Plastic, a danger to coral reefs

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Sometimes called the 7th continent (see Plastic pollution at sea: the seventh continent), plastic pollution of the oceans is becoming a major scourge. About 270,000 tonnes of plastic float on the surface of our oceans [1] and many more drift between two waters. Their impact on marine life is well identified: turtles, birds or marine mammals often die after ingesting plastic residues from can bags or packing rings that we dump into the environment. Every year, plastics kill 1.5 million animals. However, the impact of plastics on reef-building corals had been ignored until now, perhaps because of their alleged distance from plastic sources. However, analysis of plastic debris in the oceans has shown that it can carry many bacteria, including some pathogens that cause coral disease [2].

Figure 1. Acropora sp. holding a plastic bottle. [Photo © Tane Sinclair Taylor, 2018].

A team of American and Australian scientists therefore sought to understand whether the presence of plastic debris could influence the spread of disease in coral reefs. To do this, they examined the health of more than 124,000 corals on more than 150 reefs in 8 regions of the Pacific Ocean (Figure 1). Their objective was to identify and identify lesions characteristic of diseases on coral tissue and to link them to the presence or absence of plastics [3].

According to their observations, published in the journal Science, plastic debris promotes the development of diseases. Thus, the risk of disease can be up to 22 times greater on a reef polluted by plastic than on a preserved reef. Indeed, four of the most common coral diseases (skeletal eroding band, white syndromes, black band, growth anomalies, brown band, and atramentous necrosis), three of which are associated with rapid coral mortality, are more prevalent on reefs contaminated by plastics. However, plastic debris does not seem to affect all coral species in the same way. The more complex and branched the shape of the coral, the more likely it is to retain debris, and therefore the more likely the coral is to be affected (Figure 2).

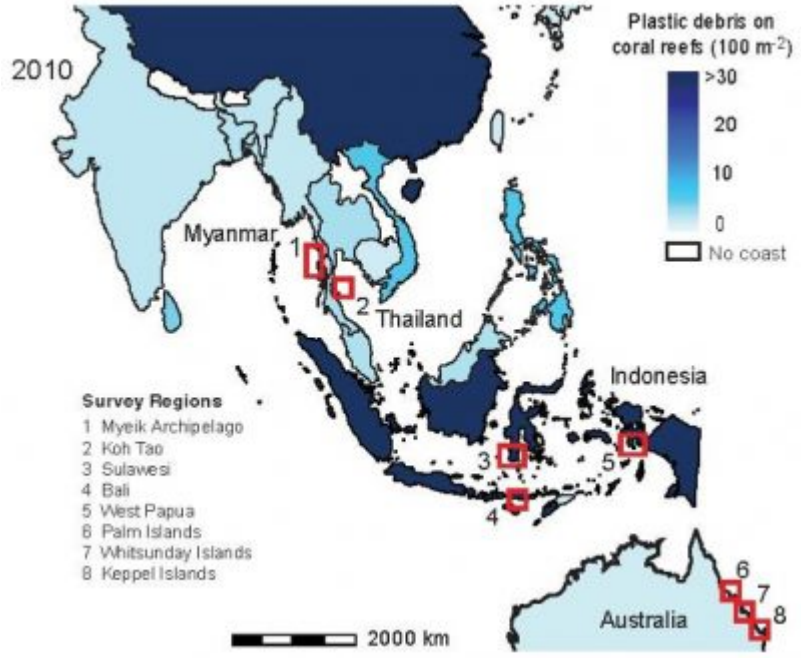

Figure 2. Concentration (100/m2) of plastic waste on coral reefs modelled from estimates of waste discharge into the oceans in 2010 and quantification in the field. [Source: Adapted from ref. [1], with permission]

Much work is still needed to fully understand these observations but researchers already have some hypotheses. According to them, plastic debris has a direct effect on the development of disease by causing physical damage to coral tissue. In addition, by carrying pathogens within and between reefs, they promote their spread and increase the risk of infection. This conclusion is all the more worrying as another study [4] suggests that corals voluntarily ingest plastic because they are attracted by its taste, probably because of the chemical additives present in plastics (chemoreception mechanism).

Thus, by promoting the development of diseases, plastic debris contributes to the degradation of coral reefs, which are already under serious threat from climate change. This conclusion is very alarming since 8 million tons of plastic end up in the ocean every year [5]. However, it also means that we can all take action every day to reduce the pressure on coral reefs by reducing our consumption of plastic, recycling it properly and ensuring that our waste does not end up in the environment.

What to remember:

- The effects of plastic debris on the spread of coral diseases were studied for the first time in 8 Pacific regions.
- In areas polluted by plastic, corals are more susceptible to disease development.
- Contact between debris and corals could cause physical injury to coral tissues and thus promote their infection by bacteria present on plastic debris.
- This study highlights the importance of combating plastic pollution in the oceans.

References and notes

Cover image. Acropora sp. holding a plastic bottle. [Photo © Tane Sinclair Taylor, with permission]

[1] Avio et al, (2017) *Plastics and microplastics in the oceans: From emerging pollutants to emerged threat.* Mar. Environ. Res. 128: 2-11.

[2] Kirstein et al, (2016) *Dangerous hitchhikers? Evidence for potentially pathogenic Vibrio spp. on microplastic particles.* Mar. Environ. Res. 120: 1-8.

[3] Lamb et al, (2018) *Plastic waste associated with disease on coral reefs.* Science 359: 460-462.

[4] Allen et al, (2017) *Chemoreception drives plastic consumption in a hard coral.* Mar. Poll. Bull. 124(1): 198-205.

[5] Jambeck et al, (2015) *Plastic waste inputs from land into the ocean.* Science 347: 768-771.

To learn more about plastic pollution:

- Surfrider Europe website
- IUCN website

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