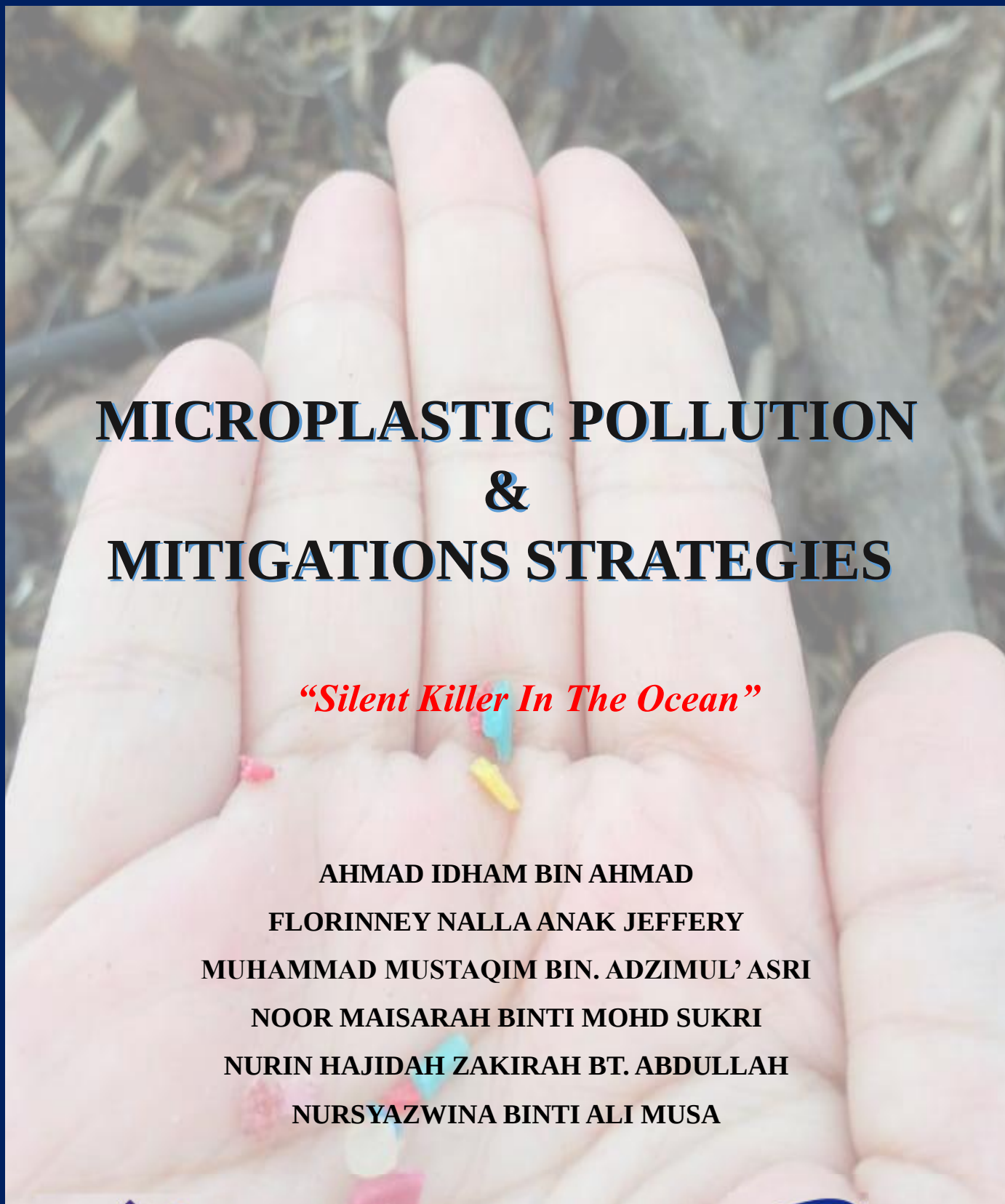

MICROPLASTIC POLLUTION & MITIGATIONS STRATEGIES

"Silent Killer In The Ocean"

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INTRODUCTION

The size of microplastic that measured is fewer than five millimeters.

Microplastics are small plastics with a length of fewer than five millimetres that can damage our environment and aquatic life and are the most common forms of marine litter found in our oceans and Great Lakes (National Ocean Service, 2012). Plastic debris can come in varying shapes, but ones with five millimetres in length are known to be microplastics. In the water, most plastics have decomposed into very tiny particles. Microbeads which found in many health and beauty products are intentionally designed to be thin. They travel across rivers into the ocean in their unaltered size. This cause birds and marine organisms may believe that the tiny pieces of plastic are their food. Malaysia is one of the ten countries in the world with improper plastic waste problems. About half of 0.9 million tons of plastic wastes have been illegally dumped into Malaysia waters. The most popular plastic waste found in Malaysia's coastal is plastic bags, cigarette buds, and plastic bottles.

These microplastics are made up of carbon and hydrogen atoms which then linked together to form polymer chains. It also typically contain phthalates, polybrominated diphenyl ethers (PBDEs) and tetrabromobisphenol (TTBPAs). These chemical additives will expel from the plastic wastes as it is being exposed to sunlight and water during its decomposition at the open ocean.

River water from all continents flow into the ocean, and they carry along millions of tons of human-induced plastic wastes to the oceans daily. The problems get worse each year as about eight million tons of plastic reach the sea annually, which is equivalent to filling a garbage truck every minute. It leads up to 80% of the litters in the oceans are made of plastic. It is reported that 51 trillion of microplastic particles are 500 times much more than galaxies in the universe has covered our oceans and severely affect the aquatic life (n.a, 2017).

ISSUES OF MICROPLASTIC POLLUTION IN MALAYSIA

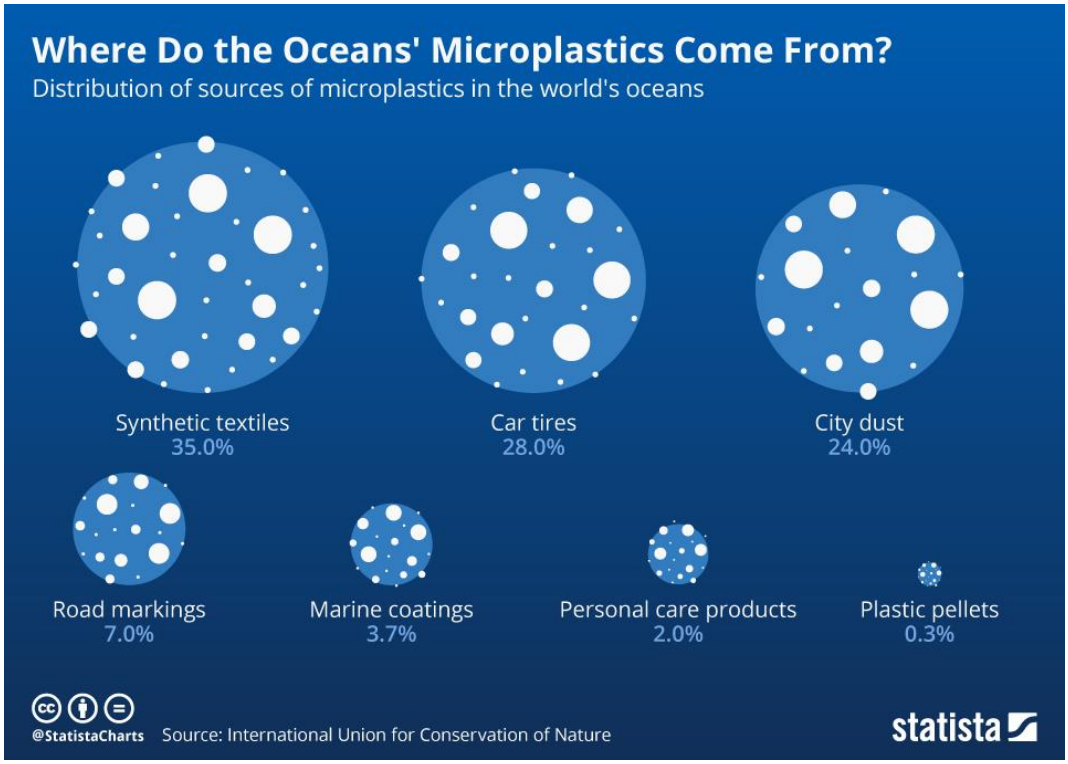
A local news reported that Malaysia ranked in eight place for the worst handling general waste globally and hardly managed 0.94 million plastic in 2010 because about 0.14-0,37 millions of it ended up in the oceans (Tharanya, 2020). It also reported that those plastics are a very concerning issue due to its breakdown and cause microplastic pollution. Then, it will end up in the sea creature's body. Studies have shown that people eat about 5 g of plastic a week (Ai-Lien,2019), and the microplastics' consumption may expose consumers to harmful chemicals. The chemicals can cause reproductive damage and obesity, defects and developmental delays in children which cause health problems even though most of us are aware of plastic pollution.

However, only few people are aware of microplastic pollution that can cause a lot of damage. It is one of our 'silent killer' because we did not take it seriously. Who knows it might end up in our drinking water one day or the chemical start to affect the sea creatures genetic and so on. Thus, to give awareness, the authority must act according to the situation, and the people must understand and take care of the environment.

Imagine the picture above is your drinking water.

SOURCE OF MICROPLASTICS

Microplastic problems in the oceans and waterways of the planet have been given high attention by number of studies in recent years. They were clearly stated about the origin, and actions should be done to minimize and prevent its uncontrolled spread. A review on global sources by the International Union for Conservation of Nature reported that synthetic textiles are the primary source of microplastics in the world's oceans.



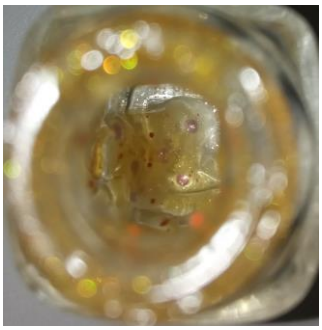
Contributor of microplastics in the oceans

Source: (Armstrong, 2019)

As stated in the infographic, an approximate 730 thousand fibres can be released into the wastewater system by a washing machine load of acrylic fabric. As this chart shows, many of them find their way into the environment. Study reports that more than one-third of the microplastics in the seas come from synthetic fabrics. The second highest cause is the car tires which contribute 28 percent due to wear while driving. Nevertheless, we as consumer have more leverage over all these sources – by purchasing less or no synthetic fibre garments and practicing carpool or public transport instead of driving own car.

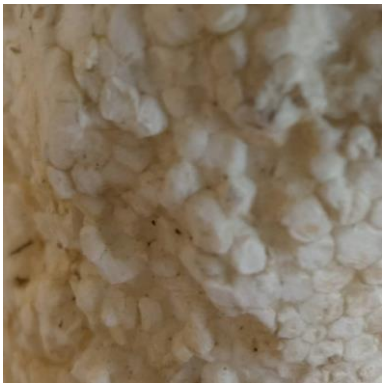
TYPES OF MICROPLASTIC

71% of gross microplastic release in the Great Lakes was contributed by fibres. A study sponsored by Patagonia revealed that the unfiltered microfibres found in wastewater treatment plants for about 40%.



Microbeads are non-biodegradable plastic particles with a diameter of less than one millimetre. They can be used in skin cleansers, exfoliating soap ingredients and toothpaste. Due to their size, they could travel through treatment plants and reach the Great Lakes.

Styrofoam is widely use in food take away containers, coffee cups and packaging products. Styrofoam chemicals can leak into food and drinks that affect human health. Most municipalities do not recycle Styrofoam.



Plastic fragments are smaller bits of plastic that break off from bigger pieces. Prominent ones include cutlery bits, lids or single-use items.

Nurdles are small plastic pellets used in the manufacturing of plastic products. Due to their size, nurdles often spill out of transport vehicles during distribution. Storms and rainwater help in terms of pushing those nurdles into storm drains, which are then empty into the lake.

Source: Guest User (2016)

EFFECTS OF MICROPLASTICS

Experiments have demonstrated that microplastics affect marine species, namely turtles and birds, by disrupting their digestive tract, which decreases the animal's urge to consume and modify feed behaviour, which reduces growth and reproductive performance. Some animals also starve and die when their stomach is stuffed with plastic.

On the other hand, microplastics can lead to chemical impacts where free-floating contaminants such as polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and heavy metals that wash off the land and into the sea appear to bind to the plastic surfaces.

A basic fact to seafood customers is that much of the microplastic eaten by the animals appear to linger in their intestines and do not pass into the muscle tissue. However, scientists are cautious about human health due to ocean plastics' effects because microplastics can ultimately decay and break into nano-plastics which make them invisible. These tiny plastics can, by accident, infiltrate the cells and pass into tissues and organs.

United Nations Food and Agriculture suggests that people are expected to consume small quantities of microplastics from the fish yet eating fish is a good diet.

Source: (Royte, 2018)

MITIGATION STRATEGIES OF MICROPLASTIC POLLUTION

1. Reduce consumption of plastics

Improve the efficiency of product packaging, such as avoiding double packaging and size reduction. Another way to reduce plastic consumption is to avoid single-use products. Single-use products include food wrappers, Styrofoam packaging, straws, and even cigarette butts.

2. Improving the disposal of waste

Reuse and recycle the plastics rather than disposing plastics by incineration or into landfills. Recycling is a waste management strategy to reduce the environmental impact of wastes such as plastic, polymers and resource depletion. With the use of recycling, many single-use products can be processed into other things.

3. Improving the efficiency of plastic production

Alternative materials such as glass, recycled, and biodegradable materials are used to improve plastic production. Product designs can be altered to use less plastic, and it should also be able to be repaired and reused. The product life can be extended, and companies can reduce the number of polymers present to make it easier for recyclability.

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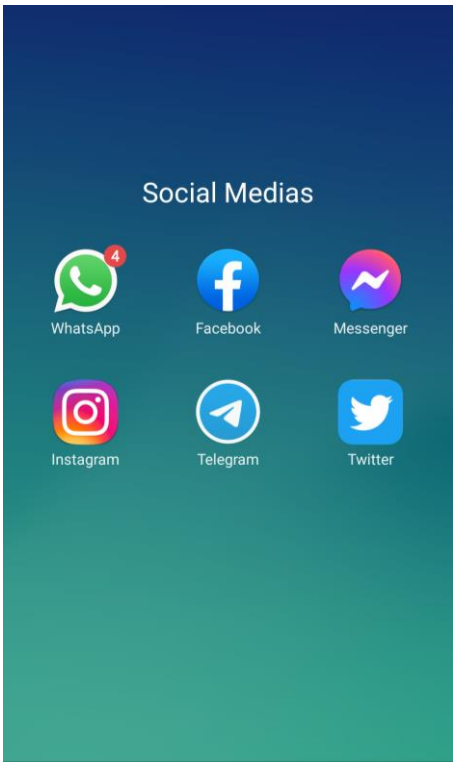
Mitigations Strategies to Overcome Microplastics Pollution.

Source: (Prata et al., 2019)



4. Provide knowledge to consumers

Increase awareness among the community by holding campaigns which provide knowledge upon the effects of plastic pollution and ways to overcome it. In this era, the internet is the main platform for education, as people of all ages use it. Awareness can be spread through social media platforms such as Facebook, Instagram, and WhatsApp.

5. Provide toxin careline for consumers

Beneficial for consumers to ensure their safety when consuming foods from the ocean. The toxin careline is provided by having a hotline connected to marine lab institutes which analyses the water quality and marine life for traces of harmful chemicals. Consumers can call this hotline to ensure safety during harvesting products from the ocean, such as fish and crustaceans.

Mitigations Strategies to Overcome Microplastics Pollution

Source: (Prata et al., 2019)

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AHMAD IRSYAD BIN AHMAD

After reading this book, I hope the readers will be more aware upon the importance of our ocean and take care of it .

FLORINNEY NALLA ANAK JEFFERY

I hope that everyone gains awareness and knowledge about microplastic pollution regarding to its harmful effect to living organisms and environment.

MUHAMMAD MUSTAQIM BIN ADZIMUL' ASRI

I am glad that I able to take part in this task and really hope that readers who read this will aware and gain some knowledge of what they read.

NOOR MAISARAH BINTI MOHD SUKRI

I am very fond of this and feel like already handled a very important mission during producing this book with my friends. Importantly, I have fun. Thanks to everyone.

NURIN HAJIDAH ZAKIRAH BT. ABDULLAH

I am glad to be part of this group and I hope that by reading this book, readers will be more aware about the effects of microplastic pollution on our ocean.

NURSYAZWINA BINTI ALI MUSA

I hope that readers will get benefits from this book so that we can start taking care of the environment together.

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MARE (Marine Coastal and Delta Sustainability for Southeast Asia)

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