Fighting Together Against Erosion

When the citizens of the Magdalen Islands each do their part to slow erosion of the dunes
LOSING GROUND

Storms have always transformed the coastline of the Islands and, with each passing season, have reshaped the beaches and dunes.

But in recent years, the rhythm of these transformations has increased and Islanders have watched the sea gradually invade more and more of their land.

Scientists have studied the coastal erosion rates of the Magdalen Islands from 1930 to the present in an attempt to evaluate their progression. They’ve developed three potential scenarios – the most likely of which predicts that by 2050 the coastline will recede, on average, 80 metres in areas where the shoreline is low and sandy, and 38 metres in areas with rocky cliffs.

Worrisome numbers that hint of big changes to come.
ONE SIMPLE ACT. ANYONE CAN DO IT.

Coastal erosion of the Islands threatens drinking water, private property, the habitats of plants and animals, and public infrastructure such as our hospital and roads. We have to intervene. But what can we do to protect our coastline?

In urgent and complex situations, we often turn to specialists and governments for solutions. But there is one simple, low-cost act that can benefit the entire archipelago and anyone can do it: we can take care of the dunes.

Like the fortress walls of a castle, the dunes protect the Islands from the sea, wind, storms, and even the sand.
GUARDIANS OF THE ISLANDS

Dunes are so much more than hills of sand. They play an important ecological role by **protecting life on the Islands**.

**Dunes and lagoons: so different and yet... inseparable**

Did you know that without the dunes, there wouldn’t be any lagoons? And without lagoons, we wouldn’t have inland bodies of water, where flora and fauna flourish, to provide the pleasures of berry picking and waterfowl hunting. Indeed, the dunes allow these rich environments to form, and prevent saltwater and sand from invading them.

**Raise a glass of water! A toast to the dunes!**

By protecting the lagoons and marshlands, the dunes also safeguard the Islands’ drinking water. These humid environments capture rain and serve as filters to supply underground aquifers with freshwater – the only source of drinking water on the Islands.
Want to come over for dinner tonight?
The dunes connect the islands and allow us to travel from one to the other. They also provide us with access to electricity and telecommunication services.

Peace upon the waves...
The dunes slow coastal erosion. Like an immense cushion, they absorb the energy of the waves. They also serve as a protective screen against sand inundation and the flooding of roads, habitats, wetlands, and forests.

The dune community
Dunes have special ecological value because they harbour plants and animals that have successfully adapted to this harsh environment. The dunes are home to numerous animal and plant species, and they provide a resting and breeding ground on the Islands for close to 50,000 migratory birds.
In Quebec, dunes are few and far between – you’ll find one in Tadoussac, another on the North Shore and some on the Gaspé coast. On the Magdalen Islands, the dunes are considered local treasures that shape everyday life and local culture.

Dunes cover close to 30% of the Magdalen Islands. They make up virtually the entire area of Pointe de l’Est and join the islands to each other. They stretch across the archipelago for a total distance of 230 km and average 9 m in height.
The Magdalen Islands are situated on the Magdalen Shallows, a continental shelf abundantly covered in sand. This sand originates from the last ice age when immense glaciers moved across the northern part of the continent, eroding the Canadian Shield.

The sand is 10,000 to 2 million years old and was transported over the millennia by waves and wind to form the beaches and dune ridges that link the islands.

But this is young compared to the other source of sand that nourishes the beaches and dunes today – the red sandstone cliffs of the Islands. These cliffs are ancient compacted dunes from a 250 million-year-old desert.

Day after day, under assault from waves, wind and the cycles of freezing and thawing, fragments of the cliffs fall into the sea. Once in the water, the grains of sand are cleaned of their red coat of iron oxide. Thus, they break apart, gradually turn golden in colour, and are washed ashore.

And where does all of this sand go?
Year after year, coastal currents carry sand from eroded cliffs and dunes, washing it onto the beaches along the coast from Plage du Sandy Hook to Pointe de l’Est.
At the mercy of the waves and tides, the sea leaves grains of sand on the shore where the wind dries them and carries them higher up the beach to the backshore.

Sometimes, shells, algae, and stones that have washed onto the beach block their path. Sand accumulates against these obstacles and at the base of the plants that grow on the beach. Over time, this process creates ripples of sand that form like a dotted line parallel to the shoreline above the high tide mark. These are embryo dunes.

The dunes grow little by little and eventually join each other to form a continuous hill of sand called the mobile foredune. Because of the presence of dune grass that traps the sand, the foredune increases in size and remains in place like a fortress between the beach and inland territory.

Behind the mobile foredune

Here, the air and water contain less salt, the winds are lighter, and the soil is richer. Plants, moss, lichens, shrubs, and even trees take root, stabilizing the soil. These are semi-fixed and fixed dunes where we pick cranberries and blueberries.
Beaches and dunes continually change; this is part of their natural evolution.

In autumn and early winter, we can expect very high, breaking waves because of storms and strong winds. When they hit the dunes, these waves lose their force only slightly and return rapidly to the sea, dragging with them anything in their path. At this time the beach loses a great deal of sand and shrinks.

However, during the spring and summer, the waves are smaller and less powerful. The dunes absorb most of their energy and the waves return quietly to the sea. The beach accumulates sand and expands.

And so it goes, in an endless cycle: by the end of the summer the beaches regain the sand that they’d lost during the winter.

For various reasons, however, this balance can be disrupted, and the beach can lose more sand than it gains. In these cases, instead of forming a gentle slope, the dunes become steep cliffs that recede inland from one year to the next.
Plants that love sand are rare and precious. Neither cranberries nor strawberries can withstand the winds, sand and saltwater spray of the beach.

There are three pioneer plants (the first vegetation to colonize a living environment) that contribute to the birth and growth of the dunes: Marram Grass, Sea-rocket, and Seabeach Sandwort.

To resist the drying effects of wind and salt, these plants have adapted to their environment in clever ways. For example, a thick coat of wax waterproofs the stem and leaves of the Marram Grass, the dune grass of the Islands. Marram Grass rolls up its leaves to prevent them from losing water and unrolls them to drink from the fog.

Caution: Hot and spicy!
The Cakile Edentula or Sea-rocket is a member of the mustard family and emits a strong odour similar to horseradish. The fruits and leaves can be eaten raw and in seasonings to spice up a dish.
Making hay in the dunes

At one time, Islanders used Marram Grass as filler in animal feed. In autumn, they would set sail in barges for a particular beach and camp for several days using the overturned boat for shelter. The grass was cut from the middle dune to the low meadow, not on the foredune dune. It had to be dry and cut in dry weather so the animals would eat it. It was then gathered into haystacks and left in place until winter. The Islanders would return to collect the hay once the ice was solid enough to support their wagon and team.

MORE ABOUT DUNES

SKELETON OF THE DUNES

On the beach, the long, thin leaves of Marram Grass are obstacles to the wind and cause grains of sand to collect at the base of the plant. As the sand accumulates, the Marram Grass grows higher, and the sand continues to build up. The buried roots and stems of the plant form an extremely dense network that traps the sand and secures the dune. You could say that Marram roots provide the framework on which dunes are built.
Normally, the atmosphere surrounding the Earth acts like the walls of a greenhouse – it traps the heat from the sun’s rays on the Earth’s surface. This greenhouse effect is essential for life; without it, the average temperature of the planet would be -18°C instead of +15°C.

But our consumption of fossil fuels as sources of energy (petroleum, fuel oil, natural gas, etc.) continues to increase, producing gas in the atmosphere that intensifies the greenhouse effect.

This has led to an increase in the average temperature of the Earth, which is causing climate change – changes in temperature, wind, precipitation, and storms.
CLIMATE CHANGE AND COASTAL EROSION IN THE MAGDALEN ISLANDS

ACCELERATED EROSION

Unfortunately, the Gulf of St. Lawrence and the Magdalen Islands can’t escape the effects of climate change. We have already begun to see its consequences.

The ice that surrounds the Islands each winter and protects the coastline from the waves is **gradually disappearing**. The period during which the ice is present has decreased by 30% since 1960. **Most likely, there will be no winter ice from now until the end of the century.**

Storms that assault the Islands occur more often and are more powerful.

As winter ice disappears and storms amplify, **the erosion of the coastline, the cliffs and the dunes accelerates**. Rising winter temperatures also play a role in accelerating erosion because they multiply the freeze-thaw cycles. During these cycles, water builds up in the cracks of the cliffs and then freezes – a process that can shatter the sandstone.

*Source: Ouranos, Étude de la sensibilité des côtes et de la vulnérabilité des communautés du golfe du Saint-Laurent aux impacts des changements climatiques, 2008.*
Magdalen Islanders have always been drawn to the beaches and dunes to dig for clams or gather berries, to hunt or harvest dune grass, and to search for driftwood and cargo from sunken ships washed ashore during storms.

They also used the beaches to go from one island to the other. In the early days, they travelled the beaches in horse or cattle-drawn carts, and many years later, in their automobiles until a network of roads was completed in 1958.

However, for more than thirty years, the beaches and dunes have been transformed into recreational areas due to growth in the tourism industry and the introduction of high-performance all-terrain vehicles.
VEHICLE TRAFFIC CRUSHES AND BREAKS DUNE GRASS

Even though Marram Grass can resist wind and sea, it’s easily trampled. When a plant dies, the sand around it is freed and carried away by the wind. Even a simple walking path gradually becomes a breach in the dune that channels the wind, intensifying its strength and ability to displace the sand. These breaches allow the sea to infiltrate and flood habitats, lagoons, and roads.

Construction and motor vehicle traffic on dunes with vegetation cause considerable damage and are largely responsible for the acceleration of erosion on the Islands.

The intertidal zone – the area between high and low tide – is the corridor for vehicle traffic on the beach that has **the least impact on the environment.**
Following numerous consultations with the ATV Club of the Islands, the Snowmobile Club, the Quebec Department of Transport, the Quebec Provincial Police, and environmental protection groups, the Municipality of the Magdalen Islands adopted a regulation that limits motor vehicle traffic on the dunes and beaches.

To protect the dune environment and slow erosion, this new regulation prohibits motor vehicle circulation on dunes with vegetation. Exceptionally and for the sole purpose of providing access to the beach, vehicles are permitted on the dunes on the condition that traffic is confined to the access corridors identified and marked for this purpose.

For public safety and the protection of shorebirds during the nesting period, motor vehicle traffic is prohibited between April 30 and September 15. Beyond this period, however, traffic is permitted on the majority of the archipelago’s beaches within the corridors identified and marked for this purpose.

Exceptionally and for the purpose of mollusc digging, traffic is permitted at all times on the beach in the two sectors known and identified for this purpose: the flats of Dune du Nord at Fatima and Plage du Bout du Banc (interior shoreline) at Havre-Aubert.
Every intervention in eroded areas must be carefully considered because most solutions are expensive, require regular maintenance, and sometimes have undesirable consequences.

For example, whereas dunes absorb wave energy, rockfill barriers allow waves to retain their strength. As a result, the waves rebound onto the rocks, tearing away at the soil at the base of the rocks, and spread to the ends of the rockfill where they accelerate erosion. This phenomenon can be observed at Martinique where, each year, the rock wall protecting Route 199 must be lengthened.

If you’re thinking of undertaking a project to protect the coastline, contact the Service d’urbanisme et d’inspection of the municipality before starting. The staff can provide useful information and necessary authorizations, as well as information on applicable regulations.
In autumn 2009, more than 200 residents of the islands – employees, friends, families, and children – mobilized to take care of the dunes to help slow erosion.

They built 27 sand fences made of brush or wood, and installed them in dune breaches to trap and accumulate windblown sand. They transplanted over 18,000 dune grass plants to secure the sand and to help the dune grow.

Sand trappers in 1873

Efforts to protect the various environments of the Magdalen Islands and to restore the dunes are not new. On September 22, 1873, the Municipality of the Magdalen Islands passed the following resolution:

“In order to protect the harbour from the winds that blow each day (...) that a permanent fence be erected across the dune, to be 14 arpents long and 4½ feet high, starting at Étang, to be made of cedar ordered from the Gaspé to have it available for next spring (...), and import fir or other seeds (...) for the purpose of creating grass and vegetation and fir trees that will retain the sand.”
Islanders face coastal erosion

Building sand fences to trap and accumulate windblown sand, then planting marram grass in the breach.
Citizens of the Magdalen Islands have installed fences in 21 dune breaches at the beaches of Dune de l’Ouest, Martinique, Corfu, Plage de l’Hôpital and Dune du Nord, Dune du Sud and Pointe de la Grande Entrée. Most of the breaches had been caused by pedestrian, ATV, and truck traffic.

Because of their work, the lagoons and habitats, and the Havre-aux-Basque section of Route 199, which is travelled each day by hundreds of local motorists, have been protected from sand, wind, and sea.
Once their work was completed, the volunteers left the beach with the satisfaction of having helped rejuvenate the Islands. They view the dunes differently now, with a more protective eye, and understand them better.

In each spring and autumn of 2010, 2011 and 2012, Attention Fragîles will conduct scientific studies at the sites to measure the impact of these efforts and to maintain the sand fencing and plantations.
Because climate change also accelerates coastal erosion, you can help reduce greenhouse gas emissions by:

- carpooling to school or work;
- turning off your vehicle whenever you’re at the corner store or when you’re waiting for someone. A motor that idles for more than ten seconds consumes more gas than what is needed to restart it;
- turning off the lights when you leave a room to save on electricity and reduce oil consumption (derived from petroleum) at our central hydro station;
- purchasing local products. Benefits include reducing the amount of energy required to transport goods.

Islanders face coastal erosion to keep the dunes in good condition, you can:

- use walkways and established paths to go to the beach;
- keep the dunes on your property intact;
- participate in efforts to restore the dunes.

And you? What will you do to take care of the dunes?

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You can do it! Small gestures are as important as big ones!
Pick all kinds of berries behind the foredunes throughout the summer and autumn. Hunt for sea-ducks at Grosse Île. Explore shipwrecks and treasures washed ashore on the beach. Skate and play hockey on frozen ponds or lagoons in winter. Dine on a lobster that began its life in the lagoon, no bigger than a flea, changed its shell each year and survived its predators for ten, maybe twenty years.

The list is long – in much that gives us pleasure living here in the Islands, the dunes play an important role. So be aware of your impact on the dunes and of the path that you choose to travel through them.

Let’s work together to slow erosion and to take care of this remarkable environment in which we live.

Fighting Together Against Erosion is a publication of Attention Fragiles.

Founded in 1988 by a citizens’ movement, Attention Fragiles began by rallying the population, planners, and visitors to the cause of ensuring the health of the Islands’ natural environment to maintain the quality of our island life.
TO ALL WHO WANT TO FIGHT EROSION ON THE MAGDALEN ISLANDS

One simple, low-cost act. Anyone can do it.
For the good of the entire archipelago, our natural environment and our communities.
We can slow coastal erosion.

Fighting Together Against Erosion was made possible through the financial contributions from:

This project has been realized, in part, through financial assistance from the Community Interactions Program (a program of the St. Lawrence Plan for a Sustainable Development jointly funded by Environment Canada and the Québec Department of Sustainable Development, the Environment and Parks). It was also made possible through contributions from the Habitat Stewardship Program for Species at Risk of the Government of Canada, Fondation de la faune du Québec, Mountain Equipment COOP, and Municipalité des Îles-de-la-Madeleine.

ISBN 978-2-9810244-0-4
Printed on paper containing 100% recycled fibres, manufactured using Biogas energy and a certified EcoLogo Chlorine Free and FSC Recycled process.