

Recent Technologies in Marine Life protection

The ocean is the largest ecosystem on the planet and a crucial component for much life on Earth. The ocean generates about [50 percent of the oxygen](#) we need to survive. Our oceans also act as [the planet's largest carbon sink](#) – a crucial buffer against the [impacts of climate change](#). Additionally, the ocean is home to approximately [50-80% of life on Earth](#). Seafood, harvested from the ocean, provides a primary source of protein for around [three billion humans](#). Ultimately, much of humans' well-being is reliant on the overall health of the ocean. This is why protection of marine ecosystems and their life is essential.

The Earth's oceans, and its inhabitants, are constantly under attack from human activities. This damage comes from overfishing, oil spillages, climate change, and the effects of marine debris pollution ([Gall & Thompson, 2015](#); [Sigler, 2014](#)). To counteract these damaging human activities, many organisations and individuals are attempting to creating innovative ways to protect our marine life and marine ecosystems. In this article we will explore some of these initiatives and how they are helping to preserve our oceans.

Plastic: A Major Threat to Marine Life

Out of all the human-made debris that enters our oceans annually, plastics are by far the most prominent and most problematic ([Gall & Thompson, 2015](#)). Plastics account for about [80% of all marine debris](#). Estimates vary, but recent studies suggest that [several million tonnes](#) of plastic waste are entering our oceans each year ([Wayman & Niemann, 2021](#)). Once in our oceans, this plastic waste sinks to the seabed or is washed up onto shorelines. Of this waste, fishing gear such as nets, vessels, and jigs often [damage ocean habitats](#).



Organisations such as [The Ocean Cleanup](#) are making efforts to remove large quantities of plastic from our oceans. However, these efforts alone are not enough to solve the crisis of marine plastic pollution.

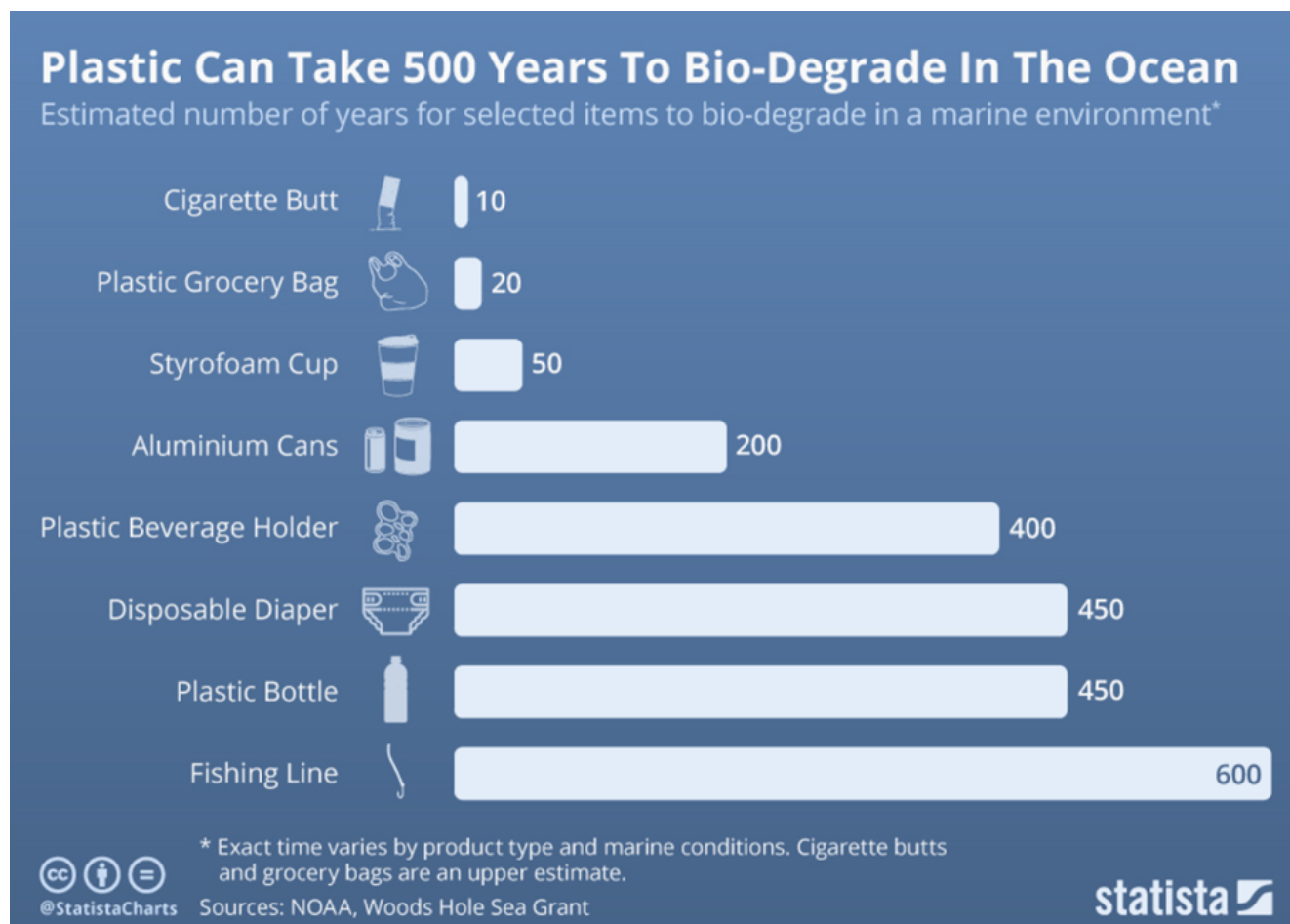
Image source: [The Ocean Cleanup](#).

Apart from habitat damage, plastic pollution can also directly harm marine life through [ingestion or entanglement](#). Plastics in the ocean can also act as rafts, facilitating the [transport of invasive species and toxic compounds](#). In the current day, plastics have many practical applications (e.g., home appliances, medical instruments, and food packaging). Because of this, it is hard to imagine that plastic production will be significantly reduced anytime soon. So, what are some initiatives that we can instead turn to in efforts to reduce the amount of harmful plastic ending up in our oceans?

1) Sustainable Product Packaging

One way that we can lessen the magnitude of our plastic waste is by choosing petroleum-free plastic alternatives. [Bioplastics](#) are one solution to the single-use plastic crisis. These plastics are typically made from renewable sources such as starches and plants. Certain types of bioplastics, such as PHA ([polyhydroxyalkanoates](#)), are completely compostable. This means that they naturally degrade after disposal ([Acharjee et al., 2023](#)). Additionally, PHA has been found to be one of the only bioplastics that will efficiently break down in the ocean without leaving harmful microplastics or toxic residue ([Dilkes-Hoffman et](#)

[al., 2019](#)).



A PHA water bottle could be expected to [completely biodegrade in just 1.5 - 3.5 years](#) within an ocean environment. This is [several hundred times faster](#) than the biodegradation rate of a petroleum-based plastic bottle.

Image source: ([WEF, 2018](#)).

Start-ups, such as [Genecis](#), are one of many organisations attempting to revolutionise the plastic industry. Genecis use [bacteria to produce PHA](#) which can then be used as a sustainable alternative to petroleum-based plastics. Organisations such as [OMAO](#) can then use this PHA to produce sustainable tableware such as the [OMAO straw](#). PHA is still an emerging technology and has yet to reach its full potential in the plastic industry. Not-for-profits such as [GO!PHA](#) advocate for PHA's use by informing key public and private stakeholders about the benefits of PHA-polymers.

Plastic-Free Alternatives

Other sustainable initiatives include [edible beer-packaging rings](#). When used in place of their plastic alternatives, these rings significantly reduce the risk of harm to marine life through ingestion or entanglement. [Saltwater Brewery](#) in Florida

construct their six-pack packaging out of barley and wheat ribbons. The barley and wheat are by-products from the brewing process. Using these materials allows them to create packaging that is biodegradable and completely edible. This packaging is safe for consumption by animals that may encounter the waste.



Sea turtles such as this one are especially vulnerable to plastic pollution. These beautiful creatures often often [mistake the debris for food](#) or become entangled in it.

Image source: ([Belle Co, Pexels.](#)).

Coral Reefs: Vital to our Oceans' Health

Within our oceans, coral reefs provide many irreplaceable functions for the marine ecosystem. Despite covering just one percent of the ocean floor, coral reefs are home to about [25 percent of all marine life](#). On top of that, coral reefs protect coastlines from storms and erosion. Reefs also provide [economic benefits](#) through tourism and by creating jobs for local communities. However, human activities are currently putting significant strain on the health of our coral reefs and the marine life that inhabit them ([El-Naggar, 2020](#)).

Pollution and debris spilling into our oceans can smother corals and accelerate the growth of damaging algae. Anthropogenically driven climate change can lead to coral bleaching. This leaves corals more susceptible to disease and ultimately death ([Baker et al., 2008](#)). Other human misconducts, such as overfishing, can leave ecosystems depleted of key reef species and directly [damage coral habitats](#). Around the world many innovative efforts are underway to help protect these beautiful marine ecosystems and the lives that live within them.

2) Artificial Reefs

An artificial reef is any structure placed on the seabed with the intention of mimicking some characteristics of a natural reef. To establish an artificial reef, [large metal or concrete modules](#) are constructed or sunk near to an existing or depleted reef ecosystem. Once in place, these artificial structures assist in [re-populating existing coral reefs](#). They can also establish entirely new coral ecosystems. Organisations deploy artificial reefs for various reasons. This includes ecological restoration of marine habitats, coastal protection, fishery improvement, or for scientific research. Artificial reefs have been successfully deployed in oceans all across the globe. Researchers have linked these reefs to an increase in local species diversity and overall abundance of fish populations ([Mills et al., 2017](#); [Boakes et al., 2022](#)).



An example of an established artificial reef. Here, a number of different coral

species have grown on the sunken metal structure.

Image source: ([BBC/Science Photo Library](#)).

More specialised approaches to creating artificial reefs also exist. For example, [Biorock](#) is an innovative technique that involves running low voltage electrical currents through metal artificial reef structures. This electrical current interacts with minerals in the seawater, causing white limestone to grow on the structure. The introduction of electricity alters the aquatic environment. This leads to [accelerated formation and growth](#) of both chemical limestone rock and the skeletons of corals and other shell-bearing organisms. Once established, Biorock structures quickly attract a diverse array of coral reef organisms, such as fish, crabs, clams, octopus, lobsters, and sea urchins.

3) Catch Monitoring

Catch monitoring is another innovation that protects marine life, in this case from overfishing ([Russo et al., 2021](#)). This technology typically involves a combination of cameras and sensors that are setup to [monitor the impact of fisheries](#) on marine environments. Catch monitoring ensure that ocean fisheries maintain sustainability both now and in the future. Fishing vessels can use these systems to ensure proper usage and retrieval of fishing gear, as well as compliance with regulatory limits on fishing hauls. Catch monitoring also allows marine conservation agencies to observe areas and particular species that require special protection. The information collected by the catch monitoring system is used to generate reports that are submitted to fishery management authorities and other relevant stakeholders.

Catch monitoring has become a functional and cost-effective tool for the conservation and sustainable harvesting of marine resources. Present day advancements include integrating [deep learning](#) technologies into monitoring systems. This provides an automated catch event detection framework, significantly reducing the time required for analysing catch monitoring footage, which humans would otherwise do manually ([Qiao et al., 2021](#)).

Catch Monitoring Promotes Sustainable Fishing

The THRIVE Project recently conducted a [study](#), evaluating the strategies and sustainability performance of 30 dominant companies operating within the seafood industry. Out of the 30 companies analysed only one achieved a

sustainability performance index (SPI) over 50/100, where 100 is the ideal benchmark. Meanwhile the other 29 achieved a score below this. In fact, eleven of the companies didn't even achieve a SPI of 20/100. These findings were consistent with the [World Benchmark Alliances' Seafood Stewardship Index](#), who found in their study that 13 of the 30 analysed companies scored lower than 20/100 for their SPI. The findings from these studies show just how poor the overall SPI of the seafood industry is in the current day. Such unsustainable practices reinforce the need for monitoring by independent bodies (e.g., catch monitoring systems). This will ensure that fishing practices move forward in a more sustainable manner.

How can we guarantee the protection of Marine Life?

Apart from the initiatives mentioned in this article, there are many ways that you can help to protect marine life on the individual level. For example, when visiting the beach, lead by example and collect any waste or litter you may see. [Voting with your wallet](#) is another individual action you can take to support the protection of marine life. [Purchasing products with biodegradable packaging](#), or no packaging at all, can make a difference to the amount of waste in the ocean and the damage that this waste causes. If you eat seafood, then purchasing sustainably sourced fish is another individual action you can take. Buying sustainably sourced fish greatly protects fish stocks and ocean biodiversity. In Australia, websites such as [GoodFish](#) exist so that you can check how sustainable different seafoods and seafood restaurants are across the country.



An example of a vibrant, thriving coral reef. By supporting technologies for marine life protection, we can ensure a future in which beautiful ecosystems such as these continue to exist.

Image source: ([BBC Earth/ Vincent Pommeyrol](#)).

Achieving the United Nations Sustainable Development Goals (SDGs) and how they link to the protection of marine life

This month The THRIVE Project focuses its sights on United Nations' [SDG 13](#) (Climate Action), which is directly linked to the protection of our marine life. SDG 13 is to: "Take urgent action to combat climate change and its impacts". Taking action against anthropogenically driven [climate change](#) means protecting our marine ecosystems and the life that inhabits them. The health of our oceans directly affects human health and well-being. So it is vital that we act now to preserve these beautiful ecosystems and ensure their continued function.

A Thrivable Framework

[The THRIVE Project](#) stands to create a future in which humans will not only survive but also thrive. Our mission is dedicated to securing the enduring welfare and ['thrivability'](#) of all species on Earth. [THRIVE Framework](#) examines issues

and evaluates potential solutions – making predictive analyses using topics that support environmental and social [**sustainability**](#) transformations. We recognise that human happiness can sometimes compete with environmental well-being. This is why we use our ciambella chart to illustrate the ‘thrivable zone’. THRIVE emphasises the possibility of satisfying environmental, ecological, and social needs concurrently, without having to compromise.

If you would like to learn more about [**thrivability**](#), you can subscribe to our [**free newsletter**](#). You can also check out our informative [**podcast series**](#) and watch some of our educational [**Youtube content**](#). Additionally, come along to our [**webinar events**](#) to hear talks from experts in the field of thrivability.