

# Sunscreens can hurt the marine environment—how to choose one that's healthy for you and the sea

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Choosing which sunscreen to use can be mind-boggling. Should you choose one with the highest sun protection factor (SPF) or another with "reef-safe" or "coral-friendly" credentials? Is it best to opt for a spray or a lotion? What's the difference between a mineral or chemical-based

formula?

On my ventures to the beach to snorkel and surf, I am forever seeing a greasy slick on the surface of the water, especially on busy summer days. This led me to question, does the [sunscreen](#) I wear wash off of me into the sea and cause harm to the marine environment? After three years of research, my answer is yes, sunscreens certainly have the potential to [harm the marine environment](#). Studies show that sunscreens can induce [coral bleaching](#), [damage marine life](#) and influence [water quality](#) even at environmentally relevant concentrations.

I used to feel extremely overwhelmed when deciding which sunscreen to purchase to protect me from the sun's ultraviolet (UV) rays. I was trying to juggle getting sufficient sun protection while ensuring the sunscreen I was wearing wasn't harming the ocean.

Sunscreens are composed of an array of complex ingredients, including UV filters, which are added to either block or absorb UV rays, as well as fragrances, stabilizers, parabens (a family of preservatives such as methylparaben or E128) and often per- and polyfluoroalkyl substances (PFAS) or forever chemicals used for waterproofing.

UV filters can be chemical or mineral-based. Chemical UV filters include [synthetic compounds](#) such as oxybenzone and octocrylene that absorb UV rays—most mainstream sunscreens use these. Mineral UV filters include zinc oxide or [titanium dioxide](#) which reflect and scatter UV rays. The latter are now more commonly added as nanoparticles—these extremely small mineral particles provide a thinner layer on the skin, unlike their bulky counterparts which can appear thick and pasty. Both mineral and chemical-based sunscreens can harm the marine environment. Mineral-based studies have largely compared the effects of [nano and non-nano particles](#), while chemical-based studies have typically focused on [oxybenzone](#).

Approximately [10 million tons](#) of UV filters are produced annually for the global market, of which, [6,000–14,000](#) tons of sunscreen is estimated to be released into coral reef zones annually from inadvertently being washed off swimmers. Approximately [25%](#) of the sunscreen we apply to our skin washes off within 20 minutes of submersion. Unsurprisingly, direct release from our skin into the sea is not the only pathway, other pathways are largely linked to the insufficient wastewater treatment system.

Traditional waste water treatment processes cannot remove most chemical-based UV filters from effluent, so these compounds can get released into rivers or the sea along with treated effluent. So even when you're not spending time at the beach, some of the ingredients in your sunscreen that you might wear in the garden, for example, can reach the marine environment after your shower.

So far, most research investigating potential effects of sunscreens on the marine environment has focused on tropical climates. Chemical UV filters, such as oxybenzone, have been observed to cause complete and [rapid coral bleaching](#) both under [laboratory conditions](#) at environmental concentrations and in the [Atlantic Ocean](#), [Indian Ocean](#), [Pacific Ocean](#) and the [Red Sea](#).

There is proof that chemical UV filters can be passed from mother to baby in [dolphins](#), can cause [oxidative stress](#) (the production of highly reactive chemicals that can turn on and off biological processes) in [sea turtles](#), and accumulate in [marine mammals](#) and [fish](#). They cause mortality, DNA damage and reduced cellular viability in [mussels](#), [clams](#), [algae and sea urchins](#). Inorganic UV filters have also been associated with [marine toxicity](#).

In [Hawaii](#) and [Palau](#), some chemical UV filters including oxybenzone and octinoxate have been banned by governments due to their

association with coral bleaching. However, these compounds and many others are still widely used globally.

Many competitive brands are starting to produce sunscreens with labels that state they are "reef-safe" or "coral-friendly." These terms allude to a formulation that is environmentally friendly and one that the consumer may feel morally obliged to purchase if eco-credentials are on their purchasing agenda. However, the use of these terms is not regulated.

While some of these products may not contain oxybenzone or octinoxate, they are instead likely to contain other chemical UV filters that too are not scientifically proved to be reef-safe, such as octocrylene—[which degrades into oxybenzone anyway](#).

## **Which sunscreen is best?**

Take a close look at the ingredients. Does the product contain chemical or mineral UV filters? Sometimes, brands won't use common ingredient names and will instead use chemical names, for example, avobenzone is also known as butyl methoxydibenzoylmethane. Research is rapidly increasing in this area to better understand the environmental consequences of sunscreen ingredients, but current research largely suggests that mineral UV filters have less adverse effects on the marine environment than chemical UV filters, with [titanium dioxide](#) generally thought to be less toxic than [zinc oxide](#).

Avoid greenwashing. If the product claims to be reef-safe, do the ingredients corroborate these claims? This phrase is largely a marketing gimmick with no robust scientific evidence to prove that its ingredients are truly reef safe.

Watch out for potential PFAS ingredients in water-resistant products like polyfluoroalkyl-phosphate-esters or PAP and polytetrafluorethylene

or PETE.

When choosing between a spray or a lotion, bear in mind that the particles in spray applications do not all land on your skin, many land on the sand or water and that's another route into the [marine environment](#).

As awareness of sunscreens as marine pollutants grows, brands need to be transparent when making eco-friendly claims and invest more in developing greener alternatives. Stronger policies could ensure that sunscreens are being manufactured with compounds that are not only effective at providing sun protection, but are also safe for the environment.

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