

Double effort needed to clean up Thames

August 7 2013, by Alison Smith



The River Thames will fail to meet pollution standards in 2015 unless farmers use 20 per cent less fertiliser and water companies reduce phosphorus discharges from sewage treatment, according to a new study.

The Thames is the main [water](#) supply for two thirds of the population of Greater London – 14 million people – but it suffers water quality problems. As nitrate and phosphate fertilisers are washed off the surrounding farmland, and treated sewage is discharged into the river, the [excess nutrients](#) can cause [algal blooms](#) that affect water supply and can smother plant and animal life.

'There is 80 years' worth of [nitrate pollution](#) soaked into aquifers, just waiting to come out, and there's not much we can do about it,' explains Professor Paul Whitehead of the University of Oxford, lead author of the paper. 'But plants need both nitrogen and phosphorous, and in most

of the UK phosphorous is actually the limiting nutrient for algal growth.'

Phosphates come from [wastewater treatment plants](#), septic tanks and fertiliser run-off. They are also found in household detergents, though they will be banned in washing powders from 2015. More surprisingly, small quantities are also added to drinking water in many areas, to stop lead pipes from dissolving.

Under the European Union Water Framework Directive, by 2015 all rivers, lakes, wetlands and groundwater must achieve 'good ecological status'. In the UK, [phosphorus pollution](#) is the main barrier to meeting this target. In the Thames, for example, the current phosphorus concentration is 0.19 milligrams per litre (mg/l), well above the target of 0.12 mg/l.

Water quality could deteriorate even further if rising global food prices encourage farmers to grow more crops in the Thames basin. The study models two scenarios in which the proportion of arable land grows from 35 per cent at present to either 50 or 60 per cent, causing phosphorus concentrations to increase to 0.23 or 0.26 mg/l.

The model shows that it will be very hard to reduce phosphorus concentrations to acceptable levels, as Professor Whitehead explains.

'The most surprising result was that it's impossible to meet the Water Framework Directive if you don't have a twin track approach, to persuade farmers to use less fertilizer or improve their farm management to get a 20 per cent reduction in phosphates from farming areas, combined with a significant drop in phosphorus coming from [sewage treatment](#) works.'

At the moment, standard sewage treatment can reduce phosphate concentrations in the effluent to 1 mg/l, but this will need to be cut to

0.3mg/l to meet the target, especially if there is a 50 per cent increase in arable crops farmed.

Cutting fertilizer use would cost farmers an estimated £2.3 per hectare per year in yield losses, adding up to £16 million per year for the whole Thames basin under the baseline scenario, and £23-37 million per year under the increased farming scenarios.

Advanced wastewater treatment methods such as ultra-filtration will increase the cost from £19 to £32 per person per year – an extra £10 million a year for consumers to pay through their water bills.

The study also looked at the potential impact of a new reservoir at Abingdon, which would store water over the winter and release it in summer. Thames Water argues that this is needed to meet a predicted shortfall in water supply by 2030, as the region suffers from low rainfall and is vulnerable to droughts. Although the reservoir would boost low summer flows and therefore dilute pollution in the river, the study found that the improvement would be barely noticeable. It is also possible that hotter summer temperatures could encourage toxic algae to grow in the reservoir, which could make water quality worse.

But perhaps the solution lies in recycling sewage. 'Phosphorus is a valuable resource for making fertilizer, and the world is running out,' explains Professor Whitehead. 'Water companies add lime, aluminium or iron hydroxide and the phosphorous precipitates out – all they have to do is pick it up, dry it out and sell it back to the farmers. As prices go up this could soon become economic.'

More information: Whitehead, P. et al. A Cost Effectiveness Analysis of Water security and Water Quality: Impacts of Climate and Land Use Change on the River Thames System, to be published in *Phil Trans R Soc A*.

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