Seaweed Houses and Sea-salt Huts, Laesoe Island (Denmark)

Denmark
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Seaweed houses:

- Museumsgården (Museum Farm) N 57º 15' 47" – E 11º 01' 57"
- Hedvigs Hus N 57º 18' 27" – E 11º 07' 32"
- Xxx

Seasalt production cultural landscape

- Rønnerne (a triangel approx. defined by the points:) N 57º 13'33" – E 11º 00' 33", N 57º 14' 16" E11º 03' 27" and N 57º 11' 48" E 11º 07' 43"

On the island of Laesoe (Danish: Læsø), situated in the northern part of Kattegat between Denmark and Sweden, a unique architecture, not found anywhere else in the world, developed from no later than 1600, based primarily on materials from the sea and clay from the ground. The wooden structures in the half-timbered houses were from hundreds of ships wrecked on the many reefs and shallow waters around the island. Panels and other woodworks in the houses were from wrecked ships, too. The roofs were made of 'seaweed' (eelgrass) that piled up on the beaches. The eelgrass-roofs were up to 1-2 metres thick and often weighted several tons. This gave the houses a unique appearance.

The historical reason for the seaweed houses is based on a pre-industrial sea-salt industry that started on Læsø around year 1150 under the ownership of the Catholic Church the northern-most sea-salt production in the world. When the land was taken by the king after the Reformation in 1536, cutting wood for salt-production turned 'wild', and by the end of the century all forests were cut down. The landscape of the island turned into a wasteland of windblown dunes, deforested heathers and salt meadows, the men went to sea as sailors and the women took over the poor farming.

The history in short is about sea-salt production, an ecological collapse and adaption to changing living conditions.

The nominated areas
The history of Læsø reflect a sequence of climatic, political, economic, and innovative events from 1150 to 1950 AD, which have set the framework for the islanders' lives and conditions, and which can be directly related to architectural style and salt production. The nominated properties include:

- Both individual and clusters of seaweed houses, which are the most illustrative example of adaptation to the resulting ecological collapse's deficiency society. The seaweed houses have both serial and cultural landscape components.

    - Keywords: use of available natural resources and shipwrecks, and innovation of techniques and methods, created primarily by the island's female regiments.
- The cultural landscape holding the ruins of salt huts includes the marine landscape of the sand flats with the hypersaline groundwater and part of the sea in front of that, where the eelgrass grows. The ruins after the salt huts point back to a very early (11th century) pre-industrial industry, organized on family basis, and of both local, national and regional economic and nutritional importance.
    - Keywords: geological basis and use of natural salt-resources, knowledge and methods brought to the island by monks from continental Europe, ecological collapse because of over-exploitation of the island's forests, and economic and architectural adaptation to changed political conditions (Reformation, wars, Swedish conquest of neighbour regions).

Historical overview

The history of Læsø represents a causal chronology of 1) discovery, settlement and exploitation of locally rich salt resources of hypersaline groundwater (introduced as a new business model by the landowner, the Catholic Church in Viborg), utilization and subsequent over-exploitation of the island's forests used as firewood for the constantly growing salt-production, leading to 2) ecologic and economic collapse of landscapes, agriculture and social structures and three centuries (1650 – 1950) of nearly complete deforestation, denudation and mobilization of windblown dunes, and 3) agricultural, economic, cultural, and architectural adaptation and innovation in response to shortage of firewood and timber as well as adaptation to a colder climate (The Little Ice age) by utilizing the island's resources of deforested grassland, seaweed (*Zostera marina*) from the shores, clay from the subsurface as well as timber from stranded and wrecked ships on the reefs and shallow waters surrounding Læsø.

This development through 800 years is richly represented a) by preserved light-open landscapes of heathers, moors, dunes and salt-marshes, b) by occurrence of c. 1.700 still visible ruins (rudera) after Medieval salt-production huts, c) by occurrence until 1950 of c. 300 houses built in the period 1500-1930 AD with roofs of seaweed (now there are about 30 seaweed houses left), d) by agricultural utilization of peat as well as seaweed for fertilization and by grassing and fencing practices.

~~**Justification of Outstanding Universal Value**~~

The seaweed houses of today are the core illustration of the history of the island. In their huge roofs and their timber- and woodworks are seen the consequential relationship between man and nature, for better and for worse, dating back 500 years prior to the construction of the oldest known houses.

The seaweed houses therefore have outstanding universal value not only because of their unique architecture and aesthetical appearance, but also because they tell us and coming generations about the human/nature relationship and how mankind through hardship can survive self-imposed ecological collapses.

The organically evolved cultural landscape with the ruderas of former salt huts, on the edge of the large salt marshes south of the island, with the huge sand flats in front of that, where the hypersaline

groundwater is continuously formed, and the deeper sea further away, represent both the backdrop history of the seaweed houses and, in its own right, a unique salt production technique using a special geological situation, making it possible to produce sea-salt further north than everywhere else.

Justification of Outstanding Universal Value (maximum 300 words)**:**

Laesoe Island (Danish: Læsø), situated in the northern part of Kattegat between Denmark and Sweden, is a lowland archipelago continuing to rise by post-glacial rebound in the strait which separates the North Sea and the Baltic Sea. From around 1150 CE to 1950, a particular consequential relationship between culture and nature produced an organically evolved cultural landscape centred on marine resources of salt and seaweed (≈ eelgrass, *Zostera marina*).

The property comprises a series of distinctive landscapes and sites, including shallow sea where eelgrass continues to grow. Across swathes of heather moorland and saltmarsh, around 1,700 archaeological sites of medieval sea-salt production huts trace continuously formed hypersaline groundwaters and successive raised palaeo-shorelines in marine regression. This landscape provides testimony to the world's northernmost industry of its kind, the fuelling of which with locally cut wood led to an extended phase of self-imposed catastrophic ecological and economic collapse.

One outcome of such unsustainable exploitation and consequent collapse is a unique architectural ensemble of half-timbered farmhouses with extraordinary eelgrass roofs. These, some dozen of which represent the best examples of 30 that survive out of a total of around 300 built between 1600 and 1950, demonstrate survival and resourceful adaption to harshening living conditions through the salvaging of shipwrecked timbers from the reefs and shallows surrounding Laesoe, the exploitation of local marine clays, and the collection of eel grass from beaches to form seaweed roofs up to 2 metres thick and many tonnes in weight.

Laesoe reveals in its special landscapes and sites a causal chronology of geological, maritime, and climatic factors, combined with political, economic, and innovative events, both internal and external. This is a nature-culture story, with multiple messages of sustainability which set the framework for the islanders' lives and conditions in this remote community. It continues to do so.

Criterion (ii)

'Seaweed Houses and Sea-salt huts, Laesoe Island' exhibit an important interchange of natural and human developments, over both a centennial span of time and within a specific narrow area of the world, including developments in both architecture and techniques.

The universality comes from the exceptionally combination of the uniqueness in the human/nature relationship and the ability for humans to adapt to changed living condition with innovations and hard work.

Statement of authenticity and integrity

Much practical knowledge has been gained by studies of preserved seaweed-roofed houses, by experiments with construction practices, and by re-roofing and restauration of more than 20 partly preserved seaweed-roofed houses as well as knowledge gained from the farm-museum 'På Lynget'

(under Læsø Museum) and the Læsø House (Dethsgaard) taken down on Læsø and rebuilt near Copenhagen by the Danish National Museum.

Several archaeological excavations of salt-production huts, building and reconstruction of salt-production huts, pans, furnaces, and salt-wells, and experimental activity have enlightened the history of the salt-production and helped to gain knowledge about how to produce high-quality, white, dry salt.

Thus, all parts of these proposed nomination sites have been described and understood in depth, both by practical and scientific means.

All proposed seaweed houses are protected by Danish law. The cultural landscape of Rønnerne, the sand flats and the deep sea is specifically protected as part of RAMSAR/Nature2000 nature conservation area as well as by law on nature conservation.

The individual seaweed houses and the clusters of the same together with the total cultural landscape of salt-production sites is of an adequate size to ensure the complete representation of the features and processes which convey the property's significance.

Comparison with other similar properties

As the proposed nomination sites are focused on seaweed roofs and sea-salt production by heating hypersaline groundwater comparisons with similar properties will be made accordingly.

- Seaweed roof in China (not on the World Heritage List)

In China can be found roofs, which also include seaweed as on Læsø: These are roofs where eelgrass is combined with straw and clay is included, below, in edges and on the top of the roof. These combined seaweed and thatch roofs are thinner than Læsø's thick seaweed roofs, and they last 100 years, unlike the Læsø roofs, which in some cases have lasted at least 250 years. In the region in China visited by Henning Johansen, the 'seaweed-man of Læsø', there are 18 roofers left. The Danish visitors were out thatching for a whole day and thus had the opportunity both to see this special form of thatching in practice and to ask questions. A quite unusual thing about the Chinese seaweed and thatched roofs is that they are neither sewn, tied nor twisted. Læsø's seaweed roof is tied firmly to the bottom three laths – what is called the 'vasker'-ramp – whereas the Chinese start by laying a tile roof in clay and then the first row of eelgrass in clay on top of the tile. The rest of the roof is loose. It is done with alternately a row of straw and a row of eel grass all the way up, and this is how you continue with laying one and the other material, respectively, every other time. The roof surface seen from the outside consists of eel grass. The straw is therefore "hidden" inside the roof, all the time covered with eelgrass. The fact that the roof does not blow off when it is not attached to the roof construction may be surprising – but the Danes saw firsthand how firm the Chinese roof is: When the roofer had to get off the scaffolding and a few meters up onto the roof, they grabbed hold of the eelgrass, which had been laid, and could thereby lift himself up. The reason why the roof is so firm may be that the fibers of the eelgrass weave into each other like wool. Thus, both the technique and the materials used in China are different from techniques and material used on Læsø. Even if the Chinese should apply to get their roofs on the WH-list, there should be room for both them and Læsø.

- Salins-les-Bains, France (WH-Listed)

In terms of the category of cultural property, as defined in Article 1 of the 1972 World Heritage Convention, the property and its extension form a group of buildings. The Great Saltworks of Salins-les-Bains have exploited the brine extracted from the considerable underground deposits since the Middle Ages and, likely, since before that. It is one of the rarer testimonies to the production of open-pan salt (crystallization by heating), with its underground and above-ground buildings and technical facilities still in place. In the 18th century, the Royal Saltworks of Arc-et-Senans were designed as a geographical and technical extension of Salins-les-Bains to make use of the nearby Chaux Forest. A 21 km brine pipeline linked the saline resources of Salins-les-Bains to Arc-et-Senans. The Arc-et-Senans saltworks were built by the architect Claude-Nicolas Ledoux, starting in 1775; it was the first large-scale expression of industrial architecture that reflected the progressive ideals of the Age of Enlightenment.

Similarities between Salins-les-Bains and Læsø is the production by actively heating saline water to the point where salt crystals are formed. The two productions are also established at the same time. In 1775 the French production site had to be moved due to a lack of firewood, like what happened on Læsø 200 years earlier. But the source of salt in Salins-les-Bains is a spring where the salinity is washed out from the underground, contrary to Læsø, where the hypersaline groundwater is constantly renewed by the sea and the subsequent evaporation from the surface of the sand flats. The production in Salins-les-Bains and Arc-et-Senans was organized in one huge industrial process, where the production on Læsø was organized by individual households under instruction from the monks or *procurators laesoeviae* from Viborg. Even though Salins-Les-Bains and Arc-et-Senans are the two World Heritage sites that in function and product are closest to Læsø, the differences are so significant i.e., fundamentally different natural resources and approaches to salt production. Salins-Les-Bains and Arc-et-Senans on the one side and Læsø on the other can't be mutually exclusive.

- Hallstatt-Dachstein, Austria (WH-listed)

The Hallstatt-Dachstein/Salzkammergut alpine region is an outstanding example of a natural landscape of great beauty and scientific interest which also contains evidence of a fundamental human economic activity, the whole integrated in a harmonious and mutually beneficial manner. Through generations Hallstatt-Dachstein have been home to salt mining. It is one of the World Heritage properties focusing on salt production. The methods of production were but so fundamentally different, that there will be room also for Læsø on the World Heritage List.