WATER INDUSTRY INSIGHTS

NATURAL RESOURCES

Martin Spiers
Principal Consultant

Susana Ochoa Rodriguez
Senior Modeller

Celina Wong
Senior Modeller

Britain’s rivers: up the creek?

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BRITAIN'S RIVERS: UP THE CREEK?

Background

The Water Framework Directive 2000/60/EC (WFD) is widely accepted as the most substantial and ambitious piece of European environmental legislation to date. Introduced in 2000, it requires that all community waters in the EU achieve 'good ecological and chemical status' by 2027 (the original deadline was 2015, but it was later postponed). Since its introduction, there have been challenges in implementation across the EU which means that not all the WFD objectives have been delivered. In addition, due to the way in which it has been adopted in different EU countries, it is difficult to benchmark how the UK water bodies are performing against its peers.

This leads us to the big question, are Britain's rivers up the creek?

In early December 2019, Ofwat will publish its final determinations – this is a set of regulatory requirements which need to be achieved between 2020–2025. Coupled with the WFD, this means that there is an everincreasing spotlight on the cleanliness of our rivers and pollutants affecting them. In order to meet these new regulatory requirements, there is an urgent need to understand how Britain's water bodies are performing, the deficiencies in and the barriers for more effective pollution management.

The current situation

A number of recent news articles in the Times and BBC, have focused their debate on the state of Britain's rivers and the role that water companies and the environmental regulators play in this. The majority of this debate has concentrated on England, where the Environment Agency (EA) has statutory powers to ensure water companies comply with licences and permits in order to protect the environment.

The issues are complex and not always understood by the commentators, with the actions of UK water companies limited by their regulatory framework and those of the Environment Agency directed by Government policy. Other stakeholders also have a key role to play if the objectives of the EU Water Framework Directive are to be met.

Lack of data from regular monitoring limits the ability to accurately determine the current standard of watercourses and the causes of failure in Britain. The current approach is largely driven through five-yearly cycles of investment and lengthy investigation and modelling processes, and a more pragmatic approach may be required to achieve good qualitative and quantitative status of all UK water bodies by the 2027 deadline.

The WFD status of rivers in England

The most up-to-date detailed information on water quality in England is from the Water Framework Directive (WFD) Cycle 2 surface water body classifications, last updated in 2016. These show that 84% of water bodies fail to meet the "good" or "high" standards required by the WFD. This is an increased failure rate from 70% in 2013, the first year for which directly comparable data is available. This apparent deterioration is disappointing, especially given the considerable investment made by water companies since the Directive's implementation in 2000.

Surface water categorisation is based on a large number of factors such as chemical pollutants (e.g. metals and benzenes), biological quality (e.g. fish), hydromorphology (e.g. physical modifications), phsico-chemical (e.g. ammonia and phosphate), as well as expert judgement. Bodies are classified against the scale of "high", "good", "moderate", "poor" and "bad" and if part of a water body fails on any one of the criteria monitored, it will fail to achieve or lose "good" status.

Reasons for failure are attributed to different industry sectors and include pollution from abandoned mines, diffuse pollution from agriculture and urban runoff, as well as point pollution from continuous and intermittent sewage discharges.

Analysis of the data shows that 43% of water bodies fail due, in part, to continuous sewage discharges (i.e. treated effluent) and 13% to intermittent discharges. 5% of water bodies have both causes of failure. Where water bodies were showing deterioration below the "good" classification, the data analysis shows that for 37% of locations the reason for failure is unknown, with only 33% of the remainder being attributable to pollution from wastewater and 23% pollution from rural areas. However, it is only a small percentage of water bodies where the cause of failure is considered 'confirmed', with the remainder being classed as either "probable" or "suspected".

The amount of periodic monitoring undertaken by the Environment Agency has declined over this period, affecting the ability to accurately categorise watercourses. In any case, periodic monitoring is problematic, with sporadic samples unlikely to capture the full impact and weather-induced variations, including the impact of intermittent discharges.

Comparison with other EU countries is difficult due to differences in the implementation of the directive, but suggests that variability between river basins in England is as great as that between basins across the rest of Europe.

In summary, while England is some way from meeting the WFD objective to have all waterbodies meeting the "good" criteria by 2027, it's hard to determine the reasons for this due to gaps in evidence. But it can be concluded that Britain's performance is not necessarily worse than in other countries.

In future, what could be done differently?

The need for change is clear. Typical water quality investigations by sewerage companies take years to gather data, model contributions and impacts, and determine investment strategies. Due to the five-yearly cycles of Asset Management Planning, price determination and the Water Industry National Environment Programme, a significant lag can occur between a problem becoming apparent and investigations beginning. On the other hand, the construction of large civils works to remove sewerage contributions from rivers has significant costs and a large carbon footprint, so it's difficult to justify without firm evidence, that this scale of investment would provide a net benefit to the environment.

More proficient and uniform sampling

Taking this into consideration, the EA needs to improve its monitoring and 'accounting' system to better identify and apportion pollution sources. Currently, waterbodies have a limited number of sampling locations and not all determinands are sampled, limiting the regulator's ability to determine waterbody status accurately.

Frequency of sampling also varies across sites, from weekly, monthly or quarterly. Likewise, monitoring is not currently linked to weather and, as such, available sampling data is not representative of given weather / operational conditions (including dry weather, wet weather and post Combined Sewer Overflow (CSO) operation).

Continuous river quality monitoring and analysis linked to rainfall and CSO spill monitoring through artificial intelligence would provide the means to ascertain where sewerage and other discharges are contributing to water quality issues, potentially allowing intervention in near-real-time where impacts are caused or exacerbated by operational issues within the sewerage network and improving the likelihood of successful prosecution or enforcement proceeding against polluters.

While improved monitoring will certainly come at a cost, in the medium – to long – term this can be expected to be offset by efficiencies in pollution management going forward, deriving from richer data speeding up root cause identification and facilitating prosecution. Initially, improved monitoring could either be funded by water companies as part of their investment program, from fines derived through tougher enforcement, or through partnership working between stakeholders – which is likely to deliver the most effective monitoring strategy to cover all sources of pollution.

Technology and public engagement

At the other extreme of the technology spectrum, citizen science water quality monitoring has already been undertaken by bodies such as Rivers Trusts, using low-tech solutions such as the use of tampons to determine the presence of optical brighteners – a clear indicator of urban pollution. This activity could be expanded to fill some of the gaps in the EA's own monitoring programme. Low-cost water quality sensors are in development which, while not providing the accuracy of data and range of determinants available from current continuous monitor technology, will be able to provide valuable data on conditions within a watercourse. Linked to the Internet of Things) widespread interrelated computing devices, mechanical and digital machines communicating without human interaction) these can be used to drive social media in an equivalent way to the linkage of river level monitoring sites to Facebook and Twitter through Gaugemap.

This in turn would increase public engagement, further raising awareness about river pollution. The work of people such as Feargal Sharkey has already created a groundswell of public dissatisfaction around river pollution and low flows. We have seen the effectiveness of increased public awareness on reducing impacts on the environment in campaigns such as those to reduce plastic waste and unsuitable discharges to sewers and can hope that increased public engagement with water quality can also drive improvements in future.

Collaborative working

Where data is not available or failure is caused by diffuse pollution, there is a need to drive pragmatic solutions. To some extent this is already happening with work through Rivers Trusts, but this should be expanded through partnership working between water companies, the Environment Agency, local authorities, industries and other stakeholders to develop a complete understanding of each water body – including current status, reasons for failure, current and future use – to deliver solutions that will drive through change. This was the spirit of the WFD – a systems approach to resolving water quality issues.

Improved guidance and regulations

Better guidance and regulations for intermittent discharge management are also needed. There has been improved guidance to the water industry for identifying problematic CSOs e.g. through Water UK's Storm Overflow Assessment Framework (SOAF). However, these criteria only identify frequently spilling CSOs; potentially disregarding, amongst others, less frequent, high volume spilling CSOs which may be behind large water quality failures. More comprehensive guidance is needed to ensure that all problematic intermittent discharges are proactively identified, considering not only spill frequency, but also volume and receiving water conditions. Associated regulations are required to ensure enforcement.

Final thoughts

Ultimately, a considerable number of water bodies are unlikely to meet the WFD criteria due to morphology issues – canalisation for navigation and flood defence, weirs and culverting. Even where these features cannot be removed, improvement can often be made through re-naturalisation of the watercourse bed and installation of fish passes. The work of the Wild Trout Trust and the River Restoration Centre shows that this sort of project requires partnership working to deliver the benefits as effectively as possible.

With time to the 2027 WFD deadline running out, pragmatic decisions are needed to make changes which are likely to improve water quality without spending too much time strategizing. Policy is needed to drive implementation of new technologies and ways of working to effect change. The clock is ticking, we don't want the UK to be the dirty man of Europe again.