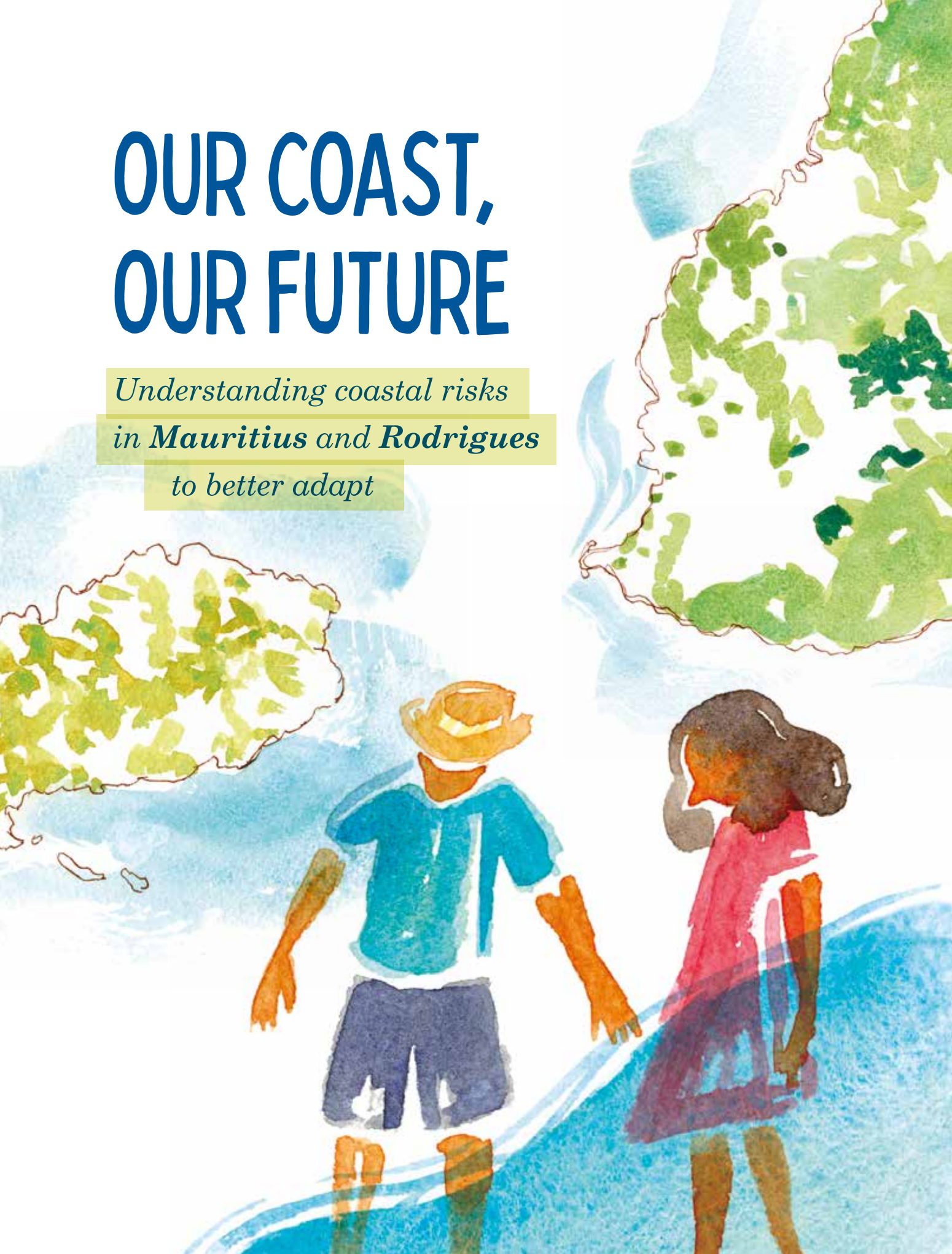
OUR COAST, OUR FUTURE

*Understanding coastal risks in **Mauritius** and **Rodrigues** to better adapt*





This document was printed
on paper sourced from sustainably managed forests.

Publication date: **September 2026**

Publication management: **BRGM**
Editorial coordination: **Pauline Boyer**
Graphic design: **Vincent Falgueyret**
Watercolour illustrations: **Delphine Garcia**
Printing: **TPS Printing** – Boundary Road, Rose-Hill, Mauritius

Authors: **Audrey Baills, Cécile Capderrey, Franck Desmazes, Pauline Douillac, Andrea Gilberto Filippini, Rodrigo Pedreros, Jérémy Rohmer, Rémi Thieblemont** (BRGM)
Nathalie Bernardie-Tahir (University of Limoges – Géolab),
Farrah Jahangeer, Divakar Moodhoo (CEDTI)

Translation into Creole and English: **Farrah Jahangeer, Divakar Moodhoo** (CEDTI)

Acknowledgements: we thank all contributors from the partner organisations, especially **Manuel Garcin**.



In Mauritius and Rodrigues, our coasts and beaches are our true treasures. We love spending time there with our families on weekends, gathering for events, listening to music, fishing, and enjoying the lagoon. But over the past 50 years, our coastline has changed.

How is that?

We built houses, hotels, and shopping centres; urbanisation expanded, and natural spaces have been reduced…

It's true that there are many activities today. But is that a problem?

Yes, because these areas are threatened by cyclones or erosion. With so many buildings along the coasts here, the risks are high. We have become more vulnerable.

And climate change is only making things worse…



COASTAL ACTIVITIES ON THE FRONT LINE



330
15
Number of beds
Public beaches
Sugar cane plantation
Tea plantation

MAURITIUS

638 inhabitants/km²
322 km shoreline
150 km of coral reef
221 km² of conserved sites

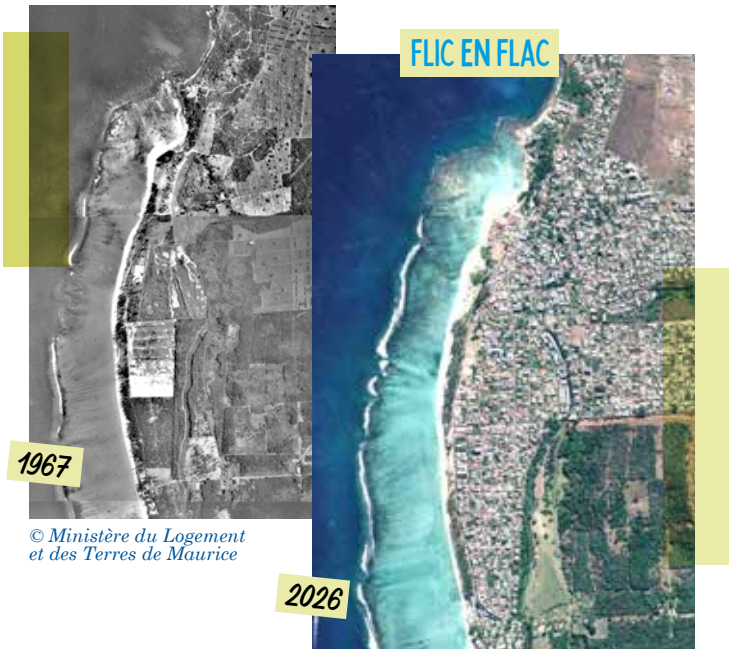
77 % of the 113 hotels are located directly next to the beaches

26 % of the population live in the 51 coastal Village Council Areas

Today, our coastline is defined by two zones that guide how coastal areas can be developed.

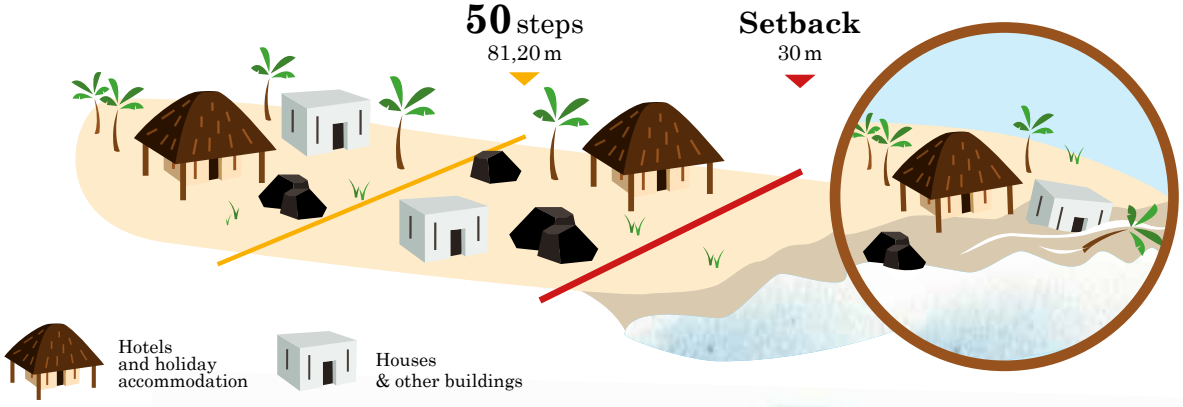
The 30-meter regulatory **setback** is a no-construction zone.

The '50 geometric steps' zone' is a coastal strip 81.20 meter-wide coastal strip that forms part of the public maritime domain. Constructions may be authorised there, provided they respect the 30 m no-build zone.



© *Ministère du Logement et des Terres de Maurice*

© *Airbus*



RODRIGUES

404 inhabitants/km²

80 km shoreline

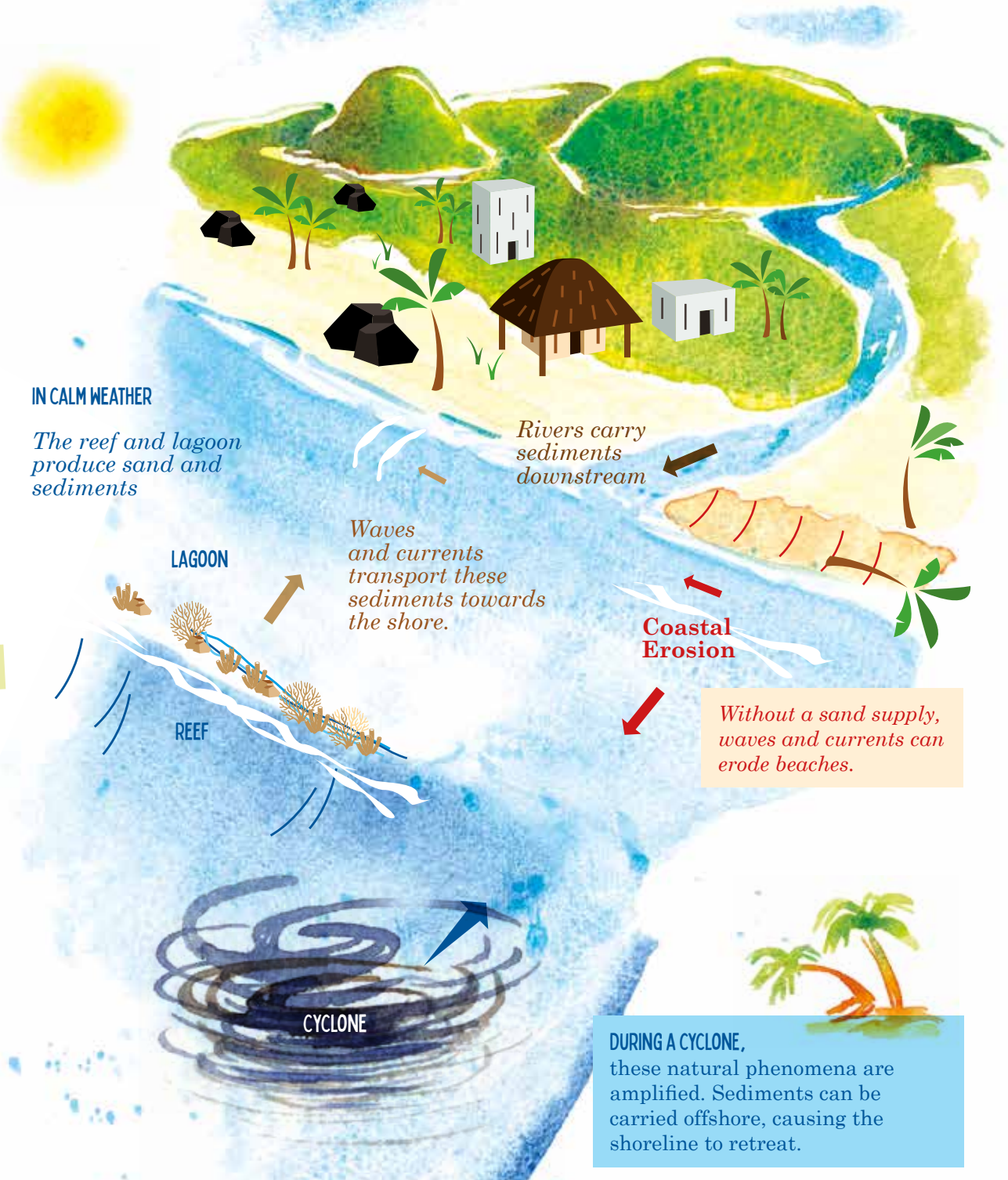
69 % of all hotel rooms are located within two coastal zones (North and East).

240 km² of lagoon



UNDERSTANDING COASTAL EROSION & FLOODING

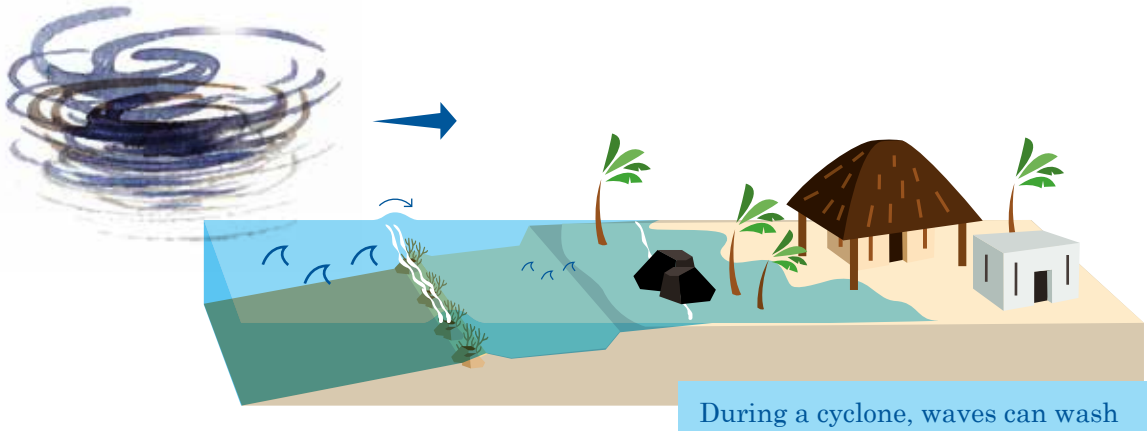
Our shoreline is constantly changing! Erosion and coastal flooding are natural processes. The sea advances, retreats, and sometimes overflows. Here's how it works.



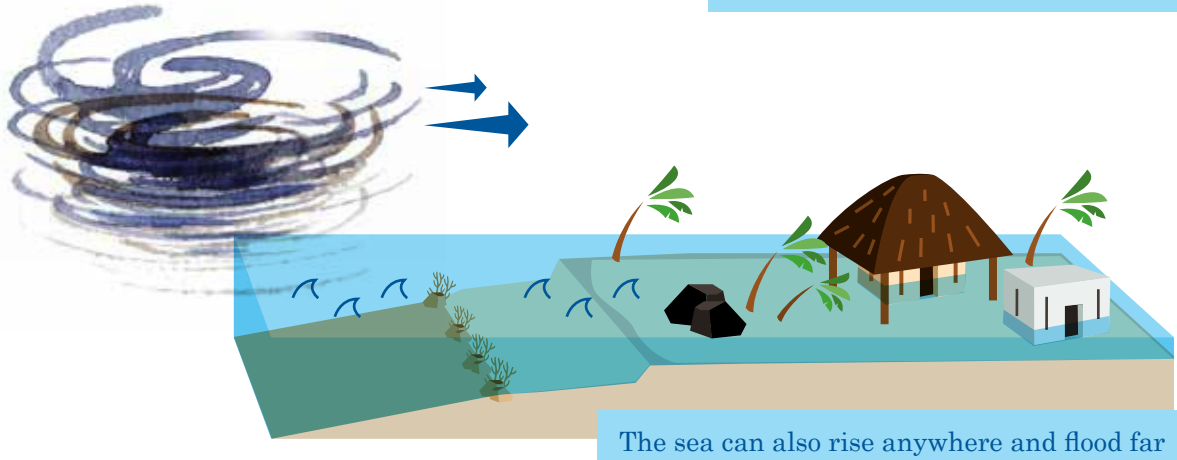


Cyclones can cause **coastal flooding**, which is the temporary inundation of land by the sea.

Offshore wind, tide, air pressure, and the big waves breaking during the cyclone push sea levels up and cause coastal flooding.



During a cyclone, waves can wash over the top of the shore. They flood buildings located near the sea.



The sea can also rise anywhere and flood far inland. The volumes of water are then larger and more destructive.

→ This is what we call overflow. It has already happened in Port Mathurin (Bella, 1991) and Poste Lafayette (Berguitta, 2018).

EXTREME NATURAL PHENOMENA

How do cyclones form? Why do they return on our islands? And what does climate change have to do with it? Let's break it down.

Grandpa, are cyclones really that dangerous?

It's a common phenomenon here. Like other tropical regions, Mauritius and Rodrigues lie along a cyclone pathway.



I learned this at school! Cyclones form when the sea reaches 26°C, even in deep water. Warm, humid air rises, starts to swirl with the Earth's rotation, and clouds form and grow bigger.

Air swirls

That's when you need to take shelter...

As soon as it reaches 26°C, water evaporates faster.





TODAY, IN THE EVENT OF A MAJOR CYCLONE

Within the 100-metre-wide coastal strip:

- **In Mauritius, over 6500 buildings would be affected. That represents more than 25% of buildings within that zone.**
- **In Rodrigues, 30% of the buildings in this coastal strip would be impacted, representing over 500 buildings.**

TROPICAL CYCLONE PATHWAYS





Did you know?

A so-called 'centennial cyclone' is an extremely intense cyclone with a 1-in-100 chance of occurring each year. It is not a regularly recurring event, but rather a matter of probability.



TRUE OR FALSE?

Are there more cyclones because of climate change?

No, but… climate change will increase cyclone intensity in the region. It is still not very visible today, but the effects will be clearly measurable in a few decades to come.

With rising sea levels from climate change, coastal flood damage will worsen as cyclones become increasingly severe.

THE SEA LEVEL IS RISING

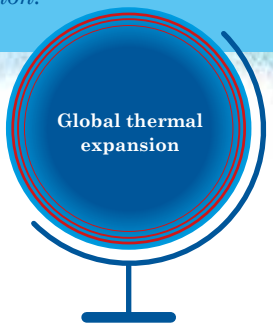
Global warming causes sea-level rise. Two main phenomena are at play: the melting of glaciers and polar ice sheets, and thermal expansion. What do these involve?

With global warming, mountain glaciers and polar ice sheets are melting. *This water flows into the oceans and causes global sea-level rise.*

In **Rodrigues**, *the island's land surface is gradually sinking. This process is called subsidence. Sea-level rise will therefore be increased by 11 cm by 2050, and by 21 cm by 2100.*



Water temperature is also rising. And when water gets warmer, it takes up more space. This is called thermal expansion.



DID YOU KNOW?

In some parts of the world, sea levels are rising faster than others, because ocean circulation does not distribute heat evenly across the globe.

The IPCC *(Intergovernmental Panel on Climate Change)* **is a body that brings together scientists from around the world.**

Depending on how our societies evolve and on greenhouse gas emissions, the IPCC produces several scenarios for global warming in the coming decades, each carrying a more 😮 or less 😐 severe impact. These help us anticipate impacts linked to climate change.

FOR MAURITIUS AND RODRIGUES, SEA LEVELS WILL RISE MORE OR LESS, DEPENDING ON CLIMATE SCENARIOS.



And it could be even worse. According to a more pessimistic scenario, water height could reach over 1.8 metres by 2100!

EROSION IS ALREADY AFFECTING OUR COASTS

In the coming decades, shoreline retreat will affect our coastal zone well beyond current protected areas. Many activities and thousands of buildings will be affected.



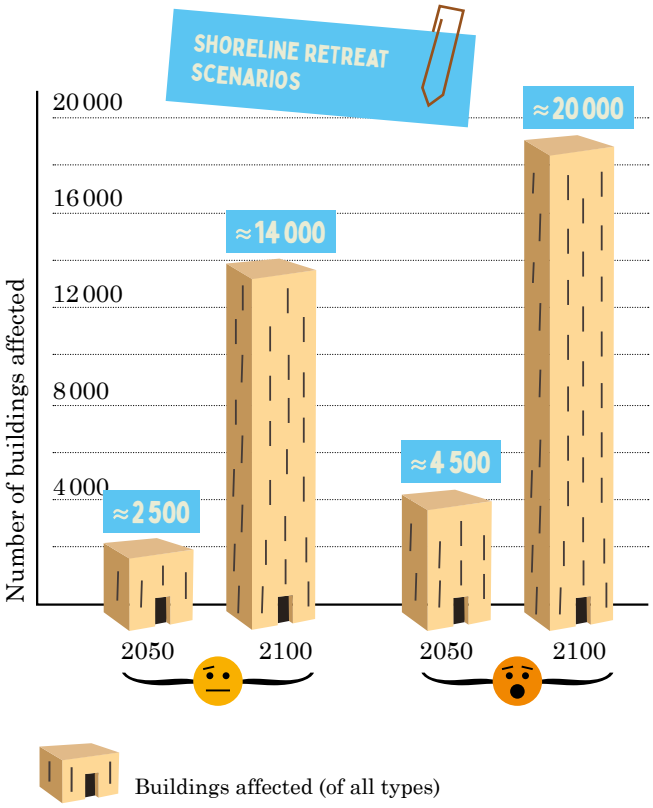
ANSE MOUROUK (RODRIGUES)

© F. Desmazes



SOUILLAC (MAURITIUS)

© M. Garcin



WHAT IMPACT FOR THE MAURITIAN COAST?

By 2050, a mean coastal strip of 20 to 30 metres wide would be affected by this sea-level rise.

In a 30 m coastal strip, nearly 75% of hotels could be affected as early as 2050, and 90% in 2100 under the scenario 😐.

By 2100, a 110 m coastal strip could be affected.



Grandpa, to protect ourselves in the coming years, we would need to know how the shoreline will evolve, right?

Yes, but it's hard to predict because the shoreline changes constantly, advancing or retreating… But one thing is certain: with global warming, it will mostly retreat.

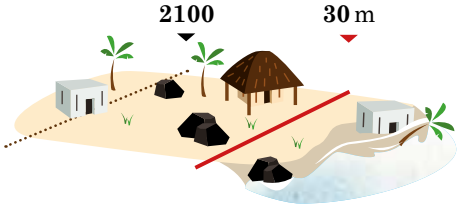
Why is that?

As sea levels rise, erosion will intensify. Cyclones will also become more intense and the low-lying areas of our islands will be gradually flooded.

Experts also say that our reef will degrade due to warming waters, stronger cyclones, and ocean acidification… Is that serious?

Yes, because if our reef weakens and shrinks, it will supply less sand to our beaches. And the lagoon will protect us less.

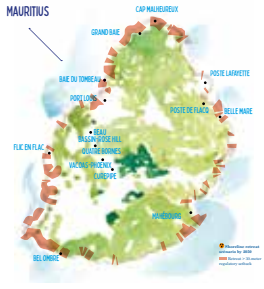
Oh, now I understand why we should avoid building on beaches!





SHORELINE RETREAT SCENARIO FOR 2050

By mid-century, erosion will impact areas beyond the regulatory 30 m setback line.



For more information

Or click here



For more information

Or click here

A HIGH RISK OF COASTAL FLOODING

The phenomenon of coastal flooding will intensify in the coming years. The risk is significant for local populations and for the many buildings located along the coast in threatened areas.

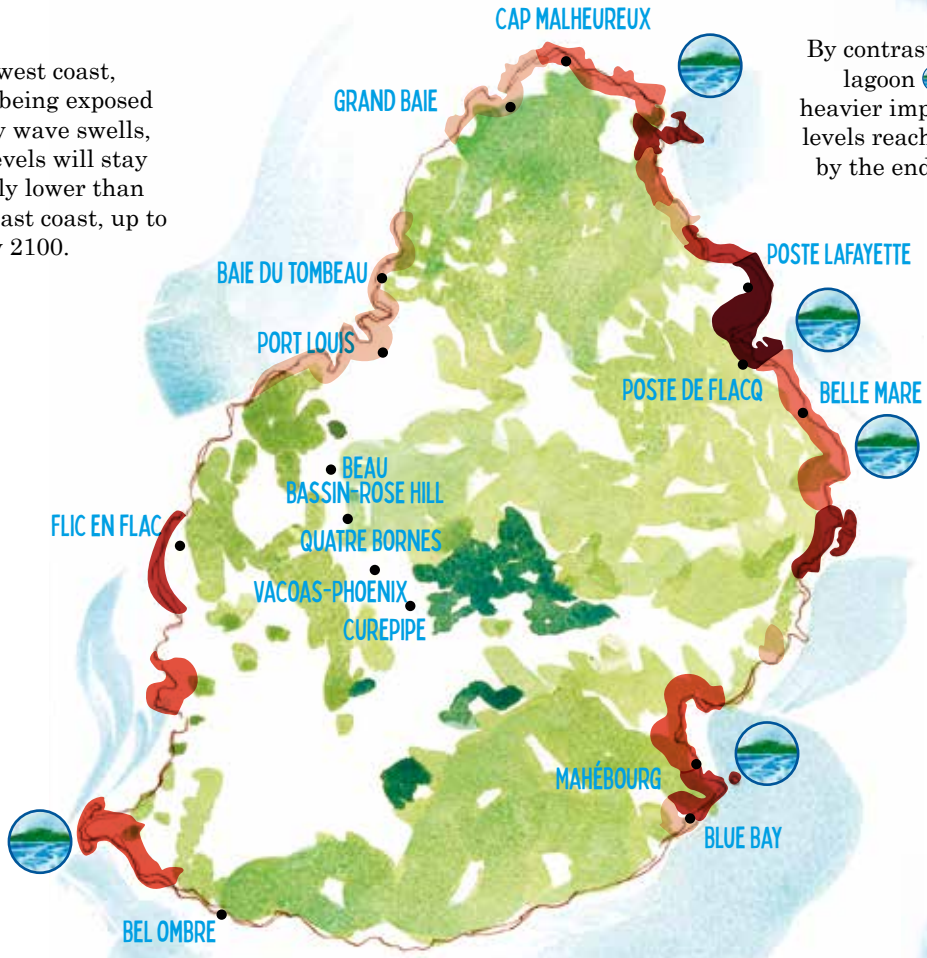
In case of severe cyclones...

Offshore, wave swells can reach an average height of 10 to 16 m.



On the west coast, despite being exposed to heavy wave swells, water levels will stay relatively lower than on the east coast, up to 2.6 m by 2100.

By contrast, the east coast lagoon faces a much heavier impact, with water levels reaching up to 3.5 m by the end of the century.



Average width of the flooded coastal strip by 2100

- 0 - 150 m
- 150 - 200 m
- 200 - 250 m
- 250 - 300 m
- 300 - 350 m
- 350 - 400 m
- 400 - 450 m

With sea-level rise, flooding will become more severe.



Coral reefs and lagoons break down this wave swell and protect Mauritius and Rodrigues from the impact of waves.

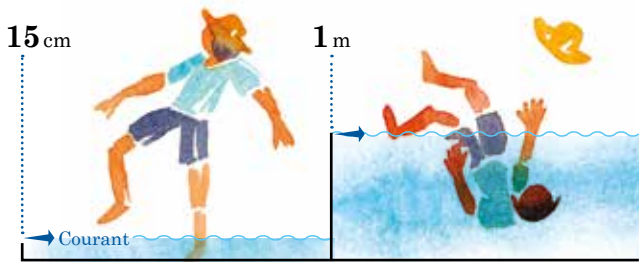
In **Rodrigues,** all waves break offshore. It is the rise in water level in the lagoon that causes flooding by overflow.



Higher water levels are observed in the south of the island.

MARINE FLOODING WILL INTENSIFY. THE RISK IS SIGNIFICANT FOR BOTH POPULATIONS AND BUILDINGS.

During a marine flooding event, the danger is not only linked to water depth. The speed of the current greatly increases the risk.



• *In just 15 cm of water, people often think they are safe, but the current can sweep an adult off their feet. It is even more dangerous for children.*

• *From one metre of water onwards, even a weak current makes movement impossible. The situation can deteriorate very quickly, so caution is essential!*

WHAT RISKS DO OUR COASTS FACE?

In **Mauritius**, more than 13,000 buildings are currently exposed to the risk of marine flooding. By 2100, these phenomena could directly threaten over 24,000 buildings, that is, 3/4 of all constructions located within the 30 m coastal strip.

In **Rodrigues**, more than 1,200 buildings are currently at risk. By the end of the century, this number could exceed 2,200.

COLLECTIVE CHOICES TO PROTECT OURSELVES

Faced with these risks, we need to anticipate and implement strategies. Build protective structures, relocate activities, or rely on more nature-based alternatives. There is no single universal solution, rather, a range of responses that can be combined, either simultaneously or over time.

If no measures are taken, whether by choice or due to lack of resources, we expose ourselves to major risks. Under this 'do-nothing' option, the coastline will gradually be eroded and buildings will eventually be destroyed.



We can choose to protect the existing coast by stabilising the shoreline. This generally involves building hard protective structures (such as seawalls, groynes or breakwaters, etc.).



- *Misleading sense of safety (no structure is 100% fail-proof)*
- *Very high maintenance costs*
- *Natural coastal dynamics are blocked*
- *Risk is transferred to another stretch of coastline.*

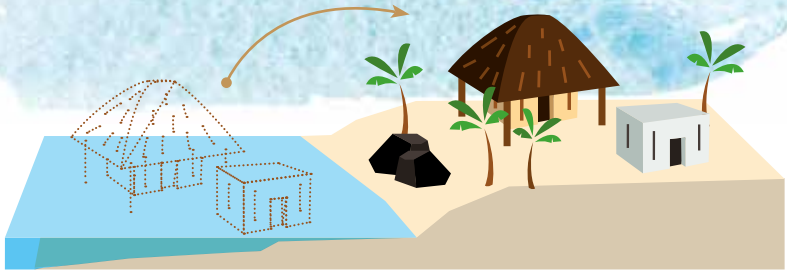
- *Can be used to protect installations that cannot be relocated.*

It is possible to extend land out into the sea or to raise ground levels using land-reclamation techniques, which consist of moving sand from one place to another. This approach has, for example, been used in the Maldives.



- *Very costly solution*
- *Destruction of marine ecosystems*
- *A controversial option in many countries.*

In some areas, relocation must be considered. Homes and activities that are at risk are moved. The retreat takes place towards less exposed areas.



- *Risks eliminated for local populations*
- *A new way of managing the coastline that gives more space back to nature*
- *Retreat carried out gradually, over several years, allowing smoother adaptation.*

- *Requires available and accessible land outside the threatened zone*
- *Potential tensions in organising the retreat process.*

We can adapt to rising sea levels by developing the coastline differently. For example, buildings can be elevated, or only upper floors can be used or fitted out.



- *Solution that allows people to continue living in areas that are increasingly exposed to flooding.*

- *Difficult to access for people with reduced mobility*
- *Not suitable for coastlines exposed to strong waves*
- *Significant maintenance required, as saltwater can weaken structures.*

Coastal ecosystems naturally act as protective barriers. Dunes, seagrass beds, mangroves and coral reefs are nature-based solutions that help limit flooding and erosion. By protecting and restoring these ecosystems, we strengthen their protective function.



- *Preservation and restoration of biodiversity*
- *Improvement of ecological quality*
- *Educational value*
- *Natural beauty restored.*

- *These solutions are not suitable for all coastal areas: their effectiveness depends on local conditions (see next page).*

RELYING ON NATURE

Ecosystems can naturally protect the coastline. Preserving and restoring them provides many benefits. These nature-based solutions (NBS) are all the more effective when natural areas are safeguarded and human activities are limited.

Mangroves

They protect the coastline by breaking waves and trapping sediments. They host rich biodiversity and store carbon.





Mudflats

Often found alongside mangroves, these areas exposed at low tide trap sediments and serve as essential feeding grounds for many species.



NATURE-BASED SOLUTIONS: MANY ADVANTAGES!

Multiple benefits at once!

→ They protect the coastline while supporting biodiversity, and they provide many services (fishing, tourism, scenic beauty).

Every coastline is different

→ Everything depends on the natural environments, their condition, and the activities around them.

They complement each other

→ They can be combined with one another or with other actions.

Nature needs time

→ Protecting or restoring an ecosystem requires time, regular monitoring and patience.



Coastal vegetation and wetlands

Important habitats for coastal biodiversity and true buffer zones, they reduce the impacts of coastal flooding, temporarily store excess water, trap sediments, and contribute to water quality.



Beaches and dunes

They are natural reserves of shifting sand. They constantly adapt to waves, wind and cyclones, which add or remove sand. Their natural evolution must be preserved, their vegetation maintained, and trampling limited.



Seagrass meadows

They slow waves, currents and stabilize sediments. These true underwater meadows host many species and store large amounts of carbon.



Reefs

They break waves and reduce their force, thereby limiting erosion and the impacts of coastal flooding. They also host rich biodiversity and support many activities, such as fishing.

WHICH NATURE-BASED SOLUTION FOR MY AREA?

To consider a NBS, it is essential to have a good understanding of the targeted coastal area.

→ Is the coastline exposed to erosion or flooding?

→ Which natural environments are already present (reefs, seagrass meadows, mangroves…) and are they in good condition?

→ What are the main threats affecting these environments (urbanisation, pollution, tourism, invasive species…)?

→ How can we act to improve the situation?

→ Who are the local stakeholders (associations, communities) and what projects are already underway along the coast?

FLIC EN FLAC, A FUTURE AT HIGH RISK





Coastal flooding caused by a severe cyclone in 2100

- Moderate flooding
- High flooding
- Buildings

For more information

Or click here





© Ministère du Logement et des Terres de Maurice
© Airbus

The former small fishing village has become highly urbanised in recent years. With tourist facilities, shops, luxury residences and hotels lining the coast, Flic en Flac is a dynamic area, but one exposed to risks.

The area is highly exposed to waves breaking close to the shore, especially in the south where there is no reef.

During a major cyclone, flooding would affect a large part of the locality. Erosion also threatens activities located very close to the sea.



In the event of coastal flooding during a major cyclone:

More than 80% of the hotels located within the 30 m coastal strip will be affected by 2050, and 100% by 2100.

→ This represents around 3,000 buildings within the next 25 years.

Regarding shoreline retreat:

By 2050, the coastal risk zone will form a strip between 60 and 110 m in width. By 2100, it could reach 75 to 120 m.

→ Around 80 buildings (mostly hotels) could be affected by 2050, and nearly five times more by 2100.

Taking action in Flic en Flac means:

→ protecting and restoring natural protective ecosystems, such as seagrass meadows and coastal vegetation, which are currently degraded by tourist pressure

→ preserving and strengthening the reef, which already acts as a natural barrier

→ leaving space behind the beaches to allow sand to move naturally.

The challenges

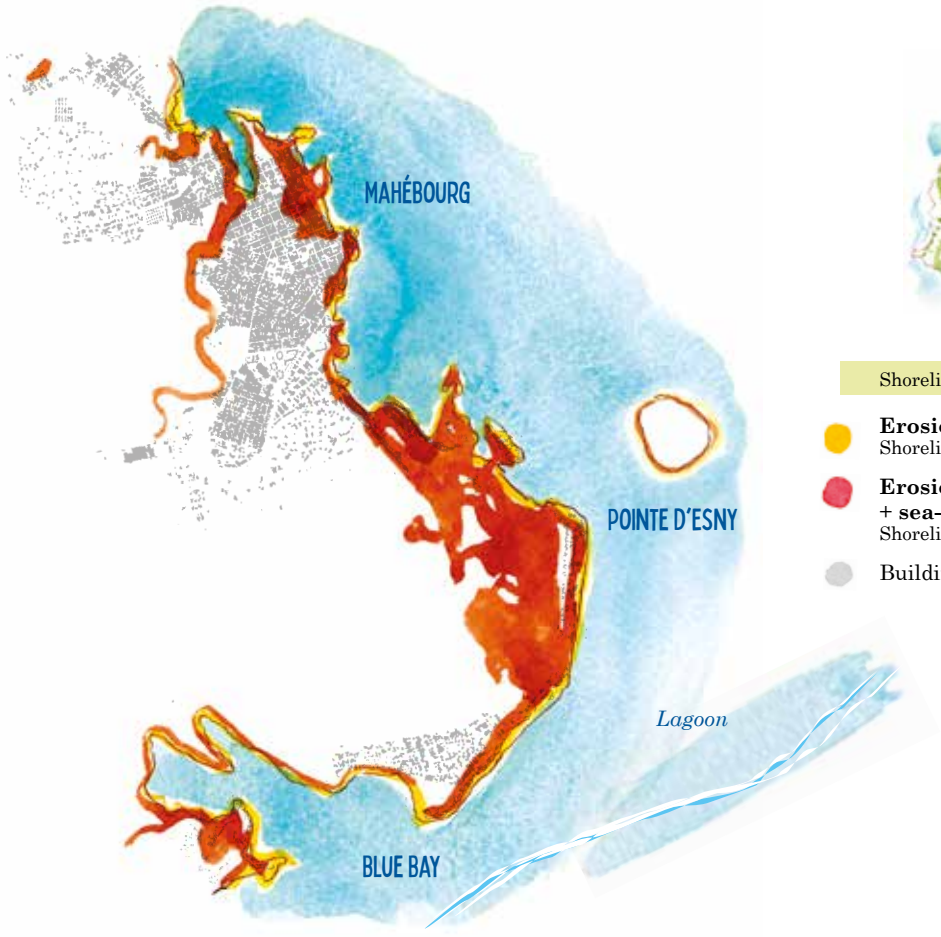
→ The area is highly built-up and heavily frequented, leaving very few open spaces where nature can regain its place.



We sum up?

Everyone enjoys the coastline, but pressures now need to be reduced.
Flic en Flac is a high-risk area.
Its future depends on the actions we take today.
Let's give ecosystems back the space they need so they can play their protective role!

FROM POINTE D'ESNY TO BLUE BAY, THE IMPORTANCE OF THE LAGOON





Shoreline retreat scenario 😯

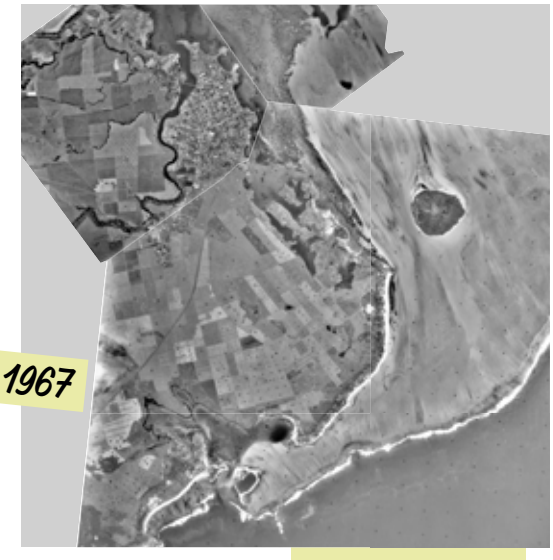
Erosion
Shoreline retreat by 2050

Erosion
+ sea-level rise
Shoreline retreat by 2100

Buildings

For more information

Or click here





© Ministère du Logement et des Terres de Maurice
© Airbus

In the south-east of Mauritius, Pointe d'Esny and Blue Bay are treasured for their preserved natural environment. The marine areas are also highly valued by the fishing community. The wide lagoon and the marine protected area are what make this site renowned: they ensure ecological balance and protect the whole zone.

But they are highly sensitive to disturbances. We all remember the devastating oil spill caused by the Wakashio shipwreck. In recent years, growing tensions have also emerged between nature conservation, local tourism and residential or tourist developments.

Caution: if the lagoon weakens, erosion will advance rapidly!



In the event of coastal flooding during a major cyclone:

The water level across the entire lagoon rises and spills over into the surrounding areas.

→ Within a coastal strip 1 km wide, nearly a quarter of the territory is already affected by flooding today. By 2100, more than 30% of the zone will be affected, and flooding will be far more destructive due to higher water levels and stronger currents.

Regarding shoreline retreat:

By 2050, retreat may exceed 30 m (the regulatory setback) across the entire site.

By 2100, it could reach up to 130 m in certain areas (see map on the left page).

Acting in Pointe d'Esny and Blue Bay means:

→ preserving healthy ecosystems (reefs, seagrass meadows, mangroves) and restoring them when needed, so we can rely on their protective role

→ reducing disturbances in the lagoon (human pollution, wastewater, excessive nautical activities…)

→ using the marine protected area as a tool for awareness-raising.

The challenges

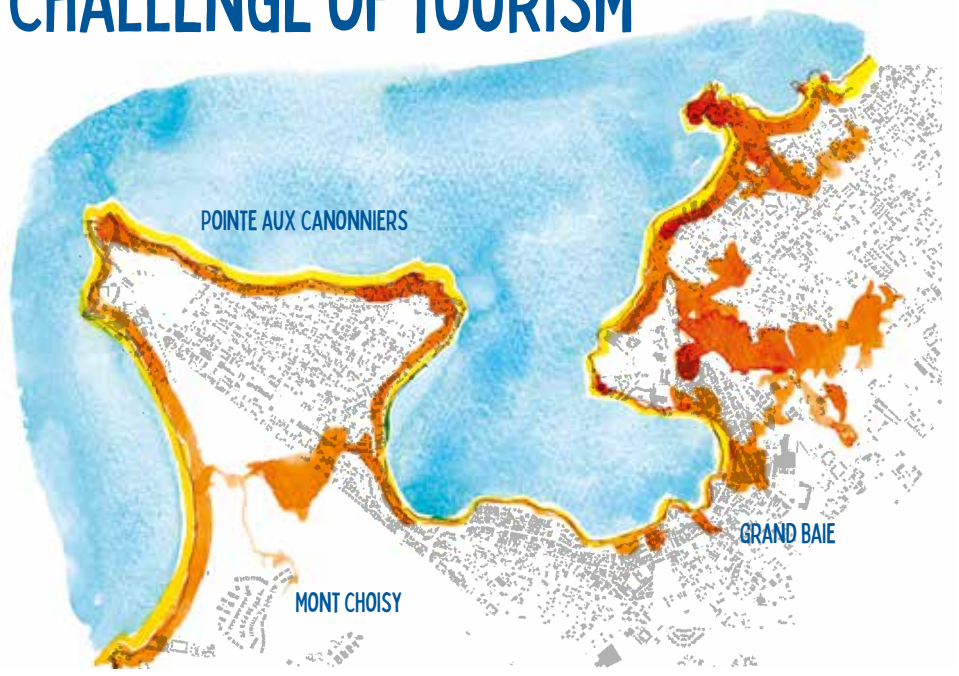
→ The territory is already fragile: any new construction or activity could disrupt the ecological balance and functioning of these environments.



We sum up?

To limit the impacts of climate risks in the coming years, it is essential to rely on the natural assets and ecological functions of Pointe d'Esny and Blue Bay. The future of the coastline depends on it!

IN GRAND BAIE AND MONT CHOISY, THE CHALLENGE OF TOURISM





Shoreline retreat scenario 😯

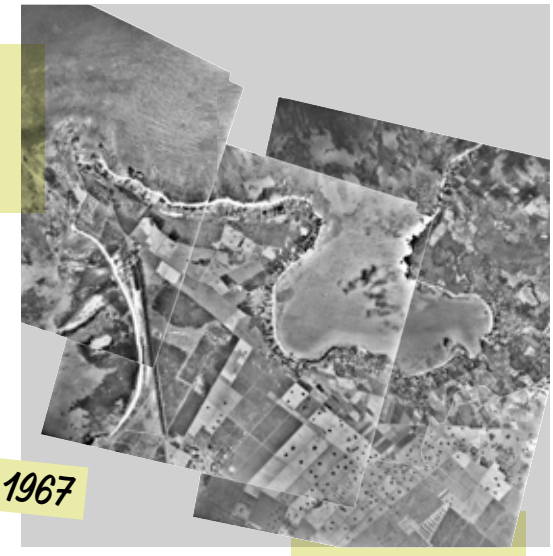
Erosion
Shoreline retreat by 2050

Erosion + sea-level rise
Shoreline retreat by 2100

Buildings

For more information

Or click here





© Ministère du Logement et des Terres de Maurice
© Airbus

This is one of the most dynamic areas of Mauritius! Hotels, residences and tourism-related businesses generate significant economic activity, but they have also driven an urbanisation that has become excessive in recent years.

And the natural spaces, exceptional and appreciated, have retreated. The concentration of people also represents a risk in the event of a climatic hazard. The challenge: restoring the coastline's natural capacity to adapt.



In the event of flooding during a major cyclone:

In the coming decades, flooding, until now limited, will worsen as water levels continue to rise.

→ By 2100, it will be far more intense: the sea will push much further inland, affecting the urban and tourist neighbourhoods on the eastern side of Pointe aux Canonniers, as well as much of the densely populated urban areas at the back of the bay.

Regarding shoreline retreat:

By 2050, the sea may erode most of the beaches and attain a large part of the built-up areas along this coastal zone. As early as 2050, retreat could exceed the 30 m regulatory setback.

By 2100, some areas could experience retreat of 100 m, or even up to 140 m.

Acting from Grand Baie to Mont Choisy means:

→ significantly slowing down urbanisation along the coastline

→ protecting the reef and seagrass meadows, which also play protective roles here, and restoring vegetation on the beaches.

The challenges

→ Human and urban pressures are already intense. They leave little room for large-scale nature-based solutions to unfold.



We sum up?

Appearances can be misleading. Although Grand Baie and Mont Choisy are often perceived as stable natural landscapes, they are in fact fragile and dependent on human intervention (such as beach nourishment). Allowing the remaining natural spaces to function freely, and actively protecting them, is becoming a strategic mission to face future challenges.
But the main lever for action will be to limit, or even reduce, the artificialisation of the coastline.

PORT MATHURIN, A THREATENED CAPITAL





Coastal flooding caused by a severe cyclone in 2100

- Moderate flooding
- High flooding
- Buildings

For more information

Or click here





© Ministère du Logement et des Terres de Maurice
© Airbus

Port Mathurin is strategic for Rodrigues! The capital hosts all essential functions: commercial, economic and industrial activities, as well as the thermal power plant that supplies the island's energy needs.

It is also an area with a high concentration of people. The port plays a major role, especially for food supply.

To allow the town to expand, land reclamation had to be carried out around the port area.



In the event of flooding during a major cyclone:

Water levels in the lagoon rise and inundate Port Mathurin, which lies at low elevation. These floods will increase significantly over time. By 2100, almost the entire port area could be affected by high to very high-intensity flooding.

Regarding shoreline retreat:

→ Coastal erosion will likely be most pronounced at Pointe Monnier. The area could experience retreat of around 40 m by 2050 and 100 m by 2100.

However, with sea-level rise, water will gradually be reaching up to Port Mathurin.

After 2100, a large part of the town will be affected by the spring tides, reaching up to 300m inland.

Acting in Port Mathurin means:

→ limiting the development of housing and strategic infrastructure in high-risk zones

→ anticipating the impact of cyclones and climate change by deploying a range of adaptation measures

→ protecting natural areas: preserving the lagoon and its reef and promoting mangroves.

The challenges

→ Around the port, the coastline is already highly artificialised. The rock armouring that protects the reclaimed land is often in a degraded state. This represents a threat in the event of a strong cyclone.



We sum up?

Port Mathurin is all the more vulnerable to coastal risks because it concentrates a large population and the island's strategic facilities. Only a smart combination of solutions can ensure optimal protection.

At the scale of the island, ecosystems are functioning but remain fragile. Preserving them is essential for maintaining coastal protection. Rodrigues offers an exceptional ground for innovation in nature-based solutions. What if our small island became a laboratory for tomorrow's solutions?



The AFD (French Development Agency) supported the MauRisCot project: 'Operational study of coastal risks (coastal flooding and coastal erosion) on the islands of Mauritius (Mauritius and Rodrigues) in the context of climate change' (Agreement No. CMU 1091 01D), for which the beneficiary is the Ministry of Environment, Solid Waste Management and Climate Change.
The project was coordinated by BRGM between 2022 and 2025. It also involved the Indian Ocean Regional Office of Météo-France, the University of Limoges (UMR 6042 Géolab), the University of Mascareignes (Mauritius), and with the contribution of the AFD Group's Adapt Action programme.