Ocean Park Conservation Foundation, Hong Kong (OPCFHK)

No Straw Campaign – Teaching Kit

Objectives of this teaching kit

Marine debris is a problem for all of us. It comes in many forms and is affecting everything from the environment to economy; and from the tiniest planktons to the giant blue whales. It is a global issue and there are still a lot to learn about the problem. Most of all, the problem is preventable. Combating this problem begins at home and everyone can help make a difference for this issue!

As part of OPCFHK's continuous commitment to boost awareness of marine conservation, OPCFHK launched its first 'No Straw Day' on June 8, 2017. June 8 has also been designated by the United Nations as World Oceans Day. The aim of the initiative is to encourage individuals to reduce their plastic straw consumption and to further reduce the consumption of disposable plastic products in the long run. According to the Environmental Protection Department, plastic straws were one of the top ten marine refuse items found at Hong Kong's coastal areas in 2014. WWF-HK's Coastal Watch 2016 project report[1], which OPCFHK participated as one of the partnering organisations, shows that up to 80% of the coastal litter was found to be plastic. Among all these plastic trash, plastic straws and stirrers ranked the 8th!

Realising the seriousness of plastic trash issue in the ocean, this teaching kit is designed to provide primary and secondary school teachers some guidelines and accurate information on the issue of marine debris. It also aims at raising overall awareness among students and inspiring them to reduce the use of plastic straws and other disposables. Teachers are recommended to introduce the topic to students using the PowerPoint as a visual tool and the information in this document as supplement.

Content 1 (Slide 2-4)	**Ecological services of the ocean – Can human live without the ocean?** Our ocean no doubted provide lots of services to us humans and play an essential role in sustaining lives in the sea as well as on the land. Let's take a look on some of the important services they provided us: - Food provider – seafood Hong Kong people love seafood. Given such a small place, Hong Kong ranked the second in seafood consumption in Asia, and the eighth in the world [2]. It was also estimated that fish is one of the very important protein sources as about 17% of the global population depends on it as a major protein source [3]. Can you imagine how it would become if the ocean became too polluted? - Regulation of the atmosphere Through the non-stop and continuous ocean currents, the ocean absorbs warmth from the sun and helps regulate the world's temperature. It also acts as the largest storage of carbon in nature. About 26% of the worlds' carbon dioxide released by human activities ended up being absorbed in the ocean[4]. The ocean is also the world's lung that it generates more than half of our breathable oxygen, through the action of photosynthesis of phytoplankton.

	- Aquatic activities all of us could enjoy Hong Kong has been famous for its long coast line and the beautiful beaches, and most of us have been enjoying being around the relaxing scenery besides the sea. - Medical of the discovered/ the not yet discovered species Lots of marine organisms, one example being the horseshoe crabs, carry mysterious medical power inside their bodies. If these organisms disappeared from the sea because of pollution created by us humans, we would be affected in a negative way as well. - Habitat of beautiful aquatic organisms (biodiversity) A recent study on marine species in Hong Kong waters revealed that about 6,000 marine species are living in our home waters. While the area of our waters only accounts for 0.03% of China's total marine area, the number of marine species we have was found to be approximately 25% of China's total[5].
Content 2 (Slide 5-10)	**Marine debris – the issue** **What are marine debris & microbeads?** - According to the NOAA Marine Debris Program[6] , marine debris refers to "any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment or the Great Lakes." - On the other hand, microbeads, which may also be called microplastics, come in two forms. One form of microbeads is when larger pieces of plastic break down into smaller pieces which are smaller than 5 mm large[7]. Another form of microbeads mainly comes from exfoliating personal care products, e.g. facial scrub products, cosmetics or even toothpaste. **How serious is the issue of marine debris & microbeads right now?** The Great Pacific Garbage Patch: - To put it simple, the Great Pacific Garbage Patch is a large patch of marine litter bounded by the North Pacific Subtropical Gyre (a system of circular ocean currents formed by the Earth's wind patterns and the forces created by the rotation of the planet)[8]. - The central area of a gyre is usually very calm and stable, and thus draws debris around into the stable centre. As debris is mainly plastics and is not biodegradable, it accumulates in the Garbage Patch and stays there for a long time. After a long time, these plastics will break into smaller and smaller pieces, which later on become microplastics[8]. Some quick facts about plastics around the world: - Plastics are simply everywhere around us. From clothing to containers, appliances to furniture. There are also disposable cutlery, polystyrene meal boxes and many other things that we are more eager to use than to keep[9]. - Every minute, the world consumes over 1 million plastic bags and 28 million plastic bottles[9]. - Enough plastic is thrown away each year to circle the earth four times[10]. - 50% of the plastic we use, we use just once and throw away[10]. - We currently recover only five percent of the plastics we produce[10].

Is marine litter problem serious in Hong Kong?

- Having 263 islands, a long coastline of 733 kilometers long, and a dense population up with more than 7 million, Hong Kong no doubted is one of the most densely populated region [1].
- On average, 15,000 tonnes of marine debris are collected by Hong Kong government every year. In the extreme case of Lap Sap Wan, which also means the 'Rubbish Bay' in Chinese and is located in Cape D' Aguilar, it was estimated that 185 tonnes of debris was accumulated and that 46 garbage trucks would be required to remove all debris [1].
- In a survey leaded by WWF-HK in Lap Sap Wan, 9 of their volunteers spent 30 minutes on the beach collecting only plastic bottles and the result was 2,064 bottles!
- In Hong Kong alone, 55 million tonnes of municipal solid waste was generated and dumped into the landfill of Hong Kong in 2015[11] which is equivalent to approximately 3.6 million of double-decker buses! Our overwhelming consumption may also be one of the causes to the problem of marine debris.
- Besides Lap Sap Wan, many coastal areas are also being affected by marine debris. For example, Lamma Island, Cheung Chau and even the backyard beach of Ocean Park. While some of these places are frequently visited by us, some other places, e.g. the habitats of horseshoe crabs like Shui Hau on Lantau Island and Ha Pak Nai in Yuen Long, are also badly affected by the issue. The problem also extended to the underwater area in Hong Kong as well.
- Marine debris is surely a serious problem in Hong Kong as well as in the world.

Sources of marine debris & the composition

- While it is a common misconception that most of these marine debris found in Hong Kong may come from other regions or countries, a recent study by Hong Kong government revealed that 95% of marine debris found in Hong Kong comes from local sources in Hong Kong. Less than 5% of marine rubbish comes from mainland or other regions [11].
- According to Coastal Watch report [1], 60-80% of marine debris comes from land-based activities, while the rest comes from sea-based sources. The land-based activities include littering, dumping in rivers and streams, and industrial losses. Industrial losses refer to the accidental losses during the production, processing or transportation of different products; one example being the spillage of plastic resin pellets in Hong Kong in the year of 2012.
- The incident of spillage of plastic resin pellets in 2012:
  On the night of 23 July 2012, a severe typhoon swept past the south China coast. Six containers with 150 tonnes of polypropylene pellets, the raw material used to make thousands of kinds of plastic products, were washed off a vessel in rough seas east of the Ninepin Islands[1]. These containers eventually were washed onto various islands and ripped open, making thousands and millions of polypropylene floated free. These pellets later accumulated onto Hong Kong's southerner coastlines, resembling snowdrifts. The spillage took different parties many weeks to clean up, and some of them still remain to this day.
- Top ten categories of land-based macro debris: 1. Glass fragments, 2. Polystyrene – fragments, 3. Plastic packaging (wrappers) and film – fragments, 4. Polystyrene – food boxes and cups, 5. Plastic fragments –hard, 6. Drink bottle caps, 7. Thin rope, string, 8. Plastic straws and stirrers, 9. Plastic packaging (wrappers) and film, ribbon pieces, 10. Miscellaneous plastic items[1].
- In the top ten categories, category 2-10 is all plastic items. In fact, around 60% of land-based marine litter and 80% of coastal floating litter were found to be plastic items in the Coastal Watch report, revealing their impacts to the local ecosystems as well as human health.

Content 3 (Slide 11)	**The impacts of marine debris on environment** **Will the marine trash disappear?** Due to the nature, plastic products will not degrade easily. By estimation, the decomposition rate of some common disposable items that we frequently use in daily lives: Glass bottles: up to millions of years Polystyrene boxes (take-away meal boxes): 10,000 years Plastic cutlery: 500 – 1,000 years (depending on the quality of the cutlery) Plastic bottles: 450 years Plastic bags: 10 – 20 years **So, what will these long-lasting plastics do to our environment?** - Wildlife entanglement, ingestion and habitat destruction are some impacts of marine debris to wildlife. - Different types of fishing nets, packing bands, rubber bands, balloon strings, and plastic bags have certain possibilities to wrap around marine life. Entanglement may injure different animals, or even lead of illnesses, suffocation, starvation, or even death. - On the other hand, many marine animals, e.g. sea turtles, albatrosses, and dolphins, have been known to ingest plastic debris as they resemble to their natural food a lot. Some of the examples include plastic bags and jelly fish, plastic pellets and fish eggs, etc. As plastic debris contains no nutrient at all, plastic debris ingestion may lead to malnutrition, internal injury, intestinal blockage, starvation, or even death. - Many of the coastal or marine habitats are critical to the survival of many other species, such as coral reefs, mudflat, mangroves etc. - Particularly in Hong Kong, a recent survey revealed almost 6,000 marine species living in Hong Kong waters, which accounts for approximately 25% of China's total[5]. Given such diverse marine ecosystems, our waters face many threats including coastal development, overfishing and of course, marine debris. The marine debris issue caused by us Hong Kong people may have disastrous and irreversible effects of our rich biodiversity. - Marine debris has harmed at least 267 species, including fish, dolphins, whales, sea lions, seals, sea turtles and seabirds. For example, over 1,000 Antarctic fur seals have been found entangled in one region of the southern Atlantic. A stranded sperm whale had over 73 kg of debris in its stomach. On a Pacific island, some albatrosses were unintentionally feeding plastic fragments to their chicks. Their digestive system may be blocked or filled by ingested debris so that the animal starves. By accumulating in the food chain, these hazardous chemicals threaten the whole marine ecosystem, and also humans[9]. **Will these long-lasting plastics affect us?** - Plastic debris issue is our problem as well. - Microplastics in different products would go into the waters easily due to their very small size. A recent study has already reverted that these microplastics have already entered the marine food chain and may eventually accumulated along the chain. While Hong Kong people are known to be serious seafood lovers, the accumulation of these microplastics will eventually come back to us human one day.

Content 4 (Slide 12)	Tackling the problem **Government** - After the spillage of plastic pellet incident, an Inter-departmental Working Group on Clean Shorelines was set up. These government departments work together to share the responsibilities in alleviating the marine litter problem. The Working Group also aims to review and formulate new measures on cleaning our shorelines. These include: - Agriculture , Fisheries and Conservation Department - Leisure and Cultural Services Department - Marine Department - Food and Environmental Hygiene Department - Drainage Services Department - Environmental Protection Department **Local campaigns** Led by WWF-HK, Coastal Watch is the first collaborative conservation project in Hong Kong along with six other NGOs (including Eco Marine, Ecovision's Hong Kong Cleanup, Green Council, Eco-Education and Resources Centre, Ocean Park Conservation Foundation, Hong Kong and Plastic Free Seas) to concurrently conduct marine litter and ecological surveys on seashores, in coastal waters and underwater. Marine litter related research is particularly important to understand more on the main source of the debris, as well as its impacts on the environment, the society and our health.
Content 5 (Slide 13-15)	**The future of our oceans is in our hands – What are you waiting for?** There is no escape – marine debris pollution is a crisis for every human being on earth. We are the source of the problem, and we owe the responsibility to fix it. A recent study shows that nearly 90% of the Earth's ocean surface is polluted with plastic debris[12]. Do not wait till it's too late, work together now for a cleaner ocean, and a better future! You can help by: **Personally** - Practice 5R lifestyle: Reduce, Reuse, Replace, Repair, Recycle. Be creative with your ideas on how to execute the 5R lifestyle! - Bring your own set of reusable utensils when you go out, and refuse using disposable plastics like plastic straws and forks. - In case you inevitably have to use disposable plastics, try your best to reuse it as many times as possible before you have to throw them away. Plastics are made to last long, so make good use of them in their hundreds of years of lifespan. - In this digital era, we can easily replace the plastic CDs, DVDs, BluRays and their cases by buying the music's and movies legally online. - Plastics are used in textile industry as well, and many of our clothes are made 100% of plastics. Some textile companies that care for the planet offer clothes repair; search for these companies and make your plastic clothes last longer. - Always recycle plastic products, and try to find out creative ways to up-cycle. - Become a volunteer of Ocean Park Conservation Foundation, Hong Kong and participate in beach/mudflat cleanups.

	- Spread the message to your friends and families, and convince them to reduce the use of disposable plastics with you. **At School** - Minimize the usage of disposable plastics. - Organise campaigns to promote plastic-free lifestyle, for example No Straw Day, DIY Up-cycling Workshop, etc. - Organise beach/mudflat cleanups for school outings. - Organise exhibitions on marine debris for School Open Day, to teach your parents and friends about the impacts of marine debris to the oceans, marine organisms, and human. **Corporates** - Bear the producer responsibility, including the collection, recycling, treatment and end-of-life disposal of their products. - Explore or support related research on alternative materials to be the substitutes for their own products, for example to replace plastic bottles or polystyrene food containers. - For retailers or catering service providers, they may give incentives to customers who bring their own cutlery or containers, e.g. discounts or gifts to those who bring their own mug for buying a coffee. They may also consider supporting different 'plastic-free' campaigns hosted by different organisations so that more people in society will learn about the issue. - For manufacturers, they may reduce unnecessary packaging and avoid using non-reusable materials in their products.

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Other useful resources:

- The Story of Stuff. (n.d.) Plastic Microbeads: Ban The Beads. Access at http://storyofstuff.org/plastic-microbeads-ban-the-bead/
- NOAA. Marine Debris Program. Access at https://marinedebris.noaa.gov/
- Conservation International. (2015). Nature is Speaking: Harrison Ford is The Ocean. Access at https://www.youtube.com/watch?v=JlKB2FOkBlU
- Ocean Conservancy. (2016). International Coastal Cleanup. Access at https://oceanconservancy.org/trash-free-seas/international-coastal-cleanup/annual-data-release/
- Environmental Protection Department. Clean Shorelines. Access at http://www.epd.gov.hk/epd/clean_shorelines/node/12.html

Appendix I – Suggested activities for primary schools

Content 1

Activity 1 (Primary):

Teacher can divide the class into 2 groups, and ask each group to think of how human are related to the ocean. The groups will then have to act out the activities without making any noise for the other group to guess. They could take turns to guess, and teacher can mark down the answers on blackboard.

Content 2

Activity 2 (Primary):

After introducing what marine debris is, assign students as different marine animals: sea turtle, dolphins, seahorse, and napoleon fish. The students have to 'become' the animal, and think of the possible threats or problems caused by marine debris they might face being that animal; then share with the class.

Content 5

Activity 3 (Primary):

Background: The time now is 2117, and the earth is facing a major crisis – all the water sources, including the ocean, rivers and lakes, are heavily polluted, and many kinds of organisms are becoming extinct because of that. Scientists found that one of the reasons for the water crisis is due to marine debris, but it is already too late to make any changes… Luckily one scientist invented a time machine, and she proposed going back to 100 years ago, that is year 2017, to convince the public, governments, and scientists to implement plans to solve the marine debris problem! But she needs a team of experts to suggest ways for the different parties to solve the problem, and to persuade them to follow these methods.

Activity: Students are divided into 3 groups, and each group has to think of suggestions for the public, government and scientists respectively to tackle marine debris problem. They will then have to present their ideas to the class, and answer any enquiries the class has.

Appendix II – Suggested activities for secondary schools

Content 2

Activity 1 (Secondary):

Students need to research on the following topics before class and share with classmates their findings

- What marine debris is
- The source of marine debris
- The impacts of marine debris to the environment, organisms, society and economy

Content 4

Activity 2 (Secondary):

Students have to hold a stakeholder forum, with the following roles; and discuss how to tackle marine debris problem in Hong Kong.

- The government
- The media
- General public
- Scientists

Content 5

Activity 3 (Secondary):

Students have to organise activities to promote plastic reduction in school.