The Control of Marine Litter：
Environmental Protection Method in Thailand

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1. Introduction

Marine environment of Thailand and Japan.

(1) Thailand

Fig. 1 Thailand map (Google 2021)

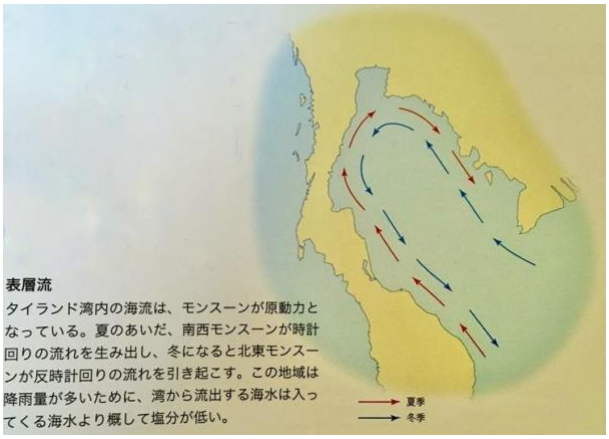

Fig. 2 Thailand bay ocean current (M. Fukasawa 2016)

Thailand has 24 national marine parks.

アーントーン諸島国立海洋公園

Fig. 3 Ang Thong National Marine Park

Located about 30km west of Koh Samui, Ang thong Islands is a national marine park with 50 large and small islands showing a variety of landscapes. Coral and various creatures live in the sea, and you can enjoy snorkeling and hiking.

サムイ島の西約 30km に位置するアーントーン諸島は大小 50 の島々が多彩な景観を見せる国立海洋公園。海中にはサンゴやさまざまな生物が生息し、シュノーケリングやハイキングが楽しめます（Thailand travel 2021）。

(2) Japan

Fig. 4 Japan map (Google 2021)

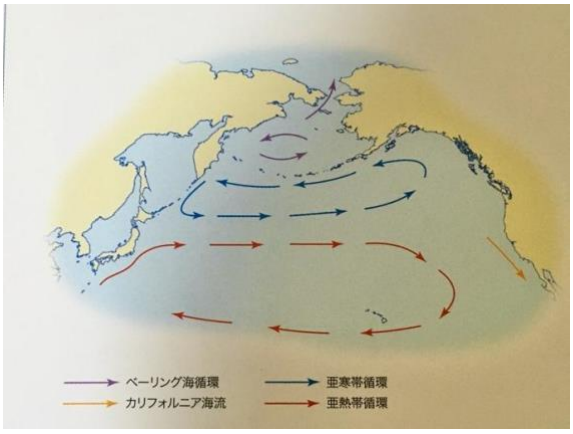

Fig. 5 The Pacific Ocean current (M. Fukasawa 2016)

Japan has 17 national marine parks.

慶良間諸島国立公園

Fig. 6 Keramashoto National Park

The Kerama Islands are located around 40 km west of Naha City, Okinawa Prefecture, comprising more than 30 islets and a number of rock reefs. The islands were designated the 31st National Park in Japan on March 5, 2014, which coincides with Coral Day.

The Kerama Islands boast a wide variety of landscapes extending from the land to the sea that include seascapes of exceptionally transparent waters, reefs densely populated by various species of corals, waters where humpback whales breed, sandy beaches, sea cliffs, the vegetation unique to windy regions, and the archipelago itself. The Park includes a land area of 3,520 hectares, and 90,475 hectares of ocean area, which majority of its park area is the ocean.

慶良間諸島は、沖縄県那覇市の西方約 40km の地点に位置する、大小 30 余りの島々と数多くの岩礁からなる島嶼群で、平成 26 年 3 月 5 日（サンゴの日）に 31 番目の国立公園として指定されました。

透明度の高い海域景観、多様なサンゴが高密度に生息するサンゴ礁、ザトウクジラの繁殖海域、多島海景観、白い砂浜、海食崖とそこに発達した風衝地特有の植生など、海と陸が連続した多様な景観を有し、陸域が 3,520ha、海域は 90,475ha と公園区域の大半が海域

となっている国立公園です（Ministry of the Environment 2021）。

(3) Biodiversity

Pseudanthias dispar
アカネハナゴイ

Fig. 7 Peach fairy basslet

Scarus schlegeli
ブダイ

Fig. 8 Parrotfish

Apolemichthys xanthurus
エンジェルフィッシュ

Fig. 9 Angelfish

Chaetodon ephippium
チョウチョウウオ

Fig. 10 Butterflyfish (Web fish 2021)

Physalia physalis
カツオノエボシ

Fig. 11 Portuguese Man O'War

Chironex yamaguchii
ハブクラゲ

Fig. 12 Box jellyfish (Enoshima 2021)

(4) Coast cleaning

Fig. 13 Yuigahama beach Kamakura

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2. Global plastic waste

Taking a look at Thailand from a wider perspective

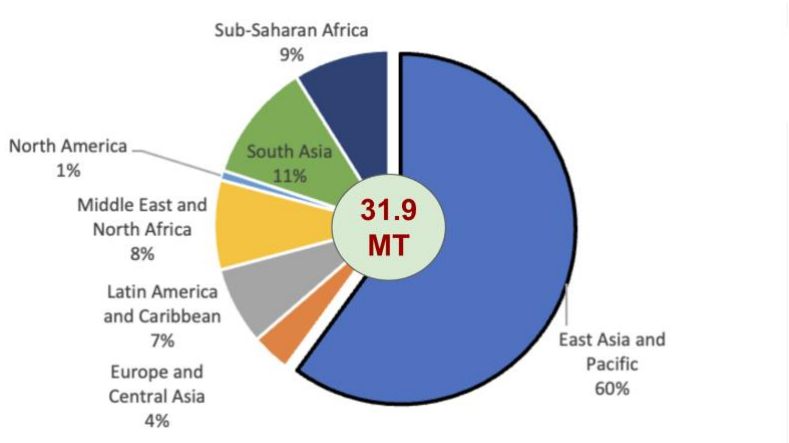

Figure 1. Mismanaged plastic waste by region in 2010
Global plastic waste was 275 million tons. 31.9 million tons was mismanaged.

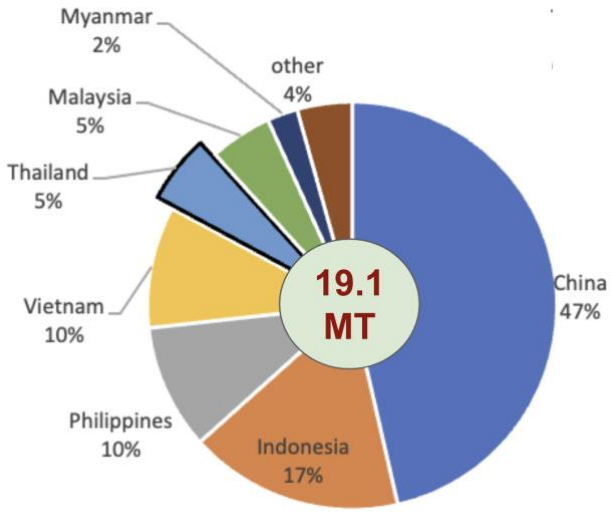

Figure 2. Mismanaged plastic waste in East Asia and Pacific region in 2010
0.9 % of mismanaged plastic in Thailand goes into the ocean.

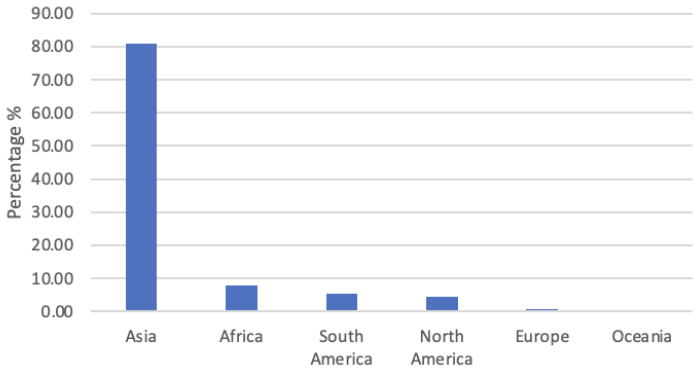

Figure 3. Share of global plastics emitted into the ocean in 2019

Thailand		France
66.4	**Plastics consumption per capita (kg/capita)**	**67.8**
58	**Mismanaged plastic(%)**	**2**
42	**Managed plastic (%)**	**98**
9	Plastic recycled (%)	22
0	Energy recovery from plastic (%)	41
90	Plastic in landfill (%)	37

Figure 4. A comparison between Thailand and France in 2018

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3. Sea animals suffered marine contamination

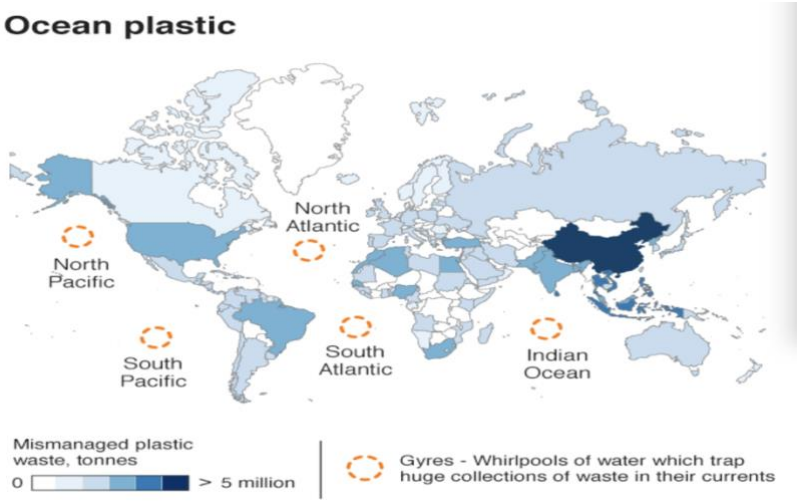
April in 2019, 2 jugong were rescued. They were named [Mariam] and [Jamil]. They become popular due to their cuteness and joyful of eating bait. Rather on Mariam died in August due to a plastic trash. Mariam swallow plastic bags. A lot of people were mourning on her death. Other sea animals (whales, turtles...) have suffered similar damage.

In Chulalongkorn university, there is a veterinary clinic that treats particularly turtles.

This below image is plastic trash that the turtle swallow.

The bluer, the more trash. Thailand needs to improve in the disposal of plastic trash.

Japan has similar problem. Kyushu University opens research base for marine plastic waste that spreads all over the world in Bangkok.



4. An Economical view of Marine Litters and its solutions

This is a photo from Chonburi, a place that is not far from Bangkok.

You can imagine how beautiful it would be if we removed these bottles, left with the wood, mountain beach and the sea.

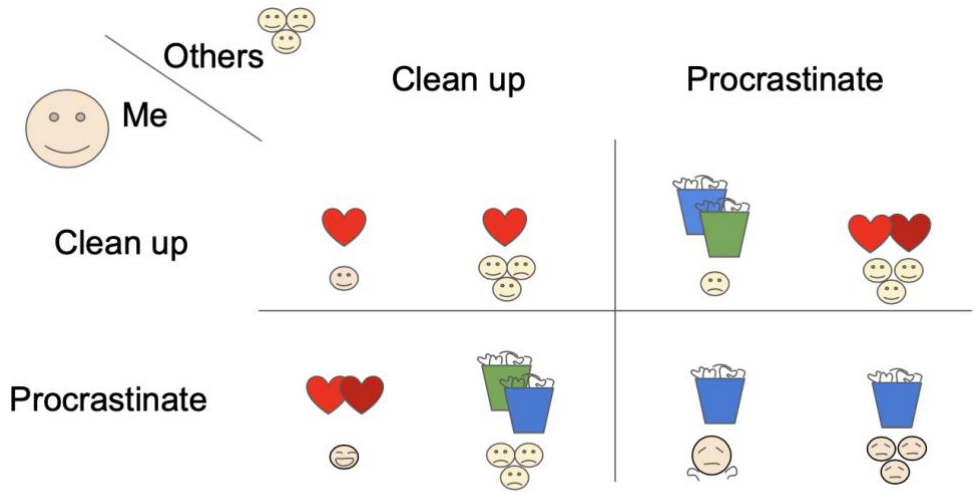
But who has the duty to clean these up if we can't find the owner?

So, we need to think "Why it happens and how to solve it"

Fortunately, there is a way to think about Economics.
We call it "The Tragedy of the Commons".

In capitalism, there is a belief that a human always pursues happiness and avoids pain.

Everyone has the right to please him or herself, that's reasonable.
However, this would lead to a bad end in society-level.



Cf. Prisoner's Dilemma

Imagine the Ocean as a Common Place, there are two kinds of people, me and others.

Everyone can choose Clean up or procrastinate.

If everyone chooses Clean up, then everyone will get 1 happy heart. Conversely, if everyone chooses to procrastinate, then everyone will get 1 basket of garbage.

Everyone chooses Clean-up is strictly better.
But why does pollution still happen?

Because, if someone choose Procrastinate and wait for others to clean up. Then he will be happier and get 2 happy hearts, not just 1.

On the other hand, if the others procrastinate, then when I choose to procrastinate too, my burden will change from 2 garbage to 1.

Finally, everyone will procrastinate.

To know more, you can search "Prisoner's Dilemma"

Luckily, there are ways to solve this problem.

Here are two examples, one for Government Cooperation.
What's interesting, this program is employed in Chula.

On the other hand, the lower two points are what the Japanese are doing.
Community Cooperation and Public Consciousness.

The photo is from Kamakura, I have been there once.
It's beautiful with many historical relics.
Hope Kamakura can keep its scenery.

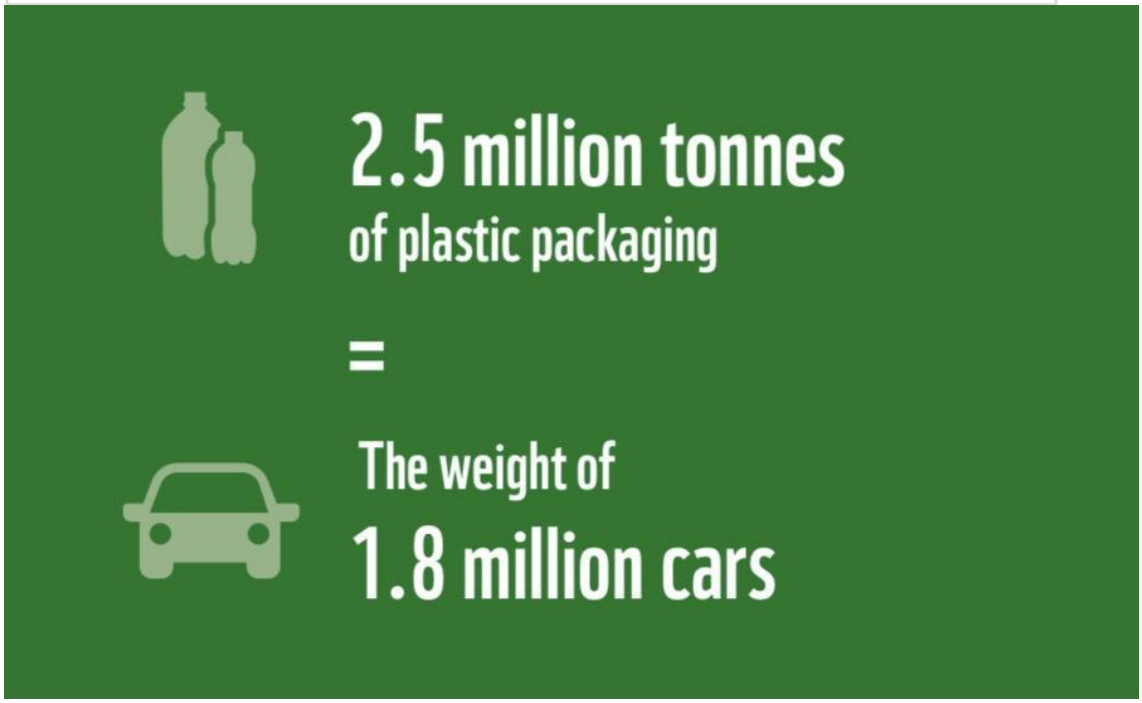
We have an ODA Program for marine litters.
This Government Cooperation program started last year and ends in 2025.

If you’re interested, google “The Project for formation of a center of excellence for marine plastic pollution studies in the Southeast Asian seas”

5. Plastic waste reduction

People in Thailand consume and generate about 2.5 million tons of plastic packaging waste a year, roughly the weight of 1.8 million cars. This waste is dominated by just two products: plastic bags and bottles, which together account for 60% of total plastic packaging waste. While the mass of plastic bag waste is almost double that of plastic bottle waste, few bags are collected for recycling as they are lightweight and often too contaminated for recycling.

Bags constitute the majority of packaging waste that ends up in disposal sites and the environment. In contrast, most plastic bottles (70%) are collected for recycling as they have much higher recycling value. PP trays and boxes are also valuable in the recycling market however, because they are less familiar to households, they are often discarded as general waste, leading to contamination and preventing economic recycling. This suggests that Thailand’s future scheme should not only address brand users of consumer packaging such as trays, bottles and jugs but also include all kinds of plastic bags, including reusable plastic bags.



In January 2020 Thailand began a ban on single-use plastic bags at major stores, and a campaign launched by the government and retailers towards a complete ban in 2021 to reduce waste and debris in the sea.

The move has inspired shoppers to reuse everyday household when they shop, which is arguably better for the environment than buying a new reusable bag. A reusable polyester bag needs to be used 35 times and a cotton tote bag used 7,100 times before their environmental impacts fall below that of a typical flimsy plastic grocery bag, according to one study by Denmark's Ministry of Environment and Food.

Some say the most challenging aspect would be the 40% of plastic bag used at fresh markets and in rural areas.

There is also a structural problem. there are many informal trash collectors in Thailand, which play important roles in Thai society especially In rural areas as in these areas official collecting system could be too expensive. And some Thai citizens don’t know how to separate reusable trash properly. The government has to take multiple actions.