

FROM INDUSTRIAL ACTIVITY TO CULTURAL AND ENVIRONMENTAL HERITAGE: THE TORREVIEJA AND LA MATA LAGOONS (ALICANTE)¹

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SUMMARY

The town of Torrevieja owes its existence to the sea, to its climate, to the two saltwater lagoons that it sits between, and to the watchtower from which it took its name. The town's motto, "*Blanca de sales, morena de soles*" ("Salt-white, sun-tanned"), neatly sums up the essence of this part of the Mediterranean, where singular environmental features have always been the driving force behind the area's economic and cultural heritage. In this regard, the salt industry and the growth of tourism are the two activities that have had most impact on this town located next to the Torrevieja and La Mata lagoons, an area of great environmental value and now classed as a nature reserve.

Key words: Torrevieja lagoons, salt works, environmental economics, tourism, industrial archaeology, nature reserve, cultural heritage and sustainable development.

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“We walked by the lagoon, a vast cauldron
fuelled by the climate; a mine of prodigious wealth,
around which grew a town that now finds itself in misery.”
Eugenio Noel, *Intimate Journal*, 1912



Figure 1
LOCATION MAP OF TORREVIEJA AND LA MATA LAGOONS

I. INTRODUCTION

The Torrevieja and La Mata lagoons cover 1,400 and 700 hectares respectively and have a combined perimeter of more than 25 kilometres. They are located in the town of Torrevieja, in the south-east of the Iberian Peninsula within the province of Alicante, in the Region of Valencia. The Spanish coast includes a great many lagoons, particularly along the Valencian coastline, where they are known as *albuferas*. This is due to the abundance of low-lying coastal areas influenced by the morphogenetic processes of sea and land². The lagoons are, therefore, a place where different environments converge: sea, river, lake, land etc; which makes them somewhat unique, blessed as they are with features that differ significantly from those of the surrounding areas. The Alicante coastline was once abundant in lagoon formations of this type, but they have almost all been wiped out by the actions of man (Box, 2004: 192). Although in many lagoons the presence of openings in the sand banks is clearly linked to the morphogenesis of the coastline, in other cases serious doubts exist as to their

² The word “*albufera*” (from the Arabic *al-buhaira*), which originally meant little sea, is used to refer to any area of “shallow waters, located parallel to the coast, separated from the sea by sand ridges, the openings or inlets of which allow for a certain amount of communication” (Roselló, 1981:43).

origin, as it is often difficult to ascertain to what extent they are natural or artificial (Roselló, 1981: 64). The Torrevieja and La Mata lagoons are a singular phenomenon within the area's coastal landscape and differ in a number of ways from other *albuferas* within the Region of Valencia, due to the fact that they were formed partly by tectonic activity (Costa, 1981: 399). These two lagoons have yet to be sufficiently categorised, as they are neither endoreic areas nor *albufera*-type lagoons. In this regard it is unclear how they were originally linked to the sea, though the Torrevieja lagoon's connection seems clearer, as the dune disappears in the channel known as *el Acequión* that was opened up in the fifteenth century, possibly indicating where the inlet was located. However, it is more difficult to classify La Mata as an *albufera*-type lagoon. Currently, both lagoons are separated from the sea by a sand dune or ridge from the Quaternary period. Regardless of whether or not the lagoons are in fact *albuferas*, the geomorphologic evolution that these areas underwent led to the appearance of endoreic basins with a distinctive morphology and characteristics, which man in turn used to his advantage, namely for salt production. La Mata and Torrevieja are the only sea-salt works in Spain located in completely natural lagoons. There was no need for them to be adapted in any way – they simply had to be linked to the sea. The local climate, with little rainfall (an annual average of around 250 millimetres) and high levels of evaporation (up to 20 millimetres in 24 hours) is another important factor that has favoured salt production here to a great extent (Costa, 1981: 401).

The town of Torrevieja owes its existence, then, to the sea, to its climate, to the two saltwater lagoons that it sits between, and to the watchtower from which it took its name. In much the same way, the town's motto, "*Blanca de sales, morena de soles*" ("Salt-white, sun-tanned"), neatly sums up the essence of this part of the Mediterranean, where singular environmental features have always been the driving force behind local economic and cultural heritage. In this regard, the salt industry and the growth of tourism have had the greatest impact on the town, located next to these lagoons of such environmental value that they are now classed as a nature reserve. Thus, contrary to the comments made by Eugenio Noel at the beginning of the twentieth century, Torrevieja today is hardly a town in economic ruin: proof of which lies in the town's strong economic growth, thanks to the development of the tourist industry, which is sustained in part by the incessant increase in construction, and in the growth of the town's population. In 1972, Torrevieja registered a population of 10,158 inhabitants, whilst the figure for 2006 is over a hundred thousand, a figure which increases six fold during the summer season. Indeed, this economic boom, particularly over the past few decades, is based not on the traditional activity that actually gave rise to the town (salt) but on another activity (tourism), which has meant an ongoing attack on the physical space available, placing serious pressure on the Torrevieja and La Mata lagoons and their exceptional cultural and environmental value.

Although the cultural value of natural spaces may be the most subjective and difficult value to determine, there is no doubt that the aesthetic values of ecosystems and landscapes contribute to the emotional wellbeing of the local population³. Natural resources can also

3 In this sense, the term value can be applied using the definition given by the Royal Academy of the Spanish Language, which says: "the degree of utility or aptitude of things to satisfy needs or provide wellbeing or pleasure".

be said to have an intrinsic value, quite apart from human feelings or needs⁴. In this regard, a negative aspect usually associated with economic growth and urbanisation or industrialisation is the gradual scarcity of goods and services derived from the natural environment. As such goods are free, they tend to be over-exploited, in such a way that citizens derive wellbeing by using additional quantities of these goods without taking any steps to preserve them. One of the most common preservation instruments used is to regulate an area of nature with various kinds of protection in order to preserve scarce environmental assets. Environmental economics is based on the hypothesis that analysis should focus not on the goods but rather on the services, which are also to a large degree public, have no market and thus lack prices by which they may be immediately quantified. These services cover the usefulness and/or wellbeing that people derive from the existence of suitably conserved natural heritage. With advances in environmental economics, a monetary value can now be established for goods which, in general, do not have a market and for natural heritage in particular. The basic element of valuation is personal preferences and, consequently, the satisfaction that an individual derives from the conservation and/or consumption of natural heritage, in a similar way to the value derived from prices as a reflection of the satisfaction obtained from goods that are bought and sold on the market. Such values are known as bequest, existence and option values, as well as indirect use value (images, videos, books, etc.) From this environmental point of view, the values that can be associated with enjoyment of the Torre Vieja-La Mata lagoons are shown in the following table:

Figure 2
BENEFITS PROVIDED BY THE TORREVIEJA NATURE RESERVE

Value of the Park	<i>Current visitors</i>	Direct enjoyment
	<i>Non-visitors</i>	Existence Option Bequest Indirect use
	<i>Residents</i>	Landscape Leisure
	<i>Direct economic</i>	Salt, hunting, agriculture Developers Tourism
	<i>Environmental value</i>	Biodiversity
	<i>Cultural value</i>	Tangible Intangible

Own table.

⁴ In this sense, Pearce and Turner (1995:175) describe the intrinsic value of natural resources as “a value that resides in something, but which people capture and express through their preferences in the form of a non-use value”.

II. HISTORICAL EVOLUTION: FROM SALT-WHITE TO SUN-TANNED

The history of Torrevieja is linked to the history of the salt works. The tradition and links that the population has maintained with the salt industry is based not only on the fact that for a long time this activity was the main source of income for the local inhabitants, it also has to do with the very origin of the town. With good reason its name is derived from an old watchtower called “*Torre Vieja de las Salinas*” (Old Tower of the Salt works) which was used to protect the coast against pirate incursions⁵. It was at the end of the eighteenth century that the first references were made to this place, where a small country house was built under the auspices of the salt industry. The botanist Cavanilles, who travelled through Alicante during that period, noted a growing group of houses in a place “next to the Cabo Cerver, facing south-west where [according to his records] a settlement known as Torre Vieja has been formed, where 25 years ago there were three families, and now there are 106, almost all involved in some way with the salt works”. For centuries, the extraction and sale of salt were the only resource for the people living in this area, besides fishing; as the town lacked official municipal status (until 1957) and thus no land was available for farming. The town’s large and well-equipped port was built to deal with the traffic of salt, which was transported exclusively by sea. Despite the radical shift in Torrevieja’s economy in recent years as a result of the boom in tourism and construction, the salt works and their facilities are still a going concern. They are the only sea salt works still owned by the State, which means they have their own dock, used exclusively for salt loading⁶. What follows is an examination of the area’s historical evolution.

2.1. First uses of the lagoons

The amphorae and other remains found in the former loading dock at La Mata and at other archaeological sites in Torrevieja suggest that salt was being extracted from La Mata during the Roman era. Indeed, given the huge importance of the salt trade, ships are known to have anchored in the area surrounding Torrevieja for the sole purpose of loading up with salt since ancient times. The first known anchorage was at the mouth of the River Segura and dates from the Phoenician era. The second was at La Mata itself and is of Roman origin (García, 1991). However, it was in the medieval period that the lagoons really became important producers of salt, although they were subsequently to have quite different futures. It should

5 Any activity on the Valencia coastline required defence mechanisms against potential enemies, particularly corsairs, pirates and smugglers. Watchtowers played an essential role and were purposely located overlooking the sea. Their proliferation along the Valencia coastline gave rise to a general system of hierarchical defence. In an unusual event in history, military informers to Spanish monarchs often stressed the negative aspects of many areas that are now saturated by a tourism searching for the very same kind of landscape that in other times was so denigrated. For example, Juan Bautista Antonelli and Juan de Lacuna, engineers under Philip II, reported that “on a coast such as that of Valencia, so lacking in large natural ports, except for Denia, any outlying coastal crag, any small cliffs surrounded by sea, any cove protected from the Levantine winds was a place that had to be defended”. By 1585, in the Kingdom of Valencia 52 watchtowers had been built, including those of Torrevieja and La Mata.

6 The Torrevieja salt works are managed by the Spanish Finance Ministry, through the Directorate-General for Publicly Owned Assets.

be pointed out that the two lagoons were not joined and that they were exploited separately, until the feeder channel was built (1926-28) between the sea and La Mata, as well as the communication channel from La Mata to Torrevieja, which led to the two lagoons becoming a single entity in terms of salt extraction⁷.

In 1252, during the reign of Alfonso X, the first regulations on the salt trade appeared, in the Seven-Part Code. This established that all income from the salt works went to monarchs and emperors, who were in turn responsible for their maintenance (Iglesia, 1980). In 1273 Alfonso X granted the locals of Orihuela the privilege of helping themselves to salt supplies from the main salt works in the area, referring to Torrevieja. In 1283, Prince Sancho of Castile (later Sancho IV, 'the Brave') granted the Torrevieja salt works to the Council of Orihuela in perpetuity, on the condition that they could not be sold, pledged or exchanged. With this, the salt works at Torrevieja (not La Mata, which was excluded due to the rate of income it generated for the crown) ceased to form part of the monarchy's possessions, although they reverted to the crown in the middle of the eighteenth century, having undergone various other guises. In 1313, James II of Aragon granted Orihuela use of the natural port to the south of Cabo Cervera for shipping wheat, linen, salt and other products. It was close to the ancient tower known as Torre del Cortijo de las Salinas, later known as Torre Vieja. In order to defend this part of the coastline and the salt works, the Torre del Moro was built on Cabo Cervera to guard against raids from Algerian corsairs and pirates. For the same purpose, the tower at La Mata was rebuilt, on the site of a former Roman tower⁸.

In the Kingdom of Aragon, the extraction of salt, its distribution and the collection of the corresponding revenue were the privilege of the crown, as in many European states. In the Kingdom of Valencia, this privilege had been established by James I from the very moment of conquest. What was important for monarchy and subjects alike was to establish fixed prices, set proper boundaries, centralise taxation, control the dispatch of consignments, prevent tax fraud and stop salt entering the market from abroad or from privateers. At the end of the Middle Ages, the salt works at La Mata were providing income for the bailiwick of Orihuela-Alicante, which found it easier and safer to lease out the works than manage them directly. The lease was granted by public auction (Salvador, 1982: 280-282). As frontier land, the lagoons were not unaffected by clashes between Aragon and Castile. Peter I ('the Cruel') of Castile promised La Mata to his Genoese allies in return for their naval help against Aragon, but the Castilians were defeated, leaving the Genoese without their longed-for salt works. Meanwhile, Peter IV, 'the Ceremonious', donated La Mata in perpetuity to the Council of Orihuela in gratitude for the defence of the city as an ally of the Crown of Aragon.

7 As a result, La Mata was used as a warming lagoon, from where the salt-lye was transferred to the Torrevieja lagoon to be left to concentrate before extraction. In 1973, a third element was incorporated into the production chain which is of vital importance today: the *Cabezo de la Sal* or salt mound.

8 This tower was described in 1787 by military engineer Pedro Navas as follows: "It is located on the edge of the sea and looked after by the people who live from the salt works. It is circular in shape and has its entrance on the ground floor. For defence it has an eight-calibre bronze mounted cannon, 2 wall guards, 1 powder spoon, 1 wad hook and 82 balls." (Quoted by F. Rebollo, *Cronología de Torrevieja*).

2.2. Torrevieja's lagoon as a fish hatchery

The production capacity at La Mata (which along with the salt works in Ibiza was the greatest salt producer in Aragon) contrasted with the diminished production at the Torrevieja lagoon, where the loss of interest by the lease holders led the Council of Orihuela to transform the lagoon into an *albufera* to be used for fishing. Permission was requested from King John I, and the Parliament at Monzón authorised a channel to be opened (*el Acequión*), linking the lagoon with the sea to supply enough water for the fishing industry to develop. Plagued with setbacks and delays due to the high cost of opening the channel, there were two failed attempts, in 1407 and 1429 (Vilar, 1977). The channel was finally completed in 1482, at a length of 1,648 *varas* (between 1,200 and 1,500 metres). However, the problems did not end there: in 1500, following heavy storms, the lagoon was cut off from the sea, and repair work by the Council of Orihuela was not completed until 1509. However, the lagoon's main problem as a fishery was the high salinity of its waters, making it impossible for species to flourish. With such high running costs and its declining value as a fishery, the Torrevieja lagoon reverted to state ownership in 1759, which turned Torrevieja into the most predominant salt lagoon in the eighteenth century⁹.

At La Mata, meanwhile, the lagoon continued to be used for extracting salt, leased out under the monopoly of the crown. Most of the supply was for the kingdom itself, with only the surplus being exported, although by all accounts up to the second half of the fifteenth century La Mata did not produce a very high yield¹⁰. Up to that period, the salt works had been leased to local merchants, craftsmen or relatives of the local patriciate, such as the Masquefá family. However, this changed following the liberalising measures brought in by John II in 1460 in an attempt to increase exports. All ships were now allowed to load and transport salt, provided they did not belong to enemies of the crown. Captains, patrons and other officials had to swear an oath "*de mans e de boca*" ("of hands and of mouth") that their shipments were not bound for Genoa, which continued to be punished for helping the Castilians against Aragon. That said, in 1461 this did not prevent the very same king from granting permission to two Genoese merchants living in Valencia (Francesc Foderat and Gaspar Gavoto) to ship salt to Genoa and Savona (Hinojosa, 1993: 285). In 1465 the salt works of La Mata were leased by the Santángel family¹¹, converted Jews who had settled in Valencia (Hinojosa, 1992), and in 1480 Ferdinand II granted them the lease for life. The ties between this family and the Italian merchants living in Valencia (particularly the Genoese), strengthened the export of

9 By around 1758 the lagoon had dried up completely, giving the appearance of an enormous natural salt flat (Vilar, 1981: 622-623).

10 It is no coincidence that most of the contracts for the sale of salt, particularly for the largest sales, are documented from the 1480s onwards (Hinojosa, 1993: 284).

11 Luis de Santángel, the Younger (so called to differentiate him from his father, the Elder), was the first member of this family to lease the salt works at La Mata. Secretary to King Ferdinand II of Aragon, he was present at the Santa Fé capitulations in Granada, and participated in Christopher Columbus's venture with a loan of 140,000 *maravedíes* and a further 500,000 from financier friends and Andalusian and Genoese merchants. Some letters from Columbus were addressed directly to him. As a reward for his services, the king named him bailiff in perpetuity of Orihuela, where he remained until 1501. He was already lord of Redován and owner of the estate there. His relatives held the bailiwick of Orihuela until 1579 (Serrano, 1991).

salt from La Mata, as the Genoese had a greater interest than anyone in this trade, as the salt formed part of the cargo of ships returning from Flanders to Italy¹². As the world entered the modern age, the Genoese had firmly established their monopoly (Hinojosa, 1993: 289).

The growth of the salt industry triggered a demographic influx and economic expansion in the area, drawing people from el Campo de Salinas, Guardamar, Rojales and Campo de Cartagena. A population nucleus sprung up around La Mata made up of the salt production workers, and as time went on and the population increased, other activities began to emerge that conflicted with the salt works, threatening the unique environmental balance of the place. This led the authorities to announce protective measures, and in 1716 the governing body of the salt works decided to mark out the boundary of the lagoon to prevent any damage to be caused by farming in the nearby fields. This protective perimeter was progressively extended to safeguard the lagoon from the growing population. In 1758, Ferdinand VI ordered a new perimeter to be marked out around La Mata to prevent any farming on the land. In 1763 the marquis of Esquilache made provisions “inside its uncultivated land established in reserve and round in its circumference, so that rainwater may enter it clear and pure, and so the aforementioned salt works [La Mata] should not be altered nor the abundance and quality of the salts it produces be affected”. Another new boundary was established in 1892. At this time, the extraction method consisted of simply waiting for the lagoon water to evaporate, which occurred in spring and summer, when the banks of the lagoon would become encrusted with salt, which was then broken up with axes and other rudimentary tools to be transported by horse on routes known as “*caminales*”, along the bed of the lagoon itself¹³. The salt was loaded on the quay at the lagoon tower. Harvest yields were highly erratic, as they depended entirely on the weather.

2.3. Salter industry's growth

As we have seen, the attempt to turn the Torre Vieja lagoon into an *albufera* was a failure, and the project was abandoned in 1763 (Claravana, 1880: 367). However, the work carried out had altered the lagoon's physical nature and economic possibilities. The channel to the sea had enlarged the lagoon bed and increased its surface area, causing flooding of the surrounding land. This affected not only the brackish strip of halophyte vegetation, but also the neighbouring farmland¹⁴. These negative consequences were a counterpoint to the increased possibilities for salt production from the lagoon, which meant that La Mata, until now the dominant establishment, was overtaken by the salt works at Torre Vieja, which had better conditions in its estuary for anchorage and substantially cheaper haulage costs as it was closer to the coastline (Box, 2004: 377). This series of advantages, together with the definitive

12 As well as Genoa, other destinations for La Mata salt in the fifteenth and sixteenth centuries were Naples, Sicily and, sporadically, Rome and Florence.

13 Cavanilles commented of this method that “the only artifice that works on this item [salt] is nature, with no need of help from man other than for its extraction”.

14 This was denounced in a text from 1739, which stated: “and having turned said lagoon into an *albufera*, this has encroached upon all that was salt marsh before and upon a growing number of lands of various owners and all else that lies next to the whole of the circumference of said *albufera*, with great loss for their owners”. (Cited by Box, 2004: 377).

abandonment of the *albufera* project, meant that in 1802 the offices installed by the Royal Treasury at La Mata were transferred to the new operation on the site of the old Cabo Cervera salt works, which in turn led to the building of the village of Torrevieja.

It must be pointed out that the docks, quays and silos located in what is known as “Las Eras de la Sal” are strongly linked to the origin of Torrevieja and its subsequent urban expansion¹⁵. Work began in the last quarter of the eighteenth century, and this became the place where salt from the Torrevieja lagoon was loaded for shipment¹⁶. This singular example of port engineering was in use up to 1958, when loading was transferred to the west breakwater. Las Eras de la Sal was where the old salt loaders and storage areas (*las eras*) were located as a regulating depot for the mounds of salt as they were piled up. The storage facilities filled up at night with wagons brought by locomotives, and the salt was then loaded from the docks. The two existing docks were built at different times: the first, to the west, was built from 1777 during the reign of Charles III; the second, known as the east dock, was built at the beginning of the reign of Isabella II, between 1835 and 1841, with an investment of 36,000 copper *reales*. Finally, in the 1880s, a wooden structure was built on the east dock to increase its loading capacity. This structure, popularly known as the “*caballete de madera*” (“wooden trestle”), stood from 1898 to 1958, and included a railway that brought loaded wagons, from where the salt was tipped down chutes onto barges, which then set off for the tanker ships anchored in the bay. On the west dock metal wagons brought the salt from the depot and loaded the barges using revolving dumpers. The complex also included an administrative building, to the east of the smaller storage area. In 1795, the illustrious writer Montesinos recorded the various destinations of salt from Torrevieja, as well as stating how the dock was used by locals from Orihuela, Almoradí, Murcia and neighbouring areas to sell their wares, attracted by the presence of European traders, particularly those from Italy.

In 1803 the king approved the plan for the new town that was growing as a result of the flourishing salt trade, and it was given the name of Torrevieja. Initially the State was in control of the construction work, and in 1804 the necessary buildings for the administration and rooms for salt workers were built, including a chapel. These initial buildings disappeared as a result of the 1829 earthquake (Canales, 1995). The constant expansion of Torrevieja during the eighteenth century meant that, in the early nineteenth century, the administration office for the salt works was transferred from La Mata to Torrevieja. There were various reasons for the move: better anchorage for boats, a greater yield from the Torrevieja lagoon and, finally, the large investment required to repair the buildings at La Mata that had almost been destroyed by an earthquake (Costa, 1981: 402). Torrevieja succeeded in separating from the municipality of Orihuela, although its municipal boundaries were limited to just the built-up

15 Las Eras de la Sal and its docks were located next to where the tower stood that gave the town its name, which was knocked down following damage sustained during the earthquake that hit the town in 1829.

16 In 1792, Cavanilles visited Torrevieja and witnessed the work being carried out at las Eras de la Sal: “This [the quay] is almost in the centre of the inlet, and is a large construction ending in a small dock, all well paved and clean: around the square there is a wall, into which they tip the salt from an upper level, having been brought there in carts from the lagoon. The men loading the launches transport the salt to them from the square in baskets, and I believe it would be more advantageous to the Royal Treasury if they used wheelbarrows.” (Cited by Esteban, 2000: 53).

area. Torrevieja remained this way until 1957 when the current demarcation of its municipal territory was set out. The new town of Torrevieja did not escape the devastating effects of the earthquakes that periodically hit the Levant area of Spain, and in 1829 it was completely razed to the ground¹⁷. The engineer Larramendi was put in charge of the reconstruction project that same year, and he proposed that only the buildings needed to house salt workers should be built, thus preventing the area from becoming populated by smugglers, as had occurred earlier.¹⁸.

With the growth of Torrevieja's salt industry, a new port was needed. From the middle of the nineteenth century, this project became one of the most important economic aspirations of the inhabitants of the Bajo Segura area, as a solution to the loading problems for salt production and in order to introduce agricultural produce into the market, thus providing two good reasons for the new port: the importance of the salt works and the agricultural wealth of its area of influence (the Vega Baja del Segura) (Canales and Crespo, 1997: 73). The project to build the new port suffered constant delays and setbacks, until it was finally completed in the second half of the twentieth century¹⁹. The Port Law of 1880 did not include Torrevieja among the ports considered of general interest, causing local protest which led to the port's inclusion in the 1882 list of works of general interest of second order. With this, the State was now obliged to build the port itself. However, good intentions were not backed up by any budgetary assignments whatsoever; to the contrary, the State's financial insufficiency led to a return, in 1888, to the policy of private concessions to try to strengthen infrastructures, such as the Torrevieja port, that were awaiting investment. Following a series of failed attempts, the State recovered administrative control, although this did not spell the beginning of construction work. The facilities that existed for the first decades of the twentieth century were limited to the small general-purpose Minguer dock and another owned by the salt works for its shipments. It was considered essential to build a main breakwater as the bay of Torrevieja is open and boats could not remain there when the east winds blew too strongly. There were further delays until, in the 1940s, the State decided that work should begin, which was completed in 1963. Up to that point, salt had been loaded using the docks at Las Eras de la Sal.

17 From 15 January to 15 June 1829 60 earthquakes were recorded in the area. The major earthquakes on 21 March devastated several towns, including Torrevieja, where 32 deaths and 67 injuries were recorded. Part of the temple, a hermitage, two mills and 534 homes were destroyed.

18 Larramendi justified his recommendation of fewer buildings with the following arguments:

"The main purpose is the salt works; and the interests of the Royal Treasury seem to demand that no more houses than necessary be built and exclusively for those people employed in this important service. The town had become highly populated without there being land to farm or any industry, and neither is its situation advantageous for legal trade. No other stimulus is known for people to establish themselves here if it is not for smuggling. It seems to me, and R. Obispo is of the same opinion, that half the number of houses as before will suffice."

(Cited by Esteban, 2000: 53).

19 Thus several projects were carried out in the latter half of the nineteenth century. In 1860 a project was drawn up by the engineer Agustín Elcoro and work began in 1862, but the contract was cancelled a year later. In 1868 another project was designed, this time by Antonio María Jándenes, which was never approved. Other attempts also ended in failure. The only project that was actually undertaken, by Elcoro, was suspended due, it was claimed, to a lack of available stone, although the real reason was because of hostility from the nearby ports of Cartagena and Alicante, which felt threatened by the commercial importance that the Torrevieja port could acquire (Esteban, 2000: 54).

2.4. Stage of modernization of the salter exploitation

As the Torrevieja and La Mata lagoons were used for the extraction of salt, they were fully controlled by the State, and this was established by the Mine Law of 1859. The State leased them in 1897 to José Guardiola, and there followed a series of private leases, the last of which was signed in 1959 to La Nueva Compañía Arrendataria de las Salinas de Torrevieja, S. A., for a period of 30 years, which was then extended to 2001 as a consequence of the project known as El Pinós. This introduced a new system of extraction from the traditional methods of obtaining salt (Costa, 1981: 407). The methods at Torrevieja and La Mata lagoons had evolved by adapting to the prevailing circumstances, which led to technological innovations that greatly increased production. Salt has always been obtained by means of crystallisation. Writing of the traditional methods at La Mata, Cavanilles described how the product obtained was “a crust of salt at times as hard as marble itself, and the salt workers use axes to break them into pieces, which are then taken by horse along tracks known as *caminales* to the depots and storage areas”. The salt was loaded onto the ships at a quay of unknown age that gave La Mata dominance over Torrevieja (Box, 2004: 379).

Between 1841 and 1923 a number of innovations were introduced that lowered costs and improved product quality²⁰. The leasing company of the financier Salamanca (1841-46) implemented improvements that would be completed and perfected later under State management, establishing an extraction method that remained in place for more than half a century. The salt began to be collected by small boats, and was washed to eliminate impurities. Another great innovation was to ensure there was always a minimum amount of water in the lagoon; in winter it would be filled to around 80 centimetres so that, as the water evaporated over the months and the salt precipitated, by June or July the water would have sunk to a depth of 30 centimetres with a sheet of salt five centimetres thick at the bottom. To extract the salt, hooks called “*paletas*” or pallets were used by specialised workers (“*volvedores*” or turners) who tore out the fragments, which were collected by “*tiradores*” or throwers, who loaded the salt pieces into the boats. A new, much cheaper transport system had been devised – flotation. Trains of boats were driven across the lagoon to the dykes or channels next to the depots by boys using poles, where crews of “*llenadores*” or fillers would unload the salt and pile it in mounds before breaking up the fragments. The salt at this point contained many impurities (hence the name “red salt”), so was then washed using rakes and sieves in the lagoon water to remove the sludge. Over time a few improvements were added to the system up to 1922, but otherwise the process did not alter substantially. A floating cable was installed in the lagoon to help the boat trains ferry back and forth, a wooden dock was built for loading the salt and a new railway transported loads from the storage area to the dock. Four mechanical washers were installed at the dykes, where the salt was piled up into mounds at the exit.

The lease to Unión Salinera de España in 1923 marked a milestone in the extraction of salt at Torrevieja, as this was an experienced company that immediately proposed increasing

20 For a detailed description of the changes introduced in salt activity, see Box (2004) and Costa (1981).

production capacity and improving working conditions. In 1928, the salt works at La Mata (where a channel to the sea had been opened in 1907) were incorporated into the Torrevieja production and the two lagoons were connected by means of a channel 2.5 kilometres long. This allowed the Torrevieja lagoon to be fed with brine saturated in sodium chloride from La Mata, which required a pumping station to be installed in 1928. The salt extraction procedure was also modernised, replacing manual extraction with machines that used a sloping blade to cut out the fragments. The salt was then transported to a hopper, from where it was loaded into the boats. This system was mounted on floating tanks and was moved around by helmsmen using poles. By 1930 manual extraction had been completely replaced. With mechanisation the harvest period was brought forward and shortened, thus avoiding the catastrophic consequences the autumn storms had on harvests. The last major modifications from this period, which lasted up to 1951, involved the building of the eastern breakwater, which greatly improved loading conditions for the large ships.

When the Treasury opened the lease to tender in 1950, the intention was to make Torrevieja a modern and profitable establishment. To achieve this, it made the winning company commit to an ambitious project of modernisation and industrialisation, with State help. In 1951 the winning bid was submitted by La Nueva Compañía Arrendataria de las Salinas de Torrevieja, S. A. This firm was owned by Unión Salinera de España (the main shareholder, with a 63.5 per cent stake), Salinera Española, Salinera Gaditana and Aprovechamientos Salineros. The initial lease was for 30 years, which was later extended to 2001 as a result of the Pinoso project. From 1951, therefore, a major process of modernisation began, including improvements in the extraction process and transport both in and around the lagoon, installing electricity for all services, mechanising stockpiling process, changing the washing system and installing a factory for by-products. The State, meanwhile, spent six years building the west breakwater and loading dock, which were completed in 1958.

The growing needs of the Spanish national market for salt led the Treasury Ministry and the lease-holding company to design a project to transfer salt lyes from the Cabezo de la Sal in Pinoso to the Torrevieja lagoon so as to increase production capacity to a million tons. However, at this time any plans to expand production areas for sea salt (the only kind to be exported) was hampered by the volume of coastal land being developed for tourism, ruling out any future expansion of sea salt facilities. Studies from 1967 indicated that the diapiric outcrops at Pinoso were the most appropriate for transfer, for two reasons: they were relatively close, at only 50 kilometres, and they contained a large reserve of rock salt – around 500 million tons. Furthermore, the Cabezo was belonged to the State, which had awarded licences for the extraction of the salt from the site since ancient times, albeit in a very rudimentary way. The company at Torrevieja thus focused its interest on Pinoso, as it could provide high-quality lyes for a long time, and it went about acquiring the appropriate licenses. The project was approved by the Cabinet of Ministers in 1970 and by 1972 the infrastructures were in place (Costa, 1981: 409). The State provided 26 per cent of the funding and the remainder came from the company. The method used now obtains brine by dissolution, pumping water from wells drilled at la Partida del Rodriguillo (La Algueña) that provide a constant supply of water which, due to its high salinity, could not be used for any other purpose. Once all impurities are eliminated from the brine, it flows to a collector at the foot of the hill and into the

pipeline onto Torrevieja²¹. The pipeline pours the brine into the channel joining the Torrevieja and La Mata lagoons, where sluice gates regulate the amount of lye required. In this way, the saturation process is much quicker: whereas sea water has a salinity of around 30 grams per litre, the Pinoso brines can reach 300 grams per litre, with an initial concentration of 21.5° Bé, placing them nearer to saturation point than sea water (Costa, 1981: 410). The new procedure increased the collection period to eight months, as the precipitation and crystallisation of the salt occurs much more quickly. Extraction, transport and dispatch are managed just as they were previously²².

As regards the industrialisation process at the Torrevieja lagoons, until the beginning of the twentieth century only unaltered coarse salt was extracted and sold. With the introduction of newer, more industrialised processes, using specialised equipment and new systems, the salt could be transformed and sold in different ways and as different types. The current milling plant dates from the 1930s and replaced another that had been built prior to 1920. The new factory housed two types of mills: a steel Krupp mill that produced crushed salt and horizontal stone mills that produced a much finer grain. In the mid-1960s, a factory was opened to obtain dry salt for table use and which also produced other types of special salts, containing different additives depending on their planned use. This factory was complemented by the existing packaging plants and the loading warehouse. In 1956, a further set of buildings was built in the area surrounding the salt works for processing by-products. However, they closed in the 1960s as saturation of the Spanish market and pressure from Israeli production from the Dead Sea made such products unviable.

As for trading, the Spanish national market is once again a priority, as salt trades at higher prices here. However, as Spain produces more salt than it consumes, surplus production is exported, albeit at a lower price. In recent years the United States has become a major destination for Torrevieja salt, which is exported as return freight. The second largest importer is Italy, which buys the salt to supply a Sardinian electrochemical company. Other countries import Torrevieja salt in much smaller quantities, headed by Portugal, which uses the salt in its fisheries industry, along with Iceland and Canada. Only a few African countries import Torrevieja salt for domestic use.

To sum up, modernisation has transformed Torrevieja into Europe's largest salt producer, with production reaching up to a million tons per year (Box, 2004: 387)²³. By including the Cabezo de la Sal at Pinoso in the production system, the Torrevieja salt industry has become a hybrid model that is unique in the world (Costa 1981: 407). The salt works have suffered a somewhat haphazard business trajectory in recent years. Currently owned by the Unión Sal group, Spain's leading salt-producing company with operations in the Cabo de Gata nature reserve in Almería, the Puerto de Santa María nature reserve in Cadiz and the Torrelavega

21 The pipeline is made from steel and lined with fibre cement. It has a diameter of 45 centimetres, runs for 52.7 kilometres and has a maximum load of 22 litres per second.

22 Traditionally, all the salt trade was carried out by sea, with only very small amounts transported by land, mainly for national consumption. However, as land traffic increased, dispatch by road eventually took over from the railway as the main form of salt transportation.

23 The average gross production of salt between 1990 and 2002 was 616 metric tons (Celdrán and Azorín, 2004: 115).

salt works in Santander. Torrevieja is the company's largest site, providing 80 per cent gross of the group's production (Such, 2003: 51). In 1989 the Belgian multinational Solvay bought la Unión Salinera de España, S.A. (the Unión Sal group), including the State's share in the Torrevieja salt works. After seven years of direct management and disappointing results, Solvay sold its share to the French group Salins du Midi et de l'Est, which was later taken over by the American multinational Morton Salt, which in turn was acquired by the North American multinational Rohm Haas. The Salins group has since bought the share of Rohm Haas, which means that all the capital is now French-owned, making for one of the main producers of salt in Europe, with operations in France, Spain and Italy. In 2003, La Nueva Compañía Arrendataria de las Salinas de Torrevieja, of which Salins du Midi is the main shareholder, registered a net profit of between five and ten per cent, of which the State paid 2.5 million euros in royalties (Celdrán y Azorín, 2004: 109). The current leasing contract was signed in 1987, renewed in 1990, and will end in 2019. The salt works currently face an uncertain future, due to weaknesses that include the following: 1) The operation coexists alongside disproportionate human pressure, with facilities clustered around the extraction sites themselves. 2) The irrigated fields around the salt works inject fresh water into the lagoons, affecting their salinity. 3) Yields per surface unit are very low. 4) State ownership and the nature of a leasing contract limit investment possibilities. 5) National and international competition is very strong on the salt market, seriously threatening economic viability. These five problems still exist despite the advantages offered by the Torrevieja operation such as: its high export capacity, its location, the deep draught of its port, the high integration of the production cycle in comparison with other rival operations, the highly technical infrastructure, which has minimised costs and significantly increased productivity, and finally the guarantee of ongoing production from the Pinoso-Torrevieja brine pipeline, which has reduced climatic risks to a minimum (Such, 2003). Nevertheless, there is no doubt as to the value of maintaining operations at the Torrevieja-La Mata lagoons, as salt production guarantees the survival and viability of the nature reserve and, consequently, priceless environmental and cultural heritage. Thus, the lease-holder is obliged by a fixed clause in the contract to conserve the surface of the lagoons, without any modifications; it must also respect all ecological and scenic values; and it must collaborate with organised visits to the nature reserve (Such, 2003: 51). Salt production has, therefore, been transformed from a more or less profitable economic operation into an activity that is essential for the preservation of the nature reserve itself.

2.5. Tourist boom and sustainable development

Furthermore, the widely held conviction that conserving the environment is the best guarantee for continued tourism has meant that some resort towns pay much greater attention to the environment and its resources in their restructuring strategies. This stems from the crisis in the late 1980s that affected well-established sun-and-beach Mediterranean resorts, exposing the risk of undifferentiated, standardised tourism and the loss of competitiveness resulting from ecological deterioration and increased public awareness about the environment. Clearly, conservation of natural and cultural heritage needed to be improved, and there was a need to maximise the tourism potential, in terms of tourism, of resources that were being insufficiently or inappropriately managed. The emphasis was thus on making use of the land

as a resource and not just a device (Vera and Monfort, 1994: 35). This meant designing new products to differentiate tourism in the area and provide new attractions alongside conventional sun-and-beach options (Vera, 1997: 104). Environmental and cultural resources needed to be enhanced to promote new leisure practices and design more specific and original products. The environment and related cultural elements in the leisure and tourism industry provide interesting possibilities to meet current trends that are more demanding in terms of environmental quality, contact with nature and motivational diversity (Buendía and Colino, 2001). According to specialists, sun-and-beach resorts, which are aimed squarely at mass tourism, are showing major signs of exhaustion (Such, 2003: 48-49). As a priority, it is therefore essential to define a new model for the sustainable development of tourism and to undertake actions aimed at incorporating certain elements into the tourism products on offer in order to increase quality and diversity, contrary to the traditional practice of continued growth.

In this sense, there is great potential for a protected area formed by an endoreic depression, next to the coast and containing two lagoons stretching across Torrevieja, Guardamar del Segura and Los Montesinos. These wetlands are one of the Region of Valencia's protected natural areas and are classified as a nature reserve, covering a total surface area of 3,754 hectares: Torrevieja covers 1,400 and La Mata 700²⁴. The map in figure 1 shows these areas. The geographic singularity and ecological importance of the diverse flora and fauna found in and around the two lagoons make the need to conserve these wetlands abundantly clear. The area is an important habitat for more than a hundred species of birds that use the area as a place of rest on their annual migrations or as wintering and nesting places. The most common birds include the black-necked grebe, the flamingo, the shelduck and the Montagu's harrier. No less important is the vegetation that provides these birds with shelter, including hydrophilous and halophilous plant life, the importance of which is recognised by the EU (DM97/62/CE). This vegetation grows in highly visible groupings of reeds, rushes and salt marshes. Plants that are endemic to the south-east of the Iberian Peninsula include the *limonium caesium* and the *salsola genistoides*. Furthermore, the combination of water and vegetation make this a place of great beauty. Of course, this is not a natural area in the strict sense of the term, as humans have shaped the landscape since at least as far back as the Middle Ages, when the Torrevieja lagoon was opened to the sea to be used for fishing. More importantly, both lagoons have been used as salt works, which is the factor that has most influenced in the shaping of the area as we know it today and has also helped its survival, as the continued flooding ensures the survival of the wetlands.

It has been pointed out that the two lagoons and the radius of land around each one are State property and classed as heritage sites, and are therefore managed by the Cultural Heritage Commission, which leases them to private companies to be used to extract salt, which in turn are obliged to observe a number of conditions to preserve the ecological and scenic values of the area. Traditionally, the salt operation has shared use of the lagoons with other activities, such as hunting, particularly fishing (which is currently banned), farming and gra-

24 The two lagoons are located in Torrevieja and make up 28.25 per cent of its surface area. This figure increases to 35 per cent if we include the land surrounding the lagoons which can hold water when levels rise, and it can even be as high as 50.3 per cent when considering the whole nature reserve.

zing²⁵. However, added to this is the strong human pressure exerted by the density of tourist and residential growth that has taken place on the edge of the lagoons. This is the main negative impact that economic growth has brought to the area, and it has worsened considerably since the 1960s. The area is subjected to uncontrolled fly tipping and rubbish and rubble dumping, vegetation is trampled and eliminated, fires are started, and so on. All this has put huge pressure on the lagoons, and there is much dispute over the various uses made of them. In a perverse marketing ploy, property developers use this landscape as a selling point; the scenery is used as a backdrop to promote developments built on the edge of public property. With the coastline itself now fully built up, the lagoons have become a desirable location for property development, conflicting with the environmental and sustainable use of these spaces.



Figure 3
MAP OF THE TORREVIEJA-LA MATA NATURE RESERVE

25 Traditional activities in and around the Torrevieja lagoons are salt extraction, hunting (banned by the Master Plan for the Use and Management of the Nature Reserve), agriculture and grazing on the protected land circling the lagoons.

Tourism in Torrevieja has up to now been mainly what is classed as “intensive vacational”, the result of permissive town planning in favour of property development²⁶. This includes high-capacity residential tourist establishments that take over and dominate large portions of the landscape with disperse actions, contributing to its deterioration, high infrastructure costs and a squandering of natural resources. The residential component itself therefore becomes a defining element of a tourist development model that is based on the continuous construction of tourist properties, which is clearly incompatible with environmental quality, respect for natural heritage and the preservation of resources, due to their over-exploitation and the associated environmental problems (noise, visual pollution, beach erosion, alteration and destruction of natural habitats, generation of waste, etc.). This model also exerts serious pressure of use due to the growth in population, which increases six fold during the summer season, from 100,000 to 600,000 people. Along the 14 kilometres of Torrevieja’s coastline, only three small sections of coastline have not been developed – barely 2.5 kilometres, which indicates the magnitude of the town’s land occupation. Aside from this aspect, tourism in Torrevieja is not dynamic in economic terms. The strategy used up to now requires a profound rethink, and a new model established to attract tourists not only with greater purchasing power but also with greater environmental awareness. In short, it is a question of improving the environmental quality of the whole town and its image as a resort, by producing new options for tourists based on the recovery and sustainable management of the public use of natural areas, whereby conservation and tourism are mutually compatible (Such, 2003: 53).

The protected area of the Torrevieja-La Mata nature reserve lies right on the border of state-owned property boundaries, the town’s municipal territory limits and land classification systems. Despite such protection, it has clearly not been enough to safeguard the values of these wetlands. The Torrevieja-La Mata lagoons were added to the Region of Valencia’s protected natural areas in 1988, when they were declared a “natural site” (Law 5/1988, 24 June, on Natural Sites of the Region of Valencia). As well as being classed a Natural Protected Area, the lagoons were also included in the Catalogue of Wetlands, bringing additional protective measures. Furthermore, the wetlands were granted maximum protection for their high ecological value by the World Wildlife Fund. The lagoons are also classed as Wetlands of International Importance (Ramsar Convention, 1971) and as Special Protection Areas for Birds (DM 79/409/CE on Wild Birds). They have been included in the Nature 200 Network, following proposals to be considered Areas of Community Interest by the Regional Valencian Government (DM 92/43/CE on Natural Habitats and Wild Flora and Fauna). Law 11/94 on Natural Protected Areas, which establishes the type of protection to apply to such areas, ruled that permitted activities should include the traditional uses of farming, cattle rearing and forestry, as well as production systems that are compatible with the very reasons the areas were given protection in the first place. The programme envisages the establishment of itineraries and areas adapted or improved for use by naturalists, the creation of a reception and information centre, and a programme of visits and information campaigns. Plans have also been made to use these areas for environmentally aware leisure activities. All uses are

26 The occupation process began in the 1960s, when under the auspices of funding for town planning the first developments were built on the edge of the Torrevieja lagoon, a situation helped by the (very large) existing farm property and the low price of the land (Vera, 1987: 360).

to be geared towards scientific activities and nature conservation and interpretation, to make these uses compatible with other recreational or naturalist activities that pose no risk of environmental degradation and which involve only a passive use of the area, such as controlled walking or hiking. The declaration as a protected area included establishing a 500-metre protection zone around the perimeter of the lagoons, but classification as a nature reserve has not stopped adjacent plots of land from being developed, with the subsequent increase of urban and population pressure on the area. These actions have even led to vegetation being ploughed up and replaced by buildings or roads up to the very boundary of the reserve, making the protection perimeter effectively redundant as an impact buffer zone.

Similarly, the Management Plan and Public Use Project for the La Mata and Torrevieja Lagoons Nature Reserve (PGOU) is, along with the project to recover Las Eras de la Sal, the most emblematic part of the Integral Plan for Quality in Spanish Tourism (PCTE 2000). This plan focuses on the role of local authorities and on sustainable development, generating plans of excellence to recover and regenerate well-established or consolidated resorts by diversifying and enhancing tourist options. The PGOU focuses environmental protection on two areas: the north coast and the perimeter of the lagoons, where prescriptive plans are required to maintain or regenerate the natural ecosystem without affecting visitor access and enjoyment. The recommended protection measures for the lagoons include bringing a halt to all building work in the adjoining areas, imposing a strict control on poaching, and repopulating the area with autochthonous species. To date only the poaching has been successfully controlled. In the future, co-ordination is needed between authorities to agree on political actions affecting the area, specifically those relating to urban development and nature conservation in order to prevent the lagoons from being exploited by property developers who may wish to use the protected area and the existence of the natural park as an extra selling point for properties, as this would only mean greater urban pressure on the area.

As regards Las Eras de la Sal, due to the inauguration of the west breakwater in 1958 in the Torrevieja port, this plant was closed and left to deteriorate, particularly around the docks. However, this area did retain a seasonal function with the largest and oldest silo being converted into an auditorium for the International Competition of Habaneras Songs, as well as for other cultural events. In 1997, the docks were given over to the Torrevieja Town Council, which designed a project to turn these facilities, now part of Torrevieja's city centre, into a cultural space that will house the future Sea and Salt Museum, an auditorium and a promenade-viewpoint, among other possible open-air uses. This project initially led to recovery work on the buildings at Las Eras de la Sal where the main aim was to restore the docks and rebuild the wooden loading bay and the eastern quay's loading chute, installing steps up to the top of the structure in order to create an excellent scenic vantage point. This work has provided the town with one of its most singular features by respectfully combining the area's historical features with cultural and environmental recovery. A key element of Torrevieja's history has thus been successfully reclaimed, as a symbol of the activity that gave birth to the town. An activity which is still an integral part of Torrevieja's urban, port and maritime environment, within the context of the morphological and functional restructuring of the town's sea front and, consequently, the urban-tourism renovation process.

Another improvement regarding the public use of the lagoons is the refurbishment of the former railway station at Torrevieja as an interpretation centre, breathing new life into pre-

viously abandoned facilities. The Torrevieja-Albatera railway was opened in 1884 to transport salt freight, and in 1898 a rail road was built linking the Torrevieja-Albatera line to the salt works, while another narrow-gauge line linked the salt works with the loading quay. The railway station was operative until 1964 and covered 30,000 square metres and is now part of Torrevieja's Plan for Excellence in Tourism, which means that it can be used as cultural heritage. Once restored, the station was converted into a multi-purpose cultural centre which may also be combined with other initiatives that promote the public use of areas related to the salt works. Given its proximity, this centre could therefore be integrated with *el Acequi3n*, creating a link with the green cycle route along the disused railway tracks.

III. CONCLUSION

To conclude, there is no doubt that all the area's natural and cultural heritage referred to here should play an important role in the future of Torrevieja. It is a question of strengthening a high-quality environmentally-friendly tourism product, which helps people to discover and interpret cultural heritage and promotes environmental education, along the lines of the European Charter on Sustainable Tourism in Protected Areas (EUROPAC 1998). Until recently, the lagoons surrounded the town; today it is the town that surrounds the lagoons. Torrevieja's economic dynamism and the growth it has experienced over the past decades set a real challenge for the immediate future: how to integrate the environmental values of the nature reserve with the ongoing development of the town's tourism industry, in a way that both come out stronger as a result. Until now, Torrevieja has lived with its back to its own



Figure 4
AERIAL VIEW OF TORREVIEJA AND LA MATA LAGOONS

nature reserve. Now, these two areas need each other: on the one hand, the lagoons require the protection of the local and regional authorities so as not to succumb to the urban expansion and, on the other, the town needs the lagoons in order to define a clear symbol of quality and thus strengthen its identity. Any irreversible alteration to the protected area would cause emotional, cultural and economic losses with serious repercussions.

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