

# Salinas mediterráneas: la necesidad de mejorar los frágiles recursos ecológicos y culturales en Portugal

## Mediterranean saltscapes: the need to enhance fragile ecological and cultural resources in Portugal

**CARLOS BALSAS**

### Resumen

Los paisajes de la sal son lugares singulares con una urgente necesidad de una política pública integrada y de atención académica. Los paisajes de la sal mediterráneos son lugares de producción antiguos ubicados principalmente en los estuarios y en la proximidad de las ciudades. Su frágil naturaleza, su transformación ecológica y cultural, principalmente como consecuencia de los procesos de reestructuración global, han llevado a la implementación de medidas específicas orientadas a la preservación y salvaguardia de las salinas como depósitos de paradigmas artesanales, ecológicos y socioeconómicos. Examinó estudios previos sobre el tema e intento de ilustrar el valor ecológico de salinas, la preeminencia cultural y el potencial turístico con ejemplos de Portugal, donde las condiciones climáticas durante el verano son bastante favorables a la cosecha de sal a través de la evaporación. Sostengo que muchas de estas salinas solares han sido amenazadas por transformaciones económicas globales, cambios en patrones de empleo, tecnologías laboriosas, estilos de vida y la invasión de la urbanización, potencialmente conduciendo a su destrucción insustituible si la planificación colaborativa entre las partes interesadas no ocurre o no es completamente aceptada.

### Palabras clave

Mediterráneo, Salinas, Paisaje, Planificación, Patrimonio cultural, Portugal.

### Abstract

Saltscapes are remarkable places in need of integrated public policy and scholarly attention. Mediterranean saltscapes are ancient production places located mostly in estuaries and within relative proximity of cities. Their fragile nature, ecological and cultural transformation, mostly as a consequence of global restructuring processes, has led to the implementation of specific measures aimed at the preservation and safeguarding of salinas as repositories of artisanal, ecological and socio-economic paradigms. I examine previous scholarship on the subject and attempt to illustrate salinas ecological value, cultural preeminence and tourism potential with examples from Portugal, where climatic conditions during the summer are quite favorable to the harvesting of salt through evaporation. I argue that many of these solar salinas have been threatened by global economic transformations, changes in employment patterns, laboring technologies, lifestyles and the encroachment of urbanization, potentially leading to their irreplaceable destruction if collaborative planning among stakeholders does not occur or is not fully embraced.

### Keywords

Mediterranean, Saltscapes, Landscape, Planning, Patrimonial Heritage, Portugal.

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## Lágrima de Preta

Encontrei uma preta / que estava a chorar,  
pedi-lhe uma lágrima / para a analisar.  
(...)

Ensaiei a frio, / experimentei ao lume,  
de todas as vezes / deu-me o que é costume:  
Nem sinais de negro, / nem vestígios de ódio.  
Água (quase tudo) / e cloreto de sódio.

ANTÓNIO GEDEÃO

## Introduction

Saltscapes are remarkable places in need of integrated public policy and scholarly attention. Mediterranean saltscapes are ancient production places located mostly in estuaries and within relative proximity of cities. Their fragile nature, ecological and cultural transformation, mostly as a consequence of global restructuring processes, has led to the implementation of specific measures aimed at the preservation and safeguarding of salinas as repositories of artisanal, ecological and socio-economic paradigms<sup>1</sup>. This paper aims to review and analyze the evolution, role and pertinence of Mediterranean saltscapes.

The Mediterranean comprises countries in both southern Europe, the middle-east and north-Africa. According to Crisman there were more than 170 salinas in 18 Mediterranean countries. Of the 90 active salinas in 1998, approximately 75% were located in northern and central Mediterranean countries. According to the same author, Spain, Greece, Italy, France and Portugal constituted approximately 77% and salinas complexes ranged in size from 1-12,000 hectares, while the remaining countries had fewer than 10 active salinas each.<sup>2</sup>

I examine previous scholarship on the subject and attempt to illustrate salinas ecological value, cultural preeminence and tourism potential with examples from Portugal, where climatic conditions during the summer are quite favorable to the harvesting of salt through evaporation.<sup>3</sup> I argue that many of these solar salinas have been threatened by global economic transformations, changes in employment patterns, laboring technologies, lifestyles and the encroachment of urbanization, potentially leading to their irreplaceable destruction if collaborative planning among stakeholders does not occur or is not fully embraced.

Fortunately, committed city planning tendencies in southern Europe, such as the sustainable city, the creative city and the slow city movement have contributed towards a resurgence of attention to these environmentally sensitive and culturally rich places. The research methods included visits to Iberian saltworks, *in loco* documentation through pictures, archival research and public policy consultations, semi-structured interviews with elected officials, landscape architects, planners and salt-related exhibit curators at Portuguese museums.

Saltscapes have not received as much scholarly attention as their aesthetic counterparts basically due to their fundamental location, design and operational differences. Saltscapes are for the most part working places where the ruthless rigors of physical exigency are easily observable during the harvesting season, while aesthetic landscapes are designed to produce feelings of harmony, beauty and candor in all those who are able to delight in their midst. Furthermore, saltscapes are usually quite transparent, unobstructed and uniform places of production, while gardens and small parks are thought out mostly for promenading and serendipitously enjoyment of ecological features such as trees, lush manicured shrubbery and water.

1 Balsas, Carlos; Kotval, Zenia & Mullin, John. 2000. Historic preservation in waterfront communities in Portugal and the USA, *Portuguese Studies Review* 8(1): 40-61.

2 Crisman, Thomas. "Conservation of Mediterranean coastal saline ecosystems: The private sector role in maintaining ecological function" (pp. 39-48). In: Korovessis, Nicholas & Themistokles Lekkas. Eds. *Saltworks: Preserving saline coastal ecosystems – Proceedings of the Post-Conference Symposium of the 6th International Conference on Environmental Science and Technology*, Athens, 2000, p.40.

3 Rau, Virginia. *Estudos sobre a História do Sal Português*. (Lisbon: Editorial Presença, 1984).

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- 4 Multhauf, Robert. *Neptune's Gift: A history of common salt*. (Baltimore: Johns Hopkins University Press, 1978). Laszlo, Pierre. *Salt: Grain of life*. (New York: Columbia University Press, 2001). Kurlansky, Mark. *Salt: A world history*. (New York: Penguin, 2003).
- 5 Crisman, Thomas. "Conservation of Mediterranean coastal saline ecosystems: The private sector role in maintaining ecological function" (pp. 39-48). In: Korovessis, Nicholas and Themistokles Lekkas. Eds. *Saltworks: Preserving saline coastal ecosystems – Proceedings of the Post-Conference Symposium of the 6th International Conference on Environmental Science and Technology*, Athens. 2000. Petanidou, Theodora. "The postmodern saline landscape in Greece and the European Mediterranean: Salinas for salt or what?" (pp. 67-80). In: Korovessis, Nicholas and Themistokles Lekkas. Eds. *Saltworks: Preserving saline coastal ecosystems – Proceedings of the Post-Conference Symposium of the 6th International Conference on Environmental Science and Technology*, Athens, 2000. Neves, Renato. "Figueira da Foz – organization and evolution of salinas on the Mondego Estuary" (pp. 45-47). In: Neves, Renato; Theodora petanidou, Rui Rufino & Sonia Pinto. Eds. *ALAS – All About Salt; Salt and salinas in the Mediterranean*. (Figueira da Foz: Intermezzo, 2004). Hueso, Katia & Petanidou, Theodora. "Cultural Aspects of Mediterranean Salinas" (pp.213-226). In: Papayannis, Thymio & Dave Pritchard. Eds. *Culture and Wetlands in the Mediterranean: An Evolving Story*. (Athens: Med-INA, 2011).
- 6 Fortuna, Carlos. "Novos trilhos da cultura: Como não falar de cidade?" (pp.273-280). In: Santos, Maria & Pais, José. *Novos Trilhos Culturais – Práticas e Políticas*. (Lisbon: Imprensa de Ciências Sociais, 2010).
- 7 Pregill, Philip & Volkman, Nancy. *Landscapes in History: Design and planning in the eastern and western traditions*. (New York: John Wiley, 1999). Andresen, Maria. *Para a Crítica da Paisagem*. (Unpublished Ph.D. Dissertation, University of Aveiro. Aveiro, 1992).
- 8 Greenbie, Barrie. *Spaces – Dimensions of the human landscape*. (New Haven: Yale University Press, 1981).
- 9 Antrop, Marc. "A brief history of landscape research" (pp.12-22). In: Howard, Peter; Ian Thompson, Emma Waterton. Eds. *The Routledge Companion to Landscape Studies*. (New York: Routledge, 2013).

Despite the traditional economic and cultural importance of salt, saltscapes have been relatively neglected areas of investigation within landscape research. *Neptune's Gift* (1978), *Salt: Grain of life* (2001), *Salt: A world history* (2003) are three seminal books on the archeology, history of salt production, commercialization developments, and the socio-economic impacts of salt in modern economies in the western world.<sup>4</sup> These books tend to lump together mineral salt with salt produced in solar salterns. More recently, multiple edited volumes gathering the contributions of international specialists, mostly from southern Europe, have also been edited.<sup>5</sup> Quite often these collections have resulted from collaborative efforts by networks of site producing regions under the aegis of the European Union or other international organizations, which have contributed to a resurgence of attention to the broad theme of saltscapes in the Mediterranean. This resurgence has had mostly positive and visible impacts, with the reactivation of old salinas, a limited growth in salt-related jobs, increases in salt production and changes in legislation to link nature conservation to the preservation of cultural heritage and the commercialization of different types of salt.<sup>6</sup>

This paper contributes to an under-researched area of landscape planning. The findings ought to be useful to professionals and academics in landscape studies, heritage preservation, tourism planning, and alternative community economic development practices. This paper has four parts. Part one places saltscapes within the context of broader landscape studies. Part two characterizes the inner-workings of saltscapes by identifying their commonalities and a few subtle differences. Part three highlights examples from the Mondego saltscapes in the littoral city of Figueira da Foz and from Castro Marim and Vila Real de Santo António in the Guadiana estuary of the southern Portuguese coast of Algarve. Finally, part four presents some concluding remarks.

## Saltscapes Within the Context of Broader Landscape Studies

### Landscape planning

Landscape studies on multiple aspects of wetlands, marshes, estuaries, biodiversity, habitat preservation and conservation have been produced in the 2000s and the state of the art has advanced by leaps and bounds with the advent of professional specializations in environmental planning, landscape ecology, and historic and cultural heritage preservation.<sup>7</sup> Cities located on river estuaries have a special appreciation for the insurmountable value of adjacent natural and symbiotic ecosystems.<sup>8</sup> This was not always the case. In a not too distant era, centrally located riverfronts were utilized mostly for active harbor and harbor-related functions, while more recondite locations usually supported less valuable and less water-intensive uses, such as storage, warehousing, ship-repair and shipbuilding activities. Saltscapes are usually distant enough from urban areas but relatively proximate to benefit from a pool of readily available labor force, economies of agglomeration, and the power of markets.

Landscape studies have emerged via the design, geographical, planning and more recently ecological and cultural anthropology arts and sciences. In the early twentieth century, Paul Vidal de la Blache (1845–1918) advocated a historic and humanistic approach to the landscape. He also recognized the importance of the local community in organizing the landscape leading to regional differentiation based on natural conditions and cultures.<sup>9</sup> Aldo Leopold (1887–1948) proposed a resurgence of environmental awareness just before WWII. He defended a land ethic approach based on the idea that "a thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends

otherwise".<sup>10</sup> More recently, Ian McHarg's (1920-2001) ecological planning method utilized a rational approach to understanding the natural characteristics, assets and constraints of ecological systems in order to map and preserve physiographic landforms and innate functions of ecosystems. In McHarg's analysis, hydrology, soils, slopes, plant associations, wildlife, human activities, degrees of compatibility and suitability of uses were utilized to identify and propose optimum land-uses and alternative development or preservation scenarios.<sup>11</sup>

Table 1. shows a set of professional practices involving landscape studies and how slightly different approaches to landscape planning have tended to privilege not only design techniques but also to integrate environmental factors, scale and systems thinking in the interpretation of natural and urban contexts.<sup>12</sup> Environmental planning in the western world emerged mainly in the 1960s and 1970s with the intent of protecting the natural environment by codifying into law the basic rules, procedures and standards needed to assure high levels of environmental integrity from public health, environmental conservation, societal welfare and natural and built-up perspectives. On the other hand, landscape architecture developed and grew as an autonomous discipline centered on the design of places from aesthetical viewpoints. On the other hand, Landscape ecology has been suggested as multidisciplinary attempts at linking together ecological and environmental goals with the basic tenets of landscape architecture and environmental planning.

Whereas landscape architecture has focused on the design of gardens and parks, landscape ecology has attempted to strengthen simultaneously the ecological and aesthetic functions of systems and places. This was accomplished in many cases not only by designing the landscape but also by augmenting the innate characteristics of natural and man-made systems. Notions of ecological value as well as of carrying capacity of (natural) systems have tended to supersede notions of beauty, human harmony and aesthetic value. It has been argued that landscape ecology needs two pre-requisites in order to be effective in producing appropriate knowledge for landscape development processes: a valuation component and suitability for use in collaborative decision-making on a local scale.<sup>13</sup>

More recently, landscape urbanism has gained preeminence in both the U.S. and Europe as a more active utilization of design and restorative principles applied to urban systems and metabolic functions, which also signals a landscape thinking instead of the more traditional site planning approaches. In Waldheim's interpretation, "landscape urbanist practices evolved to occupy a void created by urban planning's shift toward a social-science model and away from physical design over the past half century".<sup>14</sup> Furthermore, landscape has also had an important role in smoothing and absorbing impacts caused by reindustrialization processes. Landscape has thus become relevant "to remediate, redeem, and reintegrate" new urbanization tendencies.<sup>15</sup> Interesting examples of sustainable urbanism include for instance the daylighting of rivers, ambitious stream restoration projects, and the conversion of underutilized land into parks.

In general, landscape science refers to the above disciplines of landscape research. Landscape has therefore acquired multiple meanings and subtle interpretations, which transcend the scope of this paper. In the context of saltscapes, watershed and coastal management are quite central to professional practice due to their holistic relevance of for instance having multiple jurisdictions coordinate their land use and environmental protection strategies. The ecological unit of the watershed supersedes the individual boundaries of each administrative jurisdiction.<sup>16</sup> A critical mass emerges from various collective actions and from the work of various stakeholders who have to coordinate their interventions in order to obtain funding

10 Leopold (1949) cited by Marcucci, Daniel; Brinkley, James; & Lauren Jordan. 2012. A Case for Coastal Theory with Lessons from Planning Theory. *Coastal Management* 40: 401–420.

11 Mcharg, Ian. *Design with Nature*. (New York: John Wiley and Sons, 1992).

12 Pearlman, Dan & Milder, Jeffrey. *Practical Ecology for Planners. Developers, and Citizens*. (Washington: Island Press, 2005).

13 Termorshuizen, Jolande & Opdam, Paul. 2009. Landscape services as a bridge between landscape ecology and sustainable development. *Landscape Ecology* 24: 1037–1052, p.1037.

14 Waldheim, Charles. *Landscape as Urbanism: A general theory*. (Princeton: Princeton University Press, 2016, p.4).

15 *Ibid.*, p.5.

16 Mckinney, Matthew & Johnson, Shawn. *Working Across Boundaries, People, Nature, and Regions*. (Cambridge: The Lincoln Institute of Land Policy, 2009). Magalhães, Manuela. *A Arquitectura Paisagista - morfologia e complexidade*. (Lisbon: Editorial Estampa, 2001).

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and implement technical solutions. Water run-off and the mixing of domestic and rain-water effluents for instance tends to cause overflow problems that can impact negatively estuaries and aquatic habitats. In addition, there is also the possibility of contamination of water bodies due to the use of too many pesticides and fertilizers in upstream locations.

Table 1. Professional Practices Contextual to Saltscapes

	<b>Landscape architecture</b>	<b>Environmental planning</b>	<b>Landscape ecology</b>	<b>Landscape urbanism</b>
<b>Motivation</b>	The use of design techniques to mold the natural qualities of landscape dynamics	Protection of environmental elements by stipulating rules and setting standards	To apply ecological thinking to preserve the role of natural elements and systems	To utilize land(scape) as a support for development whilst conciliating the environmental, socio-economic dimensions of natural and man-made systems
<b>Main elements</b>	Artistic endeavors, maintenance of basic (eco) systems, site design efforts	Air, water, soil, noise and their quality, habitat preservation, flood protection	Emphasis on the articulation of various procedural elements and the minimization of the impact of human activities on fauna and flora	Urban densities, trade-offs among key dimensions of natural and human systems with stronger roles for environmental, economic and social spheres
<b>Policy dimensions</b>	Design elements (plants, trees, water, topography, hard surfaces, stones, etc.) for functional purposes	Elimination of material damages, comprehensive planning, environmental impact studies	Natural preserves, visual survey analysis, continuities, vistas, resource management, greenway planning	Urban transect sustainable urbanism, form-based codes, connectivity, energy conservation, compactness, completeness and connectedness
<b>Results</b>	Gardens, parks, ecological networks, promenades	Standards, regulations, guidelines, ordinances, plans, studies	Habitat inventories, conservation models and methodologies, undamming of rivers and streams	Regenerative practices, brownfield redevelopment, landfill conversions, sustainable neighborhoods, natural flood protection techniques

***Landscape protection***

The category of landscape has evolved over the years with different national regulatory environments crafting their own definitions, methods and protection levels and/or adopting those proposed and agreed upon by supra-national entities. The 1972 RAMSAR wetlands convention was one of the first attempts at protecting fragile wetlands and associated habitats. This was followed by an initial categorization of landscapes created by the International Union for the Conservation of Nature (IUCN) in 1978. The category of “protected landscape” was proposed then and in 1994 it was changed to the notion of “protected area”, which was defined as “land and/or sea especially dedicated to the protection and maintenance of biological diversity and of natural and associated cultural resources, and managed through legal or other effective means”.<sup>17</sup> The major change from 1978 to 1994 was the replacement of the concept of protected landscape with the concept of protected landscape/seascape. Seascape was meant to include a mix of land and sea – an

17 Phillips, Adrian. *Management Guidelines for IUCN Category V Areas: Protected Landscapes/Seascapes*. (Gland: IUCN, 2002).

archipelago, islands and peninsulas. The broadening of the protection level equates what nowadays is known as coastal zone management. Marcucci et al. have even advocated that coastal management ought to be a distinct field with its own set of practices, theories and epistemologies of knowledge communities.<sup>18</sup>

In addition, since 1992 cultural landscapes can be listed by UNESCO as World Heritage according to this definition:

“combined works of nature and of man [and which] are illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal”.<sup>19</sup>

Saltsclapes have benefited from both a higher awareness of seascape protection levels and from a more encompassing interpretation and recognition of cultural values, norms and traditions. Saltsclapes are “composed of a series of successive ponds with decreasing depths, delimited and protected by dykes, which are subject to water regulation and evaporation for salt production”.<sup>20</sup>

The work of Forman centered on a mosaic theory with constitutive elements (e.g. patches, boundaries, edges, corridors, streams, wind and water flows) can be applied to the study of solar saltsclapes.<sup>21</sup> This man-made structures in river estuaries can be analyzed according to their foundational blocks and applied knowledge of salt production. On one hand, the location of saltsclapes, in many cases in recondite places only accessible by boat, together with their different sizes and functional hierarchies exemplify landscape design principles at their finest. On the other hand, the salt making techniques of human raking of salt ponds (before mechanization) and the use of gravitational force to produce different qualities of salt (i.e. fine or coarse salt for culinary uses, *fleur du sel*, etc.) are demonstrative of ancient productive techniques likely to disappear if further action is not timely taken by appropriate governmental authorities.

Sassen has recently observed that current professional practices have not been sufficient to safeguard the value of fragile aquatic ecosystems. In her opinion, our current professional practices have enabled and helped to deliver the Anthropocene – “the age marked by major impact on the environment” and the outcome has been dead land, dead water.<sup>22</sup> Furthermore, we still have plenty of so-called sustainable landscape planning research and biophilic laws that neglect fragile saltsclapes and have failed to create landscape metrics to account for the preservation of these invaluable resources.<sup>23</sup> When considered within a perspective of hypoxia and eutrophication, sea level rise, biodiversity losses, clinically dead coastal zones, and above all climate change and global warming phenomena, it is obvious that additional public policy leadership on saltscape protection is needed.<sup>24</sup>

## Mediterranean Saltsclapes

Mediterranean saltsclapes are located mostly in the estuaries of the important rivers identified in Table 2. Their extension, tidal waters and good accessibility from the river banks have facilitated the growth of salt production since ancient times.<sup>25</sup> Although a detailed data inventory is incomplete, Crisman has argued that there is an estimated 28,500 square kilometer of Mediterranean wetlands.<sup>26</sup> Furthermore, the same author has claimed that the RAMSAR Bureau has identified five coastal systems in the Mediterranean Basin: (1) estuarine waters; (2) intertidal mud, sand and salt flats; (3) intertidal marshes; (4) brackish saline lagoons; and (5) fresh water lagoons and marshes in the coastal zone including deltaic systems. Many of these wetlands still have or have had salinas within their boundaries. On the other hand, according to Vaya and Kortekaas, “inland salinas can be considered a typical

- 18 Marcucci, Daniel; Brinkley, James; & Lauren Jordan. 2012. A Case for Coastal Theory with Lessons from Planning Theory. *Coastal Management* 40: 401–420.
- 19 Antrop, Marc. “A brief history of landscape research” (pp.12-22). In: Howard, P., Thompson, I. & Waterton, E. (Eds.) *The Routledge Companion to Landscape Studies*. (New York: Routledge, 2013, p.18).
- 20 Vieira, Natividade & Bio, Ana. 2014. Artisanal Salina – unique wetland habitats worth preserving. *Journal of Marine Science Research Development* 4(1): 1000e125, p.1.
- 21 Forman, Richard. *Land Mosaics: The Ecology of Landscapes and Regions*. (Cambridge. Cambridge University Press, 1996).
- 22 Sassen, Saskia. *Expulsions: Brutality and complexity in the global economy*. (Cambridge: The Belknap Press of Harvard University Press, 2014, p. 149).
- 23 Brown, James. 2016. Biophilic Laws: Planning for cities with nature. *Virginia Environmental Law Journal*, 34: 52-121.
- 24 Wong, Poh; Losada, Iñigo; Gattuso, Jean-Pierre; Hinkel, Jochen; Khattabi, Abdellatif; McInnes, Kathleen; Saito, Yoshiki & Sallenger, Asbury. “Coastal systems and low-lying areas” (pp. 361-409). In: Robert Nicholls & Filipe Santos. Eds. *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. (Cambridge: Cambridge University Press, 2014).
- 25 Grove, Alfred & Rackham, Oliver. *The Nature of Mediterranean Europe: An ecological history*. (New Haven: Yale University Press, 2001).
- 26 Crisman, Thomas. “Conservation of Mediterranean coastal saline ecosystems: The private sector role in maintaining ecological function” (pp. 39-48). In: Korovessis, Nicholas and Themistokles Lekkas. Eds. *Saltworks: Preserving saline coastal ecosystems – Proceedings of the Post-Conference Symposium of the 6th International Conference on Environmental Science and Technology*, Athens, 2000, p. 39.

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Iberian phenomenon” with remains of over 500 solar evaporation salt making sites located away from the sea.<sup>27</sup> Greek islands also have a rich salinas patrimonial heritage outside of large estuaries.

River deltas are among the most productive ecosystems in the world. Salt marshes have an abundant quantity of both salt water flowing from the ocean and sedimentary water flowing downstream toward one of the most splendid and connected systems on the planet.<sup>28</sup> Saltscapes are adapted natural systems that encapsulate altered aquatic spaces with the explicit intent of harvesting salt through solar evaporation. Sea salt ponds in estuaries are production landscapes adapted by human creative capacity to align the limitless power of the sun with the abundant existence of sea water in a complex process comprising evaporation, geochemical reactions, manual intensive labor and immemorial cultural practices, which have withstood the test of time by taking advantage of some of the most fundamental laws of nature.

Table 2. Mediterranean river estuaries with important saltwork sites<sup>29</sup>

Country	River estuary
Portugal	Tejo, Sado, Mondego, Vouga, and Douro
Spain	Guadalquivir, Júcar, and Ebro
France	Rhone
Italy	Tevere and Po
Egypt	Nile
Greece	Axios, Acheloos, and Acheron

Salt production by evaporation of seawater was a method commonly found in many parts of the world besides the Mediterranean, including in the Americas, Africa and Asia. Production of sea salt in 19<sup>th</sup> century New England is well explained by Meyer with examples from southeastern Massachusetts and central New York.<sup>30</sup> Brigand and Weller have recently edited a volume on salt production in multiple parts of the world since immemorial times.<sup>31</sup> In Europe, salt production through solar evaporation was introduced by the Phoenicians in the IX<sup>th</sup> century BC. The Roman Empire preserved this production technique and used salt to preserve food, mostly fish and meat. Such practice was continuously used until the invention of electricity in the XIX<sup>th</sup> century. Cod caught in the Nordic and gelid coasts of Europe and north-America was transported to Portugal only to be cleaned, sun dried, salted and later on commercialized. While such practices are not as intense as in earlier decades mostly due to imports of fish from other parts of the world, the longing for traditional dishes, culinary habits and cultural tastes has survived and maintained the need for sea salt in food confection and to a less extent also in food preservation.

Salt also exists in massive deposits deep inside the earth and its extraction is relatively similar to the mining of other mineral resources. In cold climates, salt is used to de-ice roads and highways during the winter months. Although such practices are well established, the impacts on the road infrastructure are also easily visible with the rusting and corrosion of concrete and metal-based transportation infrastructure. Furthermore, such extractive process encapsulates a unidirectional exploitative human activity and its assurance is relatively limited to the existence of the finite mineral reserves. On the other hand, solar salt production illustrates a model based on renewable and more natural processes. Although salt production occurs nowadays in much larger industrial complexes in coastal locations near the Equator, there has been a renewed interest in artisanal salt production in southern European countries. Salt also has medicinal uses, with salt baths and spa treatments utilizing it to rejuvenate the human body and rebalance pH levels.

- 27 Vaya, Jesus & Kortekaas, Katia. 2014. Saltscapes's products and services, one model for rural sustainable development. *XII Congreso Nacional del Medio Ambiente (CONAMA)*. Madrid, Spain, November 24-27. <http://www.conama11.vsf.es/conama10/download/files/conama2014/CT%202014/1896711551.pdf>. p.5 (accessed May 25, 2016).
- 28 Parisopoulo, George. "Water management challenges in the Mediterranean: Past, present and future past, present and future" (pp.237-249). In: Papayannis, Thymio & Dave Pritchard. Eds. *Culture and Wetlands in the Mediterranean: An Evolving Story*. (Athens: Med-INA, 2011).
- 29 Adapted from Petanidou, Theodora. "The postmodern saline landscape in Greece and the European Mediterranean: Salinas for salt or what?" (pp. 67-80). In: Korovessis, Nicholas & Themistokles Lekkas. Eds. *Saltworks: Preserving saline coastal ecosystems – Proceedings of the Post-Conference Symposium of the 6th International Conference on Environmental Science and Technology*, Athens, 2000, p.70.
- 30 Meyer, William. 2013. The Making and Unmaking of a Natural Resource: The salt industry of coastal southeastern Massachusetts. *Massachusetts Historical Review* 15: 123-150. Meyer, William. 2005. Why Did Syracuse Manufacture Solar Salt? *New York History* 86(2): 195-209.
- 31 Brigand, Robin & Weller, Olivier – Eds. *Archaeology of Salt: Approaching an invisible past*. (Leiden: Sidestone Press, 2015).

Many salt ponds in coastal locations have been abandoned, left to decay and collapse due to changes in the scale of fabrication, technological advances, and lack of workforce willing to endure the rigors of manual labor needed to operate small artisanal salt pans. Many saline wetlands have been drained, desiccated to eliminate plagues, landfilled and transformed into pastures.<sup>32</sup> The filling of abandoned salt ponds has occurred mostly as economic solutions in attempts to create new land for other uses. Fortunately the generalized closing of salinas has been avoided in a myriad of places due to the actions of ecologically minded elected officials and non-profit organizations who have recognized the exceptional value of such saltscapes (not only salt pans but also wooden warehouses utilized to temporarily store salt). Saltscapes are also part of natural preserves and quite often within the boundaries of ecological sanctuaries that serve as nidification habitats for migratory birds and other avifauna, including cranes, flamingos and pelicans.<sup>33</sup>

Saltscapes have different property ownership structures depending on where they are located. Many of the salt ponds are owned by private individuals, others by cooperatives, and many others by public non-profit entities under the ownership of municipalities and harbor authorities. Due to their location in easily flooded areas, these fragile places are subjected to a high number of regulations, including flood control and prevention, marine protected areas and marine parks, non-*ædificandi* zoning regulations, and canal space for utility lines.<sup>34</sup> According to Vaya and Kortekaas, recent legislation in Spain, Portugal and France have introduced changes “to allow salt makers to benchmark themselves. However little is regulated on how artisanal traditional or hand-harvested salt should actually be produced”.<sup>35</sup> Attempts are also being made to create certifications of origin across Europe.<sup>36</sup>

## Saltscapes in Portugal

Before analyzing the case studies, it is important to place them within the analytical framework introduced above. As such, we ought to distinguish two categories of landscapes: aesthetic and working. Table 3. shows examples of these landscapes with two subcategories each depending on their locations (coastal vs. inland), ecological value (low vs. high), and system-base production types (land vs. water).

The two case studies have been chosen because of their recent preeminence in Portugal. Figueira da Foz has implemented a salinas revitalization project in the early 2000s in collaboration with three other European salt production sites (Figure 1.–3.). Castro Marim benefited from very committed professional advocacy over a long period of time in order to reactivate its salinas system. Table 4. provides a comparative synthesis of the two case studies with special reference to management instruments and strategic actions.

Table 3. Portuguese landscapes/saltscapes contextualization typology

Sub-categories	Aesthetic landscapes		Working landscapes	
	Low ecological value	High ecological value	Cultivated landscapes (land-based)	Saltscapes (water-based)
<b>Coastal locations</b>	Dunes	Salt marshes	Forest <i>Pinhal de Leiria</i> (buffer between the Atlantic Ocean and agricultural fields)	Solar salinas of <i>Aveiro, Alcochete</i> and <i>Setúbal</i>
<b>Inland locations</b>	Designed gardens	Connected greenways	Agricultural fields of <i>Caldas da Rainha</i> and <i>Santarém</i> (i.e. <i>Ribatejo</i> )	Inland salinas of <i>Rio Maior</i>

- 32 Vaya, Jesus & Kortekaas, Katia. 2014. Saltscapes's products and services, one model for rural sustainable development. *XII Congreso Nacional del Medio Ambiente (CONAMA)*. Madrid, Spain, November 24-27. <http://www.conama11.vsf.es/conama10/download/files/conama2014/CT%202014/1896711551.pdf>. p.5 (accessed May 25, 2016).
- 33 Hueso, Katia & Petanidou, Theodora. “Cultural Aspects of Mediterranean Salinas” (pp.213-226). In: Papayannis, Thymio & Dave Pritchard. Eds. *Culture and Wetlands in the Mediterranean: An Evolving Story*. (Athens: Med-INA, 2011).
- 34 Painho, Marco; Oliveira, Tiago & Vasconcelos, Lia. 2013. Governance of Marine Protected Areas: An Approach Using Public Participation Geographic Information Systems—The MARGov Project. *Journal of Environmental Science and Engineering B*, 2: 25-35. Fidélis, Teresa. *Planeamento Territorial e Ambiental – O caso da envolvente à Ria de Aveiro*. (Cascais: Principia, 2001).
- 35 Vaya, Jesus & Kortekaas, Katia. 2014. Saltscapes's products and services, one model for rural sustainable development. *XII Congreso Nacional del Medio Ambiente (CONAMA)*. Madrid, Spain, November 24-27. <http://www.conama11.vsf.es/conama10/download/files/conama2014/CT%202014/1896711551.pdf>. p.12 (accessed May 25, 2016).
- 36 In Portuguese: *Denominação de Origem Controlada (DOC)*, in French: *Appellation d'Origine Contrôlée (AOC)*, in Italian: *Denominazione di Origine Controllata (DOC)*, and in Spanish: *Denominación de Origen (DO)*. Resende, Anabela & Fonseca, Luis. As Salinas Tradicionais de Castro Marim: A importância da gestão para o desenvolvimento local e a manutenção da biodiversidade (pp.1240-1263). *Proceedings of the 17.º Congress of the Portuguese Regional Development Association (APDR) and 5.º Congress of the Nature Conservation Management Association (AECR)*. (Brançã & Zamora: APDR, 2011).

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Table 4. Comparative case study analysis<sup>37</sup>

	<b>Figueira da Foz</b>	<b>Castro Marim</b>
<b>Extension of salinas</b> (hectares – ha)	395 (active: 238 & inactive: 157)	561.0 (traditional: 240.4 & industrial/semi-industrial: 320.6)
<b>Quantity of salinas</b> (number)	29 active	13 active
<b>Management instruments</b>	RAMSAR site, National Ecological Reserve (REN), Municipal Master Plan (PDM); Touristic Valuation Plan	Operational Plan of the Natural Preserve <i>Sapal de Castro Marim</i> and <i>Vila Real de Santo António</i> , RAMSAR site, Nature 2000, National Ecological Reserve (REN)
<b>Strategic actions</b>	Promote the endogenous potential of the Mondego estuary; implement the ALAS [All About Salt] project (1999-2002); increase the economic and cultural viability of salinas; build an eco-museum; implement pedestrian trails through the salinas; and increase the salinas' tourism potential	Revitalize the salinas by increasing their economic viability; create employment; enhance the population size of migratory water birds; maintain bird breeding sites; ameliorate habitat quality for water birds in traditional salinas

**Figueira da Foz**

Figueira da Foz is a small coastal city in the center of Portugal. The municipality had a population of approximately 62,000 thousand people in 2011. The city is located on the north bank of the Mondego River and its origins date back to immemorial times.<sup>38</sup> The first reference to salinas in the Figueira da Foz region date back to 1217. The city's evolution has been closely linked to its coastal location. The ocean allowed the flourishing of the fishing and harbor-related industries. The fertile agricultural fields of the Mondego's hinterland provided the sustenance needed to make ends meet.

**Figure 1. Mondego Salinas in the 1940s.**<sup>39</sup>

37 Ibid., 2011, and Neves, Renato. "Figueira da Foz – organization and evolution of salinas on the Mondego Estuary" (pp. 45-47). In: Neves, Renato; Theodora Petanidou, Rui Rufino & Sonia Pinto. Eds. *ALAS – All About Salt; Salt and salinas in the Mediterranean*. (Figueira da Foz: Intermezzo, 2004).

38 Câmara Municipal da Figueira da Foz. *Figueira Investida na / Invest on*. (Figueira da Foz: Município da Figueira da Foz, 2016).

39 Figure 1. *Arquivo Fotográfico Municipal da Figueira da Foz* in Gomes, Paulino & Veiga, António. *Figueira da Foz – Memória, Conhecimento, e Inovação...* (Paços de Ferreira: Néstia Editores, 2002). All other photographs were taken by the author.

The salinas were instrumental to producing salt to preserve fish and to sell to outside markets. The city's beach became one of the top tourism destinations in the XX<sup>th</sup> century attracting visitors from near and far, including from Beira Alta and many Spanish provinces. Figueira da Foz has been a weekend and summer vacation destination for the nearby residents of Coimbra, a city with one of the oldest and most prestigious universities in Europe.

Figure 2. Salinas Corredor da Cobra in Figueira da Foz.



40 Neves, Renato. "Figueira da Foz – organization and evolution of salinas on the Mondego Estuary" (pp. 45-47). In: Neves, Renato; Theodora Petanidou, Rui Rufino & Sonia Pinto. Eds. *ALAS – All About Salt; Salt and salinas in the Mediterranean*. (Figueira da Foz: Intermezzo, 2004).

The Mondego estuary occupies an extension of 35 square kilometer. The two arms form an island (i.e. *Ilha da Murraceira*) of marsh lands and salinas with an area of approximate 600 hectare. Only about 50 salinas remained in 2000 from the 229 in operation in 1960.<sup>40</sup>

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**Figure 3. Traditional Salt Warehouse.**

This decline in production was partially circumvented with a municipal intervention aimed at revitalizing the salinas for cultural and tourism purposes, which included the upgrade of a model salina and the building of a salt museum (Figure 4.). The enhancements were financed in part with funds from the European Union and Figueira da Foz has been a member of the ALAS European network of salt producing regions since its inception in 1999. The goal of this network has been to augment the understanding of the value of salt and of saltscapes in today's society.

**Figure 4. Eco-museum in the Mondego Estuary.****Castro Marim**

Castro Marim is a small town of approximately 6,700 people in Algarve on the border with Spain just north of Vila Real de Santo António. Its location on the western bank of the Guadiana River enabled the flourishing of salt production in the XIX<sup>th</sup> and XX<sup>th</sup> centuries. Many low lying marshes were converted into salinas in centuries past. The flourishing of tourism in Algarve since the 1980s caused people to relocate to the coastal resort beach locations in search of jobs in the burgeoning tourism industry. Many salinas were abandoned and left to decay resulting in considerable public health infestations as direct consequence of stagnant waters and warm weather. A considerable number had to be demolished in order to contain the spread of disease. Figure 5. shows a partial view of the town from Castro Marim's

castle with a vast area occupied by the nature preserve “Reserva Natural do Sapal de Castro Marim e Vila Real de Santo António” (RNSCMVRS) and the newly restored salinas and marshes in the foreground, and the Spanish territory at a distance in the background.<sup>41</sup>

**Figure 5. Town of Castro Marim in Algarve.**



## Conclusion

This paper aimed to review and analyze the evolution, role and pertinence of Mediterranean saltscapes, with the help of Portuguese case studies. It was argued that many of these saltscapes have been threatened by global economic transformations (Figure 6.), changes in employment patterns, laboring technologies, lifestyles and the encroachment of urbanization, potentially leading to their irreplaceable destruction if collaborative planning among stakeholders does not occur or is not fully embraced. The sustainable development of saltscapes needs a holistic and multidisciplinary approach. The planning implications are fourfold: Firstly, the need to maintain the ecological value of saltscapes; secondly, the need to preserve the man-made constructions integral to artisanal salt harvesting practices; thirdly, the need to stimulate the economic viability of artisanal salt production; and fourthly the need to promote collaborative global knowledge exchange networks. Finally, it is also important to find sustainable touristic, aesthetic and cultural strategies to preserve the patrimonial value of salinas. Future research ought to investigate these planning implications. In addition, it is important to devise responsible ways to maintain salinas' invaluable contribution to the history of our human relationships with the water-land interface.

**Figure 6. Iodized salt on a store's shelf.**



41 RESENDE, Anabela & FONSECA, Luis. As Salinas Tradicionais de Castro Marim: A importância da gestão para o desenvolvimento local e a manutenção da biodiversidade (pp.1240-1263). *Proceedings of the 17.º Congress of the Portuguese Regional Development Association (APDR) and 5.º Congress of the Nature Conservation Management Association (AECR)*. (Bragança & Zamora: APDR, 2011).

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