

Editor's note

Points of interest:

- Iberian endemism
- *Artemia salina*

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Scales

Salt production, as in any other production system, operates and is based on a system of scales and quantity relationships that determine its production. There are production relations between the proportion of water and surface evaporation, yield relation of tons to surface per year and relation of production costs, proximity to markets and transport facilities.

Over the centuries the laws of supply and demand have been the determining factor in the rise and fall of many "salt empires", defined here as production regions, in which salt has played an important role in the regional economy in terms of employment and profits. But outside these "empires" small-scale productions that we can consider domestic or local also flourished, which in very closed economies acted as "self sufficient" producers, providing salt for these communities.

This happened with salt exploration along the rocky coastal areas of dry regions, where salt was extracted in the summer from natural deposits which resulted from the evaporation of seawater deposited there in the winter time, or in some inland salt pans that made use of salt springs as a resource.

Applying this fact to ECOSAL ATLANTIS and to the issues to which this project aims to respond, we also have different scales, both with regard to the very extension of the territory of the sites and to the significance or value assigned to them, expressed in the inclusion of these sites in efforts to protect their cultural and natural heritage. So often the scale of "big" and "representative" tends to devalue what is "small" and "marginal."

For this reason ECOSAL ATLANTIS is trying to create tools to evaluate - and manage - the potential of each site that is part of the Salt Route and which may also be applied to other sites that may later be included on the Route. Measures relating to the inventory of cultural heritage (coordinated by the Municipality of Aveiro and Daviaud Ecomuseum), patrimonial management (coordinated by the Municipality of Aveiro) and analysis of tourist potential (by the Associação dos Amigos das Salinas de Interior - Friends of the Inland Salt pans Association) are already underway and will also show the importance of the small scale in relation to endemism, where we find common elements as well as distinctive elements from larger sites.

Examples of endemisms are always interesting because they are rare, fragile and localized, representing strategies that are adapted to the locations, to the times and to circumstances.

Renato Neves
National coordinator of ECOSAL ATLANTIS in Portugal

The saltpans of the interior, an Iberian endemism

In the previous Newsletter of project ECOSAL ATLANTIS we referred to the forgotten salt, in talking of the salt produced through diverse methods in the United Kingdom. Well, the salt from the salt mines from our Iberian partners will be the next to be forgotten. Among all the methods of salt production, the salt pans of the interior have a peculiarity: salt is obtained by solar evaporation, just like in coastal salt pans, only these are far from the sea.

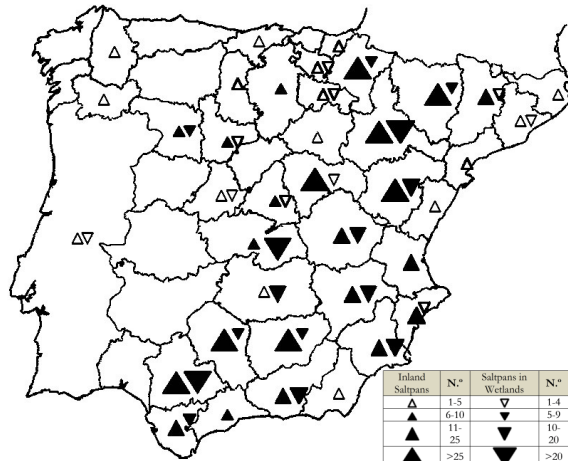


Figure 1 - Map of the Iberian Peninsula with the location in each province of saltpans and in wetlands.



Figure 2 - Partial view of a saltpan of the Cabeza Hortales in Cadiz. It still produces salt, but only symbolically.

Usually the necessary salt water comes from salty springs that flow from within the interior and are not fed by seawater. The origin of these sources is the infiltration of fresh water which becomes salt laden when in contact with layers of fossil salt underground. These layers of salt came from the sedimentation through the evaporation of inland seas that covered large areas of what is now the European continent.

In the Iberian Peninsula, the salt obtained from these sediments comes mainly from two ages. The oldest, about 200 million years ago, is from the Triassic age, and the more recent one, from the Miocene age, is from about 5 million years ago. In some cases, the salt brine used in the interior does not come from springs, but from salt lakes.

There are saltpans of this kind in the Aragon region and in parts of Castilla - La Mancha. In countries like France or Germany, these continental springs have been explored through the use of forced evaporation techniques, such as boiling the brine produced by means of the burning of various fuels. Sometimes, these operations are associated with previous treatments to increase the salinity of the brine, through gradation techniques such as wind evaporation, carried out in specific premises for the effect.

In the Iberian Peninsula, due to its predominantly Mediterranean climate with long dry summers, it is possible to use solar evaporation in places situated far away from the surrounding seas. Hence, we have this type of saltpan which is unique in Europe and rare in the rest of the world. We know of some 500 solar evaporation facilities that are far from the shore.

Currently, only about 20 are in operation and most of them risk extinction. Apart from these, in Spain there are about 250 inland saltpans in saline wetlands of all types: lakes, riverbeds, water percolation, etc, some of which were once used for salt production. The wealth of the Iberian Peninsula in salt landscapes makes it a unique case in Europe.

As we can see in the map (**Figure 1**), these landscapes are concentrated in the eastern half of the peninsula.

In the Atlantic zone, due to climatic conditions of higher humidity, there were few such saltpans. The saltpans of Añana in Álava are certainly the most emblematic and as such have been protected as 'Heritage of Cultural Interest' categorized as a Monument since 1984. In the western provinces of Andalusia there were also some relatively small installations, like the group in the Cadiz mountains (Figure 2).

In Portugal, the saltpans of Rio Maior, active since medieval times, are still in operation.

In general, the salt pans of the interior of which we speak have always been very small facilities if compared with the salt pans of coastal areas. The more extensive ones, like Imon and La Olmeda, Guadalajara, Poza de la Sal in Burgos, or the salt pans of Añana, already mentioned, have a few dozen hectares.

Some are broad valleys in the Castilian plateau, where it was relatively easy to evaporate for salt, despite the high altitude and extreme weather. But many managed to survive in the deep valleys of steep hills, where the sun's heat, essential for evaporation, only reached with some difficulty. In this case, we are talking of very remote areas, where no other kind of salt could be obtained, so the local peoples found it necessary to supply themselves with what they could find. Examples of these are the salt pans of the mountains of Albarracín, of Alto Tajo or the Pyrenees (**Figure 3**).

The method of salt production in these salt pans has many variants. In one case, the crystallization tanks were flooded with brine until it reached the desired level of concentration and this brine would evaporate to form a salt crust, which was then broken and extracted. This cycle was repeated as often as was possible during the harvesting season, and usually lasted between a week to ten days. This method was common in places where the climate was dry and stable and was employed in larger salt pans, where tank rotation could take place, so that there were always some tanks in operation. This was most common in the salt mines of the Spanish hinterland.

The other method was to spread a thin layer of brine on the dry surface of the tank, which evaporated quickly. The harvesting of salt was much faster, taking from several hours to several days. This method was common in salt pans located in areas with more unstable climate, where there was greater risk of rain in summer, as in the Añana salt pans. For this reason too, in the first case, the newly crystallized salt was left in the fresh air for as long as was necessary, and then stored as soon as it was dry. In the second case, the salt was left to drain for a shorter period, and then temporarily stored in covered structures, only to be transferred to an *alfolí* or final storage prior to being marketed.

A brief visit to some of the different salt pans of the interior, which exist or existed in the Iberian Peninsula, allows one to observe an immense variety of types and construction techniques to obtain salt, resulting from adaptation to the terrain and to the local climate, as well as to available materials. Since each salt pan feeds from its own spring, the composition of salts inside it is highly varied. Each presents an array of different trace elements in different proportions, giving the salt its unique organoleptic (i.e. sensory) properties.

All this made the craft of the salt-worker of the inland salt pan a very specialized job, requiring an extensive and deep local knowledge of available materials, terrain, and the salt source, as well as of the microclimate. Something that is currently much undervalued. This "salt diversity" is more than just threatened, it is in real danger of extinction, and even more so with the physical disappearance of salt-workers.

Projects like ECOSAL ATLANTIS contribute not only to making known and preserving this "salt diversity" but also to appreciate it, as shown in the case of the salt pans of Añana in Álava.

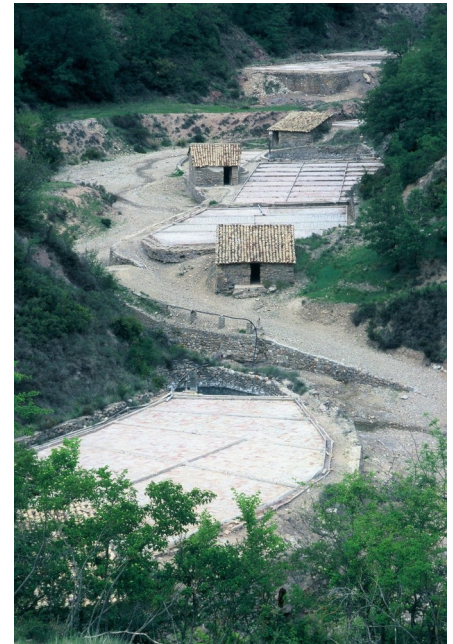


Figure 3 - Aerial view of the Guibano Salinar, in Naval, the Prepirineo Oscense. You can observe how it is wedged in a riverbed, so that the conditions for obtaining salt by solar evaporation (insulation, ventilation) are very difficult.



Figure 4 - Overview of the Añana salt pans with groups of visitors on the premises. You can visit the salt pans even though restoration work is being carried out at this site.

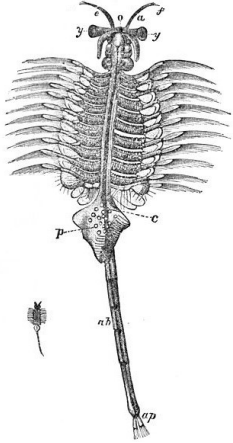
Jesús-F. Carrasco Vayá e Katia Hueso Kortekaas

Association of the Friends of Interior Salinas

Character

Artemia salina - Extremely small, extremely important

In ecology there is a concept, or definition, for the life forms that tolerate and live in harsh environments. These are called extreme organisms, which thanks to complex adaptive mechanisms live and proliferate in environments the physical and chemical gradients of which seem absolutely unsuitable for the survival of any life form.



Many of these life forms are bacteria, fungi and algae, but there are also plants and animals. Amongst these *Artemia* is one of the most surprising, as this small crustacean; about 20 mm in length - and after 200 million years of life on Earth - tolerates 10 times the salinity of seawater, so that salt flats, springs and salt lakes are their chosen habitat.

Another of the outstanding features of its biology is that reproduction can take place either sexually or through parthenogenesis (without fertilization) and the females may also be oviparous or ovoviviparous, and the environmental factors (temperature and salinity) are the factors that trigger these different strategies.



Figure 1 - Shoals of *Artemia salina* pushed by the wind on the edge of a saltpan.

Each female lays about 150 eggs, which have the capacity to lie "dormant" for months or even years, developing only in suitable conditions. This explains its existence in isolated places, which are distant and without links to other natural saline systems, such as the salt beds of the interior, where we always find them. So if there is an animal which is most characteristic and practically universal in all the salt works of the whole world, it is certainly the genus *Artemia*!

The explanation for this dispersion can be found in the action of migratory waterfowl, as these long distance travellers may carry the eggs on their feathers from one place to another. It is a small retribution for *Artemias*, as for some species of water birds, such as flamingos, they are a vital food-source. Although their size is small, their populations in any salt system - however small - are always in the millions.

For a very long time *Artemia* has been cultivated for aquariums and aquaculture, as food for fish. The cultivation was carried out mainly with the species from the American Continent (*Artemia franciscana*), the popularity of this domestic cultivation among European aquarists (by importing cysts from the USA) and subsequent release into natural environments, has brought competition problems to the European *Artemia* (*Artemia salina*) populations.

But the most surprising use for the small *Artemias* has been as pets! Since in the mid-1960s an American company has marketed kits for the cultivation of *artemias*, known as sea-monkeys, in small aquariums. The advertisement claimed that they could even be trained! Since then, with the increase of globalization, these sea-monkeys started conquering markets, and the kits also became progressively sophisticated, with aquariums that include scenes of palaces and cities and the application of lenses that magnify and allow one to observe the morphology of the *artemias*, which the supplier assures us are now larger and have greater longevity!

Renato Neves
National coordinator of ECOSAL ATLANTIS in Portugal

Events

Workshop: Disable visitors and the promotion of accessible tourism in Saltpans

June 17, 2011

Saltpans are places that are increasingly sought for tourist visits, since these sites offer peaceful scenery, which can provide high quality moments of leisure and well-being to visitors.

However, natural areas where saltpans are located may present some problems in terms of mobility and accessibility.

Tourism proposals that wish to encourage more visitors to these sites have to consider how to make them accessible for visitors with particular needs, in a way that these citizens feel that they are "welcome" when they visit these sites. With this workshop it is intended to identify the ways in which sites can be promoted and to consider a visitor model that will be developed and tested by disabled people.

This workshop has as a target audience the partners of ECOSAL ATLANTIS, as well as other organisations that are linked to the tourism sector. It is expected to have a maximum of 30 participants.

University of Aveiro, Portugal

Workshop: Salt, an enemy to kill or a product to know?

June 18, 2011

Salt is often associated with poor health in humans and with ailments such as hypertension and cardiovascular problems. In this way, it is usual to listen to public health campaigns directed to lowering the consumption of salt.

With this workshop it is intended to demystify this idea, bringing to debate the differences between artisanal sea salt, flower of salt and industrial salt, such as the advantages of using artisanal sea salt and flower of salt produced in an artisanal way.

Through different approaches (gastronomy, health, nutrition and food chemistry) it is intended to transmit to the specialized public (in the areas of gastronomy, health, nutrition and food chemistry) the benefits of artisanal sea salt and flower of salt, fostering their use.

This workshop has as target audience the partners of ECOSAL ATLANTIS and specialized public (doctors, nutritionists and associations, organisations and schools linked to the area of hotel and catering). It is expected to have a maximum of 25 participants.

University of Aveiro, Portugal

The VI International Salt Fair

July 07, 2011

The International Salt Fair is one of the landmark events of the summer in Aveiro. Integrated in the Feasts of Ria, the fair, which has this year its sixth edition, seeks to sensitize the public to using sea salt produced in traditional ways, as well as possible products of their derivatives. The event has as its main objectives the enhancement of traditional salicultura along with the spread of Aveiro as a production hub. Simultaneously it seeks to strengthen the identity and the role the saltpans now hold as a factor in local development through tourism associated with cultural and natural heritage.

In this context, the fair is one of the activities planned by the Museum of the City of Aveiro for the promotion and dissemination of the project ECOSAL Atlantis and, in particular the route, Traditional Saltmaking - Route of the Atlantic that brings together salt-makers from four European countries and also the Eco-museum Marinha Troncalhada.

As in previous years, participation is expected from several domestic producers and European sites, especially the project partners.

Municipality of Aveiro, Portugal