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Ocean Pollution

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Introduction

My name is Catrin Price, and I am a Prep 6 student of Malvern College Hong Kong. For my end of primary exhibition project (also known as PYPx) I wanted to do ocean pollution. I have always been fascinated by the ocean, as the ocean is vibrant and full of life. Writing is also one of my passions, therefore I have chosen to express my ideas through a nonfiction book.

I am compelled to share this issue for I believe the ocean is a wonderful place full of many creatures big and small, from minuscule nanoplankton to colossal blue whales. There are so many creatures, such as pods of whales, shivers of sharks, schools of fish and rafts of otters. There are so many other creatures that live in marine ecosystems that we are destroying every single day through ocean pollution.

It is crucial that we keep the ocean healthy for many reasons. For example, we get over half our oxygen from the ocean. It is also one of the largest food sources.

If we do not help the ocean, who knows what might happen, but the consequences will be catastrophic. This book is for you if you are interested in the ocean, which takes up 71% of the planet's surface and is facing the threat of ocean pollution.

In this book you will read about some of the main causes and impacts of ocean pollution. I have also written about who is mainly affected and the history of ocean pollution. At the end of this book, you will read about how we can help the ocean and if it can recover.

We must change our daily actions to save the many organisms that inhabit the sea, for if we do, the creatures of the ocean will be healthier, we will be healthier, and the world will be a better place.

Ocean Pollution

A simple definition of ocean pollution is when harmful pollutants, garbage and oil cause devastating impacts to the sea. The ocean covers 71% of the planet's surface, which makes you think it is indestructible, but it is most definitely not.

In the 1960s we learned of a threat called ocean pollution. Before that we didn't know of its disastrous influence on wildlife, including plants and creatures, and even on us as human beings in terms of our health and the economy. People used to chuck radioactive waste, plastics, sewage and garbage into the ocean on purpose! Think of the catastrophic effects on the oceans's wildlife caused by this.

All around the world, we have patches of waste floating in the ocean, such as the Pacific Garbage Patch which is DOUBLE the size of Texas! It is filled with fishing gear, single-use plastic and micro plastics that float above and just beneath the ocean's surface. It contains micro plastics which are around half a centimeter in size. Most of the plastics are just beneath the surface, so you could drive through certain areas on a boat and not even know it.

Now there are restrictions so you cannot pour radioactive waste or garbage into the sea. Yet we still are affecting the ocean by littering, which eventually goes into the ocean. Oil dripping from road vehicles, known as runoff or non-point source pollution, often finds its way into our oceans.

The definition of ocean pollution in Chinese is:

海洋污染是伤害海洋生物的原因。

Hai yang wu ran shi shang hai hai yang sheng wu de yuan yin.

China's key types of ocean pollution are:

Oil Pollution- 一个海洋污染原因是石油污染，这来自工厂的污水流入海洋令到海洋生物死亡和不能繁殖下一代。

Yi ge hai yang wu ran yuan yin shi shi you wu ran, zhe lai zi gong wang de wu shui liu ran hai yang ling dao hai yang sheng wu si wang he bu neng fan zhi xia yi dai.

Plastic Pollution- 人们常常会掉进垃圾在海洋里令海洋污染。

Ren men chang chang hui diao jin le se zai hai yang li ling hai yang wu ran.

Shark Finning- 人们会伤害鲨鱼拿去它们的鱼翅。

Ren men hui sheng hai sha yu na qu ta men de yu chi.

Plastic Pollution

Plastic is polluting our oceans with waste that we discard every day. Plastic is washing up on the shores of beaches and damaging marine creatures who mistake it for food.

The Main Causes of Plastic Pollution

80% of plastic pollution comes from land and gets blown into the ocean either directly or through storm drains. Marine creatures mistake plastic for food. Another major cause of plastic pollution are fishing nets, which also entangle marine creatures and can block up seabirds' digestive systems and make it impossible for them to eat properly.

The Main Impacts of Plastic Pollution

Plastic floating around, contaminated with chemicals or not, can be especially dangerous for marine animals. The debris can cut, tangle up, injure or even end the life of marine animals. We even have patches of plastic which are around a million square kilometers! The biggest is the Pacific Garbage Patch, which is filled with floating plastic as well as plastic just below the surface. There are five of these plastic sucking gyres around the world. Plastic is also affecting the food chain as it enters through the smallest marine creatures such as plankton, and is passed on all the way up to apex predators, including humans.

Imagine an orca swimming through the ocean. She can barely find enough food to sustain herself. Plastic floats just above her at all times. Every time she surfaces, she goes through people's polluting waste, which is destroying her home.

The History of Plastic Pollution

In the 1950s, plastic started to become an everyday use material. Plastic pollution started to come to people's attention in the 1960s, when plastics were being found in albatrosses and marine species, and seals were being found tangled in fishing nets. In the 1970s, micro plastics, tiny little plastic fragments that polluted the ocean, were discovered, making it much harder to solve plastic pollution.

In 1988 the UK government started making an effort with recycling, by identifying the seven different types of plastic. The different plastics are: Acrylic or Polymethyl Methacrylate (PMMA), Polycarbonate (PC), Polyethylene (PE), Polypropylene (PP), Polyethylene Terephthalate (PETE or PET), Polyvinyl Chloride (PVC), and Acrylonitrile-Butadiene-Styrene (ABS). Scientists and industries tried to create recycling initiatives, yet we still face the plastic crisis.

We first created plastic for the purpose of having a cheap and effective material, however now it is effective for destroying the sea and harming many creatures. Plastic was just an experiment that has turned into a material we use all around the globe today, which is harmful to the environment in the way that it's made and where it goes.

How We Can Help

We first have to be considerate in where we spend our money. Will we buy the cheap single-use plastic bottle or bring a reusable one? Will we mend it or get a new one?

We must clean the ocean of plastic, and we can help by doing beach cleanups. This is important, as plastics break down into micro plastics when exposed to the searing hot sun. We can recycle plastic and make a big impact by reducing the need to make new plastic. Recycled plastic is not just used to make new bottles but also to manufacture clothing and shoes.

Booms are used in some places to collect plastic from the ocean. This plastic is then processed or used for fuel. More work is needed though, and other innovative solutions must also be created to clean every aspect of the ocean.

Most importantly, we need to convince governments to create rules and regulations to forbid companies from using or producing plastic. As when a bath overflows, you turn the tap off before cleaning it up.



Non-Point Source Pollution

Non-point source pollution - also known as chemical contamination or nutrient pollution - comes from a variety of sources, which leads to the decline of our seas.

The Main Causes of Non-Point Source Pollution

Non-point source pollution comes from vehicles, farms, livestock ranches, and timber harvest areas. For example, it rains and the drops of water absorb pollutants, such as the oil from a car, which then at some point will go into a stream, the sea, or a lake. When you see a puddle that reflects light and is rainbow coloured, that water is polluted by non-point source pollution. This harms fish and other marine creatures. The water quality deteriorates and the fish become sick, or can even die, all from non-point source pollution.

The Main Impacts of Non-Point Source Pollution

An impact of non-point source pollution is algal blooms. These are a big problem that are caused by an excess of nitrogen and phosphorus. Although these are required for algae to survive, too much can cause algae to take over an ecosystem. However, once the organisms start to decompose and sink, the oxygen disappears and the area becomes a dead zone.

Another problem can be seen in the Great Barrier Reef, which is being populated in large numbers with crown of thorns starfish, whose population has exploded from the excess nutrients in runoff pollution. This is a massive issue as these starfish are eating the coral, which is a natural habitat for thousands of species.

Yet another issue is ocean acidification, caused by higher levels of dissolved carbon dioxide in the water. You might think this is a good thing, however it is not. The ocean has become 30% more acidic over the last 200 years, which is a far greater change than in the last 500 million years. The higher acidity is dissolving the shells of animals and making it harder for coral to form their reefs, which thousands of creatures rely on for their survival.

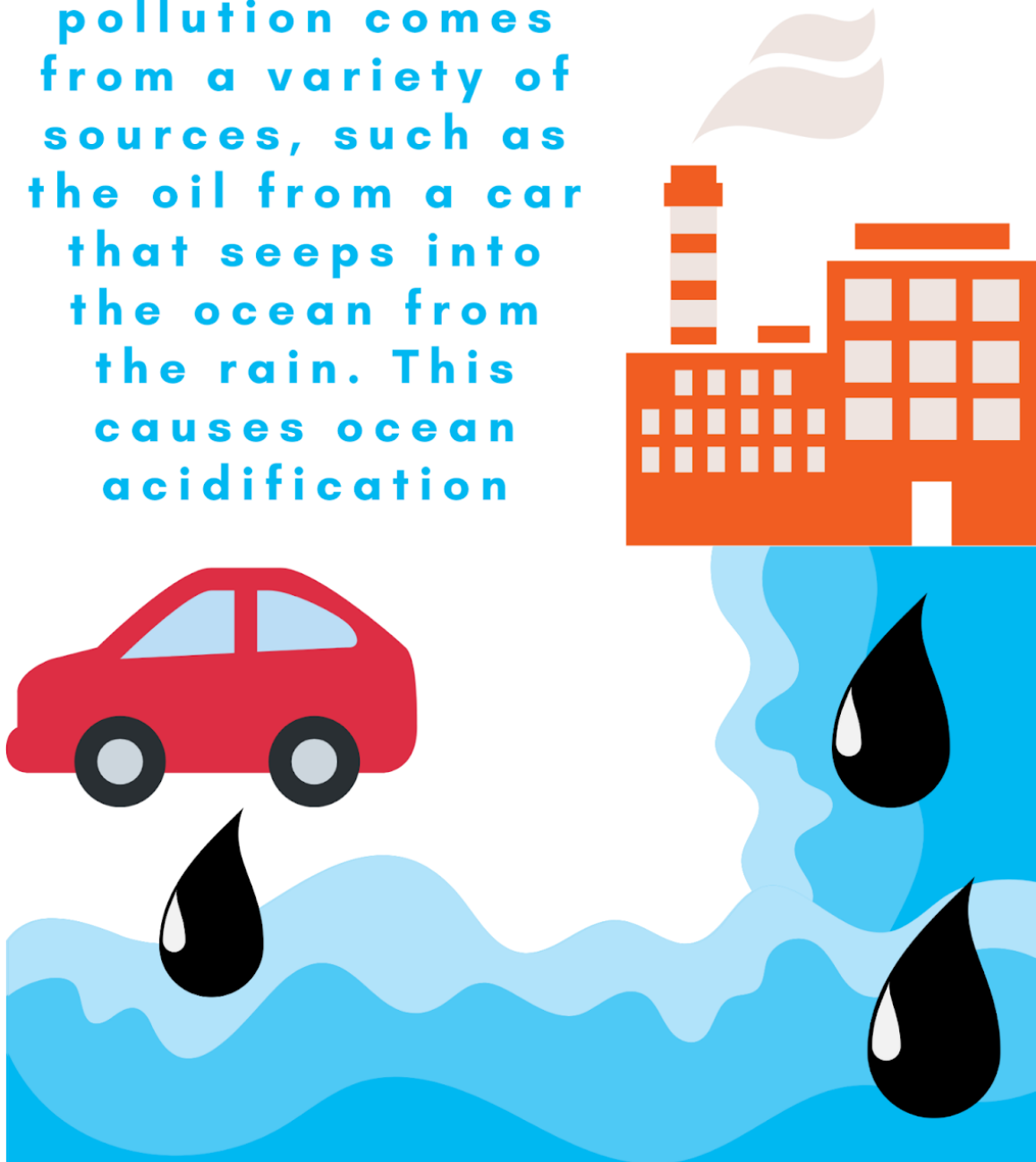
How We Can Help

We can donate to charities or NGOs that help with the issue, such as organisations that are replanting coral.

We can raise awareness. If everyone knew what was happening all around the globe and the impacts this has on our society and the sea, people might change their actions.

NON-POINT SOURCE POLLUTION

Non-point source pollution comes from a variety of sources, such as the oil from a car that seeps into the ocean from the rain. This causes ocean acidification



Oil Spills

Oil spills happen around once a week, contaminating the sea and suffocating ocean creatures.

The Main Causes of Oil Pollution

There are different types of oil spills. The most major are oil pipeline breaches, shipwrecks and oil rig explosions. For example, the Deepwater Horizon oil spill caused 210 million gallons to be released into the ocean, while the Exxon Valdez shipwreck spilt 11 million gallons of oil into pristine Arctic Ocean waters.

The Main Impacts of Oil Pollution

Every week an oil spill contaminates our seas, with devastating effects. Oil covers the feathers of birds, causing them to not be able to swim or dive, and irritating their eyes. It also blocks the gills of fish, stopping or slowing their growth rates. It is also a long process for conservationists to clean the birds as they need to be massaged in warm vegetable oil and then in a sink full of dish-washing soap. Every feather must be cleaned carefully with a toothbrush. The bird needs to be dried and have a week of rest before it can be released back into the wild.

Oil Types

There are many different kinds of oil, all of which have different viscosities (an oil's resistance to flow), volatilities (how fast the oil evaporates) and toxicities (how lethal or poisonous it is to people and other organisms).

The main types of oil are:

- 1. Non-persistent light oils - These do not leave remnants, and they evaporate within two days. They are quite toxic, with devastating impacts. The oil is very hard to clean up as it is highly flammable.**
- 2. Persistent light oils - These will leave quite a bit of residue. They will be fully gone after around two weeks and are easy to clean up.**
- 3. Medium Oils - A third of these oils will evaporate within 24 hours. They impact seabirds a lot. These oils must be cleaned up quickly as they do not degrade for a long time.**
- 4. Heavy oils - These don't evaporate much or at all. They have some of the worst effects as they are hard to get rid of and contaminate the area for a long time.**
- 5. Sinking oils - These mostly affect creatures in reefs and on the seabed. They do not really affect the shoreline as they sink. However, they have long-term impacts. They can be removed from the bottom of the ocean by dredging (scooping out the weeds and mud off the bottom of the ocean).**

Fishing

Did you know that industrial fishing companies are killing marine creatures every single day? Bycatch is more of an issue than even oil spills!

The Main Causes and Impacts of Fishing and Bycatch

Fishing is yet another major issue that contributes to ocean pollution. When you fish with big nets, you have extra animals that get tangled up in them called bycatch. These animals are often dolphins, or sharks, but the fishermen don't want these creatures. Once they reel the nets in and throw the creatures back in, the creatures are usually already dead, or soon will be because of their injuries. The impacts are devastating; more than 300,000 whales and dolphins are caught in fishing nets every year.

Think about people who live in small towns, who rely on fish. Now the fish are getting sick from swallowing plastic. There are less fish due to industrial fishing, which makes it harder for people to catch healthy fish. Think about the impact on these towns.

Yet another impact is trawling. This is when people fish with metal nets that scrape everything off the sea floor, including the fish, shellfish, and plants. Every animal survives on what lives beneath them, so if the fish on the sea floor die because they have no shelter or food, the creatures who eat them cannot survive, and it goes on and has a devastating impact on the food chain.

Another reason for marine pollution are fishing nets that get dumped by fishing boats which kill marine creatures who get tangled in them.

How We Can Help

We can fish more sustainably by recycling nets. There could be boats to pick up the nets. This would be better as marine creatures would not get entangled in discarded fishing nets.

We need to stop industrial fishing and trawling. Even if it was just for a month, ecosystems could rebound. Bycatch from fishing is a humongous issue and is made worse by industrial fishing practices and trawling.

FISHING

Everyday we push the ocean for more fish than it can offer. We are causing other creatures to starve because they don't have enough fish. We are fishing but these fish cannot grow back in the time we fish for more.

Did you know?

Over 300,000 dolphins and whales die every year from the fishing industries!



Noise Pollution

Noise pollution significantly disrupts marine creatures' communications and navigation.

The Main Causes of Noise Pollution

Noise pollution comes from large ships' and submarines' propulsion systems and SONAR devices, which disrupt the natural sounds of the environment.

The Main Impacts of Noise Pollution

This is a massive issue as it stops marine creatures from communicating. Certain marine creatures, such as toothed whales, use sounds to know what is around them and to navigate the oceans, or to 'see'. Humpback whales sing to each other. It is their culture. They compose songs that travel around the world's oceans, and we are disrupting that. Noise pollution is impacting whales' ability to navigate and is therefore causing them to get beached. Boats are using their navigation systems at the expense of marine creatures.

Light Pollution

Light pollution comes from the lights we turn on every day, disrupting the sense of time of many ocean animals.

The Main Causes of Light Pollution

Light pollution is caused by turning the light on, casting a glow over the sea. Ever since the light bulb was invented, all around the world we have lights in nearly every home.

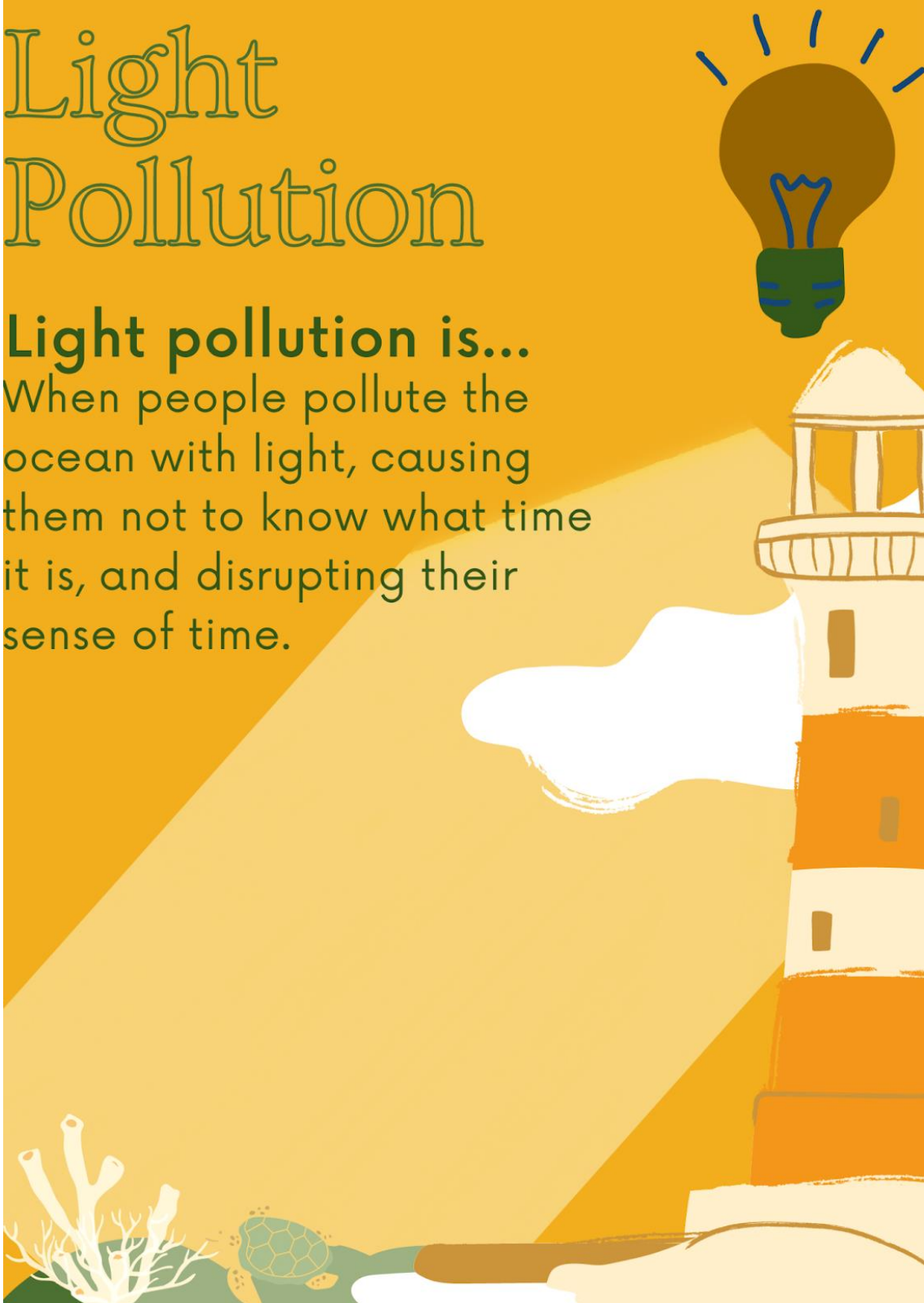
The Main Impacts of Light Pollution

Light pollution disturbs marine creatures as it disrupts the animals' sense of time. They may think it is day when it is actually night. This can affect their breeding, migration and feeding, along with when to shelter from predators.

Light Pollution

Light pollution is...

When people pollute the ocean with light, causing them not to know what time it is, and disrupting their sense of time.



Who is Mainly Affected by Ocean Pollution?

Many creatures and societies are impacted by our pollution of the oceans. Don't you wonder which societies and species are affected the most?

Animals, hundreds of thousands of them, get caught up in nets and accidentally eat plastic every single day. The creatures affected range from the smallest of plankton to the biggest of blue whales. Their lives are being ended by us and our waste. 12,000 - 24,000 tons of plastic get eaten by fish every single year! A recent study in California found that a quarter of the fish in the markets had plastic in their guts, mostly microfibers or micro plastics.

But which people suffer the most? People in fishing and coastal communities are most at risk from ocean pollution as they are dependent on the oceans for survival.

Imagine a society such as the Quileute Society. The whole tribe relies on the ocean, even the towns that are furthest away from the sea. But the fish are always sick because of non-point source pollution, oil spills, and plastic pollution. There are less fish now. The whole society is suffering from hunger and sickness because of ocean pollution.

Coral is also affected as ocean acidification makes it harder for their shells to grow. Many fish require coral for shelter. No coral means no coral reefs, and no shelter for fish, making it harder for them to avoid predators.

Seabirds are deeply affected as they dive down to the ocean to catch their prey. They can mistake the plastic for food or accidentally get it on their beaks or in their mouths when they dive into the ocean.

Seals and sea lions suffer too as they get tangled up in fishing nets and suffocate. As they are mammals, they must come to the surface to breathe, but the nets stop this.

Even the biggest sea creatures, whales, don't escape the pollution. They open their mouths and swallow their food while the water filters out, but the water contains plastic that is not safe for them. They could swallow tons of plastic. The stomachs of many beached whales are full of plastic. These creatures are suffering because of our carelessness.

海洋的生物会受到影响，他们会吃垃圾和它会死亡。我们都可以吃这个鱼所以我们是吃垃圾所以人们都会受到影响和伤害。海洋的生物都会死亡因为有石油污染。

Hai yang sheng wu hui shou dao ying chang, ta men hui chi le se he ta hui si wang.
Wo men dou ke yi chi zhe ge yu suo yi wo men shi chi le se suo yi ren men dou
hui shou da ying chang he shang hai. Hai yang de sheng wu dou hui si wang yin
wei you shi you wu ran.

What causes people to create and influence ocean pollution?

Every day we create more ocean pollution because of our uncaring actions.

Every day people litter on beaches, in parks, and on the road. The litter eventually ends up in the ocean because of carelessness and laziness. People can't be bothered to dispose of their rubbish responsibly. One reason is because there already is litter in the area, which makes a person think 'Hey! Why can they, but not me?' or that someone else should or will clean it up.

There are many issues with littering. A gust of wind can easily blow a plastic bag into the ocean, where it can get wrapped around the mouth of a sea creature such as a turtle, creating a slow, painful death that could be avoided if people safely disposed of their waste.

Another reason that people cause ocean pollution is fishing with big nets. Every once in a while they get stuck on coral or rocks on the seabed, and they have to be cut or dropped into the ocean. This may be accidental, yet it still happens and has a devastating impact on marine life.

Imagine a turtle swimming slowly in the ocean, in its home. Something moves towards her. Food, she thinks. But it is not. The turtle swallows it. Her digestion system starts to block up from eating the plastic bag.

Another issue is that people don't even know that they are affecting marine creatures. For example, when buildings in coastal communities have their lights on at night, that affects the animals' routines. When submarines are using their sonar, that disrupts the ability of sea mammals to navigate and communicate.

Every day, even if we don't mean to or don't understand the outcome, we are contributing and influencing ocean pollution in many ways.

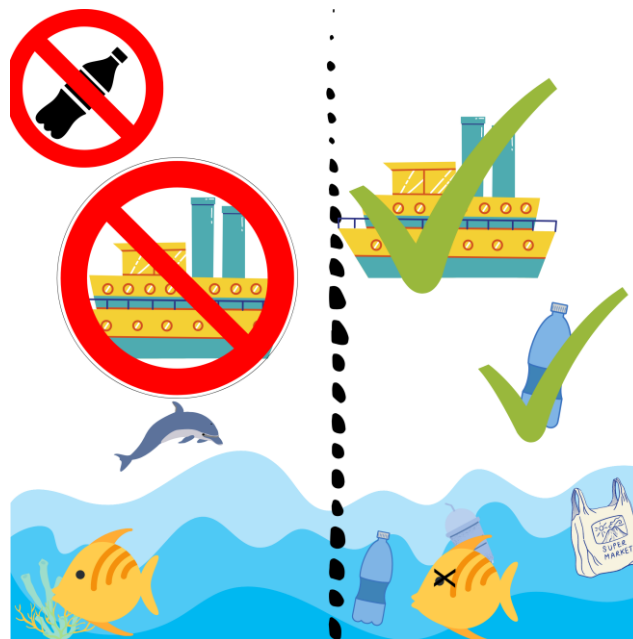
Can the Sea Recover From Ocean Pollution?

It is possible that the oceans could recover. A recent study found that it would be possible for the sea to recover within three decades, but for that to happen we must act now and stop using plastics.

We need to clean the ocean of plastic and stop using single-use plastics. Plastic is made from oil, which is a fossil fuel, and its manufacture is harmful to the environment. There are many alternatives for plastic such as bamboo and wood, which are both sustainable as they are from a renewable source.

Marine ecosystems must be restored as they are vital to the ocean's survival. These include salt marshes, mangroves, sea grass, coral reefs, kelp, oyster reefs, megafauna and the deep ocean. They are vital because they provide shelter and food for the creatures who are part of these ecosystems.

In conclusion, we need to rebuild ecosystems and protect species if we want to save our oceans, upon which we are so dependent. At the same time we must tackle global warming, as global warming is heating and acidifying the ocean, making it harder for coral reefs and other ecosystems to thrive.



Projects to Combat Ocean Pollution

Gary Stokes, the founder of Oceans Asia and a former senior activist of Sea Shepherd, used the metaphor ‘We have to stop the tap, instead of mopping it up.’ He believes we must address the root cause of ocean pollution instead of just cleaning the plastic off our beaches again and again.

When I interviewed Gary for this book, he said that one of the best projects he ever did was when he was part of the plastic pellet spill cleanup in Hong Kong in 2016. He saw positive collaboration between the plastic pellet company, the local population, and the government, and was impressed by their determination to clean it up.

Gary also participated in a project on whaling in Antarctica. These actions prevented the slaughter of whales by Japanese ships. Which was his contribution to “stopping the tap, instead of mopping it up.”

Another person I interviewed, Lauren Quiroz, was formerly part of The Ocean Cleanup organisation. Lauren, who has a master’s degree in marine science from Utrecht University, did a project on plastic polyester in clothing. This is an issue as micro plastics from clothing is a significant polluter to our oceans. Her research found alternative materials that are less harmful to our marine environment.

Nicole Senn is part of the Citizens of the Great Barrier Reef program. Members of the public are encouraged to help by taking pictures of the reefs and its resident creatures and to analyse the photos and record the different species that they can spot. This analysis helps us to understand the health and diversity of the Great Barrier Reef so that it can be compared over time.

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Interviewees:

Claire Severn

Sian Price

Gary Stokes

Lauren Quiroz

Nicole Senn

Karolina Strittmatter