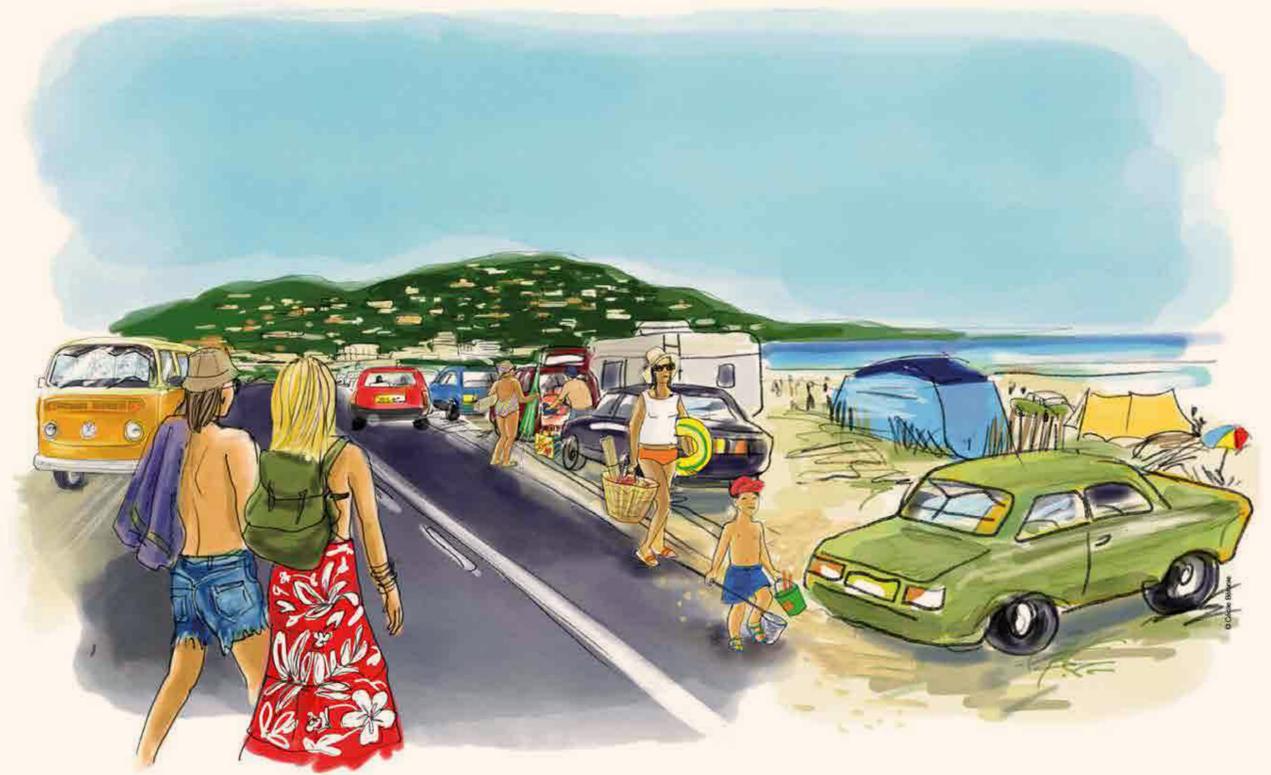




PROJET COFINANCÉ PAR LE FONDS EUROPÉEN DE DÉVELOPPEMENT RÉGIONAL



## 1. The lido before...



### A road devoured by the storms

With the increase in extreme weather episodes (13 devastating incidences between January 1997 and December 2014), whole sections of the road linking Sète and Marseillan were regularly destroyed.

And the beach suffered swells which were leading to a slow and inexorable disappearance.

### Facilities and jobs in danger

Shellfish farming, viticulture, tourism and road and rail routes were all under threat. In the long term, the étang de Thau's balance and its ecosystem were being questioned.

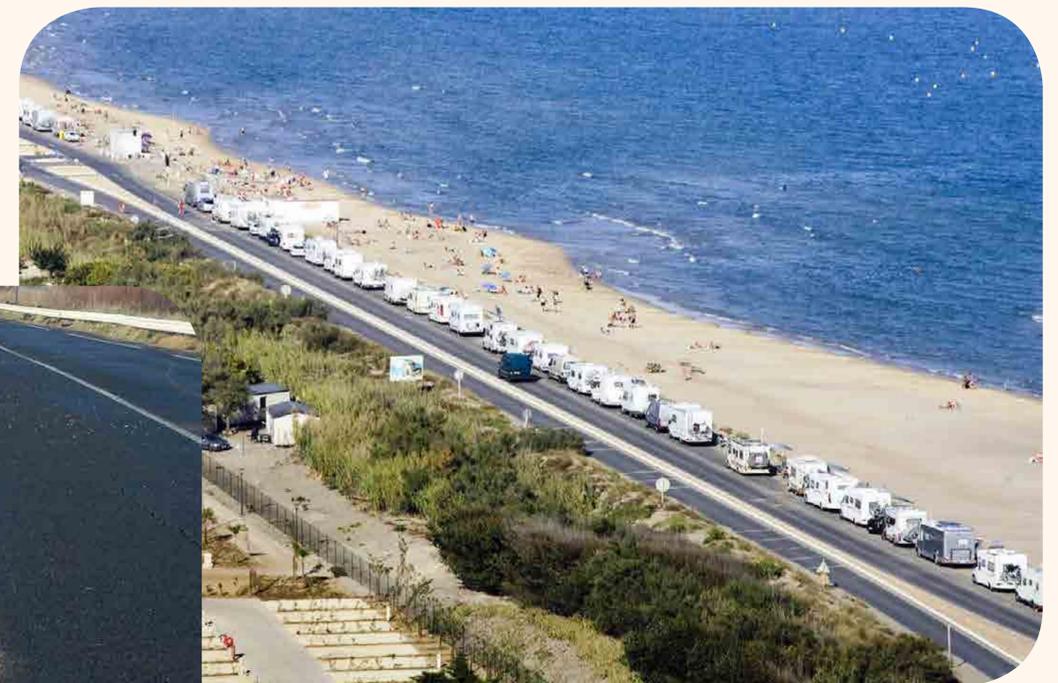
### The solution

Shellfish farming, viticulture, tourism and road and rail routes were all under threat. In the long term, the étang de Thau's balance and its ecosystem were being questioned.

Three objectives:

- Bring a sustainable response to coastal erosion
- Value the lido, a remarkable, unique site
- Better manage tourist traffic.

*In just over half a century, the Lido had lost 45 hectares of beach. Gusts up to 160 km/h, the exceptional storm of 1982 and the unprecedented destruction that resulted were like an electric shock. The following year, the public authorities began to consider rerouting the road.*





PROJECT CO-FINANCED BY EUROPEAN REGIONAL DEVELOPMENT FUNDS



## 2. The lido today...

A large project to safeguard the Lido was launched over the period 2003/2015 to return the beach to its natural rhythm. In 2010, this innovative programme to fight against coastal erosion was classified as a Major European Project. It was also the largest operation of its kind in the Mediterranean.

### The road was moved

The coastal road created a 'hard section' of rock and Tarmac at the rear of the beach, an aggravating factor in erosion. Its destruction followed by the creation of a new road next to the railway line, designed to allow traffic to move fluidly and calmly throughout the year, was the key element in the safeguarding programme.

### The greenway, a sustainable pathway

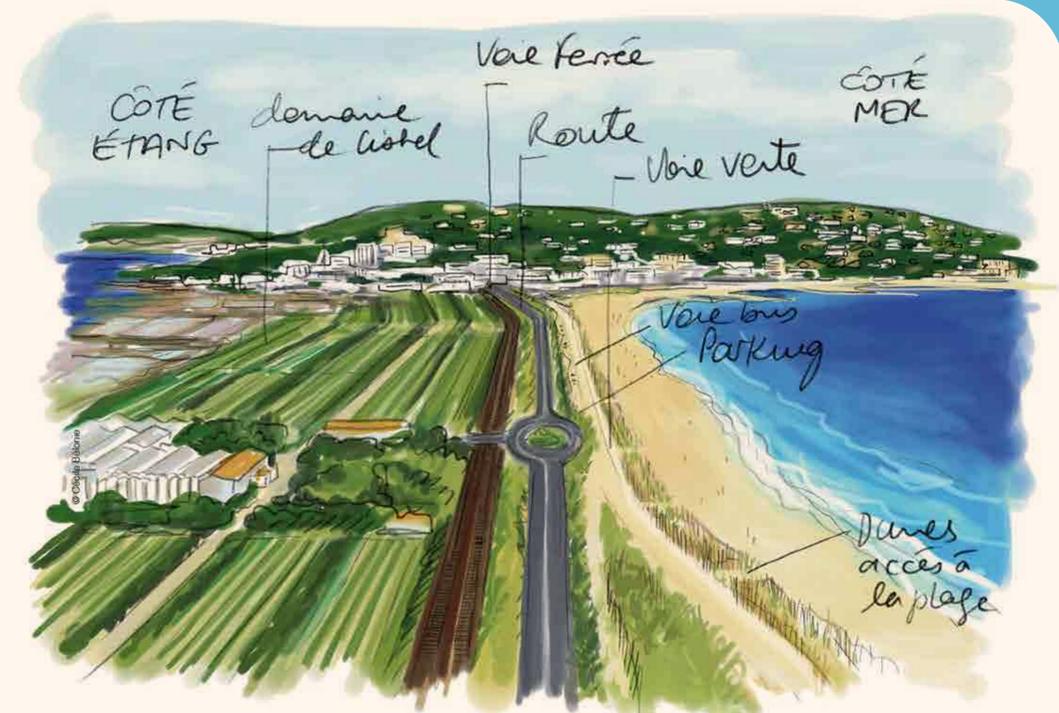
Created at the rear of the beach and protected from the wind by the dune cord, it attracts many walkers and sportsmen and women. It was created on a plant base.

### Sand traps to replenish the dunes

The dune cord has been built up using windbreaks, sand traps made of chestnut wood. These stop the sand from being dispersed and allow plants to take root.

### A beach refilled with sand

Increasing the level of sand and rock pools between Sète and the Château de Villeroy required 300,000 m<sup>3</sup> of sand from the underwater Espiguette sandbank. The beach, extended by 70 m, can once again play its stabilising role, absorbing the power of the waves.



We can see the widening of the beach and the dune, in place of the old road.

### The Lido in figures :

€ 55M of investment, financed by:

- Europe (via ERDF): 35 %
- Sète agglopolo méditerranée: 20 %
- Region: 15 %
- Department: 15 %
- State: 15%





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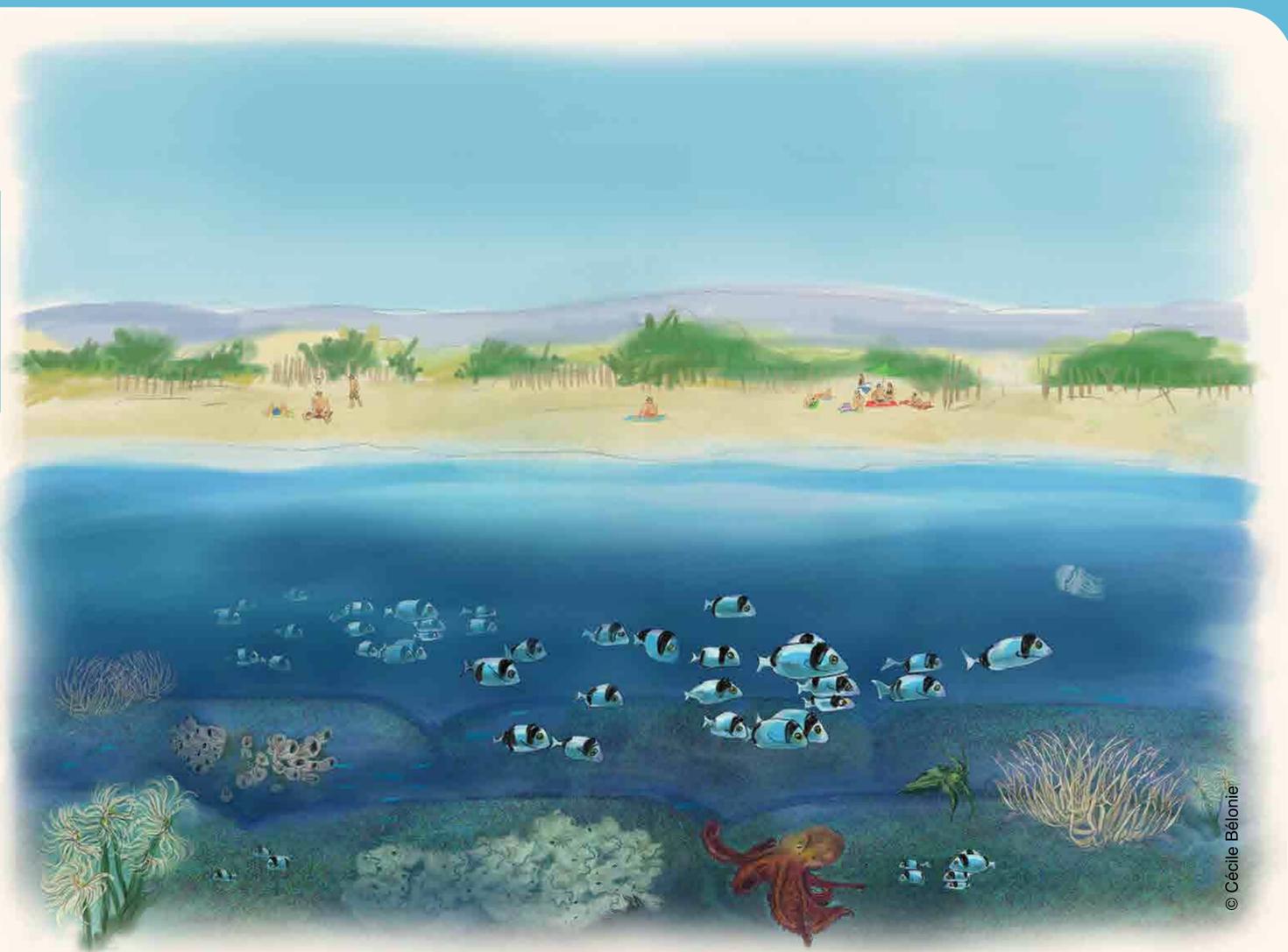
# The fight against coastal erosion

## The fight against coastal erosion

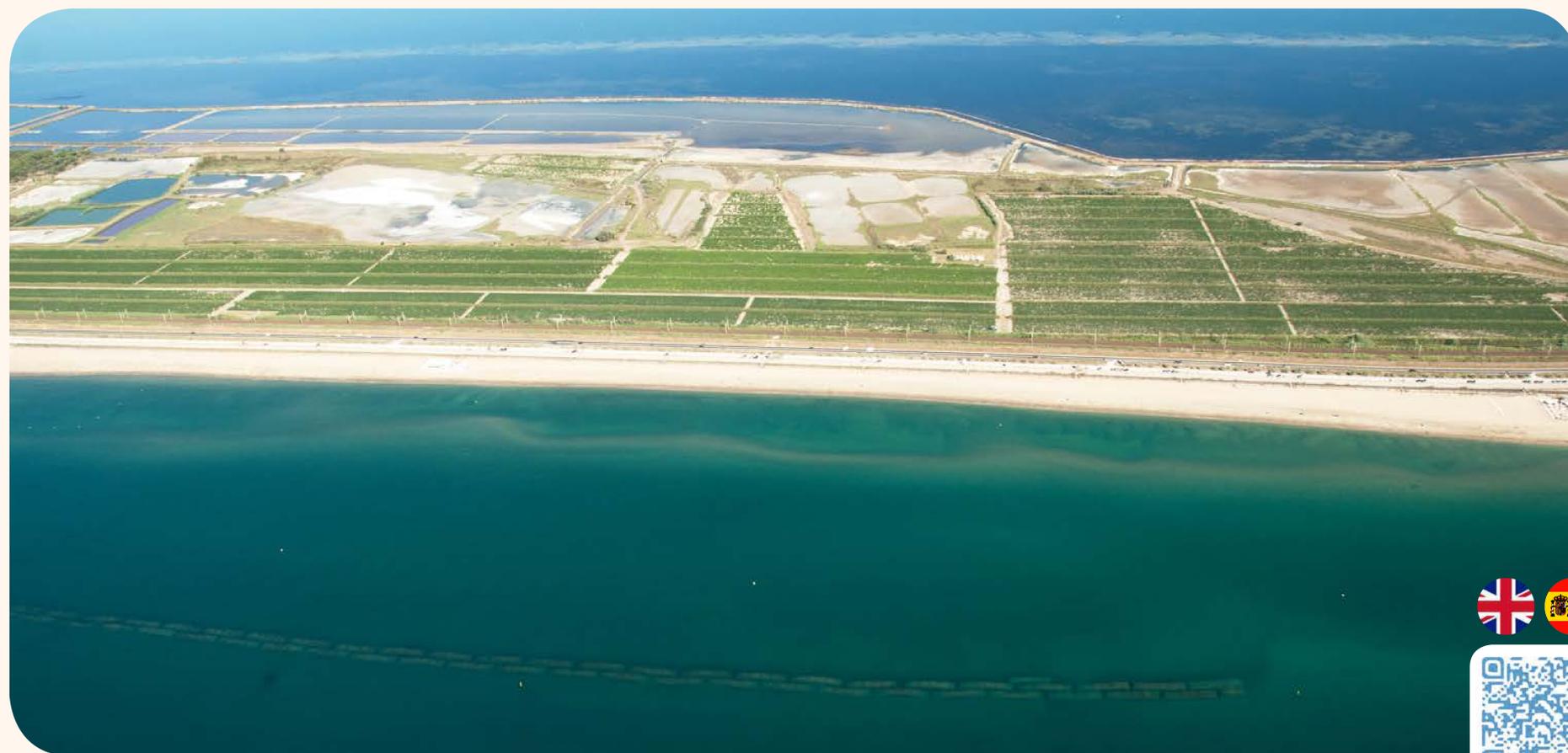
2.4 km of swell reducing geotubes have been submerged 350m from the shore, at a depth of 4.5m. This geotextile sausage, with a diameter of 3m, is filled with sand, breaks the swell on one side and holds the sand on the other. Since it was installed, erosion has stopped and the beach has more sand.

## Storms under video surveillance

Digital video cameras, perched on masts mean the evolution of the coastline can be monitored. This scientific device records movement in the sandbanks and off-shore bars to prove the effectiveness of the swell reducing tube and to evaluate its impact on the dynamic of the beach during storms.



© Cécile Bélonnier





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**From salt production...**

The salt produced by the Compagnie des Salins du Midi was not edible as it was not washed. It was instead used in tanneries, farming and industrial chemistry. The amount of salt produced was very irregular and not very plentiful. It became less and less profitable and the business stopped in 1968.

**...To the return to a natural state**

The salt marshes retain the memory of these salt pioneers: we can see the old basins or 'partènements', marked by dykes topped with wooden fences. But the remains disappear over time. Flood lands, salt meadows and temporary lagoons are taking back what was once theirs.

# 4. The Villeroy and Castellás salt marshes

*It was due to the Duchess of Villeroy's intervention that, on 15 June 1779, Louis XVI authorised the construction of a salt marsh on the coast between Sète and Agde. The salt marshes, 400 ha of protected wetlands, are now owned by the Conservatoire du Littoral, who have engaged Sète agglopôle méditerranée to manage them.*



Obione



Salicorne



Soude maritime





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## 5. A paradise for birds

Made up of nearly 90% of salt water lakes, perfect for small crustaceans, fish and worms, the Lido's wetlands attract many different Mediterranean water birds, such as ducks, migrating or resident for the winter, herons and egrets, shorebirds - seagulls, terns, avocets... and also many flamingoes. In winter, we see sandpipers and curlews making the most of these wetlands to eat or rest.

### Protecting the shorebirds: the Life+Envoll programme

The lagoons are a popular place for shorebirds - terns, elegant avocets, seagulls... where they find ideal conditions for breeding. But as the wetlands disappear and with them the nesting sites, they are under threat. The European programme, Life+Envoll, which the Sète agglomération méditerranée is a member of, manages the small nesting islands to make them home to seasonal colonies of shorebirds. The Villeroy salt marshes are the leading site in the Mediterranean for breeding pairs of the Sandwich tern.



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© Cécile Bélonie

### Beachgrass and couch grass to stabilize the sand

Plants which naturally grow in dunes promote their formation and their maintenances by stabilizing the sand with their root system, which is particularly well developed. This is the case with beachgrass, couch grass, and sea spurge. They have long roots, but are more delicate above ground. This is why wooden paths have been positioned, so you can cross the dunes without damaging this precious vegetation. During the safeguarding works on the Lido, more than 310,000 beachgrass plugs were planted to accelerate the growth on the dune cord.



## 6. Safeguarding a remarkable flora

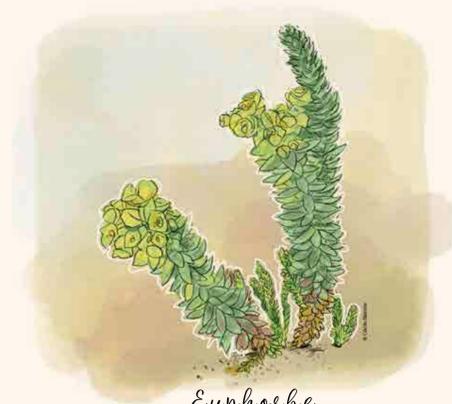
Protecting the lido was also a large-scale project to safeguard the rich flora.

### Dwarf hare's ear, Jupiter's Beard and Althenia Filiformis

205 native plant species, including 10 rare found between Maldormir and the domaine de Vassal, including some protected at a national level, such as Jupiter's Beard, extremely rare in the wild, and Dwarf hare's ear, and others, which are specific to the coast, like the Sea Daffodil, were the subject of specific protective measures during the safeguarding works on the lido. The only Jupiter's Beard plant in the Lido was replanted in land protected by the Conservatoire du Littoral. 1500 Sea Daffodil bulbs were collected and replanted in the dune cord. A 1700 m<sup>2</sup> lake was dug to recreate a natural environment for the aquatic plants, including the precious Althenia Filiformis.



Lys maritime



Euphorbe



Julienne des sables

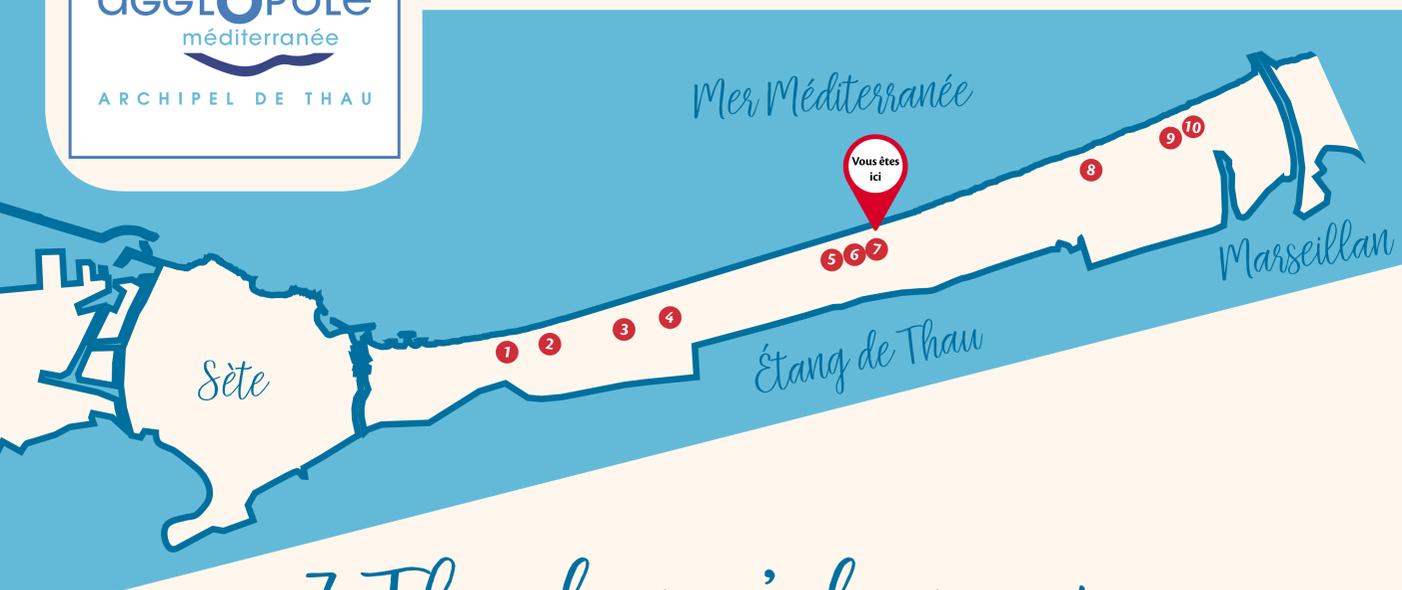


Barbe de Jupiter





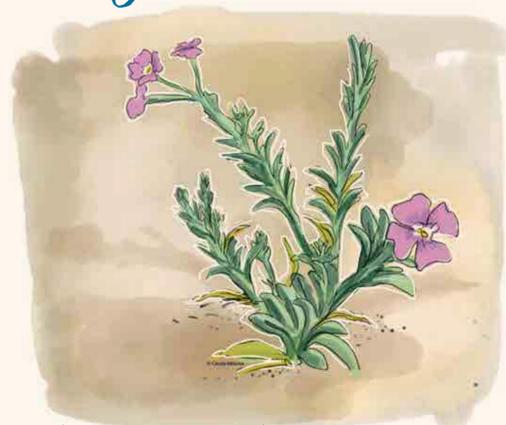
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# 7. The dunes' dynamic

## The ancient grey dunes

These are the highest and the most majestic. They are home to the greatest variety of dense vegetation: the Coastal crucianella, Shrubby everlasting, the Sea grape, Malcolmia littorea... Since 1880, they have been protecting the Listel vineyard from coastal flooding.



Julienne des sables

**A dune system is created from the intimate interaction between the wind and sand. Sea winds create a collection of fine sand at the top of the beach, which is an 'embryonic dune'. Gradually, plant life becomes established, stabilizing the sand with its roots.**

## Villeroi wood

Here, the umbrella pine has taken root in the sands of a fossil dune. It is the final stage in the evolution of the vegetation, linking the flora of the dunes and dry scrubland, such as Cistus, Sunrose and the Mastic tree.



Pistachier lentisque



## The yellow dunes

In the natural state, they are only really found at the level Marseillan. But more are being formed since the reconstitution of the dune cord thanks to the windbreaks at the top of the beach, along the 12 km of the lido. These chestnut wood sand traps have allowed vegetation to develop (notably beachgrass) and have led to a new cycle of dune stability.





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## 8. La Redoute du Castellàs

*Built in 1742, this signalling tower was one of the system of Mareschal Towers, a military engineer and responsible for fortifications in Languedoc. Now, classified as an Historic Monument, it benefits from a 500 metre protective perimeter.*

### *A defence after the English invasion of Sète in 1710*

Very medieval in style, with crenelations and arrow slits, the Redoute du Castellàs was part of the protection of the port of Sète. Other elements were built, such as the fort Richelieu, doubled by its advanced defence on the Corniche, the fort St Pierre (the current théâtre de la Mer). The fort St Louis was built at the end of the jetty which bears its name and which was destroyed during the Second World War. Today, the fort Richelieu, a military building, houses the Semaphore overlooking the sea.

### *A line of 19 forts along the curve of the Mediterranean*

Twenty of these signalling towers were built on the coast at the same time to create a network. These isolated forts have two floors with a terrace and a fire tower. On the ground floor, goods were stored, on the first floor, there was the only living area and an observation post. The terrace had the fire lantern and a defensive post. During daytime, the alarm was given using a coded system of flags, the precursor to semaphore. Its twin which could be found at Les Aresquiers – of which there are a few remains - was destroyed by the English on 1st August 1808, by Captain Jack Aubrey, the hero of the film 'Master & Commander'.



*The works on the lido enable us to make the most of La Redoute*





## 9. The formation of the lido from Sète to Marseillan

12 km long and barely 1 to 2 km wide, the lido from Sète to Marseillan covers 1,800 hectares. A real natural heritage, this long band of sand separates the sea and the Etang de Thau lagoon.

### 6,000 year old sands

The formation of the lido is relatively recent. The oldest sand dates from 6,000 years ago. 75 % of it comes from the Alps. It was transported by the Rhone to the sea and then taken along on the currents, before being deposited, from the hard points of Mont Saint-Clair and the Agde volcanoes, forming the Etang de Thau, the largest lagoon in Occitanie, behind it. For a long time, the lagoons communicated with the sea via 'graus', random channels that opened or closed according to the silt deposits. Nowadays, the Pisse-Saumes grau in Marseillan and the one from the Canal des Quilles in Sète, remain.

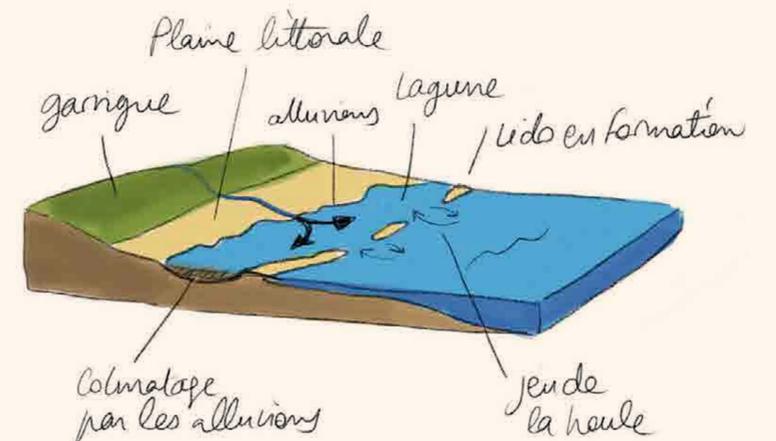
### A remarkable natural site

The lido is classified as a NATURA 2000 site of community importance with regard to birds and habitats. The Conservatoire du Littoral owns 500 ha, definitively protected from development.

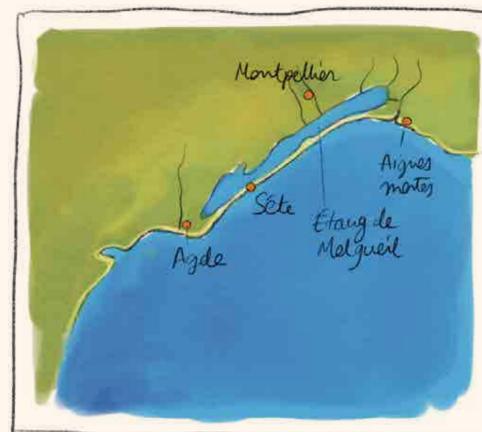
1- Il y a 10 000 ans



2- Il y a 2000 ans



3- Au XVII<sup>e</sup> siècle

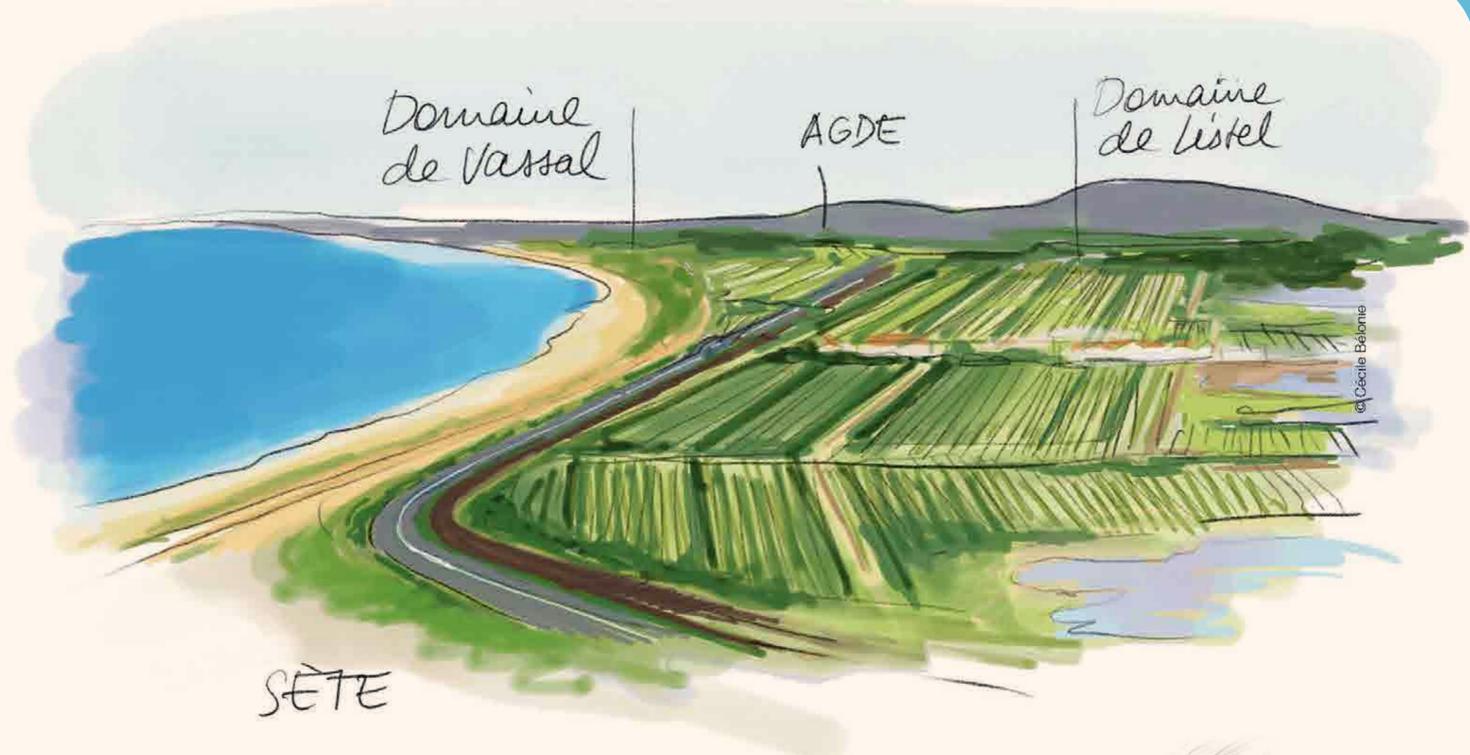


4- Aujourd'hui





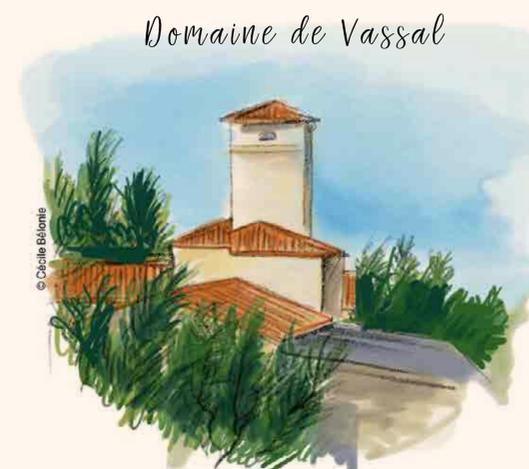
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# 10. Vines adapted to the sand

## The Listel vineyard: a key element in the landscape

It covers over 300 ha of the Lido. Historically, it was the Compagnie des Salins du Midi who, in 1883, in the midst of a phylloxera outbreak, pioneered growing vines in sand, which could resist the root-attacking aphid, as they could not live in the matter. Here, the vine could grow thanks to duckweed floating on the brackish water. The brand name 'Listel' comes from 'isle de stel', little sandy isle.



## The Domaine de Vassal: a unique heritage in the world

Since 1949, it has been home to the INRA world Conservatoire for vine genetics. A unique collection in the world, planted on 27 ha, which includes almost 4000 vine varieties from 50 different countries. This sandy region was chosen as it was impossible for virus carriers to develop there, particularly phylloxera. Its missions are conservation, knowledge and a greater appreciation in terms of the biodiversity of the vine.

