

SHEET 11

IMPACTS ON THE ENVIRONMENT



Sargassum: increasing coastal pollution...

Since 2011, the amount of Sargassum in the ocean has been increasing, culminating in 2018 when scientists recorded an algae belt 8,500 kilometers long linking the African continent to the Caribbean. We referred to this event as the green continent, then in 2021 the amount of algae even exceeded that of 2018.

The sanitary and economic risks of this situation are well known since they directly impact the daily life of the inhabitants and professionals working on the coasts. But environmental risks are still to be defined plainly.

Thousands of tons of seaweed influx wash up on the coasts of the Caribbean, devastating coastlines. The Caribbean coasts have an extremely rich biodiversity characterized by three connected or interdependent ecosystems: mangroves, coral reefs and phanerogam meadows (meadows composed of plants whose characteristics are similar to land plants, with a root system, stems, leaves, flowers and seeds, but which have adapted to aquatic life).

These three ecosystems are the threshold of a rich animal and plant biodiversity, as areas of refuge, reproduction and feeding for rare and fragile species that interact with their environment. Beyond sheltering animal species and in a more general way, the flora and these ecosystems play a very important role for the preservation of the coasts as they prevent them from erosion and act as water purifiers.

The Sargassum floating in mangroves and near sea grass beds deprives these environments of light and oxygen (the oxygen brought by the swell), completely atrophying roots and scaring faunal life away. The number of coastal environments affected by Sargassum overload is constantly increasing.



...and danger at sea

The floating Sargassum are a shelter for many species of marine fauna, in particular the lionfish (or flying scorpionfish), a venomous and invasive species that vamps the ecosystems where it settles up. The lionfish has no known predator and feeds on juveniles of other species. As a result, we can measure up to 10 million euros of economic loss per year in the whole Caribbean, mainly in the fishing sector.

Constantly moving around thanks to winds and currents, floating Sargassum patches can be very dense (up to 10 meters deep measured in some cases). Thus, the light hardly passes through and can no longer reach seabeds, especially in areas with a strong presence of corals. However, corals and seagrass beds, both essential to life at sea and on land, exist thanks to photosynthesis (a bioenergetic process that allows organic matter to be synthesized with light energy) and therefore need this light they are deprived of. Sargassum events often lead to their bleaching and death.

In Mexico in 2019, researchers from the National Autonomous University of Mexico counted the death of 72 species of corals in Puerto Morales directly linked to the Sargassum influx.



Moreover, Sargassum transported by currents and winds can travel several thousand kilometers before washing up on the Caribbean coast. Scientists studying the issue believe that it's very likely that the masses of seaweed rafts arriving from West Africa to the Caribbean also bring with them micro-organisms, crustaceans, and other species of marine fauna from Africa, consequently introducing new species normally found only near the African continent.

As Sargassum rafts prevent the passage of light through the water, they can also deprive aquatic fauna of oxygen, obviously essential for their survival.

The devastating impacts are many but their actual measurement remains difficult. All the impacts are probably not yet known by scientists. Some speak of "dead zones" since they have become anoxic, i.e. completely deprived of oxygen and where aquatic life is no longer possible. It is still difficult to necessarily blame Sargassum but it is thought to be a major contributor.

Sargassum rafts, places of opulent life in the open sea

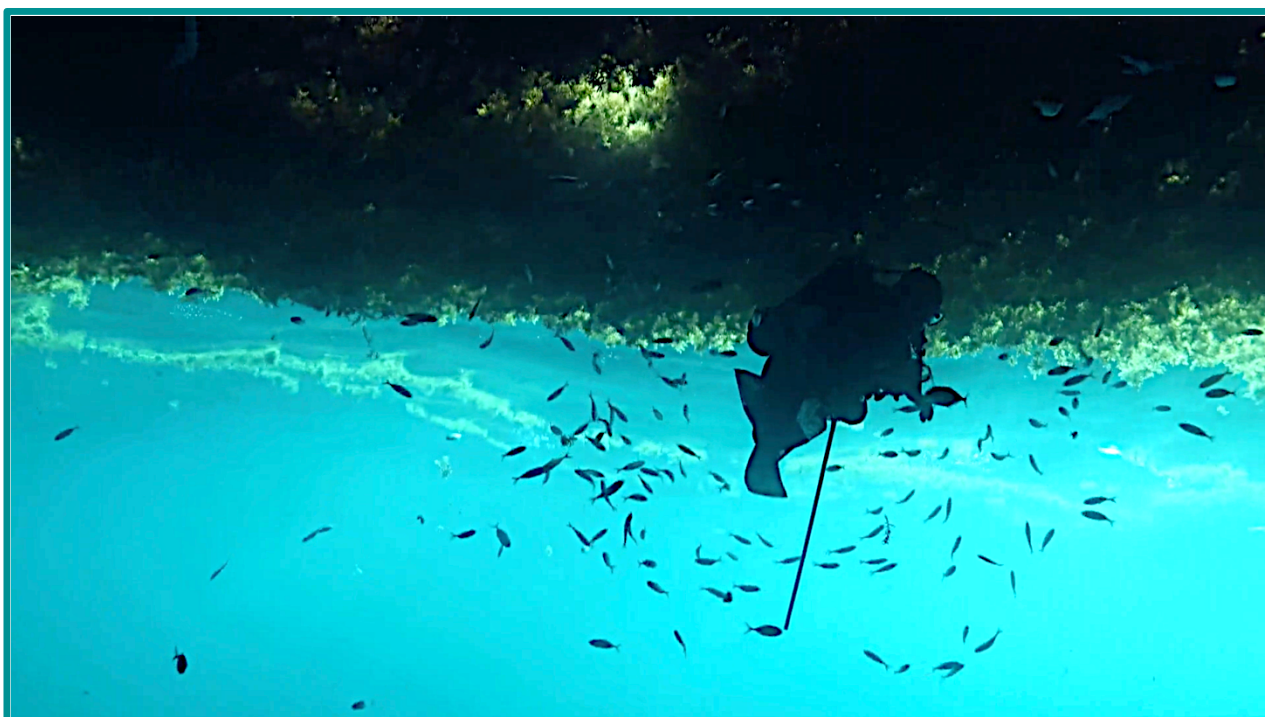
Beyond being a threat, scientists have discovered that seaweed rafts can also shelter a remarkable amount of marine life. The intermingled algae host an amazing variety of organisms that shelter in and feed from them, like small fishes, seahorses, crabs, shrimp, and sea snails. Complete food chains can be found there, with adult fish such as trevally or turtles, but also sharks (including great white sharks) and tunas coming to feed.

122 fish species of fry and juveniles come to find refuge in Sargassum rafts. They are a stopover spot on the journey for migratory species. After migrating for several thousand kilometers, these same migratory species come to feed or spawn, like eels (European and American), rays, turtles or whales.

Some species of fish-eating birds also come to feed, while open sea birds nest on the rafts. So much life is linked to the sea and to Sargassum floating farms, which feed on organic waste full of nutrients (excrement, fish remains etc...).

This complex, rich and surprising ecosystem, is constantly being studied by scientists from all over the Caribbean, and a new project has been emerging since 2019: turning the originary Sargasso Sea (located off the coast of Bermuda and Florida) into the first marine protected area in open seas. Sargassum can be so harmful when it piles up near the shore or washes up, but it is a true breeding ground in open seas, one of the most dynamic marine habitats imaginable.

Already in 2014, the Azores, Monaco, UK, US and Bermuda governments signed a joint declaration committing themselves to the conservation of the Sargasso Sea. The agreement, signed in Hamilton, the capital of Bermuda, is part of the Sargasso Sea Alliance and was led by Bermuda and managed by the International Union for Conservation of Nature (IUCN). Representatives of the governments of Sweden, Tuks and Caicos Islands, British Virgin Islands, the Netherlands, the Bahamas, South Africa and five international organizations (including the Convention on Migratory Species and the Oslo and Paris commissions) also expressed their support for the declaration.



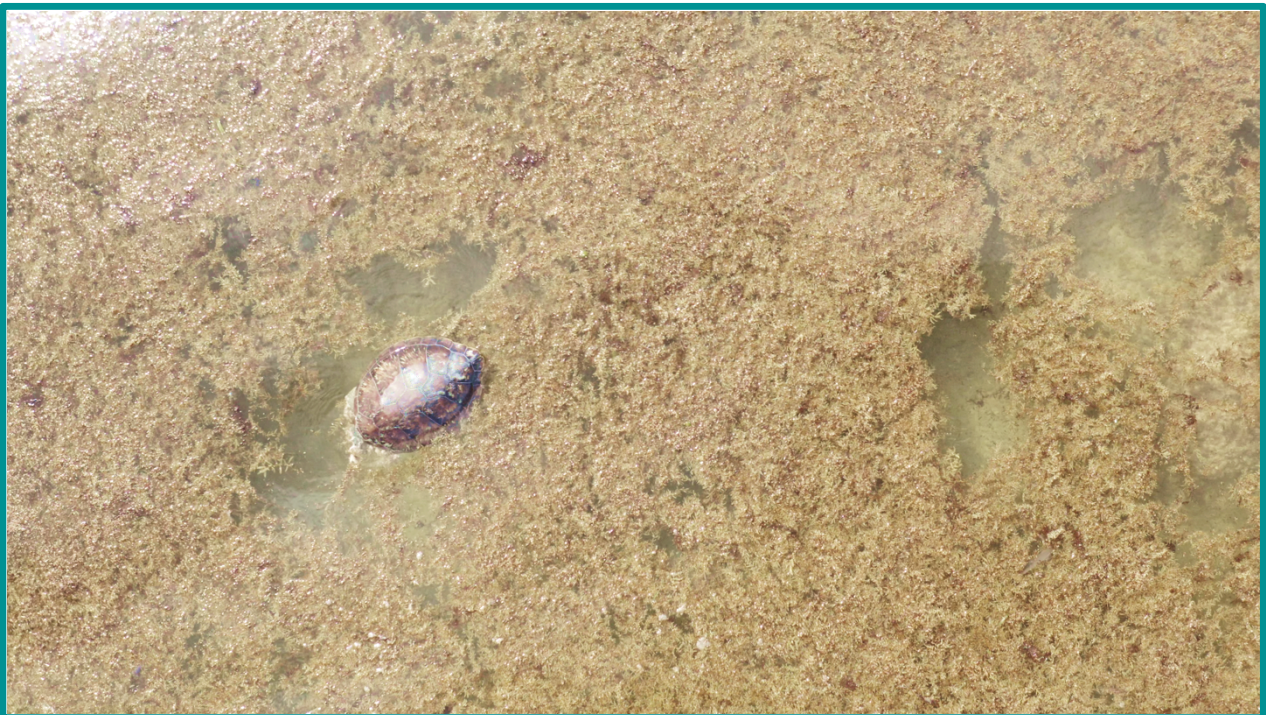
A necessary but risky harvest

Managing Sargassum is complex: the preservation of biodiversity that it supports must be ensured, while at the same time stranded seaweed must be handled before its impact is too great. There are numerous collection initiatives being organized for the most part in collaboration with institutions, but they still carry risks for the coastline and its sensitive environments.

The coming and going of mechanical machines during the collection can accelerate the settlement of soil and push their erosion when poorly adapted techniques remove sand (sometimes in large quantities) along with Sargassum.

Storage sites are also a problem. It is recommended by international authorities to store seaweed laid out in 10 centimeters thick layers to avoid excessive amounts of Hydrogen Sulfide and fermentation juices loaded with Cadmium, inorganic Arsenic and heavy metals that can pollute the soil. There are too few secure storage sites, and harvested Sargassum is often left on backshore sites, sometimes close to environmentally sensitive areas or even homes. Given the massive amount of seaweed harvested, it is often impossible to respect prerogatives.

In 2019 for example, near the town of Sainte-Marie in Martinique, collected Sargassum was stored close to mangroves which are places of reproduction and life for aquatic fauna and have been permanently impacted by fermentation juices.



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