



CREATION OF GREEN BRIGADES FOR COLLECTING SARGASSUM IN GUADELOUPE

DEAL GUADELOUPE

Departement of Environnement, Land Planning and Housing

In accordance with the action plan to fight against sargassum in the Caribbean, which had been announced by the Ministry of Ecology, Sustainable Development and Energy, the Government services in Guadeloupe signed a mobilization and solidarity protocol with the local collectivities, in order to face the massive influx of sargassum on the coastal line. Such protocol, among other actions, provides for the creation of green brigades, in charge of collecting the seaweeds, and the training of such brigades, by the Government services, for preserving the environment during the collection.

This document is a training tool of the brigades by DEAL. It does not deal with the preservation aspect of the milieu and species. The training of the brigades on the sanitary aspect is provided by the Regional Health Agency.

What is sargassum?

Sargassum is a brown seaweed of tropical waters, which may be benthic (fixed on the bottom) or pelagic (floating on the surface due to the small floats)

Those which make floating rafts can be observed in the Caribbean waters are pelagic sargassum which belongs to two species: *Sargassum fluitans* and *Sargassum natans*.

They multiply by fragmentation, that is a part of the mother algae, breaks off to make a new alga.



Sargassum gave the name to “Sargasso Sea” name given to the zone situated off the East coasts of the United States where they accumulate on various hundreds of thousands of square kilometers, due to the presence of a North Atlantic subtropical circular current (or Gyre). Piles of seaweed are carried, on a regular basis, by the current systems around, and scattered all over the Atlantic Ocean.



What is the ecologic role of sargassum in normal conditions?

The sargassum rafts are the shelter of a community of marine organisms composed of hundreds of species, including invertebrates, fishes, marine turtles...which live there temporarily or permanently.

Some of them come to look for their food; others use it as a shelter. It is the case for example of young marine turtles which very rapidly reach the high sea after their birth and often take refuge in the sargassum banks to escape their predators.

Some species are quite adapted to the life in the sargassum rafts and even developed mimicry. It is the case of sargassum fish *Histrio historio*.

On the left: a sargassum raft, sheltering fishes.



*Below the sargassum fish *Histrio historio**



Sargassum also has an ecologic role after their washing ashore phase. They form water mark, such accumulations of various debris (algae, wood, shells...) which offer a shelter and food to a multitude of small organisms, and for crabs and birds.

Then their natural degradation contributes to the increase of coastal vegetation. The presence of sargassum along the beaches consolidates sand dunes, thus contributing to limit the coastal erosion.

How can we explain the massive influx observed since 2011?

Small sargassum rafts, a few square meters large, have always been observed in the Caribbean waters and their arrivals on the beaches, were unnoticed. But since 2011, unusual large amounts of sargassum wash ashore on the coast of Guadeloupe, as all over the Caribbean area.

In 2011, the first assumption to explain such phenomenon, which was not tested, was that of a modification of current patterns within the Sargasso Sea which caused an unusual carrying of sargassum into our waters.

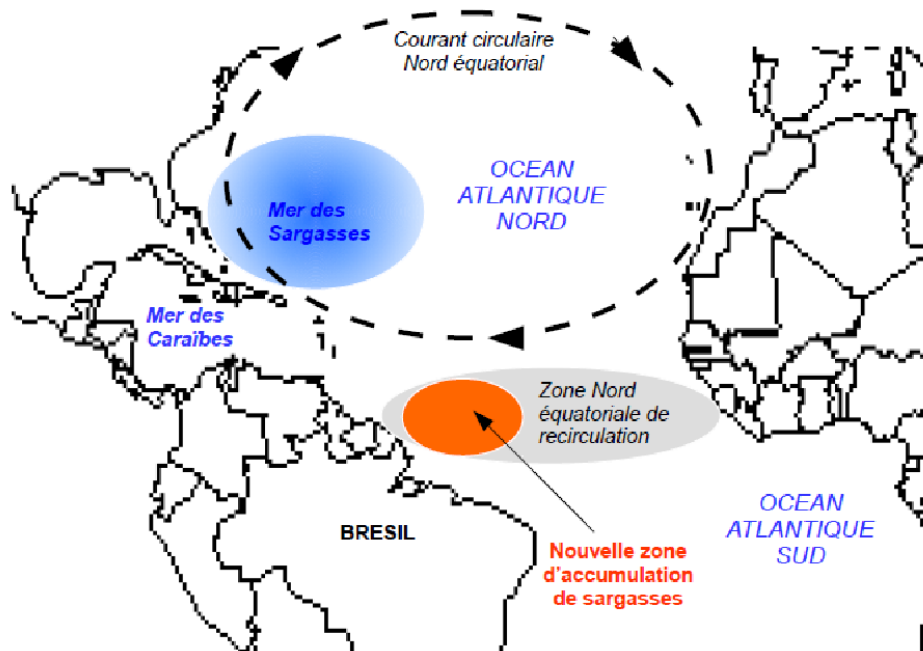
Today scientists have analyzed the ocean-meteorological conditions and report the movements of the sargassum rafts with satellite images.

They deduct that sargassum which caused the massive influx on the beaches and coasts since 2011 originate from a zone situated in the North -East of Brazil, which corresponds to a new zone of production and piling up of sargassum.

The equatorial north circular current then carries such sargassum toward the Caribbean islands.

Actually the conditions are favorable for the development of algae: waters are warm and rich in nutrients from the Congo river (in Africa) from Amazon and deep cold waters upwellings (equatorial upwellings).

The trigger element is still unknown, but one of the factors maybe the climate change .



Representation of the new zone of accumulation of sargassum (according to the works of Johnson and al.2012.)

What are the ecological consequences of such massive arrival?

When they reach such important amounts, the arrival of the sargassum have adverse effects on the marine fauna and flora.

When they wash ashore or pile up along the beach, seaweeds start decomposing.

Such decomposition alters the quality of water in the area affected, which namely diminishes the quantity of oxygen in the water. This may cause the death of fishes and of various invertebrates (crabs, shells...).

The presence of accumulated algae in the shallow waters makes a screen which prevents light from crossing the surface.

Thus, the corals and marine seaweed beds which both need to develop are threatened and also are the organisms which live there.

Most impacted animals by such sargassum influx are certainly marine turtles. Such protected species are impacted by sargassum at the sea and on the beaches where they lay their eggs.

Offshore, the young turtles finding a refuge in the sargassum banks can be trapped when the banks are piling in the bays, ports, marinas or when they arrive on the coasts. The accumulations of sargassum along the beaches make an impenetrable barrier for the newly born, who must go back to the sea. they can also disturb some adult females who want to reach the beach to lay their eggs. When such accumulations of sargassum extend to the laying zone of the turtles, they can be an obstacle for the newly born coming out of the nests.

The Solution: to collect the seaweeds.

Such beaching have disastrous ecological consequences, which were presented above but also economic (tourism and fishing) and sanitary. The sanitary impact is related to the fact that sargassum decomposition in some conditions (absence of oxygen) provokes gas emissions potentially dangerous for health (hydrogen sulfur). It is then necessary to clean the sites where beaching have been observed, in order to limit the degradation and gas emission associated, as well as the accumulation of the seaweeds at sea. Nevertheless the cleaning itself can have a negative impact on the environment, mainly when it is done with mechanical equipment.

Actually, if the machines are not adapted, they may remove large volumes of sand together with the sargassum and thus favor the erosion of beaches, which contributes to a larger exposition of the coastline to the effects of swell. Besides, the cleaning can also alter some morphological characteristics of the beaches (removal of sand, compression of sand, destruction of the vegetation ...) making them potentially less favorable to host the marine turtles when they need to lay their eggs. It is thus essential to be respectful of some recommendations when removing the seaweeds in order to have less impact on the environment.

How to conduct the removal of sargassum?

1 -When should they be collected ?

The seaweed must be picked up as soon as possible, after each arrival. This allows to avoid the accumulation of algae in the water and on the beaches, which is problematic from a point of view of environment and also to avoid reaching a phase of decomposition which can lead to a problematic situation from a sanitary point of view.

2-How should they be collected?

At sea, in closed bays, in ports and marinas.

There are vessels designed to pick up the seaweeds at sea, suitable only to calm zones (lagoons, ports, bottom of bay). In addition, tests allowed to show that it is possible to remove the seaweeds with reinforced fishing nets, toed by light boats or by hand when located in very shallow waters. In such a case it is advised to wear protections (boots or fishing waders). The seaweeds themselves do not present any danger by contact in the water, but they are a shelter for many marine species some of them being irritant.

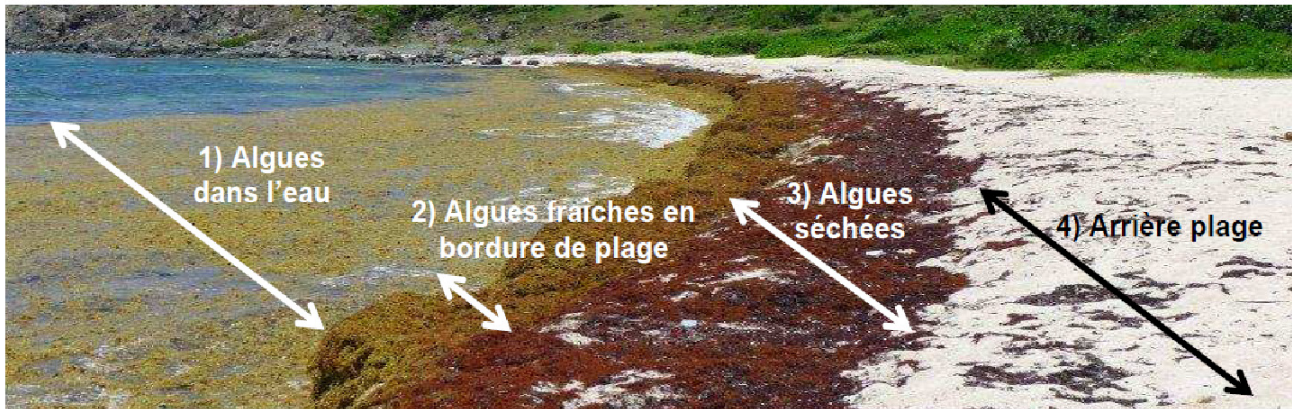
A visual control of the collected sargassum must be made, in order to evacuate the young trapped turtles and put them back into their natural environment.

Ashore

On the beaches, the seaweeds arrive and form a thick heap along the beach (2) (on the image bellow) which prevents the rising of piles of seaweeds in the water (1). Such Algae when they are fresh, that is when they just reached the shore, are light brown. Further on the beach (3), having no contact with water and aerated, dry rapidly and take a darker color.

Pick up the seaweeds along the beaches, by hand or by a mechanical device (when necessary). Such removal free the edge of the beach, thus allowing the progressive rise of the seaweed which had been blocked in the water.

Sargassum mats washed on a beach



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.Manual cleanup

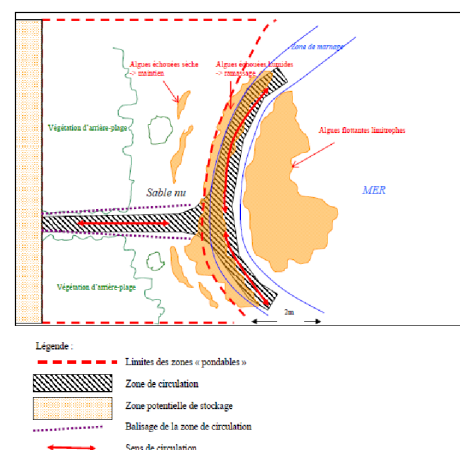
Should be preferred. It can be done on the sand beaches as well as on rocky coasts, as the case may be , pebble beaches , beach-rocks beaches, or for some spots with limited access.

Use forks or rakes in order to avoid removing the sand.
Avoid trampling the vegetation when picking up and carrying the sand .

Mapping the principles to pick up and store sargassum on a laying spot.

Extracted from the technic note of ONCFS and RTMG of 2012

Schématisation des principes concernant le ramassage et le stockage des sargasses sur un site de pointe



. Mechanized cleaning

(text and patterns drawn and modified from the notes of recommendations, produced by ONCFS and Guadeloupe Marine Turtle network, 2012 and 2015 versions) .

When only manual picking up is not possible, mechanized collection should be conducted. In case of mechanized collection, the major challenge is the preservation of marine turtle nests and of the morphology of the beach (keep the sand on the site, preservation of vegetation). Favor machines with a low bearing capacity and reduce it, namely by a lesser inflation of the tires or by the twining of the tires. Prefer engines with a claw or a harrow to pick up the less possible sand.

Avoid machines equipped with a bucket. Define a circulation plan on the beach, reducing the circulation on possibly laying spots of the turtles (see the scheme below). Reduce maneuvering to limit ruts on the beach.

Limit access to the seashore to a single transversal lane.

Mark out the circulation zone.

Limit of “maybe laying” zone

traffic zone

possible storage zone

marking up the traffic zone direction of traffic

3- What to do with the algae which have been picked up?

Hydrogen sulfur is produced only if the decomposition is made under anaerobic conditions (without oxygen). The mere fact that the algae are spread in thin layers allows for “aerating” them and thus avoid emission of hydrogen sulfur.

After picking up the seaweeds, evacuate them to a site for upgrading, if planned.

Otherwise just spread them for drying. They must be spread in thin layers (10 cm).

The spreading zone must be established on a case by case basis in agreement with ONCFS in light of the challenges related to the marine turtles.

In any case, algae must not be dropped on the vegetation of the shoreline.

Do not burry the sargassum.

SOURCES

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