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# PROJECT MSSRCE Le Gosier

This project concerns the Management of Sargassum Strandings and the Reduction of Coastal Erosion in the city of Gosier (Guadeloupe, FRANCE), on two frequently impacted sites, namely the beaches of Salines and Anse Dumont, sites belonging to the Conservatory of the Coastline and Lake Shores and managed by the city. The latter wishes to make an inventory of research on the relationship between sargassum strandings and coastline evolution, in order to answer the following question: Does not collecting the algae have a beneficial effect on the retreat of the coastline? The health impact isn't the subject of the study.

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\*\* SASU Antilles drone

PHOTO 1 : POSTCARD OF THE SALINES BEACH DATED FROM THE BEGGINING OF THE 20TH CENTURY



By Guadeloupe Departmental Archives

## INTRODUCTION

Seaweed on the coasts of Guadeloupe seemed to be present already at the beginning of the century (Photo 1), but since 2011, Guadeloupe has experienced a massive arrival of Sargassum seaweed (Photo 2). The response to these recent arrivals has been the systematic collection of seaweed on the beaches of Gosier until 2017. Empirically, the municipality noted a retreat of the coastline until 2017 but, since the cessation of collection, it has noted an advance of about ten meters of the coastline on the beaches of Salines, a sandy beach with a longitudinal profile exposed to a predominantly easterly swell, and Anse Dumont, a beach exposed to the southeast. Experiments have shown a link between Sargassum stranding and coastal erosion control (Innocenti et al., 2018; Roano et al., 2022). The Geomatik Karaïb consultancy in partnership with students of the Master Diagnostic Territorial et Gestion des Espaces Insulaires (University of the West Indies) propose to study the phenomenon.

PHOTO 2 : AERIAL VIEW BY DRONE OF THE SALINES BEACH ON AUGUST 11TH 2021



By Drone Karaïb

## OBJECTIVES

(i) To propose a state of the art on the relationship between sargassum and coastline evolution (ii) To measure the impact of the presence of sargassum on the evolution of the coastline on the two sites (iii) To measure the impact of the collection between 2010 and 2017 and the cessation of the collection from 2017 (iv) To compare to other sites in the Caribbean

## METHODS

Using a Geographic Information System, we traced the coastline limits from IGN orthophotos of 2017 and drone images of 2023 and superimposed on CEREMA data relating to the coastline limit in 1950 and 2010. We measured the retreats and advances of the limits according to the dates and according to the zones.

## RESULTS

The two maps below show the evolution of the coastline from 1950 to 2023, with a focus on the years 1950, 2010, 2017 and 2023.

and 2023.

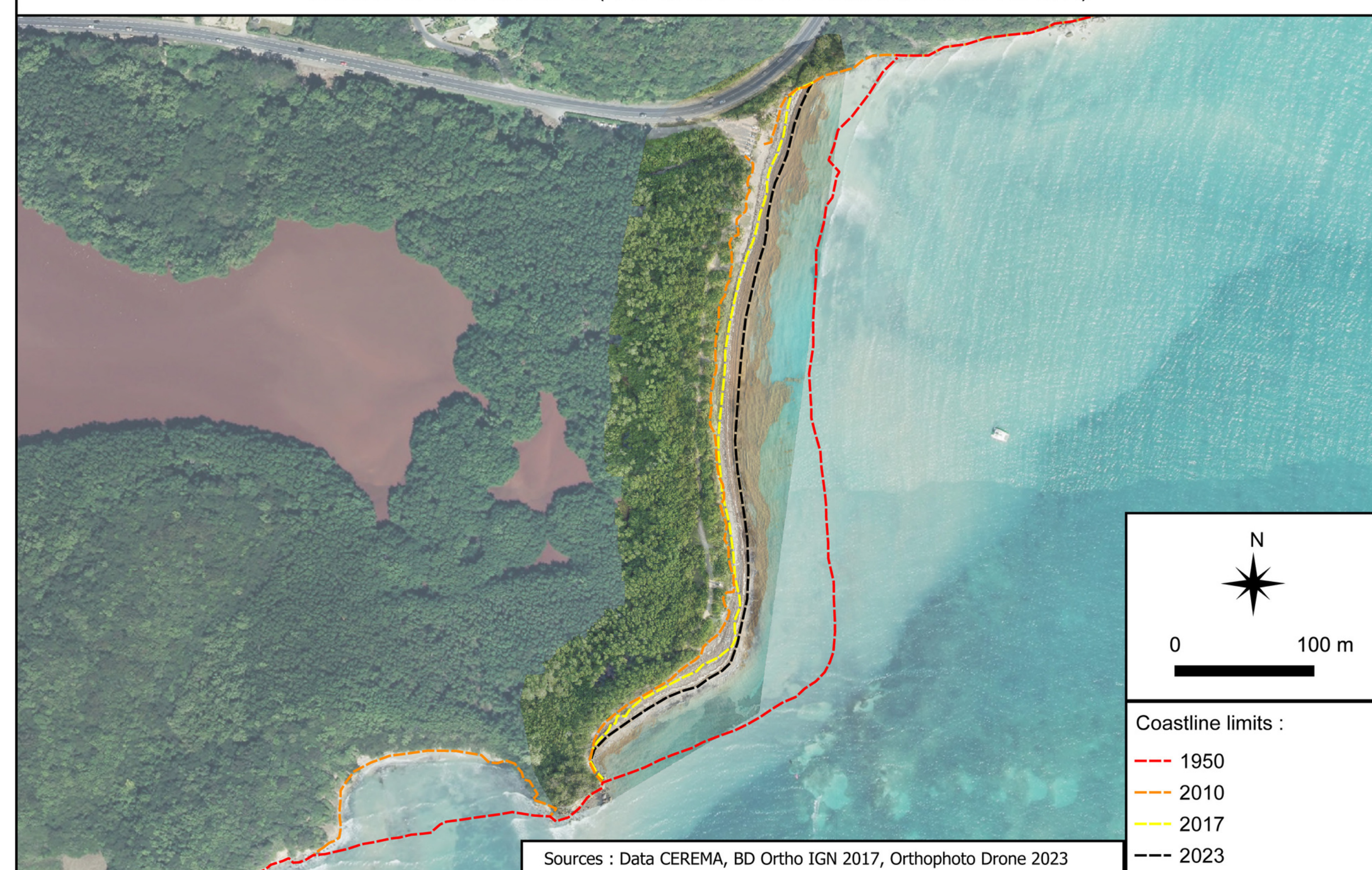
Between 1950 and 2010, the two beaches have undergone a strong coastal erosion by losing about 80 meters (CEREMA) before the massive arrival of sargassum algae on the Guadeloupean coast. Since 2010, the two beaches have experienced different sediment dynamics. The coastline of Les Salines has experienced an average advance between 0 to 30 m depending on the area. The coastline at Anse Dumont has experienced a retreat in the east (about 5 m), an advance in the center (about 10 m) and a stabilization in the west.

## ANALYSIS

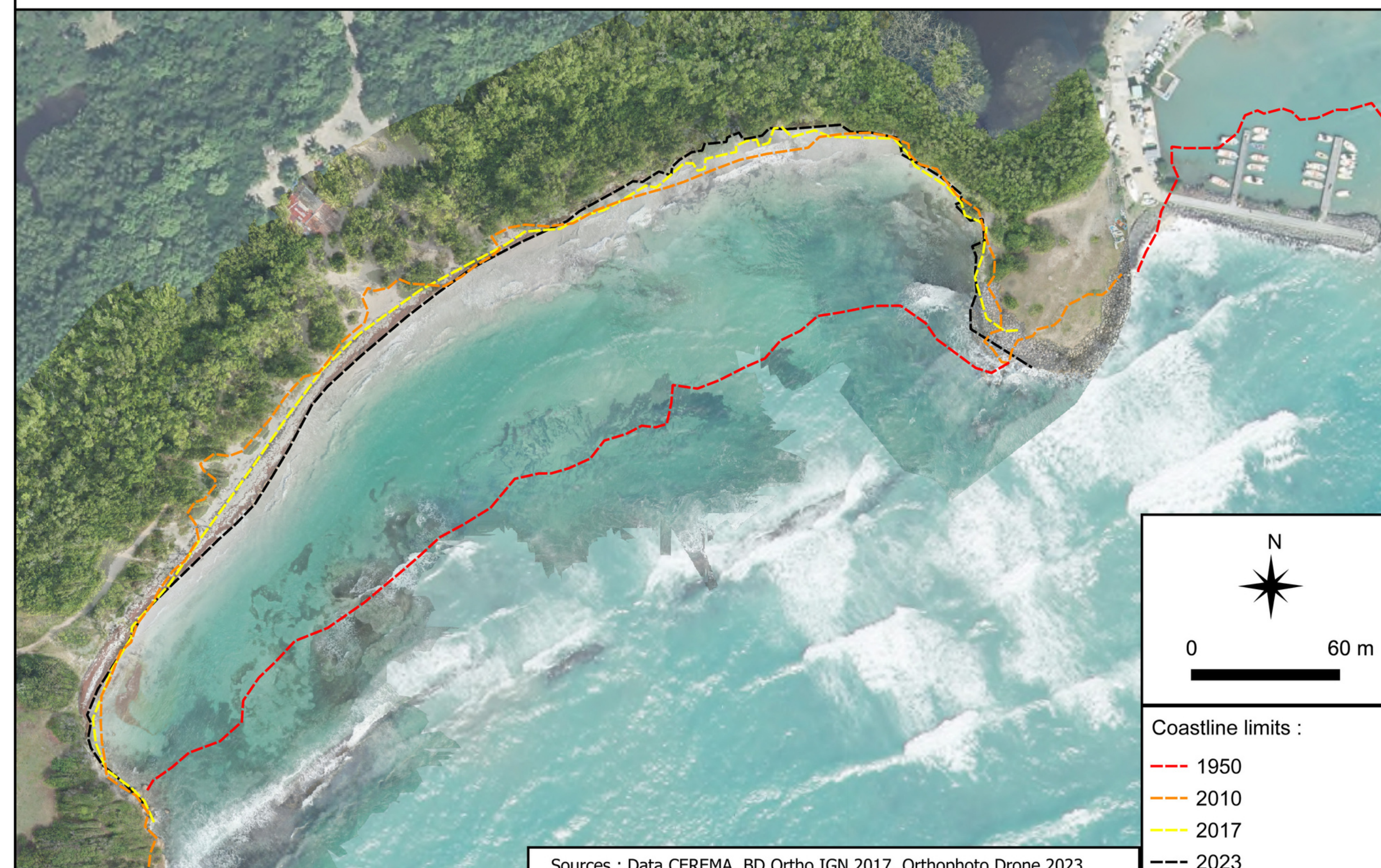
An empirical study was conducted on the implementation of "sargassum dikes" in Martinique (France-Antilles Martinique, 2022) to assist in sand accumulation. A report does confirm the link between mass stranding and coastal erosion mitigation in Martinique (DEAL, 2019).

We note: (i) Before 2011 (beginning of massive arrivals of Sargassum): the coastline retreats on both sites. (ii) At Les Salines, between 2011 and 2017 (period of systematic manual collection of seaweed): the coastline advances and between 2017 and 2023 (period of cessation of collection): the coastline continues to advance. The Salines are exposed and experience a homogeneous stranding throughout the site. (iii) The situation is more complex at Anse Dumont beach, which has undergone harbor development in 2008 and additional riprap between the harbor and the beach in 2019. These anthropizations have potentially modified the hydrodynamics of the area and therefore the evolution of the coastline. Moreover, exposure to Sargassum is not homogeneous, Sargassum washes up in the center of the beach, due to the presence of the coral cay and anthropogenic and natural riprap, and much less at the ends.

EVOLUTION OF COASTLINE FROM 1950 TO 2023  
BEACH OF LES SALINES (LES SALINES, LE GOSIER, GUADELOUPE)



EVOLUTION OF COASTLINE FROM 1950 TO 2023  
BEACH OF L'ANSE DUMONT (SAINT-FÉLIX, LE GOSIER, GUADELOUPE)



## CONCLUSIONS

According to the results of our study, before the arrival of the Sargassum, the coastline was retreating at both sites. Since the arrival of the Sargassum (without and with manual collection), the coastline is advancing steadily on the beach of Salines. The situation is more disturbed on the beach of Anse Dumont. The presence of sargassum would help control coastal erosion, but it is not clear whether collection would increase or decrease coastal erosion. As the orthophotos are not at the same resolution (low resolution for the IGN and high resolution for the drones), the measurements cannot be precise because they do not use the same geographical references.

## PERSPECTIVES

To establish a relationship between the evolution of the coastline and sargassum, it would be necessary to carry out, at

least, two orthophotos by drone, either one before the arrival of the sargassum algae (January) and one after their departure (June). It would be necessary, for example, to compare the city of Gosier, which carried out a manual collection, with the city of Sainte-Anne, which carried out a collection with a mechanical shovel (ADEME, 2021), or even extend the comparative study to several sites throughout Guadeloupe. After completing this study with finer data and more periodic aerial drone photography, it remains that sargassum, whether left on beaches or collected and stored, emits two toxic gases, hydrogen sulfide and ammonia during its natural fermentation, which can last from several days to several weeks. However, the results of in situ measurements do not reveal that the thresholds are exceeded (Source: Gwadair). A study of the impact on users and local residents should be carried out in addition.

## LITERATURE REFERENCES

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