

Barton Broad Clearwater Project

A project to help a sick lake

Barton Broad is a big lake in Norfolk. It is the second biggest of the 38 lakes which make up the protected area known as 'the Broads'. It is a very beautiful, peaceful area, full of wildlife.

These lakes were made by our ancestors

It is difficult to believe, but these huge lakes (or "broads" as they are called) were actually dug by hand. Medieval people dug up the special earth here to burn for cooking and heating. It's called 'peat' and it is made up of layers of dead plants which have not rotted.

Later, the pits flooded with river water. For the next 600 years the water was clear and full of animals and plants.

Recent trouble - the broad looked dirty and was getting shallower & shallower

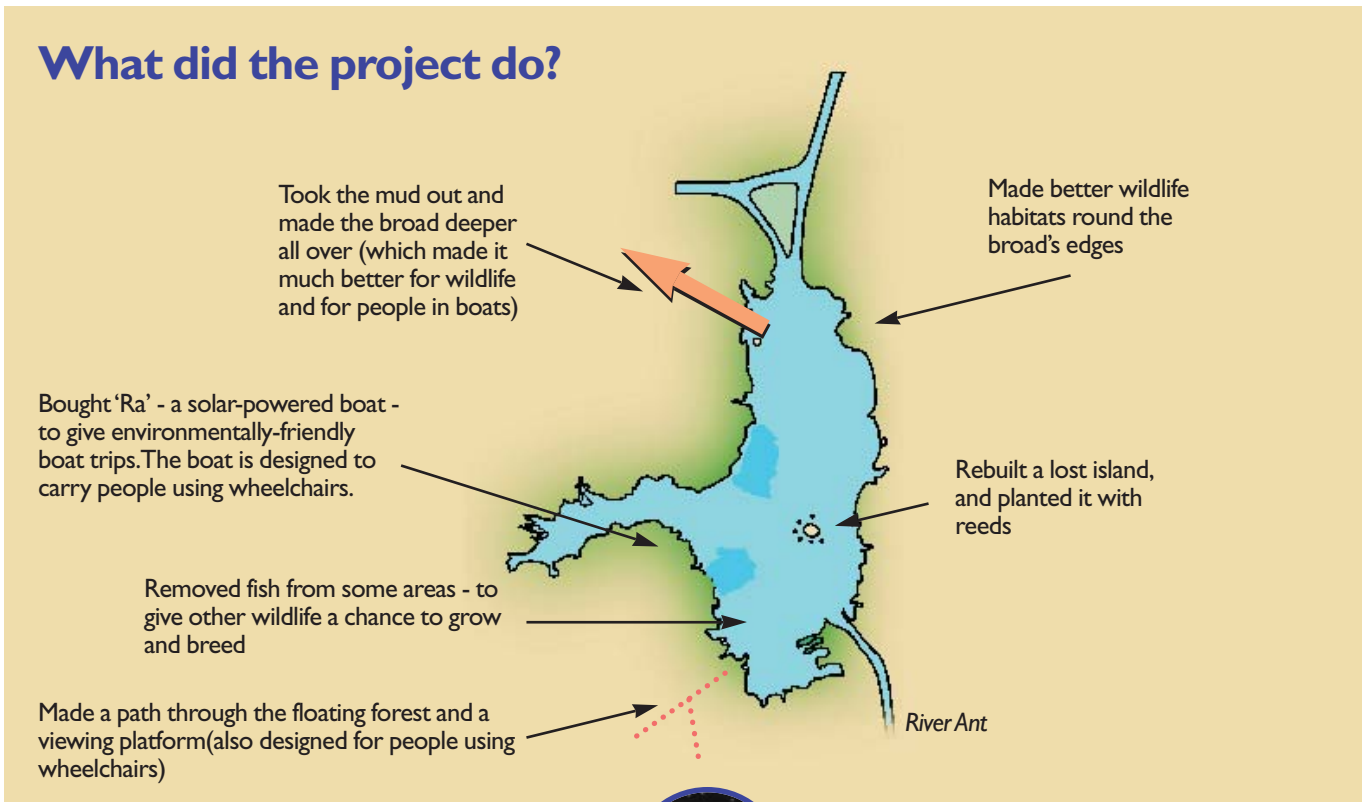
By the end of the 20th century, Barton Broad was in a terrible state and needed help. The water was dark and cloudy, very few species of animal and plant lived in it and the broad was actually filling up with mud!

The Broads Authority and their partners started a special project, aimed to clean up the broad and to make it a better place for wildlife and for people. This was the biggest clean-up project they had ever done.

Getting clear water and wildlife back into this broad is very important but it is very difficult. The methods that have worked here are being used on other lakes elsewhere in the world.



What did the project do?



Why are these tiny animals (*Daphnia*)



such heroines?? Find out on page 3...



Barton's Problems

- all about water quality



First stage

The simple habitats in a broad with low nutrient levels

First stage

For 600 years or so, the water in the broads was clear, but in the last 40 years of the 20th century it became dark and dirty-looking. Something was wrong...



Second stage

A rich underwater jungle grew as plant nutrients flowed in

Second stage - a jungle grows

In the late 1800s more and more people came to live in the area, and sewage started to be put into the broads. This made a rich plant food.

In the 1950s and 1960s farmers started using chemical fertilisers on their fields. Some of this washed off into the rivers and broad. These chemicals (known as 'nutrients') acted as food for all the plants in the water.

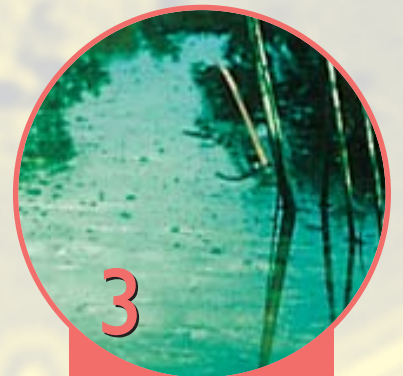
Third stage - Who turned all the lights out?

By the 1970s, the broad was like a great bowl of liquid plant food.

The plants that grew quickest on this rich diet were the algae - microscopic plants that turned the water greeny-brown. They stopped any light getting to other plants.

Imagine what it would be like to live in your house if someone painted all the windows black and there was no electric light or candles!

The underwater forests died, along with all the creatures that lived in them, and Barton Broad started to look like pea soup. The broad began to fill up with mud, made of dead algae and soil washed off the river banks and nearby fields.



Third stage

Looks like pea soup. Masses of plant nutrients made the algae grow very fast and they shaded out everything else

Underwater, Barton Broad was boring

In a good wildlife habitat, what we usually look for is 'biodiversity'. This means a lot of different species of animals and plants living together.

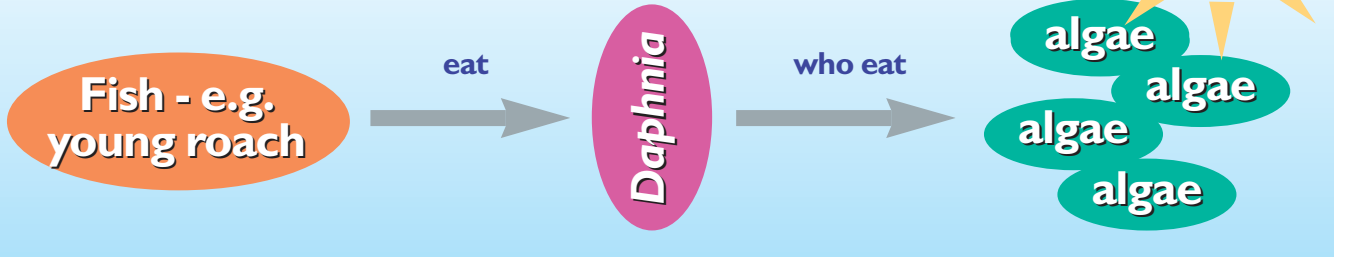
At the start of the Barton project, the broad was the exact opposite - it was one huge lake full of algae and mud with very few species of plants or animals.

We could call it **BIOMONOTONY!** It looked like soup and had a thick layer of mud on the bottom. In many places the water was only a few centimetres deep.

“Biomanipulation” - interfering with food chains

This is a simple diagram of an important food chain in the broads...

It starts with a green plant - algae. This is eaten by a plant-eater - *Daphnia*. These are then eaten by meat-eaters - young fish.



This food chain keeps the water clear - light can get through and lots of different plants can grow.

BUT

When masses of plant nutrients flowed into Barton Broad, the algae grew and grew and grew and grew and grew...

... To try to put this right, the scientists agreed they needed to increase the numbers of the plant eaters - the *Daphnia*.

They decided to do two main things:

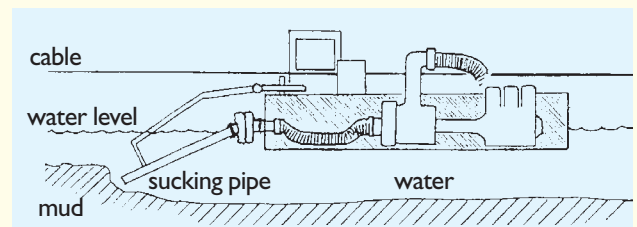
- reduce the amount of plant food, in order to 'starve' the algae and
- reduce the number of fish, in order to protect the *Daphnia* from their predators

Two steps to reduce the plant nutrients



Sewage works

Better equipment was put into the sewage works to take nutrients out of the water before it gets into the broad



The dredger

A powerful engine worked for 4 years taking mud from the bottom of the broad and pumping it onto the land. This took out a lot of stored nutrients.

Two steps to reduce the number of fish

Fish barrier

Plastic fish-proof barriers were put into the broad, to keep the fish out of the biomanipulated areas



Electrofishing

Scientists used electric shocks to stun the fish temporarily and then tipped them into the main broad



The Broads, like any lakes, are always changing

Cold or hot weather changes them, heavy rain or no rain changes them..
..BUT more than anything else, people change them.

When a lake is nutrient-rich, like Barton Broad, the water can either be cloudy and full of algae - or clear, with a jungle of plants. Here are some of the things that 'pull' a lake towards being full of algae or 'push' it towards being clear water.

Scum of blanket weed

Young roach in dark water

Algae - greatly magnified

Tubifex worms

Nutrient-rich mud, very little oxygen

Peat

If more nutrients wash in, algae can grow very fast and shade out other plants

Plants can disappear down the throats of hungry geese

Good habitats can be destroyed by too many boats going too fast

Some chemicals used in farming and on boats' hulls are VERY POISONOUS to water life



Better sewage treatment means less nutrients (plant food) getting into the water



Masses of plant food, stored in the mud, can be taken out by dredging



Daphnia-eating fish can be taken out to give the algae-eating Daphnia a head start



Plastic brushes make a good artificial habitat for Daphnia, (to hide from the fish who eat them) until the water plants grow.

Minibeasts and various species of fish

Daphnia - greatly magnified

Various plants

The project at Barton Broad is trying to swing the pendulum towards clear water and away from algal 'soup'....

It took many years of neglect to change the clear water in Barton Broad to soup - and it may take many years before the pendulum can swing back to give us clear water again.....