

Written Evidence submitted by Buglife - The Invertebrate Conservation Trust

Summary

- Pollution impacting river water quality continues to significantly impact freshwater invertebrates.
- Legislation and targets exist to improve water quality, yet they are not adequately implemented, monitored, or enforced.
- Solutions to improving water quality must address novel pollutants such as pharmaceuticals, veterinary medicines, agricultural chemicals and microplastics and extend beyond the impact to human health.
- Continued investment is required to improve the existing sewerage network while also be used to install suitable nature-based solutions offering multiple benefits to the environment.
- Measures such as green infrastructure, Water Sensitive Urban Design and Sustainable Drainage Systems must be made mandatory in land use planning.
- Greater pressure should be placed on highways agencies and local authorities to enforce existing measures to prevent pollution.
- Inland bathing waters can act as a driver of change; however, designations must be considered with wider implications for the immediate environment.

Introduction

Buglife – The Invertebrate Conservation Trust is the charity that represents the needs of all invertebrate species. Buglife has 35 member organisations, including all the leading invertebrate specialist societies, and over 2,000 individual supporters. Buglife aims to halt the extinction of invertebrates and to achieve sustainable populations of invertebrates.

Most freshwater animals are invertebrates. In the UK over 4,100 invertebrate species spend at least part of their lifecycle in freshwater playing a vital role in maintaining clean water, recycling organic matter, and providing a food source for fish, birds, and mammals.

Aquatic invertebrates have been as squeezed for room to live as terrestrial species, and freshwaters are hemorrhaging biological diversity faster than any other ecosystem on Earth. A combination of climate change and over-abstraction has led to chalk streams and other headwaters suffering from drying out in many places, while naturally temporary streams, such as winterbournes are flowing for shorter periods. There is an urgent need to restore freshwater habitats and improve the quality of rivers, streams, ditches, springs, seepages, ponds, and lakes up to the point where the freshwater invertebrates can thrive again.

Pollution is a particular problem for water quality, despite the introduction of legislation such as the Water Framework Directive in Europe. Legislative mechanisms exist to protect water quality, however, these are not effectively implemented, monitored, or enforced. Almost half of the sites monitored across Europe continue to suffer from chronic chemical pollution leading to long-term negative impacts on freshwater organisms.

The Orange-spotted Emerald dragonfly is just one example of a freshwater species that have been significantly impacted by poor water quality¹. This species became extinct on the Moors River (west Dorset) in the mid-1960s, the only long-standing population in Britain. The species is highly sensitive

¹ <https://www.wcl.org.uk/wanted-the-orange-spotted-emerald-stolen-from-future-generations.asp>

to the slightest pollution, its decline correlated with the construction of a new sewage treatment facility just upstream of the critical section of the river. It was formally declared extinct in the UK in 2008.

- **What are the best indicators for river water quality that could be used as targets being developed under the Environment Bill?**

The presence of aquatic invertebrates is the standard indicator of the health of freshwaters. Their populations tell us how healthy our environment is, and they must be properly monitored and understood. In contrast to many other invertebrate groups, the distribution of freshwater invertebrate species is relatively well known. This is due largely to routine monitoring undertaken by the statutory environment agencies (EA, SEPA, NRW and NIEA). Invertebrates have been used to determine the quality of freshwaters for over half a century. There is now a range of biotic indices which can tell us what conditions prevail in rivers and streams. These indices cover factors such as organic enrichment, nutrients, low flows, drought, sedimentation, and acidification. The data from a single invertebrate sample can be interpreted using these indices to build up a detailed picture of conditions in the watercourse.

The Water Framework Directive offers suitable targets that have been tried and tested, yet the UK must ensure targets are in place beyond the WFD 2027 target deadline. The WFD determines that a water body is in good status only when all the relevant quality elements are in good status and the relevant quality standards for good status are met (the “one-out-all-out” principle). The UK should retain this principle when setting new targets to ensure that all relevant pressures are adequately covered.

- **How could drainage and sewage management plans, introduced by the Environment Bill, play a role in reduced sewer discharges?**

Neither advice, incentives, nor regulation delivered in isolation of the others will generate the desired environmental improvements in water quality. Adequate investment in regulatory enforcement must be made if we are to see our freshwater environment recover and to provide the range of ecosystem services that society can benefit from.

Any solution to reducing sewer discharges must ensure they do not create a new problem. For example, separating stormwater from wastewater treatment must not see the increase of other diffuse and run-off pollutants entering the watercourse. Drainage and sewage management plans should consider the bigger issues associated with water quality beyond sewer discharges. Comprehensive plans can target investment towards problem areas and identify suitable solutions, including nature-based solutions.

- **How adequate are the monitoring and reporting requirements around water company discharges? How can technology improve and assist with transparency and enforcement?**

Despite great strides in tackling diffuse and point source pollution from traditional sources such as agriculture, mine drainage, and the sewerage network, there is still much to do to tackle the growing number of novel pollutants. The Water Framework Directive Watch List identifies pollutants of potential concern, however, the surveillance required is limited. Monitoring should go ‘beyond compliance’ and further investigations should look at the prevalence of substances on the Watch List

across the UK, not just in a limited number of samples to fulfil the Watch List monitoring requirements.

Chemical pollution has potentially lethal impacts on freshwater organisms at more than one in ten sites across Europe². Harmful chemicals, nutrients and plastic fragments are emitted in sewage effluent and run-off from urban and industrial areas, with pesticides from farmland posing the most immediate risk to freshwater ecosystems.

Monitoring programmes for novel pollutants should be developed to include:

- Pharmaceuticals such as paracetamol and ibuprofen (e.g. analgesics), antidepressants (e.g. fluoxetine), antibacterial compounds (e.g. triclosan), and anticonvulsants (e.g. carbamazepine).
- Veterinary medicines such as wormers (e.g. avermectins), and domestic flea treatments (e.g. fipronil and imidacloprid).
- Agricultural chemicals such as fungicides (e.g. tebuconazole, prothioconazole, etc.) and molluscides (e.g. metaldehyde and ferric phosphate).
- Emerging persistent pollutants such as all PFAS compounds (not limited just to PFOA & PFOS).
- Manmade materials such as microplastics and tyre particles.

Measures to reduce the loss of novel pollutants into the environment should be developed as part of a cross-industry strategy - addressing the use of these substances as well as removing them through wastewater treatment. The UK should continue to update UK REACH in line with EU REACH Regulations and maintain the key principles offering high-level protection to the environment from chemicals. Only by linking elements of the Water Framework Directive with regulatory control of substances of very high concern can the intended protection of water bodies/aquatic ecosystems be achieved.

The UK Government must ensure high levels of transparency in water quality data and provide a reasonable interpretation of that data for the public. Buglife supports the Sewage (Inland Waters) Bill requirements on reporting. The Bill proposes increasing levels of transparency, as companies will be mandated to report publicly not just on the frequency and extent of sewage discharges from CSOs and any other sewer catchment assets, but also on the impact on water quality as this is enabled by advances in technology.

- **What is the impact of plastic pollution and other materials on drainage and water quality in rivers and what should be done to mitigate it?**

Microplastics must be addressed as part of wastewater treatment upgrades to prevent them from entering freshwater environments. Research led by Bangor University and Friends of the Earth found that microplastics were present in all UK inland waters tested, highlighting the need for widespread monitoring of inland water systems in the UK³. Microplastics should be added to the list of pollutants regularly monitored in inland waters, requiring the agreement of an accurate, repeatable, reportable method for microplastic quantification.

² <https://www.pnas.org/content/early/2014/06/11/1321082111.abstract>

³ <https://jlimnol.it/index.php/jlimnol/article/view/jlimnol.2019.1943>

A 2018 study found microplastics in 50% of macroinvertebrate samples taken from rivers in South Wales. At all study sites, microplastics were found in invertebrates of all species, regardless of whether they lived in the water column or on the riverbed. The research showed that while plastics were found in higher concentrations where wastewater contributed more to river flow, plastics occurred both upstream and downstream of sewage outfalls – indicating that microplastics were entering rivers from widespread sources⁴.

The wide range of products that contribute to microplastic pollution indicates that the issue is not restricted to one sector, sources include car tyres, agricultural products, and synthetic clothing⁵. Mitigation to ensure microplastics do not enter the watercourse must also consider the source of microplastics to reduce the chance of them entering the environment. For example, microplastics created through wear and tear of products are an inherent part of the function and need to be addressed as part of the design and manufacturing process as well as a better understanding of end-use.

The full consequences microplastics are having on organisms, ecosystems and human health are not yet fully understood. Yet, in alignment with the Precautionary Principle (Rio Principle 15), a lack of scientific understanding of the issue is not an excuse for inaction. Indeed, where there are threats of serious and irreversible environmental and societal damage, a lack of certainty surrounding the issue should elicit policy responses that would accommodate for a worst-case scenario.

- **How can consumers be persuaded to change their behaviour to minimise pollution?**

In general, consumers want to protect the environment; however, awareness of water quality issues remains low⁶. A greater understanding of the river and sewerage system will encourage improved stewardship from consumers. Continuing to educate the consumer on the factors leading to pollution can lead to positive change, this education must go beyond direct use of the sewerage network (i.e. flushables and oils and greases) and must include an understanding of behaviour and buying powers (i.e. travel and food choices).

Freshwater ecosystems provide humans with a multitude of goods and services and most of these are provided directly or indirectly by the species that live there^{7 8}. Yet freshwater ecosystems are among the most imperilled, with biodiversity losses occurring much faster in freshwater than terrestrial or marine environments^{9 10}. Consequently, there are likely to be adverse effects on the delivery of services.

Water quality issues extend beyond the direct impact on human health through bathing. Better education on the ecosystem services and benefits provided by freshwater systems could help to create behaviour change. Of all the ecosystems on the planet, freshwater supports the greatest concentration of biodiversity. Whilst freshwater habitats cover less than 1% of the planet's surface, they support up to 10% of known species¹¹. Freshwater life is very diverse and the emergence of

⁴ <https://www.sciencedirect.com/science/article/pii/S0048969718327669>

⁵ https://www.sepa.org.uk/media/495696/scottish_microplastics_report.pdf

⁶ https://www.wwf.org.uk/sites/default/files/2017-12/Flushed%20Away_Nov2017.pdf

⁷ <https://esajournals.onlinelibrary.wiley.com/doi/abs/10.1890/1051-0761%282002%29012%5B1247%3AMEASNF%5D2.0.CO%3B2>

⁸ <https://academic.oup.com/bioscience/article/54/8/767/238251>

⁹ <https://sciences.ucf.edu/biology/king/wp-content/uploads/sites/106/2011/08/Ricciardi-and-Rasmussen-1998.pdf>

¹⁰ <https://onlinelibrary.wiley.com/doi/abs/10.1017/S1464793105006950>

¹¹ <https://www.journals.uchicago.edu/doi/10.1899/08-171.1>

insects from water contributes to healthy, functioning terrestrial ecosystems. The biology and ecology of freshwater bugs is intricate and amazing and are an important part of our culture and heritage - dragonflies inspire artists, crayfish excite children, and mayflies engage anglers.

- **What is the required investment level needed to minimise storm overflows vs the scope for sustainable drainage and nature-based solutions?**

Investment is required by the water industry to reduce inputs from wastewater treatment works and remove combined sewer overflows to significantly improve freshwater quality.

Nature-Based Solutions such as Green Roofs should be recommended as a further mitigation measure to slow the flow of rainwater into the sewerage system and deliver ecological benefits.

The decline in government spending on regulatory activity can be linked to the deterioration of water quality in many areas and be a significant contributor towards the failure to achieve compliance with a range of national targets and with the objectives of the suite of environmental regulation designed to protect our water environment.

Beyond regulation and enforcement, where the cost burden should largely lie with the polluter, the benefits of a healthy freshwater environment are received by all, so should to some extent be funded by all. This means that government funding (via both direct funding through Defra bodies, and through a future land management scheme), and water industry investment (funded by customer bills) remain legitimate and key sources of investment. Other logical funding sources include developer contributions related to biodiversity net gain and green infrastructure provision, business investment through water stewardship or biodiversity commitments, green finance, and flood funds from sources including Local Authorities, Local Economic Partnerships, and local beneficiaries. Investment from the third sector, including via grant-giving bodies, will also play an important role.

Buglife supports the proposals of the Sewage (Inland Waters) Bill. The Bill places a duty on water companies to ensure that untreated sewage is not discharged into rivers and other inland waters. The Bill will require water companies to set out plans progressively to reduce their reliance on combined sewer overflows.

The Bill proposes measures to upgrade drainage infrastructure to separate household sewage from surface water drainage, helping reduce the risk of overflows. It includes measures to reduce harmful products such as non-biodegradable wet wipes, commercial fats and oils from being disposed of down the drains.

- **How effective are the planning policy and standards around sustainable drainage systems to reduce urban diffuse pollution in England?**

Measures such as green infrastructure, Water Sensitive Urban Design and Sustainable Drainage Systems must be made mandatory in land use planning. These measures should be integrated through planning policy and mandatory in all developments, recognising the role that these measures play in improving water quality as well as providing multiple benefits around biodiversity, greenspace, air quality and health and well-being.

Impacts on water quality from new development should be considered in the early stages of the design process and a greater emphasis on high-quality design, both of buildings and places, is needed.

Quantitative assessment and modelling of approaches could support the development of effective sustainable drainage systems, reducing pollution by ensuring that green and blue infrastructure are effectively integrated into new developments.

Biodiversity net gain could also play a role where the replaced/restored habitat helps to regulate water flow. However, net gain must be additional to current requirements to deliver green and blue infrastructure.

- **Should local authorities and highways agencies be given a duty to prevent pollution to watercourses without prior treatment?**

Road surfaces have a significant impact on natural flow and biodiversity of watercourses, local authorities and highways agencies have a requirement to prevent pollution to watercourses, yet this is not always effectively enforced. In England and Wales, the Environmental Permitting Regulations (2016) give regulators powers to require highways authorities to apply for a permit where there is a risk of water or groundwater pollution. Buglife is concerned that this requirement is being ignored and leading to significant pollution to freshwater bodies. Greater pressure should be placed on highways agencies to enforce existing measures to prevent pollution, while monitoring should be increased, and further research carried out to ensure the impacts of pollution are fully understood.

Roads contribute large volumes of surface runoff leading to increased stormwater flow. Research suggests that roads close to streams negatively influence the integrity of invertebrate communities¹². Roads cause habitat modifications, through phenomena such as pollutants and storm events leading to changes in biodiversity.

Road run-off may include pollutants such as heavy metals, salt, plastics and rubber, nutrients, and pesticides depending on the surrounding land use. These impacts can be detrimental to invertebrates and evidence indicates runoff from a new road was implicated in the national extinction of the Sussex diving beetle¹³

- **How effective is Ofwat's remit and regulation of water companies? Does it facilitate sufficient investment in improvements to water quality, including sustainable drainage systems and nature-based solutions such as constructed wetlands?**

We need to accelerate the implementation of both strategic and specific actions to manage catchments in ways that reduce freshwater pollution, improve water quality, and regulate the quantity and timing of flow. These interventions will support nature's recovery and help the freshwater environment become more resilient to the impacts of climate change. Nature-based solutions to climate change are increasingly recognised as an essential approach to water management and we must restore wetlands and rivers, including managing water flow patterns, in ways that promote ecosystem processes¹⁴. Restoring and rewetting drained peatlands is a key nature-based solution, with the scope to lock up carbon, benefit biodiversity and enhance human

¹² <https://link.springer.com/article/10.1007/s10531-019-01907-4>

¹³ Shardlow, M. (2012). Species scape how best can landscape scale activities save species from decline and extinction? Trans. Suffolk Nat. Soc. 48: 51-60.

¹⁴ <https://www.naturebasedsolutionsinitiative.org/what-are-nature-based-solutions/>

well-being. Restoring wetlands and tidal marshes can protect coastal cities from storm surges and erosion. However, nature-based solutions are not yet sufficiently incorporated into strategic and project plans.

The restoration and recreation of wetlands, such as reedbeds, wet meadows and wet woodlands, will make a significant contribution to securing biodiversity, healthy functional ecosystems, and the provision of ecosystem services, as well as being crucial to the protection and enhancement of rivers, lakes, and other freshwater habitats. In particular, the ecological and ecosystem services value of floodplains need to be better recognised, and the potential risk to rivers and lakes of failing to undertake improvements to wetlands should be considered as part of the cost-benefit assessment for land-based enhancements.

As part of the more integrated approach to managing pollution, greater attention must also be given to the impact of smaller point sources both regulated (smaller WWTWs) and unregulated (e.g. septic tanks). These small discharges are typically seen as irrelevant when viewed at the catchment scale but can have a significant cumulative impact as well as a localised impact. Standing waters, wetlands and smaller water bodies are particularly vulnerable to these cumulative and localised impacts.

- **Is adequate investment being made in adapting water treatment systems to future climate change?**

Freshwater invertebrates are particularly at risk from climate change. Mitigation such as bankside planting to shade watercourses should be rolled out.

Most predictions indicate that temperatures will continue to rise because of climate change and there will be changes to precipitation patterns, these will inevitably have an impact on invertebrate populations. Freshwater invertebrates are particularly at risk, firstly because warmer water holds less of the dissolved oxygen that they need to survive, and secondly because changes to rainfall, evapotranspiration and flow rates will profoundly affect habitat continuity and availability.

With most species of invertebrates having relatively short life cycles and good powers of mobility they are likely to be one of the first groups to show the impact of a changing climate. Cold loving species will retreat northwards and uphill, while warm loving species will increase their range in the UK. In the UK a 3°C rise in temperature was found to result in a 10-43% reduction in macroinvertebrate abundance in upland circumneutral streams and lead to the local extinction of Gold ringed dragonfly (*Cordulegaster boltonii*), biting midges Ceratopogonidae and a caddisfly *Rhyacophila munda*¹⁵. Surveys have also shown that the Upland summer mayfly (*Ameletus inopinatus*) a predominately montane species restricted to cold water streams has disappeared from lower altitudes and seems to be being pushed further and further upstream as water temperatures rise¹⁶. European research using climate change models has shown that the geographical range of this species is likely to contract, with remaining populations of *A. inopinatus* in 2080 restricted to the Alps, Scandinavia and parts of the Scottish Highlands such as the Cairngorms¹⁷.

We need to increase public and private investment in nature-based solutions for climate-related water risks, such as extreme floods and droughts. The water sector has a role to play in terms of climate change mitigation: nature-based solutions to water treatment potentially offer significant

¹⁵ <https://onlinelibrary.wiley.com/doi/full/10.1111/j.1365-2486.2007.01340.x>

¹⁶ Kitchen, L., Macadam, C.R. and Yeomans, W.E. (2010). Is the upland summer mayfly (*Ameletus inopinatus* Eaton 1887) in hot water? Unpublished report to the Freshwater Biological Association.

¹⁷ <https://link.springer.com/article/10.1007/s10592-010-0157-x>

advantages in terms of biodiversity, construction cost and energy use, and more effective measures to drive water efficiency will reduce greenhouse gas emissions associated with pumping and treating water. An increased focus on water efficiency is particularly important considering the National Framework for Water Resources which identified that significant further widespread abstraction reductions will otherwise be needed in the future to maintain environmental flows in rivers. Water labelling, linked to enhanced water efficiency standards for new homes via Building Regulations, should be brought forward to help reduce abstraction demands.

Water can only be managed sustainably if all water users in the river basin work together: all public bodies, water companies, local communities, businesses, and land and water managers. This requires new governance structures that embed the value of water, carbon, and nature into business planning. For the private sector, water is both a risk and an opportunity, whether for corporate headquarters, manufacturing facilities, supply chains, or in the fields where raw materials are grown. But businesses are also uniquely positioned to champion innovative solutions to freshwater challenges, demonstrating visionary leadership that secures water for the good of the business, people, and nature. More businesses need to go beyond adopting water efficiency practices to becoming better water stewards.

- **How could the designation of inland bathing waters by water companies affect the costs of achieving the associated water quality standards?**

With only 14% of English rivers meeting good ecological standard and none meeting chemical standards, there is a clear need to invest in river water quality¹⁸. Designating inland bathing waters will not improve river water quality, however, sites will benefit from weekly water quality testing and tighter regulations. Annual results will help to ensure investment and improvements by showing long term trends and identifying where issues need to be addressed.

There are clear links between the economic and ecological value of inland bathing waters¹⁹. A study of Scottish lochs found a mean value of £1,500 per hectare of loch improved in terms of its ecological status. This study estimated that if 72% of Scottish lochs reached 'good' ecological status they would produce a benefit of £5.7m per year²⁰.

The designation of inland bathing waters should be made by the government under the 2013 bathing water regulations and fully enforced through effective monitoring and investment.

While Buglife welcomes the suggestion for increased inland bathing waters, designations must be considered with wider implications for the immediate environment. Increased usage and footfall can have a detrimental impact on delicate freshwater habitats²¹. Suitably assessed and linked management plans should be created as a part of the designation to ensure shared benefits.

February 2021

¹⁸ <https://www.theguardian.com/environment/2020/sep/17/rivers-in-england-fail-pollution-tests-due-to-sewage-and-chemicals>

¹⁹ <https://www.gov.scot/binaries/content/documents/govscot/publications/research-and-analysis/2018/08/value-bathing-waters-influence-bathing-water-quality-literature-review/documents/00539016-pdf/00539016-pdf/govscot%3Adocument/00539016.pdf>

²⁰ <https://iwaponline.com/wp/article/13/5/645/19996/Public-preferences-for-water-quality-improvements>

²¹ <https://cdnsiencepub.com/doi/10.1139/er-2017-0024>