, 2007, the State Council issued “Notice on Restricting the Production, Sales and Uses of Plastic Shopping Bags”<sup>[43]</sup>. From June 1, 2008, it was prohibited to produce, sell or use of plastic shopping bags thickness less than 0.025 mm across the country. The plastic shopping bags were not provided free of charge in all the supermarkets, department stores, marketplaces and other retailers. The object of the “Plastic limit order” is to save resources, curb pollution and promote resources recycling.

##### **(2) New types of biodegradable plastics**

The *Implementation Plan for the Industrialization of Key Technologies for New Materials* was issued on December 2017 by the Development and Reform Commission<sup>[44]</sup>. To promote the development of the biodegradable plastics industry, new types of biodegradable plastics, and bio-based plastics, are listed as the key alternative contents.

##### **(3) Ban on “foreign litter”**

Imported solid waste, some of which had been useful as raw materials in the past, has caused damage to the country’s environment and public health, China banned imports of 24 types of solid waste by the end of 2017 in a fresh move to reduce environmental pollution, which covers waste plastics, unsorted scrap paper, discarded textiles, and other kinds of waste. On March 26, 2018, the Ministry of Ecology and Environment reviewed and adopted the “*Action Plan for the Implementation Plan to Enhance Solid Waste Import Management System by Prohibiting the Entry of Foreign Waste 2018-2020*”<sup>[45]</sup>.

##### **(4) Comprehensive utilization of waste**

In order to reduce the sources of waste plastic pollution, the National Development and Reform Commission included the “Plastic Waste Recycling Technology and Equipment Development, Plastic Waste Composite Recycling Equipment” in the “Guidance Catalogue for Industrial Structure Adjustment”. The State Council issued the “Overall Plan for the Reform of the Ecological Civilization System” in 2015. It clarified the concessions for the recycling economy, establishment of a system for the

promotion and use of recycled products and raw materials, and related raw material consumption enterprises must use a certain percentage of recycled materials to reduce the use of disposable products. This Plan affirmed the necessity of the existence of the recycling industry.

#### **(5) Extended producer responsibility system**

The extended producer responsibility system refers to the system that extends the resource and environmental responsibility of producers for their products from the production link to the whole life cycle of product design, circulation and consumption, recycling and utilization, waste disposal, etc. Implementing the extended producer responsibility system is of positive significance for promoting supply-side structural reform and manufacturing transformation and upgrading. In recent years, China has explored and implemented the extended producer responsibility system in some electrical and electronic products, and achieved good results. In order to further implement the extended producer responsibility system, this program is formulated in accordance with the requirements of the central committee of the communist party of China (CPC) central committee and the state council on the issuance of "> general plan for the reform of ecological civilization system".

The plan proposes that by 2025, laws and regulations related to the extended producer responsibility system will be basically improved, product ecological design will be widely implemented, and the standard recycling and recycling rate of waste products will reach 50% on average.

Carry out ecological design. Production enterprises should give overall consideration to the resource and environmental impact of raw and auxiliary materials selection, production, packaging, sales, use, recycling, treatment and other links, and carry out in-depth product ecological design.

Use recycled materials. On the premise of ensuring product quality and performance and safe use, manufacturers are encouraged to increase the proportion of recycled raw materials and implement green supply chain management.

Standardize recycling. Production enterprises can regulate the recycling of waste products and packaging by means of independent recycling, combined recycling or entrusted recycling, and dispose them directly or by professional enterprises.

Considering the market size of products, environmental hazards and the value of resource recovery, the scheme takes the lead in determining the implementation of extended producer responsibility system for four categories of products, including electrical appliances, electronics, automobiles, lead-acid batteries and packaging materials. On the basis of summarizing the pilot experience, we should expand product varieties and fields in time.

### **3. Assessment the Activities of marine litter prevention and control**

#### **3.1 Restricting the production, sales and uses of plastic shopping bags (Plastic limit order)**

In the ten years since the implementation of the restriction, almost all major shopping malls and large supermarkets around the country have implemented the plastic shopping bag charging. The cumulative reduction in the use of plastic shopping bags was more than 1.8 million tons during 2008-2018. However, the small supermarkets and market places still provided free plastic bags. The ultra-thin plastic bags were produced continuously by illegal factories for its low price and widely used. It's extremely difficult for the government to supervise all of them. With the rapid development of e-commerce, express delivery and food delivery industry in China in recent years, the use of plastic bags in these fields is increasing rapidly. It is out of restriction of the "plastic limit order". For adapting to requirements of new situation, some experts suggested that the "plastic limit order" should be improved.

At the local level, Jilin provincial government prohibited sales and uses of one-time not degradation plastic bags and plastic table wares. As China's first comprehensive "plastic ban" province, Jilin Province formally implemented the "ban" on January 1, 2015<sup>[47]</sup>. As a result, the biodegradation plastic bags are widely used in shopping malls and supermarkets major shopping malls and large supermarkets around the whole province. On the contrary, the biodegradation plastic bags are not in wide use in market places because of the high price.

#### **3.2 Banning "foreign litter" and reducing solid waste imports**

As a major importer of waste, China imported 7.3 million tons of waste plastics in 2016, accounting for 56 percent of world imports. China's State Council issued the *Implementation Plan on Banning Entry of Foreign Litter*

*and Reforming the Administrative System of Solid Waste Importation* (Plan) on July 27, 2017<sup>[48]</sup>. The Plan announces that solid waste posing a serious threat to the environment and causing widespread public concern will be banned from entering the country by the end of 2017. The “foreign litter” to be banned includes plastic waste from living sources.

China's measure to dramatically increase the import standards for solid waste has forced waste exporters such as the United States, Australia and Japan to find alternative ways to transfer large quantities of litter to Southeast Asian countries, while some Southeast Asian countries such as Thailand, Malaysia and Indonesia have stopped importing plastic waste. In this context, the *Basel Convention* amendments were passed in May 2019 to reach an agreement on a global management mechanism for plastic waste to incorporate plastic waste into a legally binding framework.

### **3.3 Domestic waste classification system**

In 2000, the former Ministry of Construction announced the first batch of pilot cities for the classification and collection of municipal waste. Beijing, Shanghai, Hangzhou and Nanjing became the first batch of eight cities. However, after 10 years of piloting, the above-mentioned municipal waste classification work did not achieve the expected results. Many localities began to try to promote waste management regulations through local legislation, but the implementation effect was not satisfactory.

In December 2016, President Xi Jinping presided over the Central Financial and Economic Leadership Group meeting to study the general implementation of the waste classification system. In 2017, the General Office of the State Council issued the *Notice of the General Office of the State Council on Forwarding the Implementation Plan of the Municipal Waste Classification System of the Ministry of Housing and Urban-Rural Development of the National Development and Reform Commission* (the General Office of the State Council issued No. 26)<sup>[49]</sup>. According to the requirements of the document, 46 key cities including municipalities, provincial capitals, and cities with planning will basically complete a municipal waste classification system, which will make the recycling rate of municipal waste more than 35% by 2020.

After the publication of this document, the waste classification work in 46 key cities has made positive progress, and has been formed some experiences which can be replicated and promoted. All key cities have

announced the implementation of waste classification, established a two-level work coordination mechanism in the urban area, and focused on promoting the construction of municipal waste classification during throw, collection, transportation and treatment processing facilities.

In 2019, Ministry of Housing and Urban-Rural Development and other eight departments issued the *Notice on the Comprehensive Implementation of Domestic Waste Classification in Cities at the National Level and Above*, and decided to start the classification of domestic waste in cities across the country and above since 2019. Before the end of 2019, cities at all levels should complete the implementation plan for the classification of domestic wastes, clarify the classification standards, and promote the target tasks, key projects, supporting policies and specific measures. The classification and treatment system for domestic litter will be basically established in prefecture-level and above cities by 2025.

### **3.4 Agricultural and rural pollution**

In 2015, Ministry of Housing and Urban-Rural Development issued the *Guiding Opinions on Comprehensively Promoting Rural Waste Management*, proposing to establish a model of “Village collection, Town transfer, and County treatment” to effectively control agricultural production and domestic waste, construction waste, and rural industrial waste<sup>[50]</sup>. By 2020, more than 90% of the rural domestic litter will be effectively treated.

In 2018, the Ministry of Ecology and Environment and the Ministry of Agriculture and Rural Affairs issued the *Action Plan for the Uphill Battle Pollution in Agricultural and Rural Pollution*, and proposed to focus on the treatment of rural domestic waste water; carry out pilot projects for the classification and reduction of rural domestic waste, and promote the in situ classification and resource utilization of waste. Basic and conditional areas will basically cover the full coverage of the rural domestic waste disposal system by 2020.

At present, the informal dumping place of waste in country have been investigated and rectified, and special supervision of informal dumping place has been organized. Spot inspections have been carried out in the form of unannounced visits and cross-site inspections, and satellite remote sensing images have been used to monitor new informal dumping place. Incorporate the ineffective work of remediation of informal dumps,

pollution, and social impacts into the scope of central environmental protection inspectors. According to the 2017 China Ecological Environment Bulletin, the proportion of administrative villages treated with rural waste is 74%. In the country, where some levels of economic development are relatively backward, there are still non-point source pollution of plastic waste, and some towns and villages lacking the capacity of litter transfer will pile up the collected litter to remote wasteland to form a litter dump. In rural areas far away from towns and villages, some plastic wastes non-point source pollution is formed in the forests, roads, cultivated land, and villages, because they are not properly collected and transported. In addition, the agricultural film used in agricultural production is also an important source of pollution.

### **3.5 River waste control**

In 2016, the General Office of the CPC Central Committee and the General Office of the State Council issued the and implemented the *Opinions on the Full Implementation of the River Chief System*, proposing the establishment of river chiefs in each administrative region, and the river managers at all levels are responsible for organizing the management and protection of the corresponding rivers and lakes, including focusing on domestic sewage and waste treatment and comprehensively rectifying rural water environment<sup>[51]</sup>.

In 2018, the Ministry of Housing and Urban-Rural Development and the Ministry of Ecology and Environment issued the *Uphill Battle on the Treatment of Urban Black and Stinky Waters*, proposing a comprehensive rectification of urban black and odorous water bodies, ensuring that the treatment of urban black and odorous water bodies will be effective in three years. The uphill battle will actively improve waste collection and transshipment system in the country, and prevent waste from entering the river directly or randomly stacked near the water body. Strengthening the waste treatment of water bodies and their shorelines, and remediating the illegal litter dumping place within the scope. Cleaning and properly disposing of litter and floating matter in the water body.

At present, the water quality and floating litter of rivers, black and odorous water bodies within the city have generally improved significantly. Due to imperfect infrastructure of rivers in rural areas, it was observed that the phenomenon of dumping litter from neighboring villagers to the river

bank. Financial constraints are the main factors restricting the control of rural river waste.

### **3.6 Comprehensive improvement of coastal environment**

In 2017, the former SOA issued the *Guiding Opinions on Carrying out the Pilot Work on the "Long-Term System*. Carrying out the Bay Long System pilot work in some provinces and cities to build a coordinated management pattern of river-sea convergence and land-sea co-ordination. Controlling land source waste import, and prohibiting dumping waste, which is from port terminals, breeding fishing, platform ships into the sea. And cleaning up floating litter, beach litter and submarine litter.

In 2018, the Ministry of Ecology and Environment and other ministries and commissions jointly issued the *Action Plan for the Comprehensive Management of the Bohai*, proposing that special management measures be put forward for the treatment of the marine debris in the Bohai Sea<sup>[52]</sup>. Through three years of comprehensive management, the port, ship, breeding activities and the waste pollution prevention and control system will be constructed and improved, including prohibiting the dumping and landfilling of domestic litter within a certain range from the coastal high tide line to the land side, severely cracking down on illegal activities of dumping litter into the sea, and carrying out comprehensive treatment of litter into the sea and nearshore waters.

### **3.7 Public education and outreach**

A good beach environment is not just a matter of tourism but an image of the city. Clean beach, is not only about public welfare and environmental protection, but also is a symbol of civilization. China actively encourages local governments and NGOs to organize activities for cleaner beaches. Propaganda and Education were carried out to observe World Environment Day, Earth Day, World Oceans Day, International Coastal Cleanup Day and China Ocean Day. On September 17 to 25, 2016, "2016 International Coastal Cleanup Day Joint Action", in 18 Chinese cities, including Hong Kong, Macao, more than 70 social groups, nearly 10 thousand volunteers organized nearly 40 beach cleaning activities. Propagandistic brochures for the hazard and prevention of marine debris and microplastics were distributed to the public. Warning signs were set up in specific locations of shipping, fishing, tourism and other areas. Special exhibitions on marine debris pollution prevention and control were launched. Volunteer activities for beach cleaning were organized. These methods effectively raise the public awareness of prevention and control of marine debris.

## **4. Identify gaps in addressing solid waste disposal at regional level**

Take Dalian as an example to identify gaps in addressing solid waste disposal at regional level.

### **4.1 Status of municipal solid waste management**

In June 2017, Dalian City issued the “*Development Plan for Municipal Solid Waste Classification Promotion Work in Dalian*” (No. 85). The litter classification work in the downtown area of Dalian is on the main body of classification, first in public institutions and public places<sup>[53]</sup>. To carry out waste compulsory classification, and at the same time carry out the work of guiding waste sorting in residential areas. In 2018, Dalian has built 202 municipal solid waste classified demonstration communities, covering 247,000 households. By the end of 2020, Dalian Municipality has basically established a system and standard system for waste sorting, and public institutions and related enterprises have fully implemented mandatory classification. Apart from the central city, Dalian City has not carried out waste sorting work widely in counties and cities and rural areas.

At present, the terminal treatment of domestic garbage in the central urban area of Dalian is incineration and sanitary landfill. The biological treatment facility of food waste is under planning and construction.

### **4.2 Landfill and dump sites**

During the period from 1989 to 2006, the domestic garbage was buried in the abandoned shrimp pond in the coastal area, forming the first and second phase of Maoyingzi landfill, with an area of 21 hectares and 14.5 hectares respectively. The second phase of the landfill was closed in 2006. Since 2006, the three and four phases of Maoyingzi landfill have been constructed respectively. They are sanitary landfill sites that adopt anti-seepage measures and no longer carry out simple landfill for garbage. In 2012, Dalian municipal waste incineration plant was built and put into operation. After incineration of domestic waste generated in the central urban area, the bottom residue was disposed of for sanitary landfill.

During the period from 1995 to 2017, Jinzhou district once buried domestic garbage in the coastal aquaculture area and wetland beaches,

forming the Xihai landfill, which covers an area of 13.6 hectares. The landfill has stopped using in 2017 years.

### **4.3 Agricultural and rural waste pollution**

In the small town of Dalian, generally have the waste disposal facilities, its handling capacity can meet the needs of the center of city garbage disposal, but for the integration of urban and rural areas and rural living waste, processing power face greater pressure. Economic development level is relatively backward minority villages and towns, the waste transport infrastructure is not perfect, there are a small amount of household garbage scattered in the environment. In the rural areas around Dalian city, the agricultural film used in the process of agricultural cultivation is not recycled in time after being discarded, resulting in a small amount of abandoned agricultural film existing in farmland soil or surrounding wasteland.

### **4.4 Waste pollution in fishery and aquaculture activities**

Dalian fisheries aquaculture breeding approaches such as circle of sea cucumber, shrimp ponds were not observed obvious breeding waste, according to the surface of the floating litter, there are other marine aquaculture activities of foam plastic, such as nylon rope junk floating phenomenon to the beach.

According to the investigation of the coastal fishing ports, the waste collection and transportation facilities are still to be improved, and sometimes the waste cleaning and transportation are not timely.

### **4.5 Export of plastic litter by rivers into the sea**

In September 2018, the city of Dalian issued the work plan for the implementation of the river (reservoir) chief system. The implementation targets include effectively solving the problem of dumping waste into river reservoirs in urban built-up areas by 2020, and eliminating the problem of dumping waste into river reservoirs by 2030. According to the field investigation, warning signs have been set up for some rivers entering the sea, warning that dumping garbage into rivers is prohibited, and a list of river chiefs and their contact information have been provided. There is a small amount of floating litter in the rivers in the urban built-up areas, and there is no obvious sign of dumping garbage on the banks of the rivers. In the urban-rural junction and rural areas, the dumping of garbage along the

rivers entering into the sea is greatly reduced, but it has not been completely eliminated.

## **5. Recommendations on policies and regulations regarding solid waste disposal**

In order to further improve the prevention and control of marine plastic waste in China and actively respond to changes in the international marine governance situation, some suggestions for improving the solid waste disposal policies and regulations are proposed.

(1) Improving relevant legal and regulatory systems. It is recommended to promote national legislation, formulate the *Law on the Prevention and Control of Marine Litter Pollution*, or the *Regulations on the Prevention and Control of Marine Litter Pollution*, and amend the relevant laws and regulations such as the *Environmental Protection Law*, the *Marine Environmental Protection Law*, the *Water Pollution Prevention and Control Law*, the *Solid Waste Pollution Prevention and Control Law*. Increasing the relevant content of marine litter pollution prevention and control.

(2) Issuing the *National Marine Pollution Prevention and Control Action Plan*. Formulate a national marine pollution prevention and control action plan, so as to form a comprehensive integration of the prevention and control of marine litter pollution at the legal level, and develop marine litter reduction targets.

(3) Issuing a policy prohibiting the addition of plastic microbeads to household chemicals. The policy of adding plastic microbeads to household chemicals is prohibited, and the production and use of plastic microbeads are eliminated from the source.

(4) Formulating local laws and regulations. Local governments have formulated local regulations for the prevention and control of marine litter pollution, and issuing local *Regulations on Prevention and Control of Marine Litter Pollution* and local marine litter pollution prevention and control action plans.

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