PARQUE NATURAL
Bahía de Cádiz

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Parque Natural Bahía de Cádiz

VISITOR CENTRE

EXHIBITION GUIDE

Fotografía: J.H. Gallardo

Junta de Andalucía

Consejería de Sostenibilidad y Medio Ambiente

Interpretative Exhibition on the Bay of Cádiz Natural Park

The permanent exhibition at the Visitor Centre of the Bay of Cádiz Natural Park allows visitors to discover the Natural Park through a not-to-be-missed interactive journey. First, you need to find the blue brick road built in the image of a marshland vernal pool. The exhibition on the banks of this road enables you to discover the secrets of the Natural Park.

First, you will be shown a multimedia presentation, and then you will enter the exhibition, which is organised into 5 thematic blocks which our virtual vernal pool runs through: Cycles, Flows, Adaptations, Strategies and Memories. At the end of this tour, the A Global Vision and A Lynx Can't Change Its Spots blocks invite you to make an imaginary flight and see this space in its true dimension, as a whole.

The Bay of Cádiz Natural Park is a unique protected area. It comprises ten thousand hectares of intertwined muddy plains, marshland and salt ponds and bleed into one of the main urban areas of Andalusia. Natural spaces and urban development have coexisted in the area since it was invented for the West 3,000 years ago. And yet, the Bay of Cádiz Natural Park is one of the most important coastal wetlands on the Iberian Peninsula.

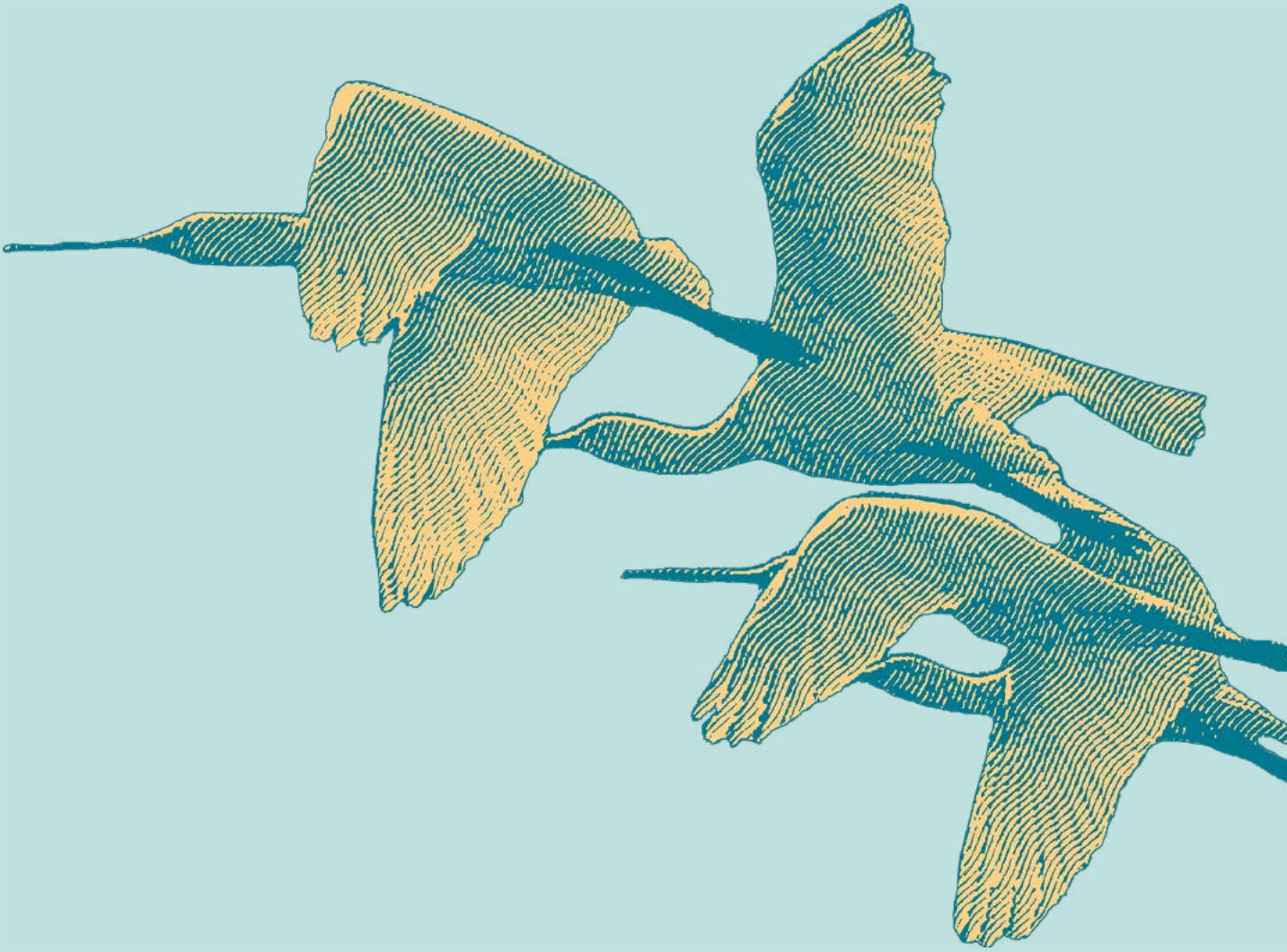
Natural Park Bahía de Cádiz: A history of mud and water

Water shaped the landscape and mud built it. Both are full of mysteries to unravel.

To get to know this space, you must let yourself be carried away by the tide and flow through the marshland pools.

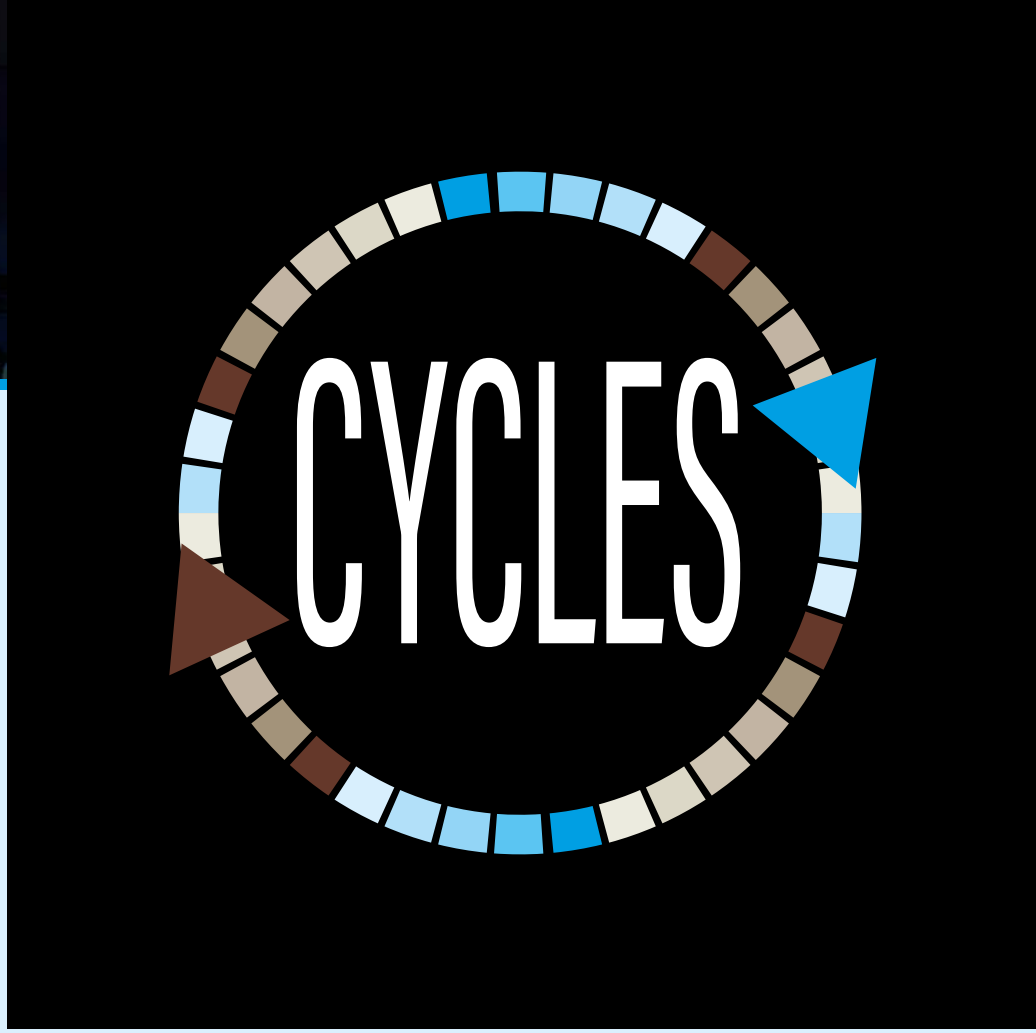
Flow like water and discover the secrets hidden in the mire.

Follow the blue brick road!



Cycles

Days in the Natural Park are marked by several cyclic rhythms. The tide, the cycle of the days and nights or the urban rhythms add music to their daily activity, although each one of them sounds louder in some corner of the Natural Park. Seasonal cycles are very marked in the Bay of Cádiz. Each season of the year brings us a different Natural Park. The bird populations, the activity in the salt ponds or the shape of the beaches greatly modify the landscape of the Natural Park throughout the year.



Vital rhythms

Days in the Natural Park are marked by several cyclic rhythms. The tide, the cycle of the days and nights or the urban rhythms add music to their daily activity, although each one of them sounds louder in some corner of the Natural Park. Seasonal cycles are very marked in the Bay of Cádiz. Each season of the year brings us a different Natural Park. The bird populations, the activity in the salt ponds or the shape of the beaches greatly modify the landscape of the Natural Park throughout the year.

Fusing rhythms

In autumn, birds migrating between Europe and Africa use the Natural Park to rest and feed. Green hues once again dominate the marshland and the storms shake the sea at the edge of it. Activity in salt ponds ceases, although the pools remain flooded, allowing the fish that got trapped in them in spring to feed.

In winter, tens of thousands of birds flock to the Natural Park, fleeing cold northern Europe. At low tide, birds flock the mire pools in search of food. The beaches have lost sand, exposing the rocky outcrops beneath. In the salt ponds, the main pond, the estero, remains open and is cleaned by the tides that rhythmically fill and empty it.

The Bahía clock

Most natural environments move with the rhythm of days and nights. In the Bay of Cádiz Natural Park, however, it is the tide that sets the time. Every 12 hours and 25 minutes the tide rises and falls in a complete cycle.

The clock on the screen shows the current tide height in the Natural Park. It is the Bay's clock. The tide height is measured based on the so-called hydrographic zero, which is the lowest level that the low tide can theoretically reach in the area.

With each tidal cycle, the landscape undergoes a continuous metamorphosis. At high tide, the waters flood the mudflats, vernal pools and beaches of the Natural Park. Then the tide ebbs, the previously flooded land is left uncovered until low tide is reached. In its wake, the mudflats, vernal pools and beaches are flooded again.

The species that feed off these intertidal spaces also alternate over time. At high tide, fish and other marine organisms come in search of a meal. When the tide ebbs and intertidal species are no longer flooded, it’s the waders’ turn.

This tube shows the height that the tide can reach in the Natural Park, on a real scale, at different times of its cycle. The tide rises and falls up to 3.5 metres every day. But its run, or the height difference between high tide and low tide, varies from day to day.

To find out more about how the tides vary throughout the month, see the **Bay Calendar** module.

Do you want to know how the bay clock works?

The tide acts as a lunar clock. The Moon draws water from the oceans on the side of the Earth facing it. The Earth's rotation balances this effect and causes the water on the opposite side to deform as well. The sun also attracts the Earth, but its tide is smaller because it is further away.

Flows

In the Flows block you will learn that the continuous movement of water, energy and living matter is indispensable for the survival of the Natural Park.

The Bay of Cádiz Natural Park is an environment in continuous evolution. The constant flow of water, air, living matter and energy acts like a great factory taking everything to where it is needed to produce life. This relentless flow is the key to its high productivity.

FLOWS

Live plumbing

Which element of the salt ponds looks like a tap?
The sluice gates in the salt ponds are used to regulate the flow of water. These are an essential element for the traditional use of the marshland through salt ponds and tidal mills, since both devices are based on the control of the water flow between different compartments or reservoirs.

The geometry of the marsh
Marshlands are natural fractals, i.e. their shape have a structure that repeats itself at different scales. The main vernal pools of the marsh are divided into secondary ponds, which in turn are divided into smaller ponds, which in turn divide into smaller ponds. Such is the geometry of nature. It is the same in trees, river system or our blood circulatory system. It is nature's way of bringing everything to where it is needed.

A big heart
The tide is like a big beating heart pumping seawater slowly and steadily. Through waterways in the manner of large arteries to the small capillaries, the water transports oxygen, nutrients, living organisms or sediments, sustaining the life of the marsh. This horizontal dynamism, non-existent in terrestrial environments, makes marshlands one of the most productive spaces in nature.

Sharing the wealth
With the ebb of the tide, the marsh transports organic matter and nutrients to the neighbouring coastal bottoms. The sandy bottoms, dominant on these coasts, are generally poor and unproductive. Therefore, the nutrients from the marshland are of great importance to sustain the life forms that live in them. The Bay of Cádiz Natural Park is a generous provider of nutrients.

Channelling traffic
When the tidal circulation is interrupted, seawater stops feeding the marsh. As a result, plants, fish and mud dwellers disappear within a short period of time. Unfortunately, water flow interruptions have been frequent in the Bay of Cádiz over the last decades. In some cases, the construction of roads and highways has led to the strangulation vernal pools, cutting them from one another and thus reducing their capacity to flood the marsh. On other occasions, vernal pools have been deliberately cut to drain entire areas of marshland for agricultural or urban development purposes.

Short-circuits
Disrupting tidal circulation has also enabled salt production. After all, salt ponds are essentially a system for artificially regulating water flows, imposing rhythms of filling and emptying that differ from natural ones. Walls and sluice gates are used to isolate areas of marshland from tides and create a specific circulation that favours evaporation.

The power of water

Sun and moon energy
Sunlight is the main source of energy for life on the planet. But in the Bay of Cádiz Natural Park, the tide is also an important source of energy. It built the typical marshland landscape, transports the materials that make life on it possible and connects its inhabitants.

Humans also learned to use tides as a s source of power to feed water to the salt ponds, to navigate vernal pools and, by means of sea mills, to grind grains.

Back to the future
The first tide mills of the Bay of Cádiz were built in the 15th century and this technology reached their peak in the 17th and 18th centuries. At a point, there were as many as 19 tide mills in the Bay. At the time of the industrial revolution, its technology, based on a clean and inexhaustible source of energy, was replaced by others based on fossil fuels.

Don't you think it's time to get it back?
Today, the fight against climate change, mainly caused by the use of fuels such as of oil, coal and gas, has revived interest in clean energy sources such as tidal power. Perhaps, in the near future, tide mills will operate on the Bay of Cádiz again.

Airs of the Bahía

The winds, the tides and the waves shape the sand on the beach, carving different forms depending on wind force and sand grain size. On the dry beach and the dunes, the wind forms rhythmic and regular ripples of sand in the direction in which the wind has been blowing in the last few hours.

The wind forms waves of sand perpendicular to its direction. These waves have a gentler slope on the upwind side and a steeper slope on the downwind side.

In the Bay of Cádiz Natural Park, winds are constant. The Levante (easterly wind) and the Poniente (westerly wind) are the predominant winds and condition all life here. Wind even influences the mood.

“Levante”
The Levante wind, the wind from the east, is dry and warm, with an earthy smell, as it comes from inland. It sweeps and burns through the area and strong winds can even drive people mad. When it blows hard it can exceed 100 kilometres per hour. But the Levante wind is also the reason why the salt flats in the Bay of Cádiz are so productive, as it greatly accelerates the evaporation of water.

“Poniente”
The Poniente wind, the wind from the west, is cool and humid, and carries the fresh smell of the Atlantic ocean from which it comes. When the westerly winds blow, life is easier. The Poniente is the most frequent wind, but it is never as strong as the Levante. It generates the waves that shape the beaches of the Bay and then drags the sand inland, creating the dune ridges.

In motion sands
You have to be built a certain way to be able to live in a place where the ground is moving under your feet. Dune plants are able to grow keeping pace with the sand accumulation to avoid being buried. Their complex root system helps to slow down the movement of the dune.
European beachgrass is abundant in the Natural Park and has an important role in fixing the sand dunes. It is able to grow as at the same pace that sand is accumulated in the dune and thus avoid being buried. Its complex root system slows down the movement of the dune, making it easier for other plants to grow.
Sea grass is able to settle on the upper part of the beach, forming embryonic dunes. The soil there is very poor, and is only fertilised by the few remains of marine organisms left behind by the tide.
The red-tailed lizard is one of the few vertebrate animals that lives there. It loves warm sand and feeds on beetles, ants and other insects that also live in the dunes.
Sea holly can settle in sands that move constantly. It is able to withstand the constant scourge of the sand-laden wind thanks to its thick leaves and deep roots.
Weevils are a type of beetles that feed on dune plants. They can remain completely immobile for hours, making other creatures think they are dead.

Dragonflies feed on mosquitoes and other insects they find among vegetation and they lay their eggs in nearby freshwater pools. Their larvae, called nymphs, spend their lives in water before becoming flying adults.

A flow of life

In the marshland mud real magic happens, the magic of life. The plant debris produced by the marshes is decomposed by bacteria and serves as food for crustaceans, molluscs and mud worms. These small animals are vital for the water birds, fish and occasionally humans that feed on them.

The soul of the marshland

Plants are the soul of the marsh. They are responsible for the high productivity of the mudflats. They thrive in the abundance of sunlight and nutrients. In addition, their high salt content makes them unappetising. As a result, they produce a large amount of plant debris that ends up mixed in the mud.

Large families

The invertebrates living on the mud and vernal pools of the Natural Park feed mainly on the abundant plant debris produced by the marsh. Only eighty different invertebrate species have been found to be present in the marshes. However, in just one square metre of mud, sixty thousand individuals weighing a total of around one and a half kilos may be found. These are some of the most abundant.

Mud-dwelling invertebrates are the main food of waders. The extent of the mudflats and their abundance in invertebrates explain the importance of the Bay of Cádiz Natural Park for bird populations.

Shellfish soup

Juvenile fish feed mainly on larvae and small invertebrates that float in the water and come and go with the tide. As the fish grow, their catches will also grow larger. In the marshes you will find invertebrates for all tastes.

Treasure Hunters

Shellfish-gathering is a traditional activity in the Natural Park, which must be made compatible with the conservation of invertebrate and bird populations. The species caught by shellfish gatherers are used as prized fishing bait, mainly worms, or in typical Cádiz dishes, such as bivalve molluscs, shrimps and crabs.

Mud magic

Now they eat some...

At high tide, molluscs and worms that live buried in the sea bottom will pull out their siphons to feed on particles suspended in the water. Fingerlings can get more and better prey. However, some may end up being swallowed by a little tern.

...Now others eat

At low tide, molluscs and worms retract their siphons and close up to conserve moisture. For crabs, on the other hand, it is tapas time! For waders, it is also dinner time and they are hungry. And fish must keep an eye on the tide so as not be left behind.

The fiddler crab, also called the calling crab, lives in burrows it digs in the mud. It feeds on bacteria and algae that it obtains by scraping the surface of the land at low tide.

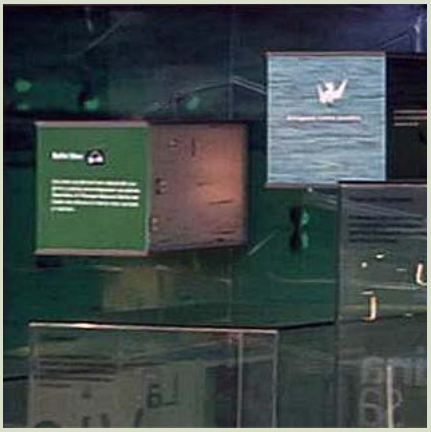
Males perform a dance with their larger claw to attract the attention of females and scare away other males. When something alerts them, they quickly hide in their burrow or seek refuge in the burrow of a reluctant neighbour.

ADAPTATIONS

Adaptations

The extreme conditions in the Bay of Cádiz Natural Park permanently put life to the test. Its inhabitants have had to adapt to the sun and salt, the unstable mud and the relentless tide to make it their home. Predictably, not many have succeeded.

In the Adaptations block you will discover how the inhabitants of the Natural Park have adapted to the difficult conditions of the marshland.



Catch it as you can?

Little Terns
Little terns specialises in swooping down on the small fish it feeds on. However, this is not the only bird that fishes in the Natural Park's canals and lagoons.

Ospreys
Ospreys feed on fish swooping down on them and catching them with their strong talons. Ospreys are also often seen perched on stakes and poles along the Bay lagoons.

Grey herons
Grey herons stand still on the water in order to be able to catch the fish by surprise. Conversely, cormorants dive to fish and are able to chase their prey underwater.

Kentish plovers
Kentish plovers locate their prey by sight. With their small beak and short legs, they scamper through the mud, stalking the small animals that move along its surface. Other species of plovers also feed in this way.

The Bay´s canteen

Dunlins
Dunlins are one of the most abundant waders in the Natural Park. They are migratory birds and can be seen in the Bay of Cádiz in spring, when they travel to northern Europe to breed and spend the summer, and in autumn, when they travel back to Africa to spend the winter there. However, some dunlins like it here and prefer to stay longer in the Natural Park.

Black-Tailed godwits
Black-tailed godwits are picky eaters. With their very sensitive beak, they are able to dig in the mud and choose the invertebrates they like best. Like godwits, many other species of waders feed on mud bugs, but each one is at a different depth depending on the length of its legs and beaks.

Pink Flamingos
Pink flamingos like chunky soups. With its fabulous beak, it filters out small crustaceans floating in the water and on the surface of the mud.
Their long necks allow them to stick their heads upside down in the water and load their curved beaks with muddy water. With their powerful tongue, they spit out the water and mud, while retaining the tasty bugs with the comb-like lamellae located on the edge of their beaks and tongues.

Island life

Until the middle of the 20th century, the salt ponds were permanently inhabited by the foremen and their families and, during the production season, also by the workers. A way of life and a unique culture grew up around the salt ponds, the salt culture, which inspired in many locals a peculiar way of understanding the relationship between human beings and the environment. Some can still remember their childhood in the salt ponds, so different, despite its proximity, from that of children in the surrounding towns.

Living in a sea of sludge
Water and mud have always dominated the Bay of Cádiz. From the dawn of civilization, humans had to adapt to this peculiar geography. Settlements were restricted to a few rocky islands or to the coastline in front of them. Thus, Cádiz and San Fernando were built as island cities and El Puerto de Santa María, Puerto Real and Chiclana were built on the coast at the very edge of the marshland.
Living on an island meant having to make good use of what little space they had, which led to a dense and compact urban fabric. Today, 70% of the population of the Bay of Cádiz lives in its two island cities, Cádiz and San Fernando, which account for only 25% of the urban area in the county.

Look through the magnifying glass to see what life is like in the cities of the Bay of Cádiz.
During the heyday of salt production, which happened in the 19th century, the need to live by the salt ponds arose. Despite the proximity of the urban centres, getting around the marsh was difficult and the salt ponds needed to be tended to at all hours. The salt mine foreman and his family had to live by the salt ponds. This is how the salt ponds houses came into being and, with them, a way of life.

Salt pond houses were masterfully adapted to the environmental conditions of the salt ponds. Many features show its effective adaptation to the marshland environment it was built on. The house was oriented against winter storms. It had thick walls and buttresses to defend it from the strong winds and unstable terrain. Its whitewashed walls and small windows were protection against the strong sunshine. An ingenious rainwater harvesting system ensured that fresh water was available in a highly saline environment.
The houses of the salt pond workers in the Bay of Cádiz, although different from each other, had important elements in common, derived from life in the salt works. Let's go discover them!
Life on the mudflat. The salt works houses in the Bay of Cádiz, although different from each other, had important elements in common, derived from life in the salt works

Adapted to a way of life

Main house
The salt pond foreman and his family lived in the main house. Foremen did not have a fixed schedule, as their work depended on the tides.

Pen
Pens were built to keep chickens and the occasional pig or cow, which, together with a small vegetable garden and fish from the estuary, were used to feed the family.

Cistern
The cistern is an ingenious system for collecting rainwater and the cistern for storing it ensured that fresh water was available.

Workers' lounge
Workers worked on the salt ponds from sunrise to sunset and they were forced to stay in the salting ponds during production season.

Stables
Stables were used to keep the mules or donkeys used to transport the salt. The haystack was located high up, to keep the fresh hay away from the wet marsh soil.

A micro organism odyssey

The Bay of Cádiz Natural Park also contains microscopic worlds, invisible to the naked eye, inhabited by unexpected organisms adapted to the most extreme conditions.

Let’s take a look at them

The evaporating and crystallizing ponds in the salt ponds form a small saline world, dominated by very salty hot water and salt crystals. However, in this seemingly uninhabitable place some bacteria, microscopic algae, small crustaceans and mosquito larvae, capable of withstanding these extreme conditions, manage to live.

The microscopic bacteria and algae capable of living on this saline universe possess red pigments that allow them to harness the sun's energy and give the water in the salt ponds its characteristic reddish colour. These pigments will be passed through the different organisms in the saline food chain.

Brine shrimp
The small crustacean Artemia salina and as well mosquito larvae feed on microscopic bacteria and algae and acquire the red hue from their pigments. These small invertebrates are also the main food of the flamingos, and eating them gives them the characteristic pink colour of their plumage.
In addition, the red pigments of the inhabitants of the salt ponds favour the crystallisation of the salt by enhancing water evaporation.

Early crustaceans
In former marsh areas that were cut off from seawater, rainfall creates temporary lagoons. These are the only freshwater environments in the Natural Park. These lagoons are only flooded for a few months of the year, during the rainy season, and may even remain dry for years. They are therefore very changeable and complicated environments for life to thrive.
However, primitive crustaceans, called branchiopods, are able to survive in these temporary lagoons. They can lie dormant in the dry mud for long periods of drought and revive when rainwater re-floods the land.

These organisms are true living fossils. They are considered the oldest animal species alive today, having remained unchanged for 200 million years, long before the existence of the first birds or the first mammals. Their current form gives us an idea of the environmental conditions that prevailed on the planet millions of years ago.

Filamentous algae
On the intertidal muds, bacteria and filamentous algae intertwine with the sediment to form a tangled mat a few millimetres thick. These microbial mats can withstand a wide range of salinity range and can therefore be found in the salt pond from the early stages of the process right to the crystallizing ponds.
Such living communities, due to their physical structure, are able to withstand strong environmental disturbances, such as an oil spill. They are therefore being investigated as a method of restoration of polluted coastal areas.

Ten thousand hectares of sludge
As in a Wild West story, the plants that colonised the marsh had to conquer a hostile land. Very few managed to overcome the high sunshine, tidal flooding, excess salt and lack of oxygen in the soil. Only a few plants have developed adaptations to live there and have stood up to the sun, salt and tide. This is no country for soft souls.

Storing water
The shrub known in Spanish as salado (“salty”), Limoniastrum monopetalum, accumulates the excess salt from the water it absorbs in its leaves and drops its leaves to eliminate salt.

Spitting salt
Arthrocnemum macrostachyum accumulates saltwater in stems and leaves and synthesises the red pigments, called carotenoids, which protect it from high solar radiation.

To take a root
Common cordgrass develops its roots on the mud surface to absorb oxygen more easily.

Duel in the sun, the salt and tide

Take your seats
The different plant species are arranged in stripes across the marshland depending on how long they are able to withstand tidal flooding. The model and the interactive audiovisual show you the vegetation of the different areas.

Strategies

The Bay of Cádiz Natural Park is a space full of opportunities for those who, like coastal fish, aquatic birds or human beings, have known how to make the most of adverse conditions, turning them into real advantages. All they needed was a good strategy.

The Strategies block will show you how humans, waterfowl and coastal fish have made the most of the marsh.

STRATEGIES

Salt cousin

A well-organized kitchen

Salt ponds are composed from a closed circuit of channels specially designed to promote the evaporation of water and crystallise salt.

Do you want to know the parts of a marshland?

-At hight tide, this channel system is fed salt water by the natural vernal pools.

-The outer lap is a wall of mud and stones that protects the salt pan from the influence of the tide.

-The sluice gate controls the inflow and outflow of water into the saline from the vernal pool. The large, shallow artificial pond where the water to be used in the saline is stored is called estero, which in Spanish is another word for "lagoon".

-The spillways are small sluice gates that connect the different compartments of the salt pond system.

-The different evaporation ponds across which water is driven are called in Spanish, from lower to higher salt concentration, lucios, vueltas de retenida and vueltas de periquillo. Its winding, narrow and shallow channels favour water evaporation.

-The set of crystallizing ponds is called tajería. They are oriented in the east-west direction, which is the direction of the prevailing winds. To facilitate manual harvesting, each raft is divided into squares called pajos.

-The salero is the place where the salt obtained is accumulated before being transported.

Allied with the enemy
Early on, humans realised that the marshland soils were not fertile. Not the ideal place to grow a vegetable garden, then. The salt ponds were the best strategy to turn the unfavourable conditions of this environment into the best allies for salt production.

Sea water
The salinity of the seawater made agriculture impossible in the marshlands. However, seawater is an inexhaustible source of salt that mankind has been able to use.

Mud
The instability of the mud of the marsh made human settlement and the construction of communication routes difficult throughout history. However, mud plasticity allows the complex circuit of the salt ponds to be easily modelled.

Tide
The permanent and wide oscillation of the tides in the Bay of Cádiz made it difficult to use the intertidal spaces. However, tides are nature's way of pumping water into the salt ponds.

Sun
In the Bay of Cádiz, the climate is dry, with a lot of sunshine and little rainfall, which makes agriculture difficult. However, the more than 3,000 hours of sunshine a year are an unbeatable source of energy for evaporating seawater and obtaining salt.

Wind
The intense and frequent winds along this coast have traditionally been an impediment to human activities. However, the Levante, strong, dry wind from the East accelerates water evaporation n the salt ponds and improves salt production.

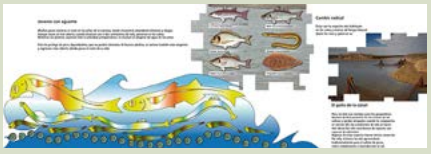
The tidal creek law

Rumble fish
Many coastal fish grow in the vernal pools of the marshland, where they find abundant food and shelter. Although they are born in the open sea, when they reach one or two centimetres in size, they go live in the vernal pools.
While young, they cope well with the salinity and temperature and the lack of oxygen of the water in these vernal pools. There, they are protected from predatory fish, which cannot tolerate these conditions. As they become adults, they also become more demanding and return

to the open sea, where they spend the rest of their lives. Only three species of fish, the perch, the big-scale sand smelt and the piranha, spend their entire lives in the marshland.

The drawings on the table are some of the most common species found in the vernal pools and esteros of the Natural Park. The drawings shown multimedia guide are those same fish at their juvenile stage. Can you tell which fish corresponds to each adult fish?

Click on each of them to check it out.



Prison yard
But not everything is easy for these fingerlings. Many of them enter the esteros of the salt marshes and are trapped when the sluice gates close. There, living conditions become harsher. Only a dozen species are able to survive.
Some of these species are of commercial interest. For this reason, the estuary has traditionally been used for fish farming as a complement to salt production.

They were always future
Juveniles of at least 48 species of fish are present in the Natural Park's vernal pools and a large number of them are of fishing interest. Conserving the marshland is the best strategy to ensure that we can fish in the future.

Home is where the salt is

The Bay of Cádiz Natural Park offers water birds thousands of hectares of safe and quiet salt ponds and abundant food. The perfect place for birds to breed and take care of their newborn chicks.

Lullaby
The water birds that breed in the Bay's salt marshes build their nests on the ground, using the walls, dikes, islets and small beaches that they find in the salt ponds. Each species has its own strategy. Click to learn about some of them.

Acting with courage
Some birds, such as black-winged stilts, nest even in the most seemingly degraded and risky places.

Artful eggs
Water birds have learnt camouflage their eggs, giving them a similar colour to the bottom where they lay them.

A Hitchcock film
Yellow-legged gulls defend their nests and chicks fiercely, flying over and even defecating on anyone who comes near.
Pied avocets, little terns and Kentish plovers often share nesting spots on the small islets of the lagoons. But each species uses a different strategy.

-*Pied avocets* build their nests in open areas using dry vegetation. Any intruder approach is met with loud screeches.
-*Little terns* dig their nests in the ground and decorate them with small stones. At the slightest sign of danger, they leave the nest at once.
-*Kentish plovers* dig a small hole in the ground, or even use the tread of a vehicle, as a nest. It is used to living with humans.
-*Nearby eggs but not scrambled*
Are you able to differentiate their nests?

-*Spoonbills* are migratory water birds who spend winters in Africa and summers in Europe. They feeds in marshlands and shallow lagoons, using their beaks to dig in the mud for food. Although once very common in Europe, it is now an endangered species. The Bay of Cádiz Natural Park is home to one of the few breeding colonies in Andalusia.

They shall not pass!

In the 18th century, the Bay of Cádiz was an important commercial hub and a strategic military enclave. Being one of the main hubs of trade with the Americas, together with the arrival of the ideas of Enlightenment, made Cádiz one of the most flourishing and coveted places in Europe, and consequently had to be defended against pirate raids and attacks from enemy countries.

The peculiar geography of the Bay of Cádiz required a defence strategy that was also peculiar. This strategy was based on making Cádiz a fortress city and concentrating the defence forces the strategic access points by land and sea. Forts, castles, bastions and batteries were built, most of which are now located within the Natural Park.

Battleship Cádiz
In the 19th century, the Zuazo Bridge was the only link between San Fernando and Cádiz, so any goods bounds to be shipped from the port of Cádiz had to go through it. Evidently, its strategic significance cannot overemphasized. For this reason, at the end of the 16th century, it was decided to have this bridge fortified. In fact, the bastions defending its flanks have survived to this day.
In the Peninsular Wars, the Napoleonic troops occupied Spain between 1808 and 1814, but they never managed to cross the Zuazo Bridge. San Fernando and Cádiz were besieged for two and a half years. It was here that, in 1812, the first national assembly, the Cortes Nacionales, were constituted and the first Spanish Constitution was drawn up.

San Luis Fort
The San Luis Fort, located on the Trocadero Island, defended the entrance to the Trocadero and La Carraca pools, where the Navy's ships were repaired. When the French army invaded Spain again in 1823, the Cortes Nacionales took refuge in Cádiz again taking King Ferdinand VII hostage. The French army, known as the Hundred Thousand Sons of Saint Louis, managed to take the fort during the Battle of the Trocadero, which led to Cádiz surrendering. This marked the effective end of the Constitution that had been passed here in 1812 and the definitive restoration of the monarchy and Bourbon and, as well as the beginning of the one of darkest and most repressive periods in Spanish history.

Sancti-Petri Castle
The Sancti-Petri Castle, located on the Sancti-Petri island, and the Urrutia battery, located opposite it, defended the sea entrance to the Sancti-Petri channel, which leads to San Fernando and the Arsenal of La Carraca. For this reason, during the 1810-1812 French siege and later, during the second siege in 1823, the castle was heavily bombarded.

MEMORIES

Memories

The Bay of Cádiz Natural Park is a young area, but with an intense life behind it. Its history is closely linked to the history of human settlements in the area, and it is carved in its landscape, biology and culture. These memories from the past also help shape a future.

The Memories block takes you on a journey through time in the Bay of Cádiz, from the remote times to the space as we know it today.

Marshland memories

Until a few centuries ago, the marshland was the dominant landscape of the Bay of Cádiz. The balance between the constant tidal flow and the growth of vegetation resulted in a complex web of tidal ponds. Since then, humans have modified this space to make the most of it. These transformations have left deep traces in the mud that help us to remember.

Traditional salt ponds

During the 18th and 19th centuries, most of the marshland was transformed into salt marshes, thus isolating it from the tidal dynamics and its rhythm. In salt ponds, water levels remain constant, dependent on artificial management and seasonal cycles. In addition, the salt marshes led to an increase in salinity compared to the natural salt marsh. These changes favoured certain species, such as water birds, which found more stable nesting and feeding conditions in the salt ponds. But all this depends on the continuation of the salt extraction activities.

Abandoned salt pond
In the 20th century, the salt crisis led to the progressive abandonment of the saltworks. Consequently, water management and maintenance of the salt ponds were also abandoned, causing them to gradually degrade: water stagnation, silting of the ponds, crumbled perimeter walls... Water birds, which benefited from the creation of the salt ponds, are now being harmed by their deterioration. The bird populations of the Natural Park need the salt ponds to remain alive.

Drained marshland
During the 20th century, more than 5,000 hectares of marshland were unsuccessfully drained for agricultural purposes. The tidal ponds were cut and drainage networks were created to facilitate the outflow of water. Despite this, the high salinity of these soils rendered them unusable for agricultural purposes, and instead they became wasteland devoid of the rich vegetation that they had as marshland. However, the outline of the web of tidal pools is still preserved, and re-flooding them could bring life back to this area.

Urban infilled
In the last third of the 20th century, thousands of hectares of marshland were sacrificed to ill-planned cities, industrial estates and port and transport infrastructures. Technical advances have made it possible to overcome a centuries-old obstacle: the instability of the marshlands, which had made human settlement difficult.

Industrial saltworks
Currently, the main salt production in the Bay of Cádiz is carried out in a few highly mechanised saltworks. Here, electric pumps and not the tide feed the salt water into the saltworks and the many manual tasks required in the artisanal salt ponds are now carried out by large machines. Large crystallising ponds have replaced the labyrinthine web of traditional salt ponds, reducing the diversity of the landscape.

Fish farming
In recent decades, many of the former salt ponds have been converted for fish farming. The decline in demand for salt made the fish caught in the marshland the only profitable product in the salt marshes. While many salt ponds have continued traditional extensive farming, others have been transformed into deep, free-standing ponds for intensive fish production. The change in water levels and seasonal variability has disappeared. The greater depth of the ponds prevents waders from feeding there and has instead favoured the proliferation of fish-eating birds.

Natural recovery of the marshland
The marshland is a young and dynamic system, which retains its original form in its memory. When the tide returns to the abandoned salt ponds with collapsed walls, the dendritic network of the vernal pools spontaneously re-emerges. Gradually, the natural structure of the marsh is restored. Thus, the recovery of transformed spaces is possible on a human time scale. The only thing that needs to be done is to break down the walls.

The knowledge of the salt maker

From generation to generation
The salt trade has been present in the Bay of Cádiz for more than three thousand years. Salt production has shaped the landscape of the salt ponds, creating complex structures and developing sophisticated techniques to maximize salt production. Salt production know-how that has evolved over the centuries, passed down from generation to generation.

Pioneers
Since the dawn of history, humans have worked on obtaining salt. When the food preservation properties of salt were discovered, the need to produce salt in very large quantities arose. Salted fish guaranteed that food was available throughout the year and could be traded over long distances.

Tartessos
The Tartessians obtained salt by evaporating seawater in ceramic pots heated over a fire.
They made salt blocks that could be transported and used in trade. Marshes provided obtain water with a higher salt concentration.
At the beginning of the first millennium BC, the Bay of Cádiz became an important commercial hub connecting Atlantic and Mediterranean trade routes. The Tartessians and the Phoenicians settlers in Gadir controlled this trade, in which salt played an important role. The local people of the time sailed to the British Isles, at the time known as Cassiterides, to trade the salt produced in the Bay for lead and tin for the metal industry of Tartessos.

Phoenicians
As early as the 3rd century BC, the Phoenicians settlements in Cádiz minted coins depicting Helios, the god of the sun, on one side, and two tuna fish on the other side. The motifs used by the first settlers in the area show the importance of the tuna fishery and its salted fish trade for the economy and its close relationship with the trade in Gadir.
From the 6th and 5th centuries B.C. onwards, salted fish from Cádiz experienced a boom and achieved great fame throughout the Mediterranean. The Phoenicians had established fisheries along the coast of Cádiz, linked to the migratory routes of bluefin tuna. Associated with the boom in the salted fish industry, salt production in the Bay of Cádiz is believed to have increased considerably as well.
The Phoenicians created solar salt ponds from a single pond dug directly on the marsh mud. The special climatic and tidal conditions of the Bay of Cádiz led to this important technological breakthrough.

Romans
The salted fish industry reached its peak from the 3rd century BC onwards, during the Roman domination. In addition to salted fish, garum, a sauce made from fish intestines marinated in a large amount of salt, was highly prized. The Roman Empire considered salt as an essential element for structuring its domains and had a monopoly over it, controlling its price and conditions of sale and purchase.
The Roman Empire developed and extended the Phoenician system of salt ponds dug out of the mud of the marshes to its entire domain. To speed up the process, they heated the brine obtained in clay pots over a fire.

Andalusies
During the Middle Ages, in Muslim Al-Andalus salt was used for everything from food preservation to medicinal preparations, as well as in the leather and dye industries. The salt ponds of the Bay must therefore have been of great importance in Al-Andalus.
During this period, salt production experienced a great technical breakthrough. Instead of retaining the seawater in a single artificial pool and waiting for the sun to evaporate it, Andalusians created salt ponds with several successive pools, which allowed the brine to be gradually concentrated until it crystallised, which greatly accelerated the salt production process.

Castilians
After the Christian conquest of Cádiz in the 13th century, the salt ponds became the property of the Crown of Castile, which retained the monopoly on salt production and trade.
Most of the salt produced in the Bay of Cádiz went to the local almadrabas (tuna fishing boats), which is proof of the volume and importance of tuna fishing. Despite this, salt ponds still occupied a small area of marshland and there were no further significant technical changes.

Global salt workers
In the 18th and 19th centuries, however, most of the marshland in the Bay of Cádiz was converted into salt ponds. The growth of salt exports and the abolition of the state monopoly led to this salt boom. During this peak period of salt production in the Bay of Cádiz, the tidal saltworks system that has survived to the present day was developed, although its structure and management were perfected at a later date. The salt ponds in the Bay of Cádiz were the most productive at the time and produced 20% of the country's salt.

Artisans and industrialists
In the 20th century, most of the salt ponds were gradually abandoned due to the loss of their economic profitability. Despite this, salt production in the Bay of Cádiz continues to this day. Today, artisanal salt ponds, operated essentially by hand, coexist with large, fully mechanised industrial operations.
The industrial saltworks brought about a major change in the size and configuration of the salt marshes and in the way they were exploited. A modern industrial saltworks is about 10 times larger than artisanal salt ponds. Water is collected and moved by pumps and the extraction and processing of the salt is fully mechanised.

Salt craftsmen R&D

With a high dose of curiosity and inventiveness, the salt craftsmen have made up for the scarcity of materials in the marshes, creating a multitude of ingenious gadgets and tools to facilitate the hard work in the salt ponds.

In this scene scale models of some of them are presented.

1. The preservation of the salt ponds depended to a large extent on the resistance of the outer perimeter, which insulated it from the effects of the tide. To support the outer perimeter, built of mud and stones, old boats and wooden stakes driven into the mud were used as a framework. The stakes were made of eucalyptus, the cheapest and most accessible wood, and could measure up to 12 or 15 metres. The stakes were hammered into the mud with ta large mallet called martinete and wielded by four men.
2. Winter storms damaged the walls, turns and pits, so repairs were essential before production could begin. Various tools were used for this purpose: wheelbarrows and parihuelas (pallets) for transporting stones and dirt; hammers for shaping the stones and fitting them into the wall of the outer enclosure; shovels for cleaning and repairing the enclosures and the pits.
3. After the production season, the estero was emptied and cleaned. To prevent the fish from escaping when the tide gate was opened, a frame with a net was placed in the tide gate.
   For completely draining the estero, the drainage cannon was used, a wooden conduit that crossed the outer lap and was situated at a lower level than the floodgate.
   To empty the enclosures and pikes, which are at a lower level than the estuary, a combero was used, which was regularly used to reverse water in the salt pond circuit.
   The production of fish and shellfish in the estero involved the creation fishing tools, adapted or created expressly for the specific needs of this environment. In late autumn, the estuary was swept with the weeding net, operated by two men, catching all the fish that had been living (and getting fat and tasty) in the estero since spring. Zalabares are net baskets supported by a hoop and were used to transport the fish caught. A reliquia was used to fish for cuttlefish and prawns in the canals, and the shrimp trawler would dive into the estuary from the outside to catch shrimps.
4. Artisanal salt works operate by circulating the water in stages in consecutive compartments. The key to this is the circuit made of periquillos or largaderos, small gates that connect the different compartments of the saltworks.
   To start crystallising salt, the pit is filled with brine by making a hole with the drill in the small wall that separates it from the head or channel that feeds it with water.
   The first salt that crystallises is used to form a very hard layer at the bottom of the pit, so that the salt produced afterwards does not become muddy. To form this hard bottom layer, the salt surface is polished with the stick and scraping board.
   The stick is the main tool in the pit. It is about 12 to 14 metres long and at its end the board is placed to take the salt out of the pit. Before this, a hoe is used to break up the crystallised salt crust.
5. Traditionally, donkeys, carrying esparto grass baskets, transported the salt from the pits to the salt ponds, where it was accumulated in a large heap. To make the run to the heap shorter, small bridges were built across the turns, covered with old, discarded baskets to prevent the donkeys from slipping. Once the harvest was finished, the salt was loaded onto the ships using a special parihuela (pallet), which had a standard capacity of 33 kilos. In this way, the production of each salt works could be accounted for. Different types of shovels were used to load the salt: the big one to load the donkeys in the pits, the small one in the heap, the iron one to stow the load in the ships.
   Some tools were intended to make the harsh environmental conditions in the salt works more bearable for the workers. Fresh water was the most precious commodity in the salt pan. Next to the pits, there was always a good jug of water so the workers, who were exposed to the scorching summer sun all day long to drink. Workers also wore a cloak made of canvas waterproofed with linseed oil to protect themselves from the high humidity of the salt mine or the rain.
   Kentish plovers locates their prey by sight. With its small beak and short legs, it scampers through the mud, stalking the small animals that move along its surface. Other species of plovers also feed in this way.

The voice of experience

Times passes for everyone
Some environments in the Natural Park are already old and show us what the landscape of the future could be like in hundreds, thousands or even millions of years. We have to listen to our elders.

Listening to elders

Ostionera Grandmother
The rocky islets in the Bay of Cádiz are extremely old. They consist of ostionera rock, a conglomerate of sands and mollusc shells. They are the remains of the beaches of Cádiz from 5 million years ago.
The action of the sea on this type of rock forms platforms that the tide floods and uncovers. A multitude of marine organisms settle here, providing a firm place to cling to against the continuous pounding of the waves.

Pre-retired dune
Vegetation fixes the dunes and gradually prevents sand to be blown away by the wind. The pines planted from the 19th century onwards on numerous sandbanks in the Bay of Cádiz brought forward their natural end.
These coastal pine forests, despite having been planted by humans, have become real forests, and a great diversity of plants and wildlife live in their shade.

Mature marsh
The inland marsh areas become silted up and gradually lose the influence of the tide. After few hundred years, they become saline grasslands. As salt in these saline grasslands is gradually washed away by rain, the original marsh plants make way for others that could not withstand the high salinity.
Rainfall creates temporary freshwater lagoons on these saline grasslands. In rainy years, springs brings about a multitude of water plants called buttercups. These lagoons are used by water birds to drink fresh water, a very scarce resource in the saline Bay of Cádiz Natural Park.

Once upon a time...

The history of the Bay of Cádiz Natural Park has only just begun. The tide, the wind, the waves... will continue to play with it and shape it.

Humans have also been involved in shaping this space since they first set foot in it. We now have a strong commitment to their conservation. You too can be part of their story.

When you leave the hall, go up the ramp and continue your visit to the exhibition.

A global approach

Since ancient times, the Bay of Cádiz has welcomed the influence of cultures from East and West. Its strategic location and its character as a natural port made it, from early times, an important meeting hub for civilisations. New ideas, concepts or products spread from here to the rest of the Iberian Peninsula or Europe.

Winds from the East, Winds from the West
150 sunken ships from the 15th to 19th centuries have been found under the waters of the Bay of Cádiz

3000 years worth their salt
Throughout history, the Bay of Cádiz has been one of the main salt-producing areas in the Iberian Peninsula, and even in the world. In old times, the salted fish from Cádiz became famous throughout the Mediterranean, thanks to the Phoenician and Roman trade. Cádiz salt was used as currency in the trades conducted with the peoples of Northern Europe.
Between the 18th and 19th centuries, the Bay of Cádiz exported most of its salt production to the American colonies, Northern Europe and Terra Nova for the fish and leather industries.

- 1900s: 143 salt mines in operation = 250,000 tonnes of salt produced per annum
- 2000s: 13 salt mines in operation = 33,000 tonnes of salt produced per year
- Currently: 90 aquaculture farms = 2,000 tonnes of fish and shellfish per year

BR: Bird Resort
The diversity of invertebrate wildlife in the Bay of Cádiz is the attraction for a multitude of birds that use the Natural Park as a refuge and a place to feed.
During their long migratory journeys between Europe and Africa, birds need feeding and resting places to recharge. The Bay of Cádiz Natural Park is an extensive wetland full of invertebrates

and strategically located in the middle of these routes. The conservation of this area is therefore essential for the world's bird populations.

- Water birds wintering in the Natural Park = 120,000 individuals of 70 different species.
- Water birds nesting in the Natural Park = 6,500 pairs of 20 different species.
- Water birds whose migratory routes pass through the Natural Park on migration = More than 1 million specimens.

The Moon is staring hard

Do you remember how the tidal range in the Bay of Cádiz Natural Park? The Moon is staring hard.

- Less than 1 metre.
- Too short! Tidal range of less than 1 metre occur on the Mediterranean coasts.
- Approximately 3.5 metres.
- Very well. In spring, high tides can reach this distance.
- More than 14 metres
- You've gone a bit too far. Such large tides occur on the east coast of Canada and northern France.

A lynx can't change its spots

As you have been able to see throughout our tour, the Bay of Cádiz Natural Park deserves a prize. Despite being a young environment, this natural space has built up a brilliant curriculum vitae, loaded with awards from within and beyond our borders.

Who would have imagined it when it was just a newborn? Well, look at it now..

In 1989, the entire area of marshland and salt marshes and some beaches, dunes and coastal pine forests of the Bay of Cádiz were protected as a Natural Park. Its interior includes the Trocadero Island and Sancti Petri Marshland Nature Reserves and the Punta del Boquerón Natural Monument, due to their singularity.

Continue this tour to learn about the different types of protection and recognition of the Bay of Cádiz Natural Park.

The Bahía de Cádiz Natural Park is part of European network of natural areas, known as the **Natura 2000 Network.**

Special Protection Areas for Wild Birds (SPAs)

Bahía de Cádiz Natural Park is one of the most important ornithological areas in Europe. In 1993, the Bahía de Cádiz Natural Park was declared a Special Protection Area for Birds, in accordance with European Union regulations, as it is a natural area of singular importance for the conservation of birdlife threatened with extinction.

Special Areas of Conservation (SACs)
Bahía de Cádiz Natural Park has the largest extension of salt marshland in Spain and includes 8 habitats considered a priority by the European Union. However, only one fourth of the intertidal araeas of the Bahía de Cádiz remain in their natural state.
In 2006, the Bahía de Cádiz Natural Park was ratified by the European Union as a Site of Community Importance, as it is home to priority habitats for the conservation of biodiversity. Subsequently, in 2012 it was declared a Special Area of Conservation (hereinafter SAC) of the European Ecological Network Natura 2000, in the Autonomous Community of Andalusia.

A Wetland of International Importance Ramsar Convention Wetlands
Since 2002, the Bahía de Cádiz Natural Park has been included in the list of Wetlands of International Importance of the Ramsar Convention. Its main goal is the conservation and rational use of wetlands as a contribution to achieving sustainable development.

Junta de Andalucía

Consejería de Sostenibilidad y Medio Ambiente