



Inland Salt Locations around the Kyffhäuser Mountains

Rare and endangered Habitats Europe-wide



The Kyffhäuser Mountains and their surroundings offer many diverse types of scenery. Possibly, you have already heard of the dry gypsum hillsides of the Kyffhäuser or the ancient deciduous forests of the Hainleite, which line the fertile valleys of the Golden and Diamond Aue (meadow).

There are however, also other treasures to be found – the semi-natural inland salt locations. Here grow plants that otherwise only appear at the seaside in Europe. For man in the past, salt used to be as precious as gold. For most plants it is rather a toxin. In spite of this, some plants have managed to adjust to the difficult conditions of the salt

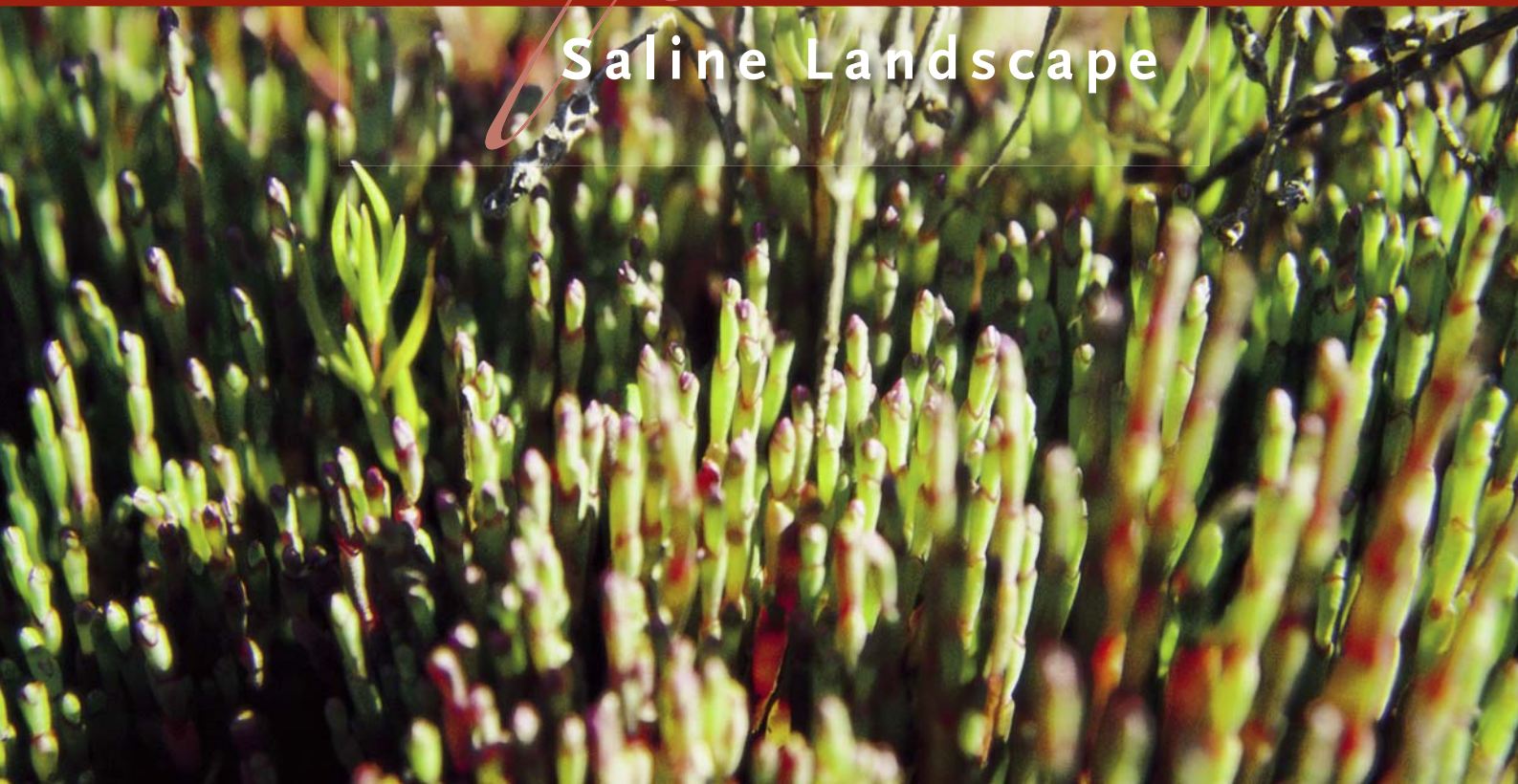


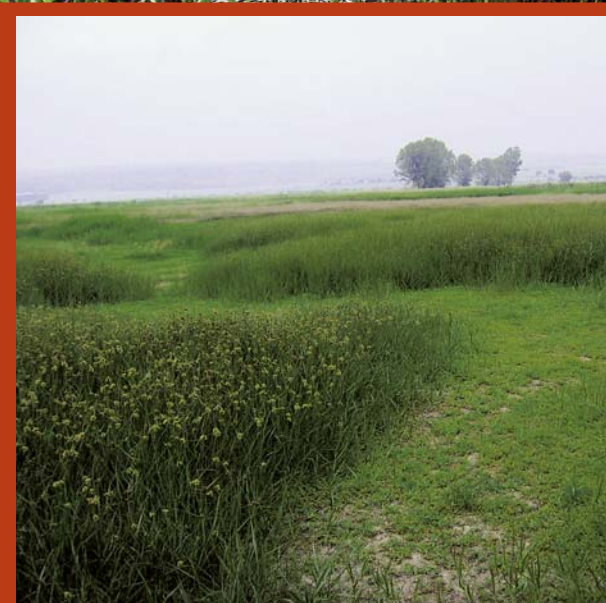
locations. Here, they have a competitive advantage in comparison to those plant species, which would suppress them on salt-free grounds.

Seepweed glasswort meadow with Sea Purslane at the Artern Solgraben

Unique

Saline Landscape





*Sea Clubrush-Reed
Communities in the
Esperstedt Reed*

They achieve this with various “tricks”. The sea milkwort, for instance, is able to secrete excess salt from special glands. Others, in turn, store water in their cells and appear succulent and swollen, such as the glasswort.

The main reason for the occurrence of inland salt locations are surface-near salt deposits, which developed out of the Zechstein Sea 255 million years ago. Saline groundwater can reach the surface in geological fault zones.

In Artern, Bad Frankenhausen and near the Kelbra Dam at the river Numburg, it emerges as salt springs. In the Esperstedt Reed or at the Kachstedt Salt Meadows diffuse saline water rises are registered. The low rainfall around the Kyffhäuser

also plays a decisive role. In the Helme-Unstrut lowland areas close to the groundwater, the water which evaporates exceeds the rainfall (hydrological

ablation area). This prevents a further washout of the salts. The evaporation of the saline groundwater leads to enrichment of the salts in the upper soil layers and creates favourable conditions for the halophytes.



*Grasswort only occurs on
highly saline grounds.*



Weeping Alkali Grass



Sea Milkwort



Seepweed



Sea Purslane



Salt Meadow Rush

Characteristic Plant Species

Common Glasswort	<i>Salicornia europaea</i>
Distant Sedge	<i>Carex distans</i>
Low Goosefoot	<i>Chenopodium botryodes</i>
Marshmallow Echter	<i>Althaea officinalis</i>
Meadow Barley	<i>Hordeum secalinum</i>
Media Sandspurry	<i>Spergularia maritima</i>
No Common Name	<i>Carex hordeistichos</i> (sedge)
Rock Wormwood	<i>Artemisia rupestris</i>
Sea-Aster	<i>Aster tripolium</i>
Salt Meadow Rush	<i>Juncus gerardii</i>
Salt Sandspurry	<i>Spergularia salina</i>
Sea Clubrush	<i>Bolboschoenus maritimus</i>
Sea Milkwort	<i>Glaux maritime</i>
Sea Plantain	<i>Plantago maritima</i>
Sea Purslane	<i>Halimione pedunculata</i>
Seaside Arrowgrass	<i>Triglochin maritimum</i>
Seaside Brookweed	<i>Samolus valerandi</i>
Sea Wormwood	<i>Artemisia maritime</i>
Seepweed	<i>Suaeda maritima</i>
Slender Hare's Ear	<i>Bupleurum tenuissimum</i>
Small-Flowered Melilot	<i>Melilotus dentate</i>
Small Flowering Viper's Grass ...	<i>Scorzonera parviflora</i>
Spear-Leave Orache	<i>Atriplex prostrata</i>
Strawberry Clover	<i>Trifolium fragiferum</i>
Weeping Alkali Grass	<i>Puccinellia distans</i>
Wigeongrass	<i>Ruppia maritima</i>
Wild Celery	<i>Apium graveolens</i>



Seaside Arrowgrass



Slender Hare's Ear



Small Flowering Viper's Grass



Sea Plantain



Seaside Brookweed



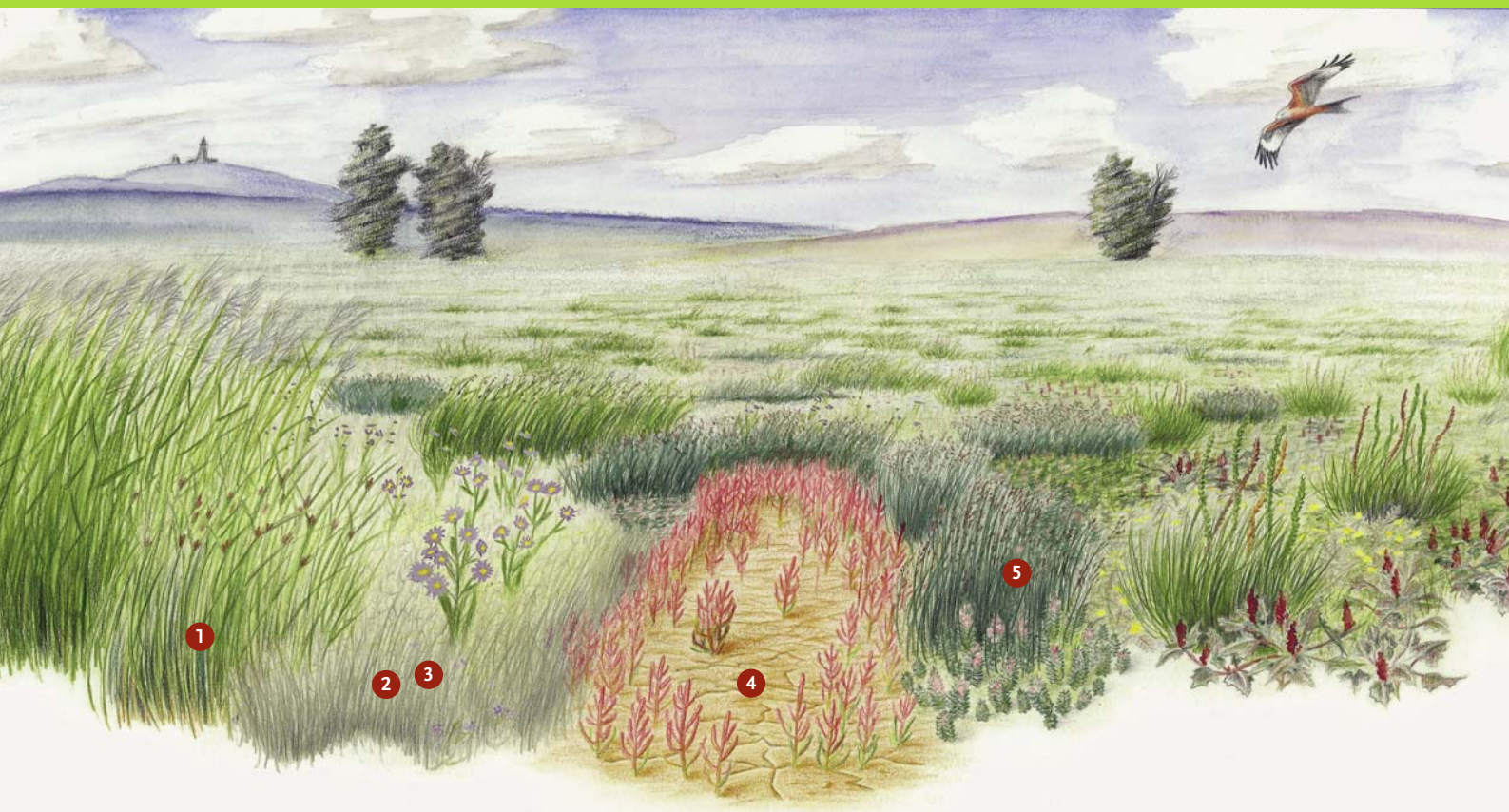
Carex hordeistichos (sedge)



Sea Clubrush

Plant Communities

1. Sea Clubrush-Reed Communities *Scirpetum maritime*
2. Sandspurry-Alkali Grass Communities *Spergulario-Puccinellietum distantis*
3. Salt Marsh Rush-Alkali Grass Communities *Astero-Puccinellietum distantis*
4. Seepweed-Glasswort-Meadows *Salicornietum ramosissimae*
5. Salt Marsh Rush Communities *Juncetum gerardii*
6. Sea Wormwood-Meadows *Artemisietum maritimae*
7. Saltmarsh-Grass *Deschampsio-Caricetum distantis*
8. Wigeongrass-Submerged Meadows *Ruppiaetum maritimae*



The Esperstedt Reed is an approximately 500 ha large depression with no outlet, which developed due to lixiviation of the salt layers situated at an approximate depth of 300 m.

According to their dimension and biodiversity, it represents the most significant inland salt location of Thuringia.

After all, 35 of the original 42 halophyte species can still be encountered today.

Here, botanical special features are the small flowering viper's grass, which can only be encountered in two further locations in Sachsen-Anhalt

in Germany, as well as the low goosefoot with the only known location in Thuringia. Next to salt marsh grasslands, one can encounter large-area

salt marsh rush meadows that also contain sea milkwort, seaside arrowgrass as well as the sea aster. The purple glasswort can only easily be detected in its autumn colouration. It does however only occur at very few locations.



The Small Flowering Viper's Grass only occurs in the Esperstedt Reed in Thuringia

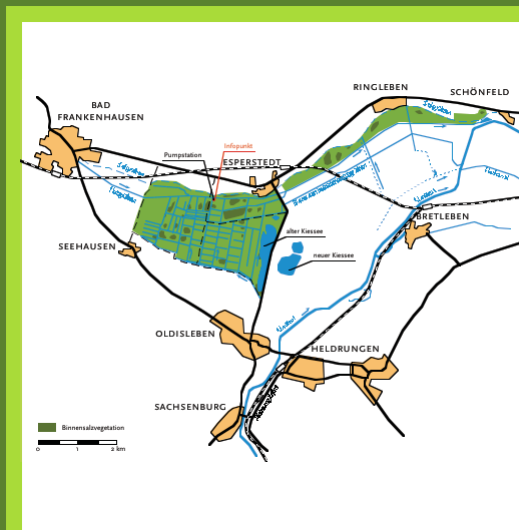
Salt Locations in the Esperstedt



and Ringleben Reed

The diary of the Hereditary Prince Friedrich Karl notes the following:

"On the 12th of May (1775), I went to the great Seehaus reeds where I encountered countless breeding wild ducks everywhere. Due to the deep mud, it is not possible to enter far into the reed and the dog can not pass through the dense



cane. Thus, it is hard to come by ... The impressive reeds, in rainy years, resemble a wide lake ..."

The reed was cut in winter and used for firewood. With the straightening of the Unstrut at the end of the 19th Century and the construction of a drainage system, the areas could regularly be used as grassland for the first time. An interesting

fact is that the first botanical documentations referring to halophytes were only established when the land was developed and utilised. These were obviously able to settle, respectively extensively spread with the suppression of the reed.

Queller-Flur im Herbst

Saline *Wealth*

After the inland salt marsh vegetation initially profited from the utilisation, it was repressed again due to the strong intensification of the utilisation as grassland in the 1970'ies and 1980'ies.

Impressive evidence of this is contained in the documentation of the well-known Central German botanist Stephan Rauschert:



Low Goosefoot can only be encountered in the Esperstedt Reed in Thuringia.

"On the two great grassland areas ..., on which, in 1973, I observed the greatest occurrence of scorzonera parviflora (small flowering viper grass), approximately 100.000. In 1970, I merely found a grazing area that was over-fertilised and used

in an industrial style, species-poor, merely consisting of 2 to 3 grass types, which did not contain even one scorzonera parviflora or any other halophytet".

Due to the intensification of the grassland utilisation, which is promoted in the scope of the Kulap since 1992, the inland saline flora was able to recover a little.



Pump House: Since 1926, pumps are deployed for the drainage in the Esperstedt Reed.

Basic prerequisite for a long-term protection, next to the intensive grassland utilisation, is the control of a ditch and pump system aligned to the preservation of the inland salt locations.

One main measure of the EU-LIFE project in the Esperstedt Reed is therefore the reconstruction of a functional drainage system.

The drainage system was constructed around 1900.



in the Kyffhäuser Natural Park



In Kachstedt, 3 km to the north-west of Artern, time seems to pass somewhat slower. The nature lover is able to encounter a formerly unknown rarity. Hidden behind the embankment of the former narrow-gauge railway there are salt-influenced marsh areas and mead-

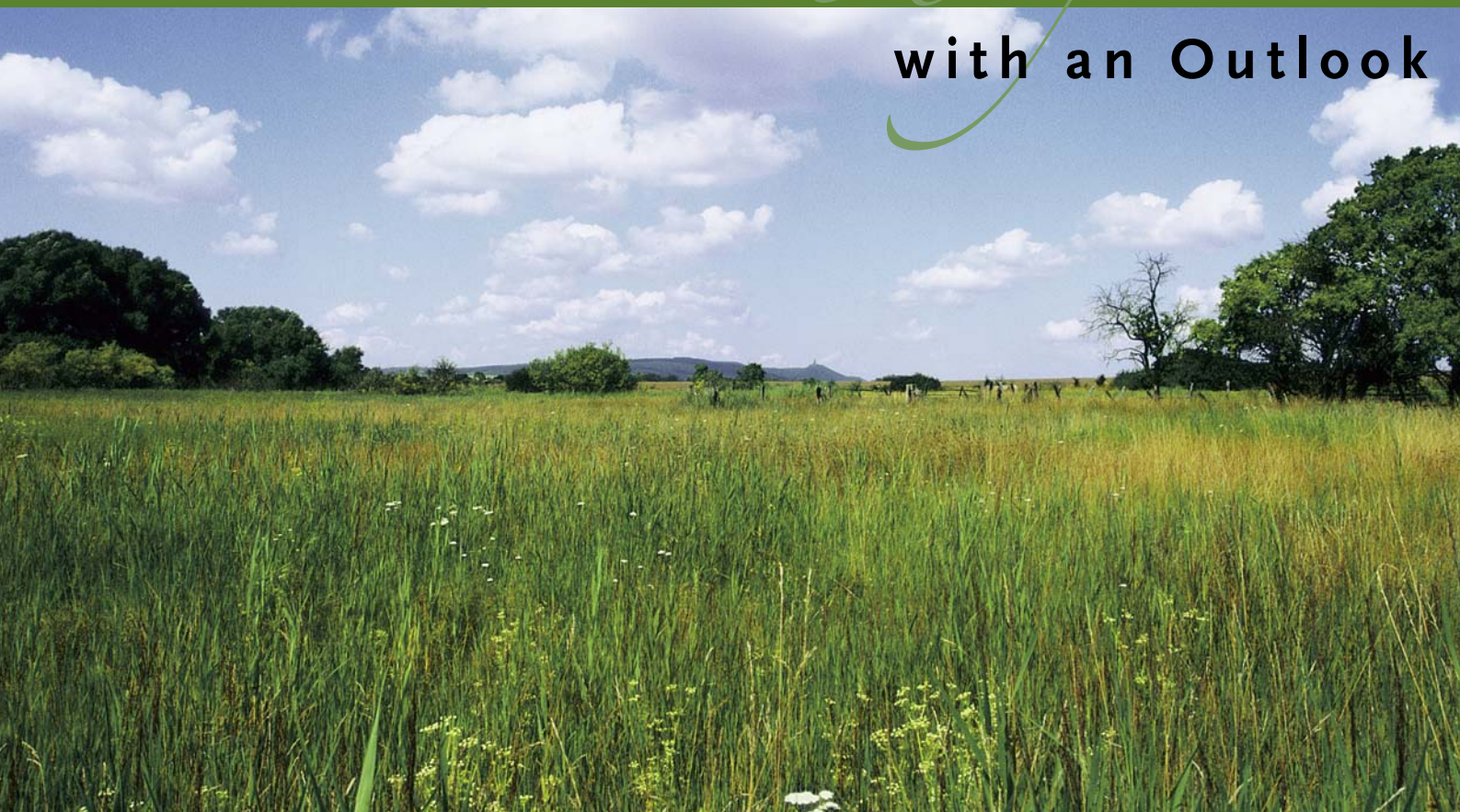


Sedge (carex hordeistichos)
profits from cattle grazing.

ows with drainage ditches running through them. One of the remarkable species in Kachstedt is the celery *apium graveolens*,

the slender Hare's ear, and the very rare sedge *carex hordeistichos*. Its population here is one of the greatest in Thuringia. In particular the cattle grazing positively influences their growth.

Hidden *Beauty* with an Outlook





The Kachstedt Salt Meadows



Wild celery, highly endangered in Thuringia, is still quite frequent in Kachstedt.

Of the 31 plants known since the floristic exploration, 24 can still be verified. Amongst others, the European glasswort, sea purslane, seepweed, and oval purse have disappeared.

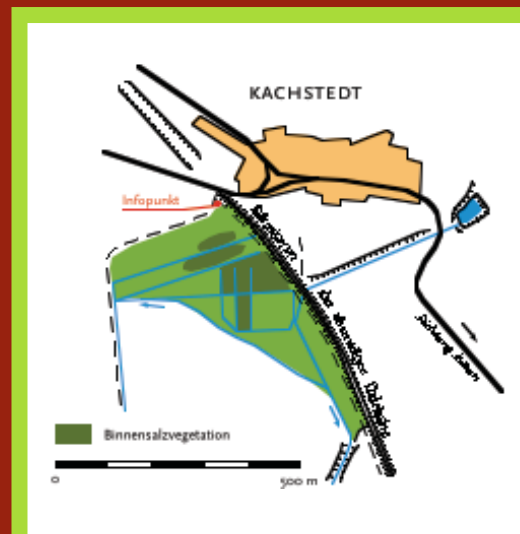
Also worth mentioning is that the surrounding wetlands were drained and transformed into farmland in the middle of the 19th Century.

In the course of this, salt-influenced grassland was lost, which formerly reached to Borxleben. The Kachstedt Salt Meadow was also an acre at times.

The too wet condition of the ground and the salt content did not allow any significant harvest. After agriculture was given up, the salt flora underwent an astounding recovery within a few decades.

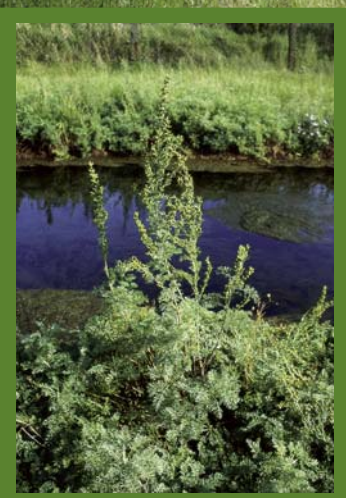
Due to the EU-LIFE project, it is now possible to point out the hardly known salt meadows near Kachstedt to the public and to significantly improve the conditions for

the preservation of these inland salt locations through land acquisition.



*Sea Wormwood
at the Artern Solgraben*

Artern Solgraben



The Arterner Solgraben is a protected landscape already since 1935.

Here, on a very small area, there are a great number of rare and endangered salt plant species. Probably nowhere else is it possible to view the rare saline flora so easily. The sea-aster with its purple blossoms and the sea wormwood with its silver-shiny appearance

and spicy smell are easy to spot. Both species are especially appealing in September. A closer look is required to spot the delicate slender hare's ear, the media sandspurry or the sea plantain.

On the areas without vegetation, the salt concentration in the ground is so high that no plant is able to grow. On the border areas, glasswort occurs, which of all plants can bear the highest salt

concentration and dyes the areas into a bright red in autumn.

Interspersed into these areas are the sea purslane and the purple glasswort. These delicate halophyte species can only be encountered here in Thuringia at the semi-natural inland salt locations. Furthermore, the wigeon-grass, which as a water plant can be encountered in the less silty sections of the Solgraben (saline ditch), here has its last occurrence in the German inland.

For the preservation and expansion of this saline treasure it is necessary to occasionally mow or graze cattle and to clean the Solgraben (saline ditch) in sections.

With the help of the EU-LIFE project, more living space is created for these extremely scarce species. The Solgraben is being cleaned and former landfills which destroyed parts of the salt location are being removed.



Rock Wormwood

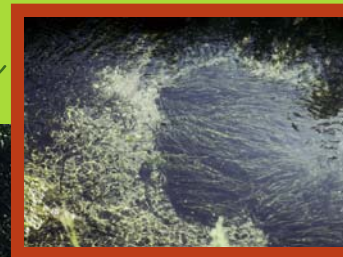
As a special feature, the rock wormwood must be mentioned. Its main natural range is situated in Mongolia and South Siberia. Its occurrence in Artern represents a very distant isolated outpost and can only be encountered here in Germany.



It is assumed that the salt spring is spluttering already for thousands of years. It carries saline water to the surface from a depth of approximately 200 m. Since the 15th Century, with interruptions until the middle of the 19th Century, it was used for the production of evaporated salt. Then, whilst drilling, saline water containing 26% salt was encountered. The salt content of the sole, until that point of time, had to be increased with enormous effort in graduation houses. If one studies the history of the Artern Salina, one can learn much about the changeful history and the various property claims of different dynasties.

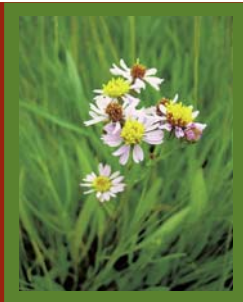
*Wigeongrass at
the Artern Solgraben*

Salty *Experience* in the smallest Area



The inland salt locations at the Numburg Westquelle belong to the floristically best explored in Germany.

After WWII, parts of the salt meadow were ploughed and it was attempted to cultivate sea wormwood as a drug. It is said that the production was stopped because of too meagre harvests after two years.



*Sea-Aster
is easy to spot.*

In 1967, 80% of the formerly extensive salt meadows between Kelbra and Auleben were flooded due to the construction of the Kelbra Dam and the subsequent accumulation of the river Helme. The salt meadows at the Numburg

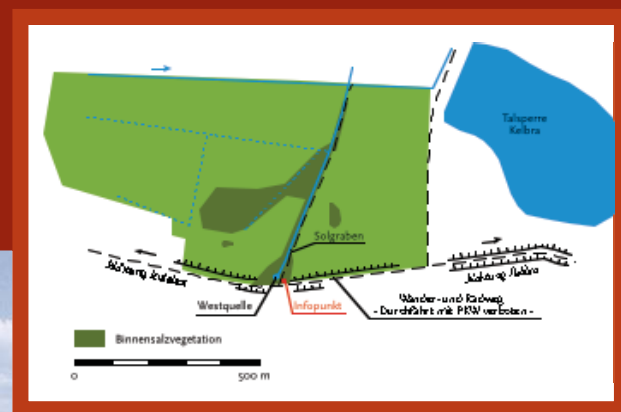
represent the remaining areas at the western boarder of the reservoir. These were almost immediately secured as protected areas. The grassland utilisation conducted up

to this point of time was given up thereupon. The result of the fallow was a suppression of the salt meadows.

At the beginning of the 1980'ies, water penetration in the nearby copper shale mines near Sangerhausen led to the ebbing of the Numburg West-

quelle and the lowering of the groundwater levels on the Solwiese. Only after the copper shale mining was stopped around the year 1991 does the spring flow again without interruption.

Inland Salt Locations at the Numburg Westquelle



Protected and preserved by *rustic* Cattle

All this led to a significant decline of the saline flora. Of the formerly 42 halophyte species, only 24 can still be verified today. Amongst others, the sea purslane, the seepweed and the meadow barley have disappeared.

To the right and left hand side of the Salzgraben (salt ditch), also referred to as the Solbach, are salt-influenced grassland areas. The westerly situated areas are preserved best.

The grazing of these areas since 1998 secures the survival of the saline vegetation. For this, Heck cattle are deployed, which are very robust and are well able to handle the wet

conditions in the reed. But pay attention-sometimes these rustic animals are also seen on the other side of the fence.

Less dangerous to visit for the visitor are the halophytes on the path along the Solbach. Here, amongst others, it is possible to find sea milkwort, sea plantain, seaside arrowgrass, alkali bulrush, and glasswort.

In the future, in particular the continuation and expansion of extensive

farming and the respectively connected suppression of the reed will be decisive for the survival of the saline vegetation. For this purpose, funds out of the EU-LIFE project are available.

The attractive strawberry clover is an indicator for low-saline grounds.



The marsh areas around the Kelbra Dam are also EU bird sanctuaries. Thousands of cranes rest here during the autumn migration period. Amongst the observable breeding birds are endangered species like the corncrake, the common snipe and the peewit. For some breeding birds, the salt-influenced grassland with the low and heterogeneous vegetation hereby represents an important feeding and breeding location.



Extensive Farming is an

The inland saline vegetation mainly consists of “half-natural” habitats that have mainly developed due to extensive farming utilisation in the course of the last centuries. In natural landscapes, areas inhabited by halophytes can probably only be found on small areas close to salt springs, salt lakes and locations cleared by game animals.

The attractive strawberry clover is an indicator for low-saline grounds.



In case grasslands are not used, the hardly competitive and light loving halophytes are suppressed by

other plants. Particular strong competitors are the reed on the damper, and the quitch on dryer locations. Both species are salt tolerant. Similar observations were also made on the salt-influenced grassland of the North Sea and Baltic Sea coasts.

If, on the other hand, the utilisation is too intense, and the water balance is disturbed too much, the salt meadow will also perish. Farming subsequently bears great responsibility for the preservation of the inland salt locations.

Fortunately, most farmers could be gained as partners and sensitised for the preservation of this

scarce habitat. In particular the large scale extensive cultivation of areas, i.e. reduced use of fertilis-

ers and pesticides, and the ploughing of the areas and new seeding, have led to first results in securing this Europe-wide scarce habitat.

essential

Partner for the Preservation of the Inland Salt Locations



Nature Treasures in Europe

and their Protection for the Future

At the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in 1992, the EU has undertaken to preserve its rich and diverse natural heritage. This obligation was based on the knowledge of the progressive worldwide destruction of habitats and the subsequently connected

loss of species, as well as the responsibility for life on our earth.

The objective to preserve or restore the natural habitats and subsequently the diversity of species of wild animals and plants on the European continent were not only empty phrases.

Already in 1992, the Flora-Fauna-Habitat-Guideline (FFH-Guideline) was passed. This determined that a Europe-wide network of special preservation areas, referred to as "Natura 2000" were to be established. This process has extensively been concluded in the mean time.

A novelty for nature conservation is the fact that the habitats, animal and plant species that are listed in the FFH-Guideline were selected on the basis of an overall European view.

One category of protected habitats is the "inland salt marshes", which are given special attention due to their extreme rarity and small dimensions. The FFH-Guideline especially lists them as a "top priority" habitat category and they are under special protection.

From 19 to 30 May 2008, Germany is the host of the 9th Convention on Biological Diversity (CBD). Parallel hereto, a biodiversity campaign will be conducted on Federal State and federal level. This brochure was established within the scope of this campaign and is intended to advertise for the inland salt locations of North Thuringia and the measures conducted within the scope of the Life-project beyond the frontiers.



**FURTHER
INFORMATION IN
THE INTERNET:**
<http://www.europa.eu.int/scadplus/leg/de/lvb/l28021.htm>
www.europa.eu.int/scadplus/leg/de/lvb/l28076.htm

The EU-LIFE Project “Preservation and Development of the Inland Salt Locations of North Thuringia”

The Free State of Thuringia bears special responsibility for the “inland salt meadows”. For this reason, a respective application for promotion was submitted by the Ministry for Agriculture and Environment in 2003. This application was approved by the EU Commission in September 2003. The EU-LIFE project “Preservation and Development of the Inland Salt Locations of North Thuringia” has a period of five years and ends in August 2008.

The EU promotes environmental measures with the LIFE programme (L' Instrument Financier pour l' Environnement), which exists since 1992. The financing instrument LIFE-Nature is intended to contribute to the protection of endangered habitats and nature. With this, the establishment of the European protection network “Natura 2000” is promoted.



Natura-2000 areas in Germany



Measures in the LIFE Project

The LIFE project comprises four project areas, the "Esperstedt Reed" (796 ha), the "Arterner Solgraben" (5 ha), the "Kachstedt Salt Meadows" (8 ha) and the inland salt location at the Numburg Westquelle (44 ha). The total area is 853 ha.

In the Esperstedt Reed, the control of the drainage system was repaired and optimised to ensure the

preservation of the valuable inland salt locations. The maintenance of the long neglected drainage ditches and the renovation of individual water engineering structures are both intended to lead to a more sparing realisation of the draining and to save energy costs. On individual sections of the meadows, troughs were piled up and partially flooded with salt water

from the nearby saline ditch to create new habitats for the highly-specialised saline flora and fauna. As an emergency measure to preserve the species, the endangered sea purslane (*halimione pedunculata*) and seepweed (*suaeda maritima*) were resettled in the area. To ensure the sustainable preservation of the salt locations, the Free State of Thuringia has purchased 128 ha of land and is currently conducting a land consolidation

programme, at the completion of which the Free State shall be the owner of the valuable salt locations. The land will continue to be leased to the former land users.



Sea Purslane is endangered in Thuringia. It was resettled in the Esperstedt Reed and was able to spread out considerably at the Artern Solgraben due to the creation of new raw land locations.



Common snipe (*Gallinago gallinago*), as many other ground breeders, can be observed feeding at the flooded troughs. After decades of absence, it is again a breeding bird in the Esperstedt Reed since 2003.



Flooding channels constructed in 2006 in the Esperstedt Reed, which are supplied with salt water from the nearby Solgraben. An ideal habitat for the saline fauna and flora and bird life.



Also in the other three project areas, measures are conducted to promote the inland salt locations. Debris deposits were removed at the Artern Solgraben (saline ditch) and new raw land areas were created, which can be flooded with salt water via three gates. At the "Numburger Westquelle", the grazing areas could be optimised and extended to potential inland salt locations.

The raising of the stocking rate to up to three live-stock units per hectare during the growing season is generating significant results. Species-rich inland salt locations were able to develop on former saline areas which had been unutilised for decades and had degenerated to

Areas cleared of debris at the »Arterner Solgraben«, in which endangered plant and insect species were able to gain a foothold again.



species-poor raygrass and couch grass pastures. The project monitoring conducted in 2007 clearly gives evidence of this fact. In the project area "Num-

burger Westquelle" for instance, the salt meadows were able to be extended from 4.5 ha to 7.5 ha. This means an increase of 67%. Next to the halo-

phytes, also salt loving insect species and ground breeders, such as the common snipe and the peewit, are able to profit from this development.



Wild Konik horses acquired with LIFE funds are grazing in the project area since spring 2006.

The LIFE project is accompanied by intensive public relation work.

To be stated here as examples are the establishment of a permanent exhibition with an audio-visual exhibition in the regional museum in Bad Frankenhausen, the publication of an information brochure, the setting-up

of information boards in the four project areas and regular guided tours. The public is intended to be given a better understanding in regard to the special features of the inland salt locations and the nature conservation policies of the EU and its member states at the same time.

LITERATURE

(only available in the German Language):

Westhus, W. et al. (1997): Binnensalzstellen in Thüringen. Naturschutz report, book 12.

Böttcher, H. & S. Pfützenreuter (2005): Das EU-LIFE-Projekt "Erhaltung und Entwicklung der Binnensalzstellen Nordthüringens" – eine erste Bilanz. – Landschaftspflege und Naturschutz Thüringen 42 (book 2): 79-81

Thuringian Ministry for Agriculture, Nature Conservation and Environment (2007): "Binnensalzstellen Mitteleuropas" (conference transcript to the international conference from 8th to 10th September 2005 in Bad Frankenhausen)

The conference transcript is available at:
Regionalmuseum Bad Frankenhausen,
Schloss, 06567 Bad Frankenhausen,
e-mail: museum-badfrankenhausen@web.de



Insights into the permanent exhibition



A permanent exhibition about inland salt locations has been established in the Regional Museum in Bad Frankenhausen with LIFE project funds.

The Kyffhäuser Salt

An audio-visual exhibition on DVD about
the inland salt locations of North Thuringia



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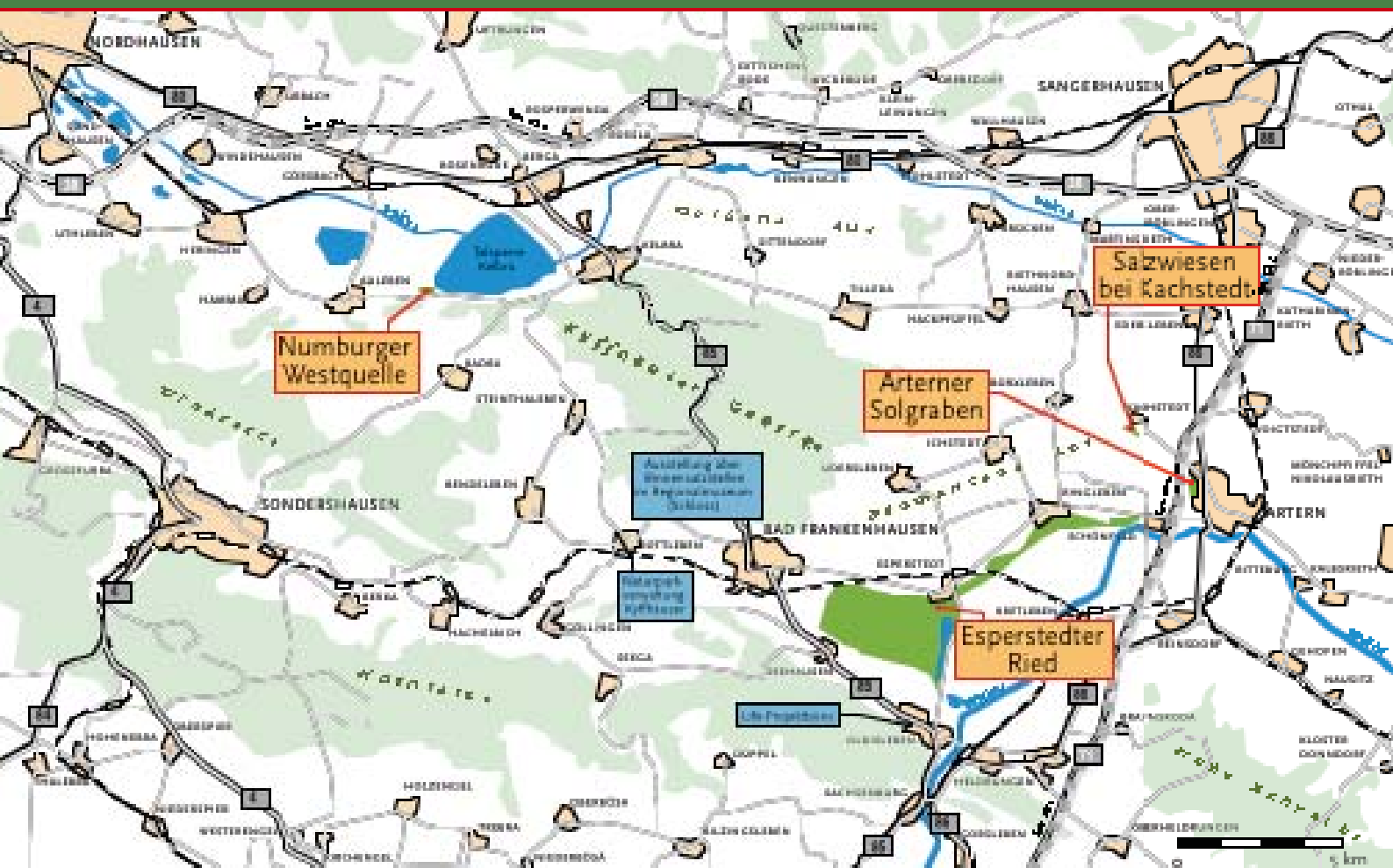
Internet: www.eu-lifebinnensalz.thueringen.de
www.naturparkkyffhaeuser.thueringen.de

EXHIBITION TO

THE TOPIC OF INLAND
SALT LOCATIONS:

in the regional museum in
Bad Frankenhausen

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