



Suddenly, Sargassum!

How a seaweed
changed St. Martin

Mark Yokoyama

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Table of Contents

Suddenly, Sargassum!	3
What Is Sargassum?	6
The Floating Forest	8
Sargassum Marine Life Guide	10
A Wind of Change	16
Caribbean Blooms	18
Near the Shore	20
Death on the Beach	22
Life on the Beach	24
Sargassum Beach Life Guide	26
Birds and Sargassum	32
A Feast for Guests	34
Sargassum Bird Guide	36
Living With Sargassum	42
Can We Use It?	44
Sargassum in Art	46
Sargassum's Future	50
About This Book	52

Suddenly, Sargassum!

In recent years, huge shifts have happened in nature all over the world. Glaciers and ice caps have melted. Giant forest fires have burned across Australia and North America. Deserts have grown in Africa and Asia, swallowing towns and forcing people to move.

In the Caribbean, hurricanes have become stronger and more frequent. Some parts, like St. Martin, have also suffered frequent droughts. Large areas of mangrove wetlands and coral reef are now dead or diminished.

Even in a world of sudden changes and calamities, the arrival of sargassum is astonishing. Before 2011, it was almost unknown on St. Martin. It was something from the distant Sargasso Sea. It lived in the imagination, perhaps even in the past.



Suddenly, sargassum was here. Huge mats and long rows floated in from the Atlantic. It covered beaches in yellow and orange. It stained the water. It piled high. It rotted and stank. It dried in the sun into reds and browns.

Sargassum is many things. It is seaweed. It is home to a floating world of sea creatures. It is home to another group of animals on the beach. When it is in the wrong place, it rolls in as a tide of disruption and destruction, killing things on land and sea.

Sargassum could be a kind of bounty. It is energy from the sun, pushed to us by wind and waves. We look for ways to harvest and use it.

It can have a kind of beauty. Patches float on the sea like lost islands. It paints the beach with gold, orange, and red, blending into each other. It inspires poets and artists.

Sargassum arrives and disappears throughout the year, like a new kind of season. It is like the wet season and the dry season. It is like the hurricane season, the Christmas winds and the ground sea. But all of those are as old as time. They started before history and before memory.

There are no ancient myths about sargassum on St. Martin. We were here when it first arrived. We are the ones learning where it comes from and why it is here. We will decide what to do about it. Perhaps we will write the legends and stories of sargassum, how it came to be and what it means.





What Is Sargassum?

Sargassum is seaweed. Seaweeds are living things called algae. Algae are a lot like plants. They use energy from the sun to grow.

Most seaweeds are attached to something, like rocks or corals. That's how they stay in the same place when the water in the ocean is always moving.

A couple kinds of sargassum seaweed are free-floating. Instead of being attached to the sea floor, they have little balls filled with air so they can float on the surface of the sea. Instead of staying in one place, they travel where ocean currents take them.

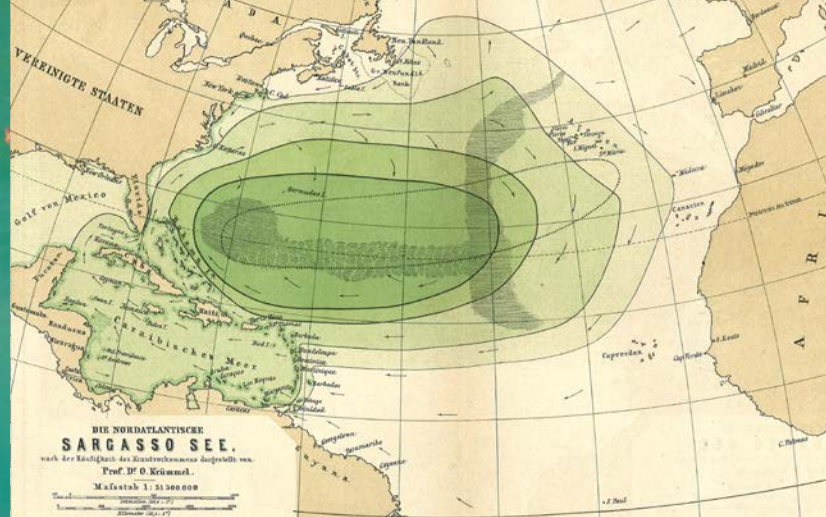
In the North Atlantic Ocean, currents moving around the edges of the ocean keep most of the sargassum in the middle of the ocean. This place is called the Sargasso Sea. In this area, there is always sargassum.

Living sargassum is a golden yellow color. In the sea, wind and currents can clump it together in big mats or rafts. Sometimes wind blows it into long lines that stretch as far as the eye can see. These are called windrows.

Up close, sargassum has branching stems. The blades grow from the stems. These are long, flat and narrow and look like leaves. Small round or oval balls grow on little stalks coming from the stems. These balls are full of gas, like tiny balloons. They keep the sargassum floating.

When a piece of sargassum breaks off, it grows into a new clump. This is how it reproduces. As a clump of sargassum gets old, the air balls lose their air and the sargassum sinks to the bottom of the sea.





The sargassum that washes up on St. Martin beaches is free-floating seaweed.

The Sargasso Sea is in the North Atlantic Ocean. It is the dark green area on this map. (Map by Otto Krümmel, 1891)

Sargassum has branching stems, flat blades and small balls. The blades are like leaves on a plant.

The round balls on sargassum are full of air. They keep sargassum floating on the surface of the ocean. When they get old and break, the sargassum sinks into the sea.



The Floating Forest

Usually, the middle of the ocean is empty, like a desert. There's no place to hide, nothing to hold on to, and not much to eat. But in places where there is sargassum, the sea is full of life.

Tiny animals attach to the sargassum and grow on it. Hydroids look like tiny feathers, and bryozoans cover sargassum in a lumpy crust. Tiny tubeworms have shells that look like snail shells. Other algae even attach to sargassum and grow there.

Other small animals move around, but still spend their whole life crawling on the sargassum. Some snails, flatworms and sea spiders may live their whole life on the same clump of sargassum.

Other animals spend their life swimming around the sargassum or holding onto it. Some of them are larger, but still pretty small, like shrimp, crabs and the Sargassum Frogfish. Many of them eat the smaller animals that live in sargassum.

There are more than 100 animals that live in the sargassum. And there are at least ten that live only in sargassum and nowhere else. Mostly, they don't eat the sargassum itself. The sargassum is just a place for a whole web of different algae and animals to live together. In the vast space of the open ocean, sargassum is like their spaceship.

All of this life can attract other animals that don't live in the sargassum all the time. Many young sea turtles live in sargassum for a couple years while they grow, and come back to coral reefs and sea grass beds when they are bigger.

Like a forest, or a coral reef, or an oasis in the desert, sargassum creates a rich space for life in the middle of the ocean. It's all thanks to a simple seaweed floating along.





Sargassum Marine Life Guide

Sargassum in the sea is full of life. If you look closely while swimming near it, you might see small crabs hiding in it. It is important to animals like sea turtles, and some fish.

The closer you look, the more life you can find. Up close, you can find little shrimp and see that there are even smaller things attached to the sargassum. Parts of the sargassum are covered with different textures.

Under a microscope, it is easier to see the world of life in the sargassum. Some of these animals are like smaller versions of familiar things, like a sea anemone or a snail. Others can be strange and surprising, like tubeworms that make spiral shells. Others, like hydroids and bryozoans, might not look like animals at all.

Here are a few of the dozens of species that live in sargassum. All of them depend on this golden forest in the sea. Looking closely at just one handful of sargassum, you could probably find most of the species shown here.

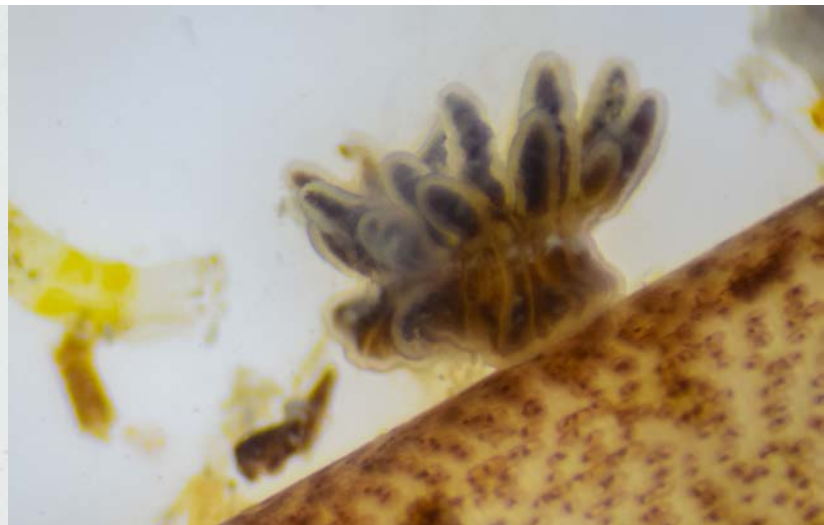
Hydroid (Class Hydrozoa)

Hydroids are animals related to jellyfish.

They have stinging cells. They can sting your skin when you swim in sargassum. A colony of hydroids attached to each other can look like a tiny feather.

Sargassum Anemone (*Anemonia sargassensis*)

Tiny sea anemones live on sargassum. This one is immature. They grow to be about 1cm wide, and have 32 tentacles.





Sargassum Acoel (*Heterochaerus sargassi*)
This incredibly small animal is only about 2mm long.



Sargassum Flatworm (*Chatziplana grubei*)
These flatworms can be up to 1cm long. They have two short tentacles, the light colored bumps on the left. The dark spots are simple eyes called ocelli.

Ragworm (Family Nereididae)
These worms have segmented bodies. Several species are common on sargassum, including *Platynereis dumerilii*.

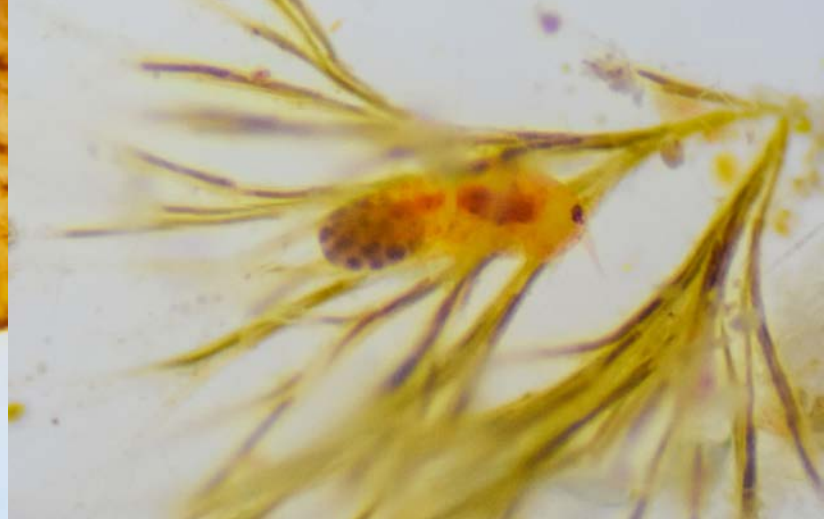
Spiral Tubeworm (*Spirorbis corrugatus*)
These worms make spiral shells the size of a grain of sand. The worm inside sticks feathery tentacles out of its shell to collect food from the water. You can find their tiny shells on almost every piece of sargassum.





Bryozoan (*Membranipora tuberculata*)

These simple animals live in colonies on the surface of the sargassum. They form a crust that looks like a white mesh. They can extend a crown of tentacles to filter food from the water.



Copepod (Subclass Copepoda)

Copepods are crustaceans, like crabs and shrimp, but much smaller. This one is less than 1mm. The head is on the right, where there is a dark eye spot. On the left is a sac of eggs. The female carries the eggs with her.

Seaweed Amphipod (Family Ampithoidae)

These tiny crustaceans are only 1-2mm long, and they spend their lives around sargassum. The mother holds the eggs and young in a pouch on her chest. The three dark spots in this picture are probably eggs.



Sargassum Shrimp (*Latreutes fucorum*)

This small shrimp is very common on sargassum. It is smaller than 2cm, about the length of a short sargassum blade.

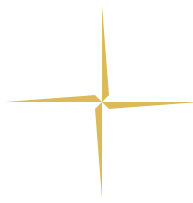




Sargassum Shrimp Bopyrid (*Probopyrinella latreuticola*)
The large round growth on this **Sargassum Shrimp** is caused by a Bopyrid, a parasitic isopod that attaches to the shrimp.



Brown Grass Shrimp (*Leander tenuicornis*)
This shrimp grows up to 5cm and has long, transparent front claws.



Sargassum Swimming Crab (*Portunus sayi*)
Immature swimming crabs can be translucent. Their internal organs can be seen through their shell. Their back legs are wide and flat, like paddles, for stronger swimming.

Sargassum Swimming Crab (*Portunus sayi*)
The carapace (shell or back) of this crab can be over 5cm wide. This photo shows an adult female carrying her eggs under her tail.





Sea Spider (Order Pantopoda)

Sea spiders are not actual spiders. But they are chelicerates, which is a larger group that includes spiders. They are usually very small. This one was less than 1cm long.



Sea Spider (Order Pantopoda)

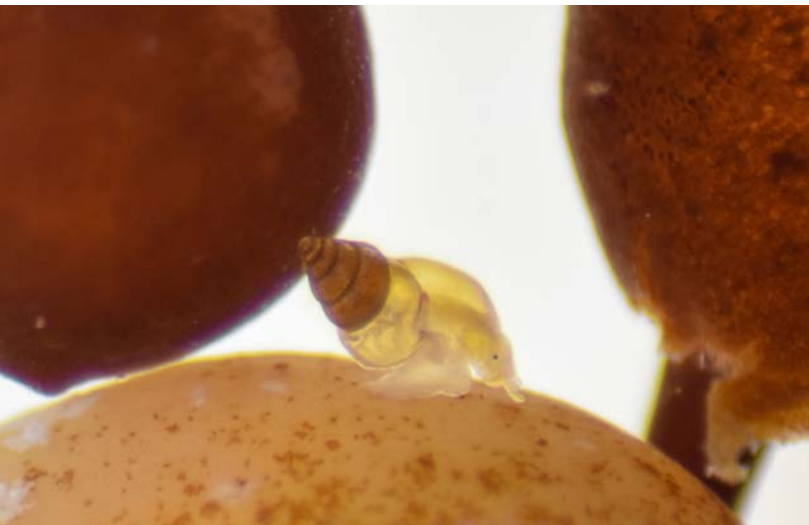
Sea spiders have long legs and very small bodies. This one has four eyes on top of its head, so it can see in every direction. Their mouth is like a straw. They stick it into a soft animal and suck out the nutrients.

Sargassum Snail (*Litiopa melanostoma*)

This tiny snail is also called the **Brown Sargassum Shell**. The immature snail below is less than 1mm long. It is walking on the surface of a sargassum ball.

Sargassum Snail (*Litiopa melanostoma*)

Even fully grown, these snails are only about half a centimeter long. They are extremely common in sargassum.





Sargassum Nudibranch (*Scyllaea pelagica*)

This mollusk can grow up to 4cm. It is almost perfectly camouflaged in sargassum. It feeds on the tiny hydroids that live on the sargassum. (Photo by Michal Mañas)

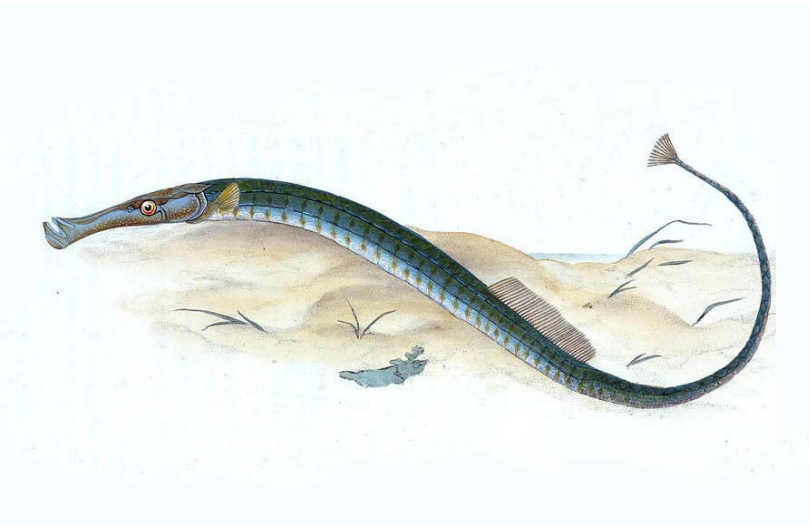


Sargassum Frogfish (*Histrio histrio*)

This small fish clings to clumps of sargassum. It is almost perfectly hidden there. It has a fleshy lump on its upper lip that it uses to lure little fish and shrimp. When they get close, it swallows them.

Sargassum Pipefish (*Syngnathus pelagicus*)

This fish lives in sargassum and eats tiny crustaceans. Pipefish are related to seahorses. Male pipefish have a pouch where they carry their eggs until they hatch. (Illustration by Edward Donovan, 1804)



Green Turtle (*Chelonias mydas*)

After hatching in the Caribbean, many of these turtles head to the Sargasso Sea. They may live in the sargassum for years while they grow. They return to the Caribbean when they are bigger.



A Wind of Change

The Sargasso Sea is a huge area in the North Atlantic Ocean. Circling currents keep most of the sargassum in the middle of the ocean. These currents don't lead to the Caribbean. The process that brought sargassum to St. Martin actually took several steps.

The first event was an unusual change in air pressure over the Atlantic Ocean. Normally, air pressure is higher in the middle of the North Atlantic, and air pressure is lower way up north by Iceland. But sometimes it switches. These switches change the strength and direction of winds over the Atlantic.

In 2010, the pressure was lower in the middle of the ocean. It was the lowest it had ever been since people started measuring it over 100 years ago. This created unusual winds that blew across the Sargasso Sea to the east, towards Africa.

Ocean currents usually keep sargassum in the Sargasso Sea. But sargassum floats right at the top of the water, so it can also be blown by the wind. The unusual winds of 2010 were enough to blow sargassum across the ocean towards Africa.

Off the coast of Africa, currents run south to the tropics. The sargassum went along with these currents. In the tropical water, the sargassum found the sunlight and nutrients it needed to grow. This sargassum was the beginning of a whole new area of sargassum. This area is now called the Great Atlantic Sargassum Belt.

The sargassum that blooms in this belt is what comes into the Caribbean now. The first time it arrived on St. Martin was in 2011. Sent by the unusual winds of 2010, the sargassum followed currents to the tropics. It bloomed and grew, and then flowed up to the Caribbean the next year. The whole cycle was set into motion by a rare change in air pressure.



Ocean currents circling the North Atlantic tend to keep sargassum in the Sargasso Sea. In this map, you can see that the Gulf Stream, North Atlantic Drift, Canary Current and North Equatorial Current form a circle around the outside of the Sargasso Sea. Usually there is little wind in the Sargasso Sea, but in 2010, there was enough wind to blow sargassum east to the Canary Current. From there, the sargassum travelled south to start a new sargassum area in tropical waters.

Caribbean Blooms

Unusual winds helped bring sargassum to the tropics, but those conditions are rare. However, sargassum is still arriving in the Caribbean almost every year, usually in the summer months. Now, there is a whole new system that's producing and moving sargassum.

Sargassum that arrives on St. Martin comes from the Great Atlantic Sargassum Belt in the tropics to the south of us. In this area, there are currents that move water, and sargassum, around in a circle between South America and Africa.

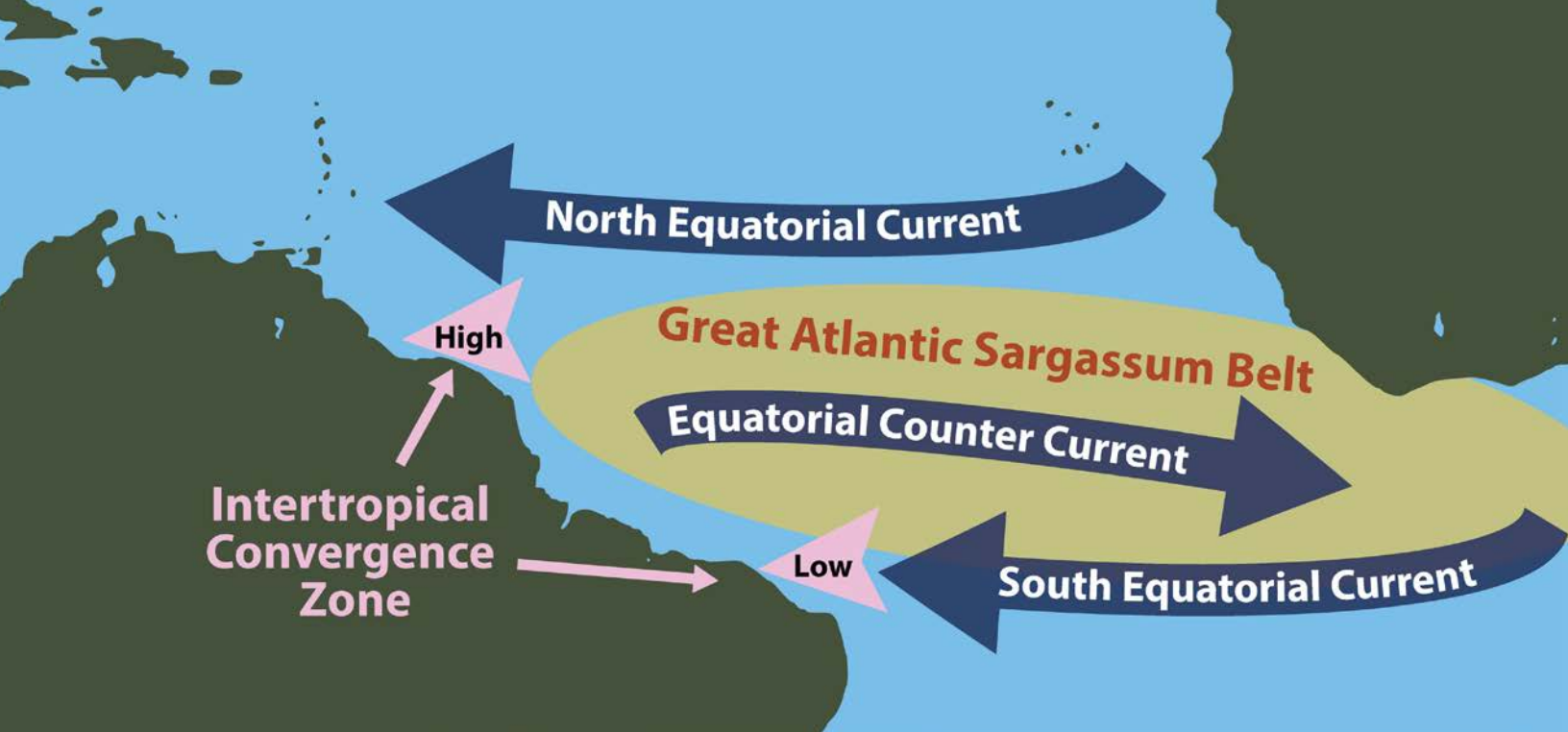
Under the right conditions, large amounts of sargassum can grow. This is called a sargassum bloom. At the ocean surface there usually aren't enough nutrients to grow big sargassum blooms. But in some times and places, there are. Nutrients are brought out to the ocean from rivers like the Amazon. Nutrients from deeper in the water can be brought to the surface by water movement. Little bits of sargassum are circling around the belt, so whenever they reach a spot with nutrients, they quickly grow into huge blooms.

There are also trade winds blowing from the east. The ones from the north blow a little bit south and the ones from the south blow a little bit north. Where they meet is called the Intertropical Convergence Zone.

In the Atlantic, this zone moves up and down around the northern part of South America. In the spring and summer, it moves up towards the Caribbean. This is when the sargassum gets pushed into currents that take it to St. Martin. During the fall, the zone moves south, which is why sargassum normally doesn't arrive in the winter.

We still don't know everything about the Great Atlantic Sargassum Belt. We know some of the sources of nutrients that help it bloom, but we don't know how important each one is. We aren't exactly sure why some years have more sargassum than others. We don't know if the amount of sargassum might grow over time.

We also don't know if it will last forever. It only began about ten years ago. Perhaps if there were a year or two of conditions that were bad for sargassum growth, the cycle would be broken and the new sargassum belt would disappear. Time, and research, will tell us more.



The new sargassum area, the Great Atlantic Sargassum Belt, is south of the Caribbean. In spring and summer, the Intertropical Convergence Zone (the place where the trade winds meet) is further north. At this time, winds push sargassum into the North Equatorial Current, which sends it to the Caribbean. In the winter, the trade winds meet further south and sargassum stops coming to the Caribbean.



Near the Shore

Out in the sea, sargassum uses energy from the sun and nutrients from the sea to grow. When a piece of sargassum gets old, it begins to fall apart. The little balls of air that keep it floating break open, and eventually the clump of sargassum will sink.

Out in the open ocean, it might sink thousands of meters to the ocean floor. Perhaps it is an important form of food for the animals that live down in those dark depths. It is very hard to study the deep sea, so we don't really know yet.

In the Caribbean, there is a wind blowing from the East most of the time. Here, sargassum blows with the wind until something stops it, like an island. When wind and waves push sargassum into the shallow water near the shore, it dies.

Dead sargassum near the shore gets broken apart by the movement of the water. It rots, and all the tiny animals living on it die and rot. The water turns brown. The process of rotting can also use up all the oxygen in the water. Fish, crabs and other animals trapped there can suffocate and die.

When the dead sargassum is broken down, its energy and nutrients are left in the sea water. As this water spreads, it is like fertilizer. It can cause other seaweeds to grow suddenly. This can be very bad.

The clear water of the Caribbean doesn't have a lot of nutrients. This is why slow-growing corals and sea grasses can live here. Fast-growing algae don't have enough nutrients to take over. But when they are fertilized by the nutrients from dead sargassum, the balance can be upset.

Powered by sargassum nutrients, algae can quickly overgrow corals and seagrasses. The algae can smother them, and cut off the light and flowing water they need to survive. The dead sargassum bits that turn the water brown also block light from reaching corals and seagrass.

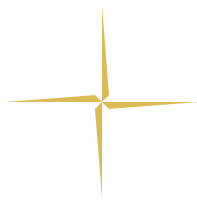
If the sargassum stops arriving, the water will become clear and the algae die down again. But it would still take years to recover from the damage already done to corals and other marine life.



In the shallow water near the shore, sargassum is rolled in the waves. It breaks, dies and begins to rot in the water.



In areas where sargassum collects, rotting seaweed colors the water brown.



Fish and other marine animals can suffocate and die in areas with large amounts of sargassum.

Nutrients from dead sargassum may cause other kinds of algae to grow rapidly. This out-of-control growth can kill reefs and sea grass, which are important for fish and other sea creatures.



Death on the Beach

The waves that bring sargassum to the shore also carry it up onto the land. In small amounts, it is not a problem. It can even be good. It can be food for animals that live on rocky shores. It can also provide nutrients for plants that live on the coast, like Beach Morning Glory. These plants help keep beaches from washing away.

When large amounts of sargassum land on a beach, that's a different story. It can cause problems for animals, plants and people. Large amounts of sargassum can make the beach less stable. As it rots, a gas called hydrogen sulfide is created. It smells like rotten eggs, and can be harmful.

Animals that depend on the beach can be hurt by sargassum, too. It can make it hard for sea turtles to dig their nests. If sargassum covers a nest, that may also make it harder for baby turtles to leave the nest when they hatch. Animals that move back and forth between the beach and the sea, like crabs, may also be disrupted by sargassum.

Coastal plants are important for beaches and sand dunes. Their roots keep the sand from being washed away by waves or blown away by the wind. Sargassum on the beach can provide nutrients to help these plants grow. But if there is too much, it can make the beach unstable. Sand becomes mixed with rotting sargassum, and the loose mixture gets washed out to sea.

Human efforts to clean sargassum from beaches can also hurt beach plants. Heavy machinery that collects sargassum from the beach also removes sand and beach plants. In some cases, the best option is to let natural processes break down the sargassum. But if it continues to arrive year after year, that might cause permanent changes to beaches and coastlines.

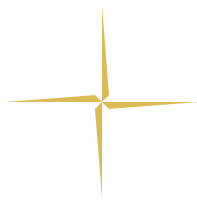




Small amounts of sargassum can be good for coastal plants. These plants help beaches hold on to their sand.

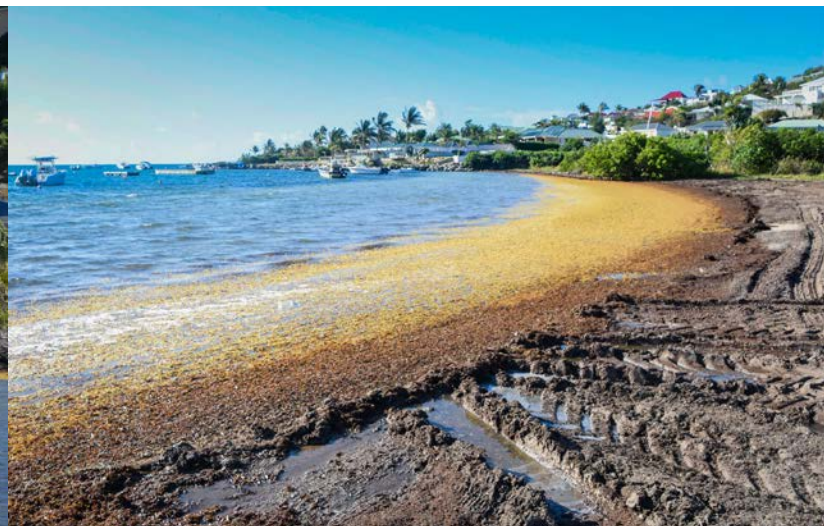


When huge amounts of sargassum arrive, it can completely cover coastlines with large piles of rotting seaweed.



At the shoreline, heavy machinery and trucks are used to collect and transport sargassum.

Even if it is done carefully, using heavy machines to remove sargassum from the beach can damage beaches. Doing this repeatedly during the season can increase the harm done.



Life on the Beach

The beach is a fun place to visit, but it isn't easy to live there. There's hot sun, strong winds and salty water. The sand isn't rich in nutrients, and it is hard to find the fresh water that most plants and animals depend on. St. Martin's clean, sandy beaches look more like a desert than a forest.

In a forest or a grassland, plants take nutrients from the soil and energy from the sun to make the food that animals depend on. Not many plants can live on a beach, so most of the food on a beach comes from seaweed and other things that wash up from the sea.

Beach wrack is the name for all the dead seaweed, plants and animals that wash up on the beach. It feeds a whole community of beach animals. Some eat the beach wrack, others eat those animals. Most of these animals are insects and other small creatures.

When large amounts of sargassum arrive, they create huge amounts of beach wrack: tons and tons of it! Hidden inside these piles of seaweed are millions of tiny animals eating it.

Near the shore where it is wet, amphipods are probably the most common. Amphipods are crustaceans, like shrimp and crabs. Many of them live in the sea, but some live on land or in the border between land and sea. If you turn over a clump of wet sargassum on the beach and hundreds of tiny animals start jumping around, these are amphipods.

Strong waves can also send sargassum further up the beach. In these areas, it dries out and there are different animals eating it. Many of these are insects like the larvae, or young, of flies and beetles.

Although most of the animals that eat sargassum on the beach are tiny, they have a huge job to do. Without them, sargassum would just pile up more and more on the beach each year. They also have another big job: feeding other animals. All of the amphipods and insects eating sargassum on the beach are prey for other animals. Spiders and tiger beetles hunt on the beach wrack. Ground lizards also hunt here. Geckos even visit the beach at night to hunt.

In every clump of sargassum on the beach, there is a tiny living world. Inside, the nutrients washed up from the sea are brought into the cycle of life on the land. An amphipod eats sargassum, a spider eats the amphipod, a lizard eats the spider, and a bird eats the lizard. When the bird poops, it fertilizes a plant that becomes food for a caterpillar, and the cycle continues.



Sargassum Beach Life Guide

From a distance, sargassum on the beach looks lifeless. But when you get closer, you can see activity in these red and brown piles of seaweed. Often a faint cloud of flies hovers above sargassum. Step onto it, and little amphipods called sand fleas jump out in every direction.

At night, beetles come out to eat the seaweed, and spiders come out to hunt. Ants roam the sargassum searching for food to bring back to their nest. Snails that were tight in their shells during the day leave trails of slime as they slide along.

Under the microscope, even more can be seen. Tiny fly larvae and mites the size of a grain of sand live in the sargassum. The closer you look, the more living things you can find.

Here are a few of the many animals that live on sargassum that has washed up on St. Martin's beaches.



Crustaceans

Many crustaceans, like shrimp and lobsters, live in the water. But there are some that live on the land, or spend some of their time on land and some in the water. Many crustaceans are also specialized to eat dead plants and animals. These animals always clean the beach by eating marine life that washes ashore. When large amounts of sargassum come to shore, they help break it down.

Sand Flea (Family Talitridae)

These tiny amphipods are very common in wet sargassum. They are adapted to eat seaweed on beaches. They do jump, but they are not related to fleas and they don't bite. They are also called **Scuds**.



Ghost Crab (*Ocypode quadrata*)

This crab is common on the beaches of St. Martin. It blends in with the color of sand, but stands out against the dark sargassum. It digs burrows in the sand so it can hide if a predator approaches.

Fiddler Crab (*Minuca* sp.)

Fiddler crabs are common around St. Martin's salt ponds. These ponds connect to the sea. Winds and currents can bring sargassum into ponds and mangrove wetlands where fiddler crabs live.



Insects

There are hundreds of different kinds of insects living on St. Martin. There might even be thousands! We haven't studied them enough to know for sure.

Many insects are adapted to eat dead plants and animals. Some are also adapted to life in salty areas near the ocean. These specialists are the ones that we find in the sargassum.



Fly (Order Diptera)

Many flies eat decaying materials. Different kinds of flies found on sargassum on St. Martin include flesh flies, dung flies and shore flies. Some flies lay eggs in the sargassum so their larvae can grow there.

Earwig (Order Dermaptera)

Earwigs are small insects with a pair of pincers at one end. Some hunt insects and other small animals, and some scavenge dead material.

Midge Larva (Family Chironomidae)

Midges are tiny flies that look like mosquitoes. Their larvae usually eat algae, and they are very common in sargassum on St. Martin.





Darkling Beetle (*Phaleria* sp.)

There are more than 20,000 kinds of darkling beetles in the world. There might be a dozen kinds or more on St. Martin. Most darkling beetles eat dead plant material and most are active at night.

Darkling Beetle (*Blapstinus* sp.)

Many darkling beetles live in deserts, so it is not surprising to see species adapted to life on the beach. Like their desert relatives, they can hide during the day and travel the sand at night in search of food.



Mudflat Tiger Beetle (*Cicindela trifasciata*)

With long legs and big, sharp jaws, these beetles race around the sargassum wrack hunting insects and other small creatures.

Bigheaded Ant (*Pheidole megacephala*)

In sargassum on the higher and drier areas of a beach, there are different animals. Land animals, like these ants, forage in the dry sargassum.



Spiders

There are dozens of kinds of spiders on St. Martin. Each has its own method for hunting insects and other small prey. On sargassum, the most commonly-seen spiders are ones that chase their prey. Wolf spiders (Family Lycosidae), prowling spiders (Family Miturgidae), and jumping spiders (Family Salticidae) all chase their prey on foot.

Spiders that build webs may also benefit from sargassum. If their webs are near sargassum, they can catch animals that eat sargassum as larvae, like flies and midges.

Jumping Spider (Family Salticidae)
Jumping spiders hunt during the day. They have big eyes. They can hunt insects like flies by slowly approaching and then jumping to catch them.



Spider (Order Araneae)
Many spiders are nighttime hunters. Prowling spiders and wolf spiders can be seen around sargassum at night.

Mite (Order Acari)
Mites are closely related to spiders. This one is a predatory mite, so it is a hunter. It is about the size of a grain of sand, so it hunts the very smallest things living in the sargassum.



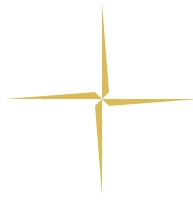
Visitors

Some animals might live their whole life in beached sargassum, like the beach flea. Others, like flies and midges, may live in the sargassum as larvae. Other animals may only spend some of the time in and around sargassum. By moving around, they bring some of the nutrients from the sargassum to other places. Here are some of those sargassum visitors.



Striped Periwinkle (*Echinolittorina* sp.)
This is another snail that feeds on sargassum in rocky coastal areas.

Beaded Periwinkle (*Cenchritis muricatus*)
This snail is a kind of sea snail that mostly lives on land. To conserve water, it spends its days sealed up and attached to rocks. At night, it visits sargassum to feed, leaving sparkling trails of dried slime.



St. Martin Ground Lizard
(*Pholidoscelis plei analifera*)
This lizard is found in many habitats. It roots through the sargassum to find sand fleas and insects to eat.



Birds and Sargassum

Wherever there's sargassum, you will probably find birds. Many different kinds of birds look for food in and near sargassum. The sargassum can help them find food in several ways.

When sargassum is floating in the water, schools of small fish hide underneath it. Birds like the Royal Tern and Brown Pelican dive into the water near sargassum patches to catch these fish.

When sargassum collects in shallow bays, long-legged birds like the Great Egret stand in the water and pick food out of the sargassum. Sargassum Swimming Crabs are probably one of the things they hunt this way.

When sargassum is on the shore, birds called shorebirds are often picking through it to find amphipods and other small animals to eat. Most of the shorebirds on St. Martin are long-distance travelers that spend the fall and winter months here, and the summers in North America.

There are even a few land birds that use sargassum. Barn Swallows are small birds that eat flying insects. When sargassum is rotting on the beach, it often has clouds of flies above it. Barn Swallows will fly just above the sargassum to catch them. The Gray Kingbird, which usually isn't near the beach, will sometimes catch flying insects by sargassum, too.





A Feast for Guests

More than twenty kinds of migratory shorebirds come to St. Martin each year. They spend their summers up in North America, sometimes as far north as the Arctic Circle. That's where they nest and raise their chicks. When it gets colder up there, they fly south. Most arrive on St. Martin between August and October.

Shorebirds usually live near beaches and ponds. They mainly eat little animals living in water, mud or sand. They often have long legs for standing in mud or water. They have long bills for digging around to find insects, crabs, snails and other foods.

After the long flight to the Caribbean, many shorebirds come to St. Martin to rest and eat. St. Martin has many shallow ponds where they can live and find food until they fly back north in the spring.

St. Martin is normally driest in the spring, and usually gets rainier over the summer. This makes the ponds healthy and full of food by the time these birds arrive. However, in recent years, summers have been very dry. Some ponds have been drying out completely and don't refill until rain comes in the fall. When the shorebirds arrive, they are empty.

Over these same years, sargassum has been arriving in the spring and summer. It piles up on the beach and is full of tiny creatures these shorebirds can eat. If the ponds are dry, these birds go to the beach to find food in the sargassum.

Migratory shorebirds have found amazing ways to live their lives. They travel thousands of kilometers north each year to find a safe place to raise their chicks. They cross seas and avoid hurricanes to travel back south. They know which places make the best stops in between. As climate change has made the summer drier in St. Martin, they have adapted again, finding food in the sargassum when the ponds are dry.





Sargassum Bird Guide

Wherever you see sargassum on St. Martin, you will probably see birds. There are more than 30 kinds of birds that hunt for food in sargassum. Many of them are birds we normally see at sea or on the beach. Others are usually found inland or on ponds. In just a few years, all of these birds have learned to use the sargassum.

In this guide, there are sixteen kinds of birds that are commonly seen around sargassum on St. Martin. Scientists are still learning which birds use sargassum and how. If you write down your observations of birds using sargassum, you can contribute to this research.

A mixed group of shorebirds forages for food on a sargassum-covered beach. In this photo, there are dowitchers, plovers, sandpipers and turnstones.



Seabirds

Some seabirds hunt for fish near sargassum in the open ocean. The sargassum attracts fish because it provides food and shelter for them. Usually this happens in places far from St. Martin, like the Sargasso Sea. Most of the seabirds that live in the open ocean are not common on St. Martin.

The Royal Tern and the Laughing Gull are birds that hunt near sargassum in the open ocean. The Brown Pelican is a bird that stays near land. It learned to fish near sargassum when the seaweed started arriving.

Royal Tern (*Thalasseus maximus*)

This tern hunts near sargassum in the open ocean and near the shore. It dives for fish around the edges of sargassum mats in the water. It catches one fish at a time in its bill, so it doesn't accidentally eat sargassum.



Brown Pelican (*Pelecanus occidentalis*)

Diving into the sea, Brown Pelicans catch fish in their giant throat pouch. They drain water from the pouch before swallowing, but they may also eat a lot of sargassum. We don't know if this is bad for them.

Laughing Gull (*Leucophaeus atricilla*)

These gulls migrate. They live here from April to October. They feed in sargassum on shore and in the water. On land, they stomp on sargassum, perhaps to expose small animals that they can eat.



Herons

Herons are birds with long legs and pointed bills. White-colored herons are often called egrets. Most herons live near water. On St. Martin, they are usually found by ponds and mangroves.

Herons are very smart and quick to adapt. When fish are trapped in a drying pond, they will gather to eat them all. If their pond dries up, they will hunt for lizards and insects.

Herons and egrets hunt in the sargassum in the water and on shore. It can be an important place for them to find food when ponds are dry.

Great Egret (*Ardea alba*)

With its very long legs, this egret often wades out to hunt for fish and crabs in the sargassum mats floating near the shore.



Snowy Egret (*Egretta thula*)

Flocks of Snowy Egrets are common around beached sargassum. They pick through fresh sargassum to find crabs and shrimp that have washed up with the seaweed.

Green Heron (*Butorides virescens*)

Normally seen around ponds or streams, the Green Heron will go to the beach to forage around sargassum.



Land Birds

Most land birds are not attracted to sargassum. For birds that eat seeds, nectar or fruits, sargassum has nothing to offer.

A few insect-eating birds can be found around sargassum. They don't spend most of their time there, but it is a reliable place to find insects.



Gray Kingbird (*Tyrannus dominicensis*)
The Gray Kingbird usually sits on a high branch, flitting off to snap up insects that fly nearby. This one, with a broken upper bill, was seen catching insects in sargassum, perhaps because it couldn't do it the normal way.

Barn Swallow (*Hirundo rustica*)
Barn Swallows fly around catching tiny insects. When there are piles of sargassum on shore, swallows fly low over them to catch the flies and midges that are there.

House Sparrow (*Passer domesticus*)
House Sparrows mostly eat seeds, but they are also very adaptable. These House Sparrows were probably eating insects or sand fleas in the sargassum.



Shorebirds

There are many kinds of shorebirds. They usually live around ponds, wetlands or beaches. They often have long legs and long bills. They eat foods like crabs, snails, fish and insects.

There are a few shorebirds that live on St. Martin all year. Many more arrive between August and October. They have flown hundreds of kilometers or more and they are hungry! When they arrive, the beaches are often covered with sargassum, and full of small animals for them to eat.

Black-necked Stilt (*Himantopus mexicanus*)
The Black-necked Stilt lives on St. Martin all year. Usually it is found on ponds, but when there is a lot of sargassum, it will go to the beach to look for food.



Killdeer (*Charadrius vociferus*)
The Killdeer lives on St. Martin year-round. It is most common on sandy areas near ponds, but it also lives on beaches.

Semipalmated Plover
(*Charadrius semipalmatus*)
This plover is a migrant. Unlike many shorebirds, it has a short bill. It picks insects and amphipods off the surface of the sargassum.





Semipalmated Sandpiper (*Calidris pusilla*)

This small sandpiper picks through sargassum on shore. It is also light enough to land on sargassum mats in the sea and hunt through them for shrimp and crabs.

Lesser Yellowlegs (*Tringa flavipes*)

This migratory shorebird is usually seen picking through sargassum on the beach.



Short-billed Dowitcher

(*Limnodromus griseus*)

The Short-billed Dowitcher has a long bill designed for probing into the mud. It can also use this bill to dip into sargassum mounds and pull out small animals to eat.

Ruddy Turnstone (*Arenaria interpres*)

This bird flips stones to find insects and other food underneath. It does something similar in sargassum. It sticks its bill in, flips a clump of sargassum over, and then eats what it has uncovered.



Living With Sargassum

Sargassum impacts people on St. Martin in many ways. Sargassum in the water or on the beach is unpleasant. It may also cause health problems. Sargassum also impacts local businesses, like tourism and fishing.

People can get skin irritation from swimming around sargassum. This isn't caused by the sargassum itself. Tiny stinging animals called hydroids live on the sargassum. Brushing against them activates their stingers.

When sargassum rots on the beach, it releases hydrogen sulfide gas. This gas smells like rotten eggs. It is also poisonous. The amount of gas in the air isn't enough to be instantly dangerous. But people living near it or working in it for weeks or months can become sick.

Exposure to hydrogen sulfide can cause symptoms like headaches, dizziness and nausea. It can also irritate the eyes, nose, throat and lungs. The effects can be bad enough to send people to the hospital. Since sargassum only arrived recently, we don't know what health problems may happen after years of exposure to this gas.

Sargassum also contains a poisonous chemical called arsenic. Small amounts of arsenic are natural in the ocean, but as sargassum grows, it absorbs large amounts of arsenic from the water. When sargassum rots along the shore, it can make mud that is full of arsenic. Some scientists are worried that this arsenic could get into the bodies of shellfish or other seafood that people eat.

Sargassum can also have a big impact on tourism. The beautiful beaches of St. Martin are very popular. Many hotels and restaurants are on or near beaches. Large amounts of sargassum turn the water brown, cover the beaches, and create a smell that no one likes. Using big machines to remove sargassum from the beach can also hurt beaches. Over time, if a lot of sand is removed with the sargassum, beaches can become smaller or disappear.

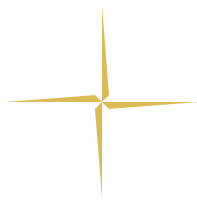
Sargassum is also bad for fishing. It can block water intakes on boats and clog propellers. It gets tangled in fishing lines and hooks, and can make it hard to pull up fish pots. When a bay fills up with sargassum, boats can be trapped on their moorings.

Over just a few years, sargassum has impacted people in many ways, both big and small. We have struggled to deal with the problems it has caused. In the future, there may be even more problems that we haven't seen yet.



Sargassum can fill up a whole bay. This can make it hard to move boats, or enjoy water sports like kayaking. Nearby homes can be overwhelmed by the rotten-egg smell of decomposing sargassum.

Dead sargassum in shallow water can cause the growth of algae and bacteria. Invisible toxins, like arsenic, may also be released.



Large amounts of sargassum make it hard for people to use the beach. It is a problem for residents who love the beach. On St. Martin, it is also an economic problem, because tourism is the primary industry.

Large amounts of rotting sargassum can stain the water a dirty brown color. Direct contact with sargassum in the water can cause skin irritation from stinging hydroids attached to the seaweed.



Can We Use It?

On St. Martin, people have found creative uses for natural materials since prehistoric times. Cabbage palm fronds were used to make brooms. Seashells were burned to make lime mortar for building. Seawater was used to make salt.

Today, many people on St. Martin and around the Caribbean are looking for ways to use sargassum. It is basically solar energy stored in seaweed, and it arrives in large amounts. It is already being collected in some areas, and using it would be better than throwing it away.

There are many possible uses for sargassum. In Mexico, Omar Vázquez Sánchez invented a way to make bricks out of sargassum for building homes. In Barbados, Dr. Legena Henry leads a team learning to make fuel from sargassum to replace gasoline. There are other projects seeking to turn sargassum into fertilizer, paper, and other products.

Although many creative projects are underway in the Caribbean, making something useful from sargassum isn't easy. One challenge is that supply isn't steady. Large amounts arrive in the summer months, but there are also long periods with no sargassum. Projects that need a steady supply might have to store sargassum to run year-round.

Sargassum can also be mixed with many things when it is collected: salt from the sea, sand from the beach, plastic trash and many other things. For some products, sargassum might need to be cleaned before it can be used.

We also have to make sure sargassum is safe to use. We know sargassum contains arsenic, which is poisonous. To use sargassum for fertilizer or livestock feed, we need to make sure that any dangerous chemicals are only present in safe levels.

Despite the challenges, Caribbean people are developing creative ways to use sargassum. In the future, sargassum might be seen as a resource instead of a problem. It could be a raw material for products that create jobs and grow local economies.



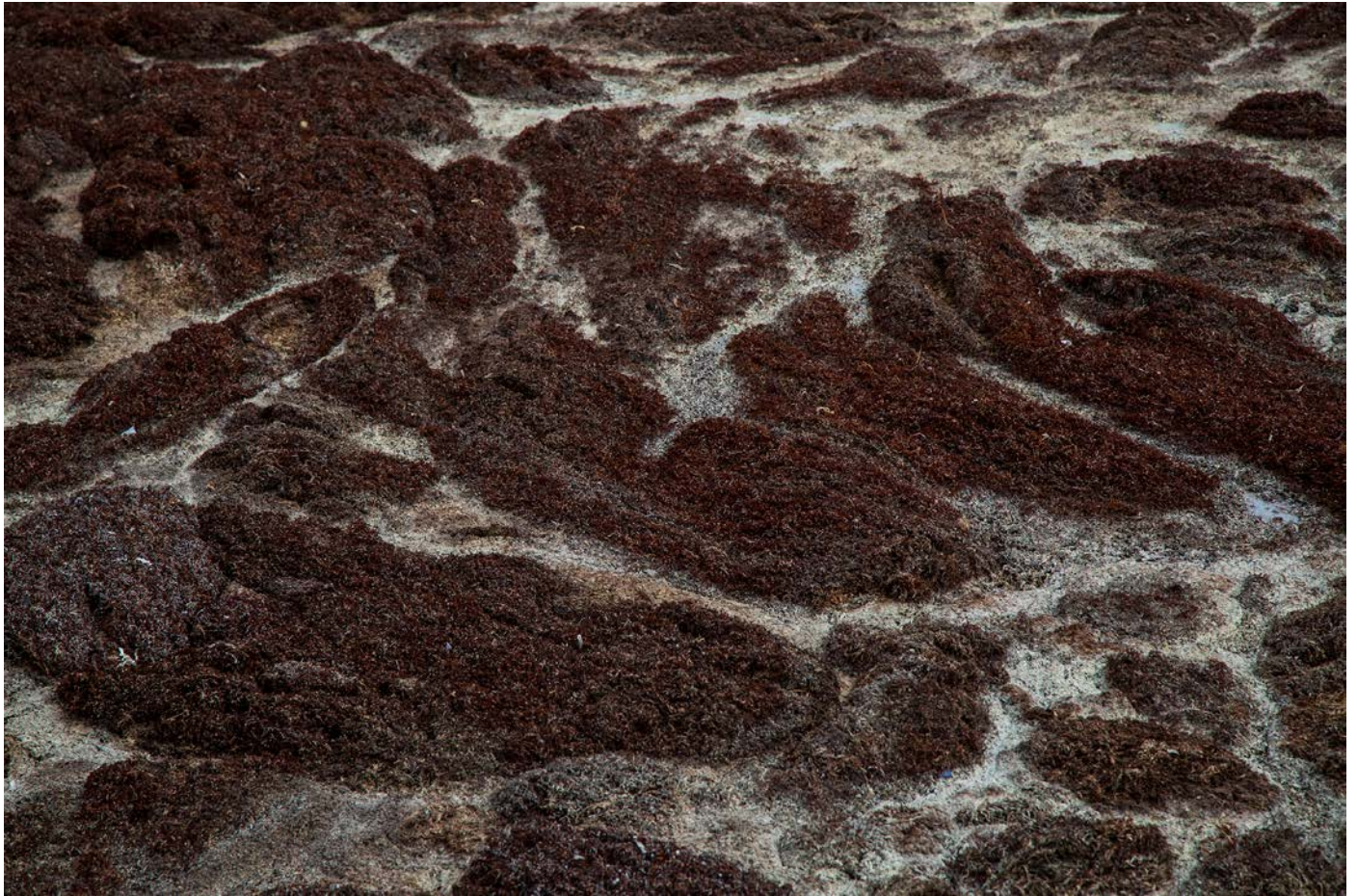
Sargassum in Art

Deborah Jack is an artist and author from St. Martin. She has created and exhibited art all over the world, including video installations, photography and paintings. Her work often features nature, especially the sea. Many of her works explore cultural memory and the effects of colonialism. In this 2022 interview, she spoke about documenting sargassum and how it inspires her creatively.

In my creative practice, I'm constantly returning to the shoreline, and that sort of space, visually and conceptually. The sargassum definitely impacts the coastline and creates this shift, a rupture in what we consider to be that space. Even in terms of people interacting there, like being able to just even stand in that place.

I've always thought of the coastline and the shoreline as sort of like a transitional or liminal space for my work. As a place of arrival and departure. I've been thinking about the storm surge erasing that line temporarily. In a way, sargassum kind of does the same thing, too. Opposed to it being an inundation of water, it is this inundation of plant life from the sea, right? This organism is there, that's also traveling. It's using currents to come to this place as well.





Above and far left: Digital photographs from an untitled project by Deborah Jack. (Used with permission of the artist.)

Left: St. Martin artist and author Deborah Jack. (Photo by Ryan Tackling)



Above and opposite: Digital photographs from an untitled project by Deborah Jack. (Used with permission of the artist.)

So, I was intrigued by it. I was thinking metaphorically along the lines of invasive species, and that colonialism is also an invasive species, if we were to think of it as an organism. In a cultural and political sense, colonialism and its lingering effects function like an invasive species. As an artist, the sargassum then can serve as a rich visual metaphor.

Colonialism and the Transatlantic Slave Trade were a form of extraction capitalism. It's one of the early forms where some folks collectively decide "Okay, we're gonna move bodies, extract them from one place and move them to the other for labor. For profit." Extrapolating on that idea, think about all these extraction practices that have affected the climate over all these years since the Industrial Revolution. The long-term effects of these practices now cause this blooming of sargassum.

So, in a way, all these things work together. It's a cycle that, for me as an artist, you can sort of build layers into and use as metaphors and as symbols in the work.

I spent a lot of time just filming and photographing the sargassum. Creating a folder of all this footage, and still images. I thought it was kind of lovely after a while. There is all this texture. It had these golden and red tones to it. A lot of times, I'll film and photograph something and not necessarily work with it right away. I'll just sit with it and come back years later and then really start to think about how I want to incorporate it into my artwork.



Beyond the visual, I really like that there's a stench to it. On some level, you can turn around and not look, but you can't avoid a smell that inundates the air around you. And it's more than a smell, it's like a fume. I had a mask on and a bandana, and it was still coming through it. My eyes are burning and I was like, this is intense, you know? I like the fact that it takes over all your senses. Even your eyes start to tear up.

Sargassum's Future

What is the future of sargassum in the Caribbean? We asked Dr. Franziska Elmer, a marine scientist and educator. She's one of the hosts of *The Sargassum Podcast*, where she has interviewed dozens of experts and innovators about all aspects of sargassum.

What products can we make that would use a lot of sargassum?

I think making fertilizers and biostimulants can use quite a lot. Also plastics, because there are many plastics that we need to find substitutes for. And biofuels, if you can find a good way to do it, like they are working on in Barbados. Incorporating sargassum into concrete is also one of the things that could use a lot.

What obstacles keep us from using most of the sargassum?

It's kind of difficult in the Caribbean islands. First of all, you need to have a market for your product. If you are making something at a big scale, is there a local market, or do you have to ship it off? Also, for many purposes you need fresh sargassum, and you only have a few hours to get that fresh sargassum when it's on the beach.

Also, it's not something that comes every day. You don't know in advance when the harvesting season will be. And each year is different. So you have to have a flexible business that can react to sargassum when it is there, and be dormant or work on other things when it isn't.

Do you think there are long-term impacts that we haven't seen yet?

I was talking to Dr. Brigitta Ine van Tussenbroek, a researcher working on seagrasses in Mexico for many years. She said before sargassum came here, the sand was hard sand. It was really stable and stuck together. Then the sargassum brown tide came in. Now, for several months in the summer, we have brown water and the sargassum mixes into the sand. And she says the entire sand has changed. You can now put your hand right into the sand, it's softer.





You can see it as well in the water. The sand is being brought up in the waves, so you don't have that crystal clear Caribbean water anymore. And it's all year round, even when we don't have sargassum.

We are losing seagrass beds. People see mangroves dying. Sargassum gets into the mangrove roots, and then juvenile fish, little baby fish, can't use that ecosystem. And then mangroves may die from having sargassum there the whole time.

Are you surprised at how much we've learned in the last ten years, or how little?

I think it is amazing what we have learned, and how many new products we've come up with to use sargassum. We figured out how the sargassum went from the Sargasso Sea to down here. We've made advances to how we can see it with satellites. But at the same time, you feel like ten years is a long time, why don't we have a sargassum industry already?

What is one thing you would really like to learn about sargassum?

I would want to learn how nutrients impact sargassum growth. We don't really know what makes it grow faster. Knowing that would tell us how plumes of nutrients from rivers affect sargassum. But also, if you wanted to grow it, what would you have to feed it? One of the things you need for big industry is having a way to grow it in years where you don't have much of it.

What do you think sargassum will be like in the Caribbean in 25 years?

I think we're going to have what we have now, or even more. I think it's still getting stronger. But I hope by then we are actually using most of it. That's my hope, because it can be a whole new pillar of the economy in the Caribbean. Like the salt industry or conch industry used to be really big, it's time for a sargassum industry to rise up. And that's the main reason behind doing the podcast, to share information between people on different islands. And to inspire people to start their own business or start experimenting with sargassum.

About This Book

This book was made by Les Fruits de Mer. Les Fruits de Mer is a non-profit association based in St. Martin. Their core mission is to collect and share knowledge about local nature and heritage. They carry out this mission through books and other publications, their free museum, short films and oral histories, events and other projects. Discover more and download free resources at lesfruitsdemer.com.

Amuseum Naturalis is a free museum of the nature and heritage of St. Martin and the Caribbean, created by Les Fruits de Mer. It is located at the historic Old House in French Quarter on the hill above Coconut Grove. For the latest information, visit amuseumnaturalis.com.

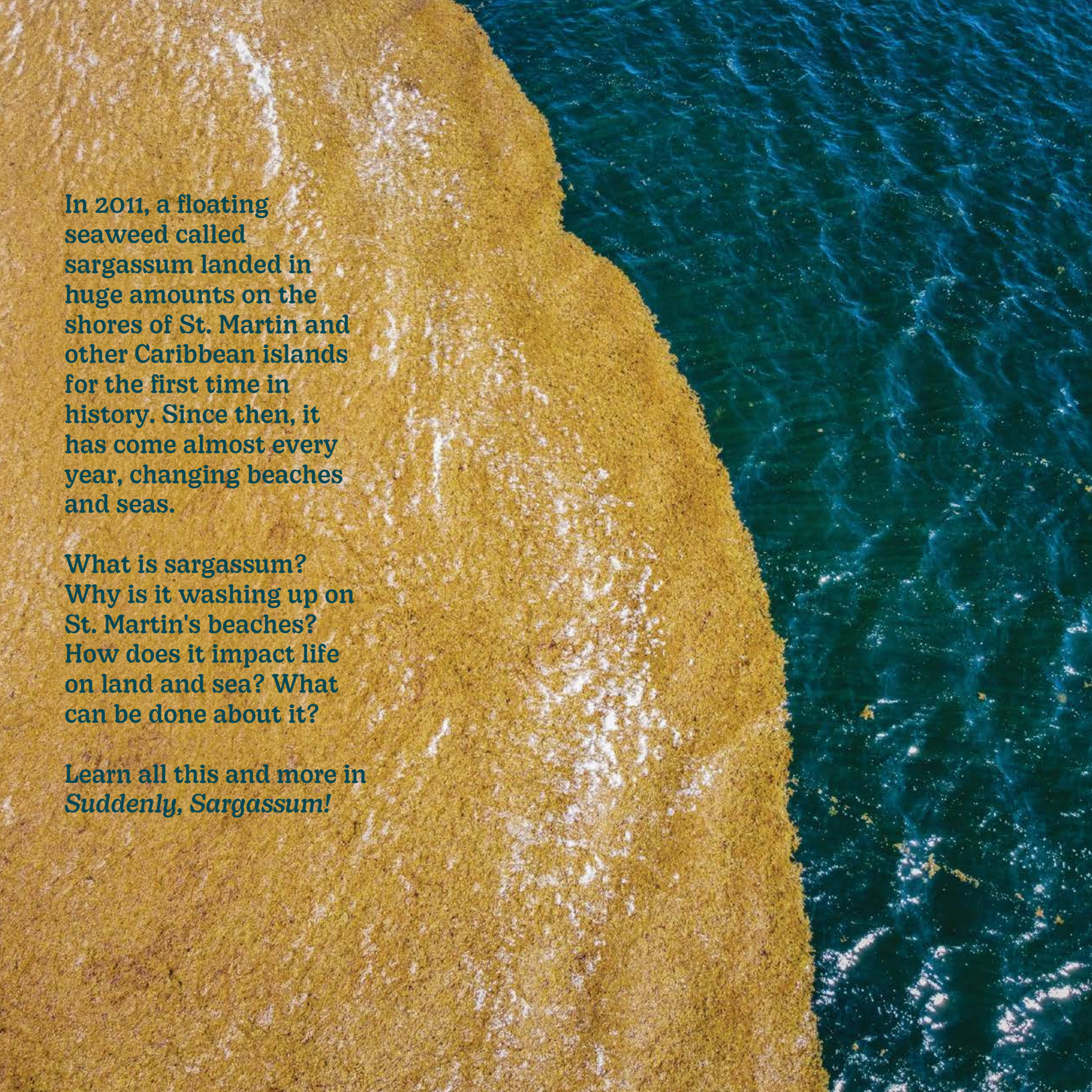
Mark Yokoyama has photographed and written about nature on St. Martin since 2009.

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Special thanks to *The Sargassum Podcast*, and all the hosts and guests who shared their knowledge and perspectives about sargassum. For anyone interested in learning more about sargassum, it is the perfect place to start. Thanks to Te Me Um and the Office of Biodiversity of France for assistance with the French translation of this book.







In 2011, a floating seaweed called sargassum landed in huge amounts on the shores of St. Martin and other Caribbean islands for the first time in history. Since then, it has come almost every year, changing beaches and seas.

What is sargassum?
Why is it washing up on St. Martin's beaches?
How does it impact life on land and sea? What can be done about it?

Learn all this and more in *Suddenly, Sargassum!*