

PLASTIC POLLUTION AND THE CONSTRUCTION OF RESOURCE CIRCULATION SYSTEMS FOR PLASTICS

With their advanced functionality, plastics have contributed to the solution of many social problems, for example by reducing food waste and increasing energy efficiency. However, research indicates that because of inadequate processing practices millions of tons of plastic litter flow from land into the world's oceans every year, raising concerns over global pollution.

This chapter summarizes developments relating to marine plastic litter in Japan, and introduces work toward the construction of resource circulation systems for plastics.

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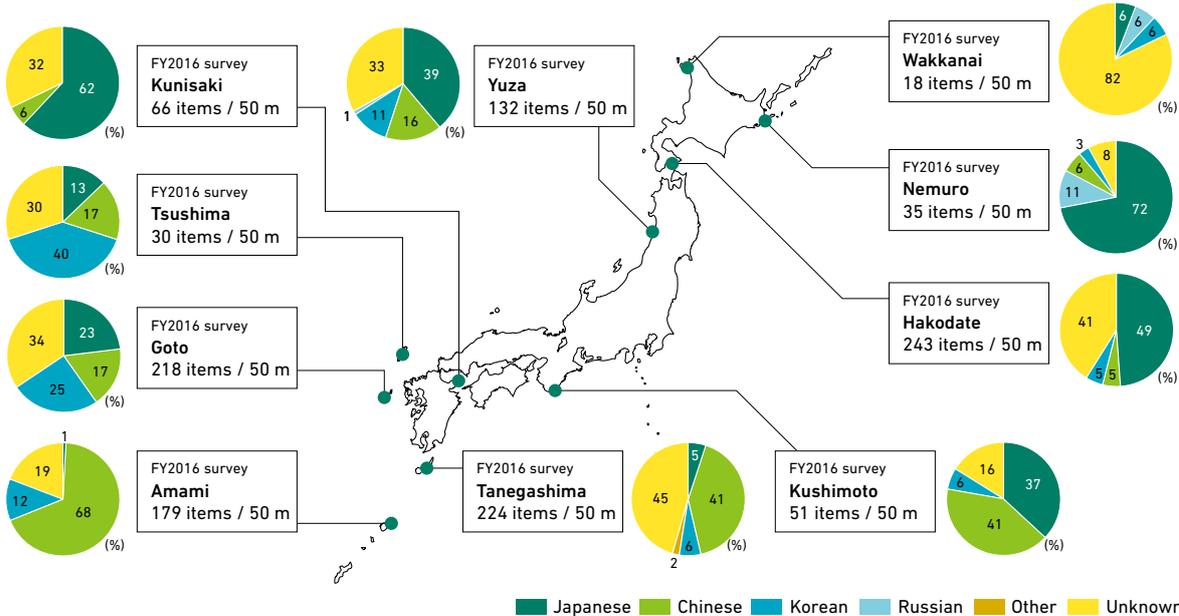
MARINE PLASTIC LITTER - UNDERSTANDING AND ADDRESSING THE PROBLEM

Marine plastic waste causes a myriad of problems. It harms ecosystems and the marine environment. It adversely affects navigation, fishing, tourism, and the appearance and functions of shorelines. In recent years, the effect of microplastics (generally defined as plastic fragments less than 5 mm long) on marine ecosystems has become an issue of global concern.

A great deal of driftwood and marine debris washes up on the coasts of Japan. According to a

FY2016 Ministry of the Environment survey of materials washed up at 10 shoreline locations around the country, natural objects accounted for the largest percentage by weight, but plastics accounted for the largest percentage by volume and by number of objects. Labels on PET bottles collected in the survey included labels in the Japanese language, indicating that the source of the debris was not limited to other countries. More needs to be done to reduce the amount of litter flowing into the seas around Japan.

PET bottle label language ratios (FY2016 survey)



Source: Ministry of the Environment

Determining the distribution of plastic litter

Many aspects of marine contamination by plastic litter are still poorly understood, including the routes over which it flows into the sea. Pirika Inc. and the Pirika Association are developing methods to measure the amount of plastic in flows of various kinds, as a first step toward understanding and solving the problem. Surveys of plastic flows must make measurements in environments such as rivers, harbors, and sewage treatment facilities. Pirika has developed a device called "Albatross" to measure the amount of plastic particles floating in water, and uses it to measure the amount of plastics in rivers, harbors, and water reclamation centers. Floating microplastic surveys extract plastic fragments from water samples. The fragments are analyzed to determine their weight, size, and composition. The results are useful in identifying likely outflow routes and devising ways to block them. Survey results are published on the Pirika website, to provide data that can help resolve the problem of microplastic waste.



Survey using "Albatross"
Source: Pirika Inc.

RESOURCE CIRCULATION STRATEGY FOR PLASTICS

Low reuse rates of waste plastic and the contamination of the seas by marine plastics are global problems. Japan was an early adopter of the 3Rs (reduce, reuse, and recycle) and proper processing of its own waste streams. Japan is also working to contribute internationally. On the other hand, Japan ranks second in the world in the volume of discarded containers and wrapping per person. This plastic waste must be processed domestically, because other countries in Asia are restricting imports. Against this background, Japan adopted a “Resource Circulation Strategy for Plastics” in May 2019.

The strategy is founded on the idea of “3R + Renewable” . While working to reduce both usage and emissions, it will address the problem of marine plastic litter, ahead of efforts elsewhere in the world. Japan will also export our hard and soft technologies, experience, and know-how, in an order-made packaged to suit the conditions and stage of development in the other country. It will contribute to sustainable economic development and simultaneous solutions to world problems such as resource limitations, waste management, marine plastic litter, and climate change.

Milestones

Reduce

Cumulative 25% reduction in single-use plastics by 2030

Reuse and Recycle

Reusable/recyclable design for all containers and packaging/products by 2025

60% rate of recycling for containers and packaging by 2030

100% effective utilization of used plastics by 2035 including circular economy

Recycled and Biomass Plastics

Doubled use of recycled material by 2030

Approximate 2 million ton introduction of biomass plastics by 2030

Source: Ministry of the Environment

PLASTICS SMART CAMPAIGN

In October 2018, the Ministry of the Environment launched a campaign entitled “Plastics Smart”. It aims to mobilize individuals, local governments, NGOs, businesses, and research institutes in a movement to establish smart relationships with plastics. The campaign catalogs and publishes activities by a variety of stakeholders including:

- + Eradication of littering and illegal waste dumping
- + Collection of scattered waste
- + Reduction of single use plastics
- + Use of reusable dishware at events
- + Application of recycled/recyclable materials in the supply chain
- + R&D and application of alternative materials, such as bio-plastics and paper



Plastics Smart campaign website

Source: Ministry of the Environment

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PROMOTING INNOVATION TOWARD THE CONSTRUCTION OF A RESOURCE CIRCULATION SYSTEMS FOR PLASTICS

Construction of resource circulation systems for plastics will reduce dependence on non-renewable resources, and encourage the use of circular and renewable resources. The introduction of natural resources will encourage capital to stay in the area instead of flowing to the outside, and will reduce the amount of waste that requires final disposal.

Growth of the circular economy can be expected to invigorate the area's economy. The following concrete examples show how a commitment to the construction of circular resource systems and the use of new technologies and local resources by private companies can help bring about a sound material-cycle society.

Paper solutions

Paper is made from wood, a renewable resource. With the recent focus on the problem of marine plastic litter, paper is expected to play a larger role as a replacement for plastic. The Nippon Paper Group is working to develop paper products for new fields that will contribute to the construction of a low-carbon, sound material-cycle society.

applying a barrier coating layer to a base paper made with 100% wood pulp, using existing technologies for manufacturing coated printing paper. This eco-friendly paper product provides a new alternative to barrier materials such as aluminum and plastic. The Group has established a paper solutions office, and is developing products such as paper drinking straws to replace plastic ones, under the slogan "Let paper do what it can do" .

One of those products is SHIELDPLUS, a new paper barrier material. This product is manufactured by

Develop products that expand the application range of paper

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| Plastic cups | Barrier paper cups |
| Flexible packaging | Paper barrier material (SHIELDPLUS®) |
| Film packaging, plastic containers | Heat seal coating for paper, paperboard |
| Plastic containers, PET containers | Paper cartons |
| Plastic trays and containers | Paper trays |
| Styrofoam | Functional cardboard |
| Plastic straws | Paper straws |
| Plastic cushioning | Paper cushioning |

Applications of SHIELDPLUS



Source: Nippon Paper Industries Co., Ltd.

Biodegradable plastic “BioPBS”

Mitsubishi Chemical Corporation (MCC) has developed an eco-friendly biodegradable plastic. It licenses the technology to PTT MCC Biochem, a joint venture with the PTT Group of Thailand, which produces and sells the product under the brand name “BioPBS”. BioPBS is a plant-based biodegradable plastic that decomposes into water and carbon dioxide by the action of microorganisms that live in the soil.

Paper cups using this eco-friendly, completely biodegradable and easily recycled material became available on the market in October 2018. Applications of this material are being developed in various fields, such as food packaging and serving products (including coffee capsules, cutlery, and straws) and agricultural mulch film. The material is strong enough to replace other plastics, for example in drinking straws.

The government supports development and testing of these applications. New materials developed through cooperative public, private, and academic innovation will be vital to the evolution of plastic resource recycling. It is especially important for the high-tech materials business to be based not only in Japan but also in key markets overseas, so that Japanese technology can contribute to the emergence of a global circular economy.



Biodegradable plastic “BioPBS” applications

Source: Mitsubishi Chemical Corporation