

Other brochures about the area

The Brede Å - improvements on streams and land

Folder published by the County of Sønderjylland in 1996.
Also available in Danish.

River revitalization - on river restoration in southern Jutland

Brochure published by the County of Sønderjylland in 1996.
Also available in Danish.

Sailing and canoeing on South Jutland streams

Folder published by the County of Sønderjylland in 1995.
Also available in Danish and German.

Æ Markmandssti (The farmer's path)

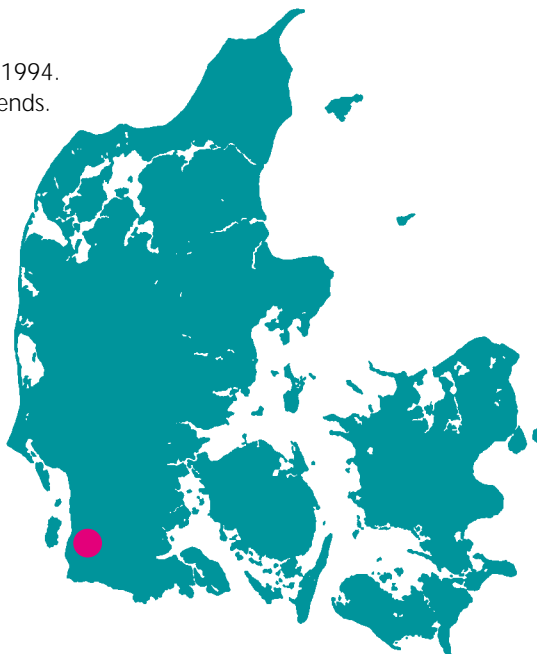
Folder published by the County of Sønderjylland in 1994.
Only available in Danish.

Sønderjylland på cykel (Southern Jutland by bike)

Cycle path map published by
the County of Sønderjylland in 1994.
In Danish with English map legends.
New edition to be published
in 1998.

På tur i Brede Å dalen (Walking in the Brede river valley)

To be published by
the County of Sønderjylland
in 1998.
Only available in Danish.





County of Sønderjylland

The River Brede

- enriching our countryside



Committee for Technical and Environmental Matters

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Foreword

Watercourses are dynamic elements of the landscape. They embellish and form the landscape through which they run, gradually changing their course with time. Their discharge and water level vary such that they often flow not only along the river bed itself, but also spread out into the river valley. At least that is the case when nature rules.

Until the mid 1970s, numerous drainage projects were undertaken in Denmark to promote agricultural production. The projects were supported through legislation and financial subsidies from the State. The watercourses were channelized or culverted, meadows and bogs were drained, and shallow lakes and estuarine fjords were reclaimed.

Times have now changed, however. Greater local and global awareness of nature and the environment has arisen. For the sake of our own well-being and survival we need to manage nature and the environment in a sustainable manner. In recent years, numerous projects have therefore been undertaken aimed at enriching our nature and improving the environment that surrounds us.

In Sønderjylland County, a number of projects have been undertaken in the River Brede and its catchment area. Some of the projects primarily aim to improve nature and the environment, while others aim to enhance the possibilities for outdoor life in the area. This booklet describes the River Brede catchment area and the projects undertaken and planned by the County Council.



Sven Tarp

Chairman, Committee for Technical and Environmental Matters

Future projects

In its endeavours to improve nature and the environment, the County of Sønderjylland focuses its efforts on a few geographically restricted areas at a time. One of these is the river Brede catchment area, and projects will continue to be undertaken in the area in the years to come.

The river valleys

Restoration of the main course of the river system will continue in a northerly direction in Lobæk brook. It is not certain that all reaches of the watercourses will be remeandered. The advantage of remeandering is that the result is immediately apparent and that plants and animals react rapidly and positively. In some reaches, however, one can instead choose to narrow the watercourse's profile, lay out stones, and undertake environmentally sound maintenance so that the watercourse will eventually transform itself into a natural watercourse with wet meadows.

The bogs

There are some rather large and in some cases well-preserved bogs on the edge of the Brede river system, e.g. Draved Bog, Sølsted Bog, Skast Bog and Hønning Bog. In the coming years it is planned to undertake projects aimed at enhancing the natural state of these bogs, primarily by increasing water input to them and maintaining a sufficiently high water level.

There is now more water in Draved Bog since the ditches were closed off in 1993.

Outdoor life

Extension of the footpath system along the river Brede and Lobæk brook will continue in a northerly direction past Løgumgårde. At the other end, it is intended to extend the footpaths westwards from Bredebro to join the paths at Mjolden and Misthusum.

In the longer term, the paths will become part of a network of footpaths comprising the so-called "Western Ox Road".

Collaboration with landowners

The projects benefit both the individual landowner and society as a whole. Experience from the River Brede project has shown that conflicts between landowners and natural and environmental interests can be diminished. The landowners involved have indicated that it is particularly important that land redistribution is undertaken so as to ensure them an alternative to risky agricultural production on low-lying land.

The projects also enhance the number of habitats for animals and plants, and ensure a more diverse nature to the benefit of outdoor life, including hunting and angling. Meadows and wetlands once again come to function as nature's own treatment plant, reducing nutrient and ochre pollution of the watercourses.

The County of Sønderjylland has decided to help ensure the realization of these benefits to landowners and society. The County has therefore allocated resources for re-establishing and improving conditions in a number of important river valleys throughout the county – an endeavour that started with the River Brede.



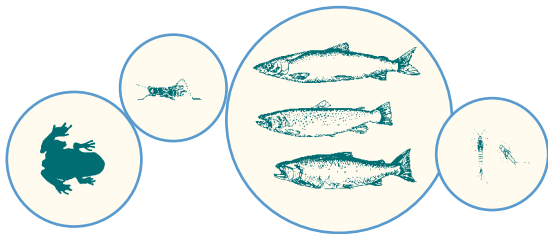


Improving nature and the environment

Watercourse flora and fauna

Restoration of the watercourse reaches has definitely resulted in better living conditions for animals and plants in the watercourses. The plants have a stable bed of gravel to grow on, the stones and plants provide habitats for aquatic insects, and the fish therefore have a better food resource. At the same time, the fish have habitats in deep holes in the bed and near stones and tree roots, and they can spawn in the gravel banks in the riffles.

Obstructions in the form of concrete weirs have been removed or converted to riffles so there is now free passage up and down the watercourse for fish and invertebrates.



it covers the aquatic plants and spawning grounds with a layer of red sludge.

Plant and animal species that inhabit wet meadows are able to recolonize or survive. Meadows with their numerous flowers are a welcome sight in the landscape for most people. Moreover, many plant, insect and bird species threatened by extinction inhabit these meadows. All the projects undertaken in the River Brede catchment area have taken into account the need to provide good living conditions for the otter if it should reappear in southern Jutland. At present, there are otter populations less than a hundred kilometres north and south of the River Brede.

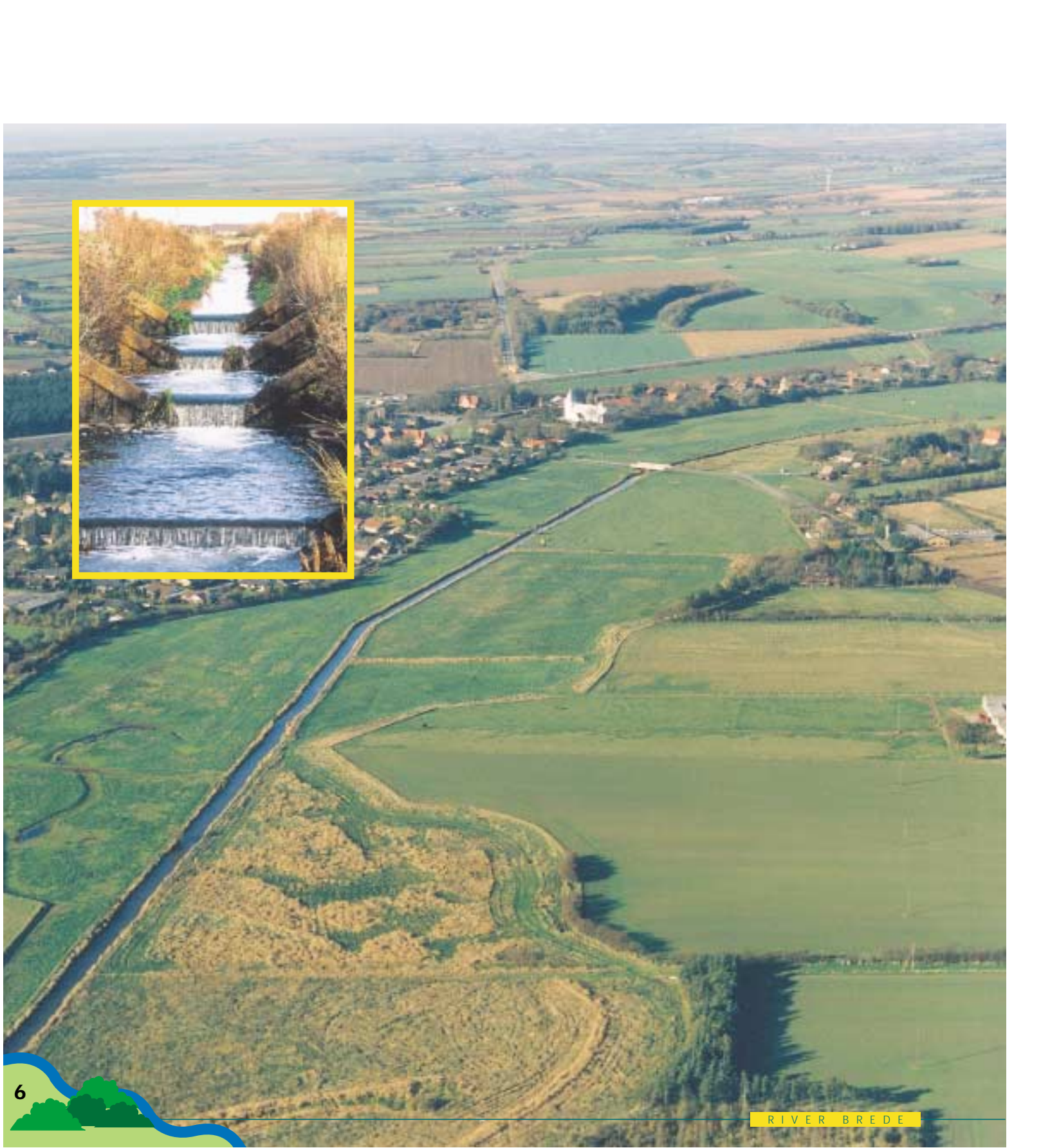
The wet meadows

The wet meadows hinder nutrients and ochre from reaching the watercourses, so that the water in the watercourses becomes cleaner. When the meadows become wetter, the soil becomes anoxic, thereby allowing nitrogen in nitrate to be converted to nitrogen gas. At the same time, the wet meadows hinder oxidation of the iron in the ground to ochre. At a certain concentration, ochre kills aquatic insects and fish, and

Løgumkloster mill pond, Landeby brook and Lobæk brook were recreated and restored in 1989-96.

What do the inhabitants think of the projects?

At the beginning of 1997, the County of Sønderjylland conducted a questionnaire survey among landowners and inhabitants of Bredebro and Løgumkloster on their attitude to the restoration of the River Brede. It turned out that almost everyone (118 answered) was positive towards the projects. In particular, many people thought that restoration of the river had enhanced the area's landscape value. The majority also thought that the biological value of the area and its value for outdoor life had increased.



Projects in and around the River Brede

Landeby brook and Løgumkloster mill pond

This was the first project in the Brede river system. In 1989, 500 metres of Landeby brook were remeandered to an 800 metre reach. At the same time, just under 2 ha of the mill pond at Løgumkloster were recreated. Løgumkloster Municipality has since laid footpaths around the mill pond which now serves as a recreational area for Løgumkloster. At the same time, the pond traps large amounts of ochre, thereby protecting the downstream fauna.

Restoration of the River Brede and Lobæk brook

During the period 1991-97, 13.6 kilometres of channelized watercourse were remeandered to a 20 kilometre winding course. At the same time, the watercourse bed was raised so that the meadows in the river valley became wetter with frequent winter flooding. Stones and spawning gravel were laid out in the remeandered watercourses to improve conditions for aquatic insects and fish. In addition, ponds were created in some of the original meanders and in unused sections of the former straightened watercourse.

Removal of weirs

In 1990, a large weir at the railway bridge in Bredebro was converted to a riffle so as to provide free passage for fish. A further eight concrete weirs were removed in connection with the restoration of the River Brede and Lobæk brook. The work on Lobæk brook also included removal of a large four-tier weir, and two weirs were converted to riffles in Ny Havnebæk brook.

It was particularly important to remove the weirs in the River Brede to help promote survival of the houting. This is because unlike other salmonids, the houting is unable to force weirs by jumping.

Projects in tributaries of the River Brede

In two of the tributaries that feed into the River Brede at Løgumkloster, the County Council has established two lakes (3 ha and 1 ha) to retain ochre so as to protect the downstream fauna.

Draved Bog is one of the most well-preserved raised bogs in southern Jutland. It lies on the watershed between the Brede river system and the Vidå river system. For a number of years, the bog and its flora and fauna have been threatened by drying up and becoming overgrown with scrub. In 1993, some of the ditches that drained the central part of the bog were closed off leading to the recreation of approximately 25 ha of open water and waterlogged ground.

Projects for outdoor life

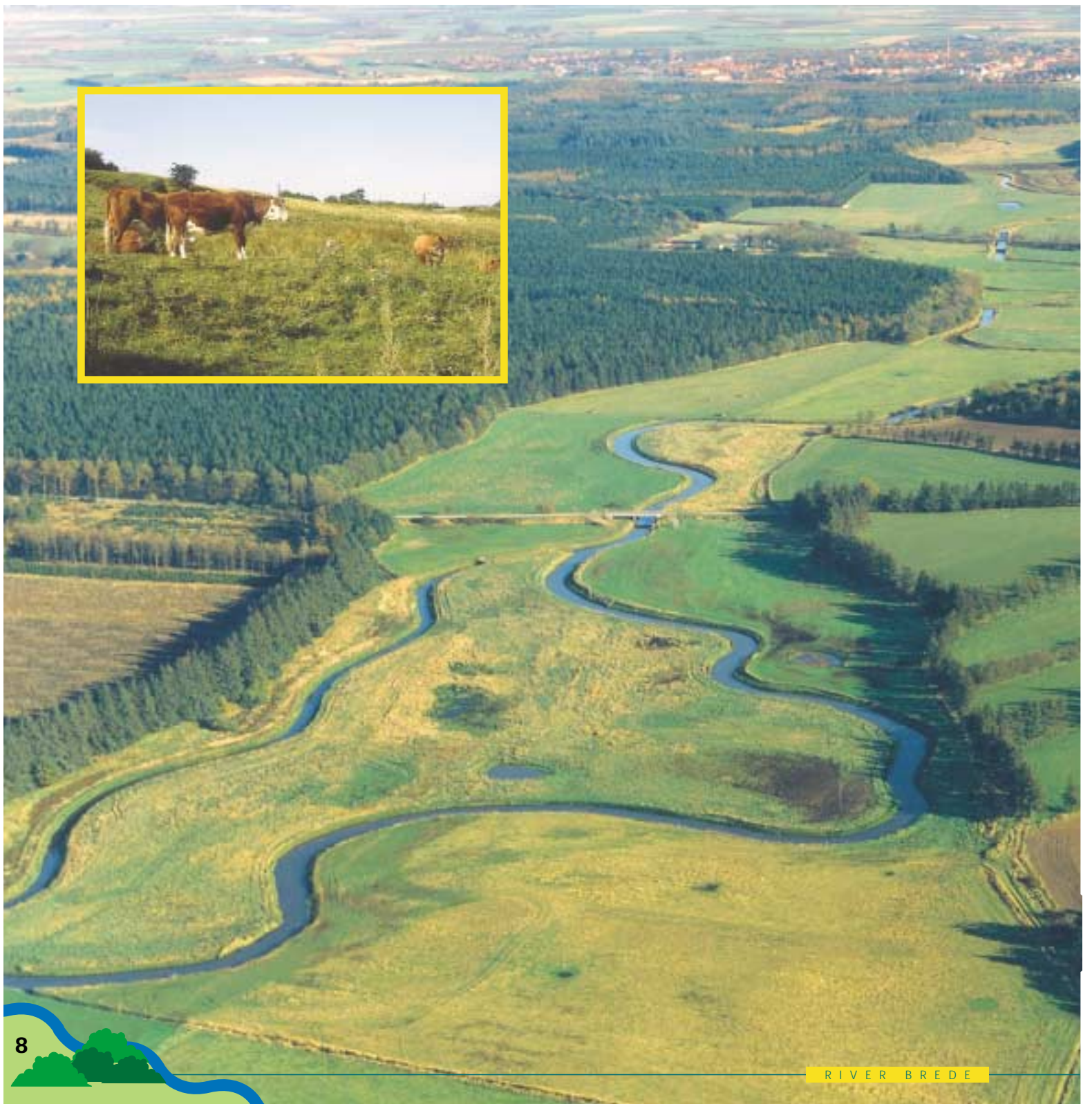
When the planned footpath system is complete, it will be possible to walk the approximately 10 kilometres from Løgumkloster to Bredebro. Most of the path runs alongside the edge of the river valley, and occasionally crosses the river.

In Ballum marsh, there is a foot and cycle path from Mjolden past Misthusum and on to the Rømmø Causeway or Hjemsted at Skærbæk.

In 1995, a footpath was built to Vongshøj hill from the car park on the Tønder-Kolding road adjacent to Nørre Løgum.

Canoeing is permitted on Lobæk brook and the River Brede downstream from Nørre Løgum, also on the restored reach. At the new riffles, though, it will often be necessary to carry the canoe. Landing places for canoes have been made at several spots along the watercourse and three primitive campsites are underway.





The River Brede today

Times have changed and we now have a surplus of agricultural products in Denmark and the EU. This provides the grounds for concentrating agricultural production on the best land so as to provide more space for nature on the land that is less suitable for cultivation, for example the river valleys.

In recent years, both Denmark and other countries have devoted considerable resources to projects aimed at improving nature and the environment and enhancing the possibilities for outdoor life. This is also the case in the River Brede catchment area, where such work has been going on since the end of the 1980s with the County of Sønderjylland as the driving force and numerous other interested parties providing valuable assistance. Not least the goodwill of landowners in the river valley has played an important role.

A long reach of the river has been remeandered, the weirs have been removed and the bed has been restored to its former level so that the meadows become wetter. Lakes have been constructed in the tributaries of the river to serve as ochre traps, and facilities have been provided for those who would like to walk along the river or go canoeing on it.

How have the projects been undertaken?

All the projects have been undertaken on a voluntary basis and in agreement with the landowners. The latter were involved in the early planning stages and hence have been able to have a real influence on the projects.

The River Brede in 1995. The river once again follows a meandering course and obstructions to fish have been removed.

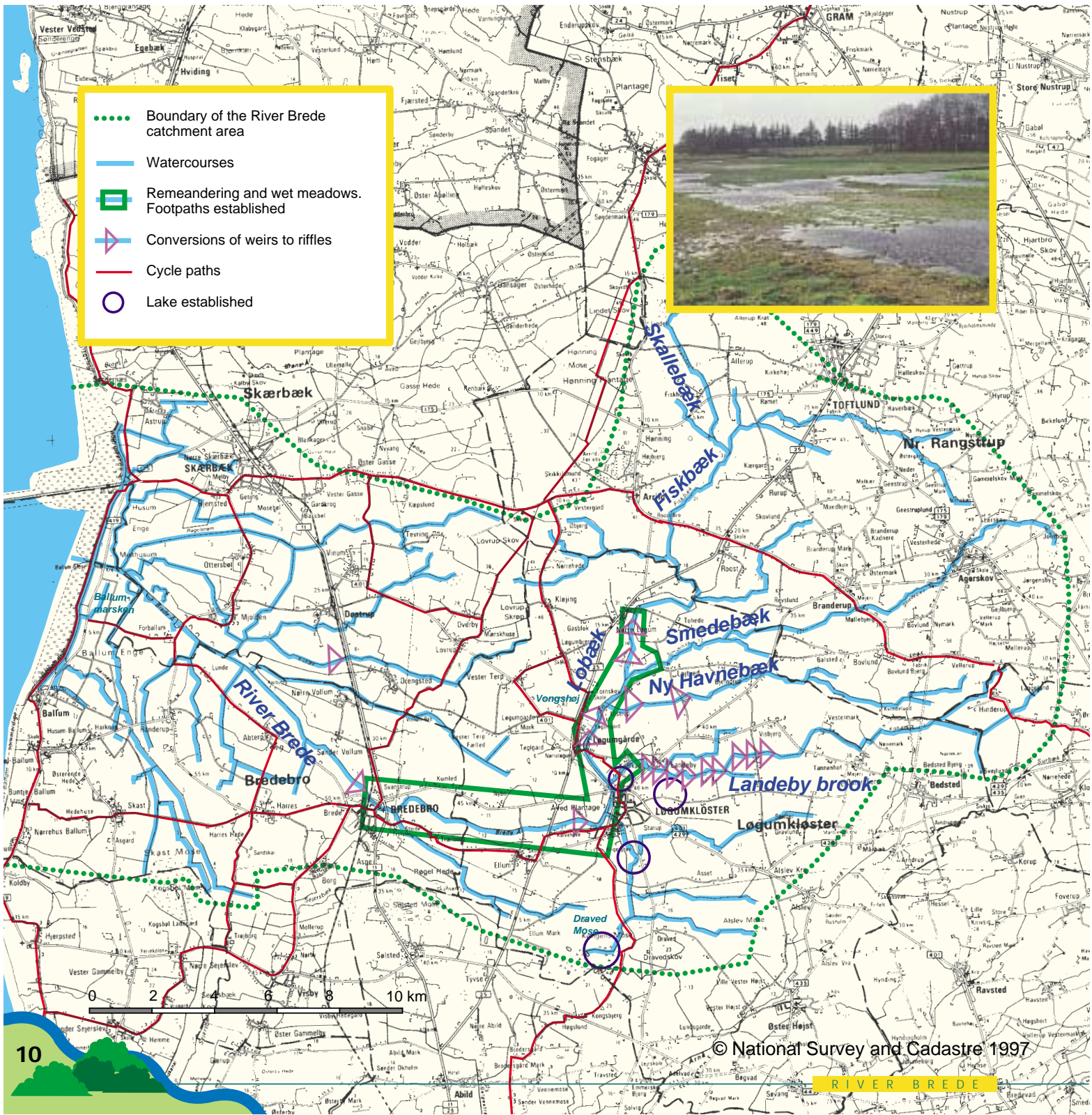
The landowners have kept the land, even in cases where there are now lakes on their property. In connection with restoration the land near the watercourses was redistributed among the landowners in a manner that tried to best meet their individual wishes. The South Jutland Land Fund played an important role in this process serving as a "land bank".

The affected landowners received compensation, in some cases in the form of additional land. In future, it will be possible to use the EU subsidy scheme for sustainable agricultural measures as an active tool in the projects. Among other things, the subsidies can be used as compensation to landowners to manage their grazing meadows without the use of fertilizers and pesticides, for letting their meadows become more wet, or for taking them out of production completely.

How have the projects been financed?

The majority of the projects have been undertaken and financed by the County of Sønderjylland and various collaborators. The EU LIFE Fund and the Danish Environmental Protection Agency have made major contributions to the restoration of the River Brede. Løgumkloster and Nørre Rangstrup Municipalities have also contributed financially.

The River Brede is home to a fine population of sea trout and salmon. In addition, one also finds houting, a rare salmonid that was threatened by extinction in the early 1980s. It is now found in several of its original habitats in the watercourses of southwestern Jutland following major breeding and restocking work.



Regulation of the River Brede

The Brede river system consists of more than 1,000 kilometres of open ditches and watercourses. These drain an area of 473 square kilometres. The river flows out into the Wadden Sea through Ballum Sluice. The last 10 kilometres of the river running through Ballum marsh have virtually no slope.

Ballum Sluice was built in 1914-19 together with Ballum Dyke, at which time the outlet of the River Brede was rerouted to the sluice via a canal. Before the dyke was built, the mouth of the river lay north of the present Rømø Causeway. The former outlet now lies as a static river reach east of the road that runs through Ballum marsh to the Rømø Causeway.

The main reaches

The main reaches – Lobæk brook and the River Brede – were regulated in the 1950s. The watercourses were formed into straight canals and the bed lowered so as to increase their water discharge capacity. Weirs were constructed to expend the energy of the water so that the river did not start to remeander. These measures enabled the river valley to be drained so that the meadows could be used more effectively for agricultural production. Often the meadows continued to be used for harvesting hay and grazing, actual cultivation of the meadows along the river valley first starting with the mechanization of agriculture in the 1960s.

Lobæk brook prior to restoration. The straight, canal-like watercourse with concrete weirs did not provide many habitats for plants and animals. The former meanders can be seen in the foreground.

At that time, there was political and economic support for enhancing agricultural efficiency, the desire being that Denmark should be able to feed its own population. For a number of years farmers obtained a good yield from the soil in the river valleys, but drainage and soil treatment eventually led the soil to settle, and it became difficult to cultivate it. When oxygen reached the deeper soil layers, the peat decomposed and the soil collapsed. At the same time, the iron compounds in the soil became oxidized with the result that ochre leaked out into the watercourses.

Regulation of the watercourses also had other unfortunate environmental consequences. The straight, canal-like watercourse did not provide many habitats for plants and animals, especially as many reaches were subject to sand migration with the bed continually moving or becoming blanketed by sand.

Drainage water from the meadows and the slopes of the river valley was led directly out into the river via drain pipes such that the water arrived in torrents. This resulted in more frequent flooding of the lower parts of the river valley. At the same time, nutrients from the agricultural land were led out into the watercourses and from there directly on to the shallow areas of the Wadden Sea, where they enhanced algal growth. Previously, a large part of the nutrients (nitrogen and phosphorus) were metabolized in the wet meadows and hence did not reach the watercourses.

The wet meadows house a multitude of different species of plants and animals that are unable to thrive elsewhere. The meadows are also very rich in flowers, which are the basis for many species of insects and birds. In former times, many of our undisturbed watercourses were home to the otter.





Man and the landscape

Historic sites

Visible relics of the past are rather sparse in the area around the River Brede. However, at Løgumbjerger near Vongshøj hill there is a major collection of Bronze Age barrows. In the river valley north of Abterp, one can see two impressive long barrows that have been exposed. They stem from the late Stone Age (around 3,500 B.C.). They now lie in a swampy meadow, but when they were built, the coastline lay many kilometres further west than today so the area was drier.

At Draved Bog, Maglemosian settlements have been found dating from around 6,000-4,400 B.C. In Draved Forest, archaeologists and geologists have experimented with slash-and-burn farming. This has provided considerable new knowledge on the earliest form of agriculture.

In the Iron Age, pig iron was extracted from bog iron ore. In the river valley west of Løgumkloster and at Drengsted, two large villages from 300-500 A.D. have been studied that to some extent lived off the extraction and sale of iron.

Castle mounds

In the river valley of the upper part of the River Brede there are two well-preserved castle mounds, Nørrevolde and Søndervolde. The former lies near Fiskbæk brook east of Arrild and is the most well-preserved of the two. It consists of the actual castle mound and two farmhouse mounds surrounded by a moat, and was in use from 1350 to 1370 A.D. Søndervolde castle mound has the same structure, and lies a couple of hundred

In the Brede river system 20 kilometres of meandering watercourse have so far been recreated.

metres east of the Tønder-Kolding road near Lobæk brook. A large collection of finds from Nørrevolde castle mound is housed at Haderslev Museum.

Løgumkloster monastery and Løgumgårde

The monastery at Løgumkloster was founded by Cistercian monks in 1173. The impressive church there was built by the monks over a 100-year period starting around the year 1225. The church at Løgumgårde was built in the 1190s, and is thereby the oldest tiled church in the area.

Water mills

Throughout the ages the inhabitants of the area have exploited the river water to drive mills. At Lobæk brook near Løgumgårde, the remains of a water mill dating from the end of the 12th century have been discovered. At the same time, the monks at Løgumkloster constructed a mill on Slotsbæk brook and at Vestermølle. Around the year 1600 a water mill was built north of Løgumkloster leading to the formation of an extensive mill pond. The mill pond was reclaimed in the 1950s in connection with regulation of Lobæk brook. A minor part of the mill pond was recreated in 1989 as part of a nature rehabilitation project.

Ballum marsh

At Ballum marsh the River Brede runs past several farmhouse mounds. These were constructed in the early Middle Ages before it became practice to build dykes as protection against storm tides. The farmhouses on the mounds at Misthusum were abandoned in 1811.



The landscape

The Ice Age

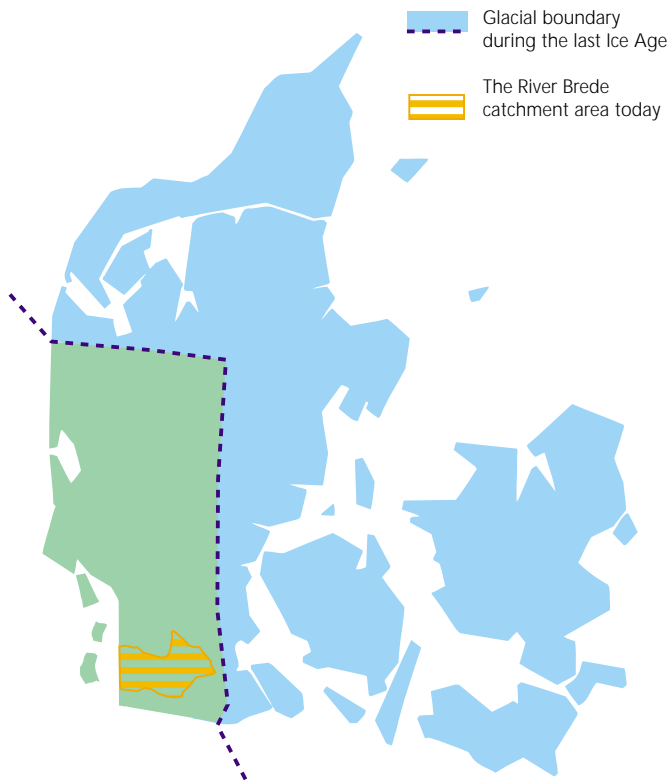
Southwest Jutland was not covered by ice during the last Ice Age, which ended approximately 15,000 years ago. The landscape therefore consists of hill islands deposited during the penultimate Ice Age, between which lie outwash plains deposited by meltwater during the last Ice Age. At that time, the glacial boundary lay roughly where the motorway runs through Sønderjylland County today.

The upper ends of the watercourses in the Brede river system arise partly on Tinglev outwash plain and partly on Toftlund hill

island. Most of the river runs through the outwash plain. The last 10 kilometres before the outlet into the Wadden Sea run through Ballum marsh. The marsh consists of fine-grained material (marine clay) deposited by the sea over the last few thousand years.

The surface of the outwash plain mainly consists of sand. In some parts, the wind has formed it into dunes, for example west of Løgumkloster, where a large area of shifting sand has been converted to plantation.

At the edge of the river valley west of Løgumgårde protrudes the highest point in western and southern Jutland, Vongshøj hill (62 metres a.s.l.). It lies on a southern spur of Toftlund hill island, where meltwater from the last Ice Age has formed deep cuts in the steep eastern slopes.



The bogs

On the edge of the Brede river catchment area there are several large bogs, among others Draved Bog, Sølsted Bog, Skast Bog and Hønning Bog. In the upper part of the river system there are large areas of forest on the edge of Toftlund hill island, for example Lindet Forest and Hønning Plantation.

The whole river system upstream of Bredebrogård is characterized by very iron-rich groundwater, and the watercourses therefore have a high ochre content. When the iron-rich groundwater meets deposits of peat or gyttja mud, bog iron ore is formed.

There are more than 1,000 kilometres of open watercourses and ditches in the 473 square kilometre River Brede catchment area.

