



**Algal filters -
increasing
resilience to
climate change.**

Algal filters - increasing resilience to climate change.

Algal blooms are a natural phenomenon, but when they happen they can block processes in our water treatment plants. This is already a regular occurrence, and it's set to get more common with climate change. We're exploring an innovative way to remove algae and reduce the impact on our treatment processes, by adapting a filter that's already widely used in treating wastewater effluent.

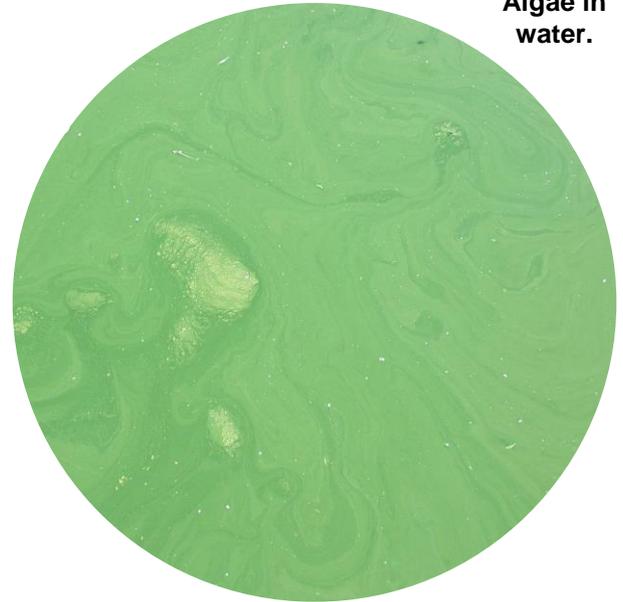
Background.

Algae are microscopic plants which live in water. Because plant nutrients are plentiful in the Thames Water area, we experience extreme algal population growth, called 'blooms', in our reservoirs several times a year between spring and autumn. Each bloom results in a large number of algal cells needing to be removed from the water to make it fit to drink. This increase in algae can block our filters more quickly, which requires more wash water, and sometimes limits production capacity.

To provide water to our customers, we operate a network of over 20 large storage reservoirs which are fed from the River Thames and River Lea. These reservoirs supply nine water treatment works, where we use a sequence of treatment steps to remove particles and other impurities from the water to make it fit to drink.

Every day, under normal weather conditions, we pump river water into our storage reservoirs and take some out for treatment. This makes sure we have enough water stored to supply our customers for approximately three months if the river flows get too low. Storing the water also helps to start purifying it naturally.

Algae in water.



- Novel use of established filter technology.
- Future-proofing our treatment works against climate change.

Challenge.

Our current approach to controlling algae involves mixing water in our deepest reservoirs. This moves algae to deep water, out of the sunlight, which restricts its growth. We then try to select water from the most treatable reservoirs.

However, climate change may result in warmer temperatures, as well as longer, dryer and sunnier periods, and more intense storms. If this occurs, we anticipate that reservoir water will become more difficult to treat. Our filters could be overloaded by algal blooms and too many microscopic particles – and our current algae control strategy of mixing water won't work if there's not enough water to keep the reservoirs full to allow mixing.

**The filter cloth
half immersed
in reservoir
water.**



An innovative solution.

We're currently investigating whether adding an extra stage of filtration ahead of our normal water treatment processes could protect our existing equipment and make sure it remains capable of doing the job.

Although this method of filtration is widely used to treat wastewater, using it to treat raw water is an innovative new application. The filter is made of fabric which is fixed onto a rotating drum and allows water to pass through. To keep the cloth clean, a pump periodically pulls water back through the fabric to remove debris including algae.

We installed these compact Mecana filters at two of our operational treatment works, and operated them over a two year period – testing how effectively they could filter a range of algae of different shapes and sizes which grow naturally in our reservoirs.



**Compact filter
at one of our
sites.**

Promising results.

Our tests so far have shown that Mecana filters can efficiently remove the kind of algae we find in west London reservoirs – taking out around 80 per cent of them. In east London the filters removed around 80 per cent of algae during summer and autumn, and around 50 per cent of the very fine algae present during spring. The results have been extremely encouraging, and demonstrate that this technology will be able to offer the protection we need for our water treatment works against some of the anticipated future challenges of climate change. In turn, this will enable us to keep on providing clean, safe drinking water for our customers.

Future testing.

The filters are now being moved to our research and development centre at Kempton, where we have special tanks for growing algae in test settings. We'll put the technology through its paces in more extreme conditions, and investigate whether the filters are effective against algae in excess of what our reservoirs usually produce.

The water from these tests can then be pumped to our pilot-scale water treatment works to demonstrate the protection this extra filtration step will give to our security of supply. Then, in the next five years, we're planning to build two demonstration sites to test this technology at full scale.

