



INSTITUTE OF FISHERIES MANAGEMENT

POSITION STATEMENT ON LOUGH NEAGH

Executive summary

Lough Neagh is experiencing severe algal blooms driven by a complex relationship between Nitrogen and Phosphorus balance and zebra mussel, with climate warming accelerating impacts. This perfect storm has resulted in reduced utility and amenity of a huge natural asset.

The lake can recover, though not quickly. This will require concerted efforts by competent authorities, NGO's, and society. With farming the predominant land use in the large catchment, it follows that a policy framework for an agriculture transition with reduced nutrient loss to water at its centre is urgently required.

Introduction

Lough Neagh is situated in the centre of Northern Ireland. It is the largest freshwater lake in the United Kingdom covering an area of 383 km² with a longest length of 30.5 km and narrowest width of 12.1 km across the middle. The lake is very shallow for its size with a mean depth of 8.9 metres.

2023 saw the lake turn green! Informed opinion suggests this will happen again in 2024 and perhaps for decades to come.

Characteristics of Lough Neagh

Because the lake is shallow with a high surface area to volume ratio, and has long wind fetches the water column is usually well mixed, with oxygen from the surface available through the water column. When the water is thus mixed, phosphate and ammonium are mixed through the water column and promote algal growth. In periods of calm weather, particularly in summer, wind driven aeration reduces and high oxygen demand from bed sediments begins to strip oxygen from the lower levels, while the surface water warms. Oxygen depletion in the lake sediment also increases release of plant nutrients such as phosphate (P) and ammonium (N) into the water column. Prolonged periods of combined surface heating and bottom oxygen stripping effectively separate the water into layers (stratification) and have in recent summers temporarily reduced the water column portion safe for fish to a narrowing band in the middle. Sudden re-mixing after prolonged summer stratification could be ecologically catastrophic, with a risk of high-water temperature and short-term oxygen starvation throughout the lake.

The Neagh Bann River basin district covers an area of around 5740 km². It includes all of County Armagh, large parts of Counties Antrim, Londonderry, Down and Tyrone and a small area of County Fermanagh. All land-based activities in this area that generate materials that are soluble in water or



can be transported by water can end up in Lough Neagh. The catchment drains 43% of the land area of Northern Ireland as well as some border areas of the Republic of Ireland.

The level of Lough Neagh has been lowered twice, to control flooding, improve navigation and create new farmland.

The lake provides 40% of Northern Ireland's drinking water.

Zebra Mussels attach to the hull of boats and on weeds caught on boat trailers. They are transferred to new areas when infested boats are launched into new waterways. The spread of Zebra Mussels to Lough Neagh was confirmed in 2006. Zebra mussels negatively impact ecosystems in many ways. They filter out algae that native species need for food, and they attach to and incapacitate native fauna.

The lake has supported a huge population of growing eels (and other fishes) of significant socio-economic and cultural importance. A sustainable eel fishery depends upon the lake being able to provide ideal eel habitat. This is compromised by water quality and habitat degradation manifest as algal blooms. Lough Neagh is also home to a population of pollan, a rare whitefish endemic to 5 lakes, all in Ireland.

Problems and their causes

In Lough Neagh both Nitrogen and Phosphorus are massively elevated over safe levels.

Phosphorus is particularly elevated and generally in surplus in soils, with additional risk of new recycling and release from warming and potentially oxygen deficient lake sediments. The stored P becomes a biochemical oxygen source.

Nitrogen is now below the "normal" ratio to phosphorus for balanced take up by plants, (15N: 1P) but both are way above absolute safe levels. The ratio of the available elements in the water is such that N is potentially limiting. The plants and algae (bacteria) therefore have an even greater surfeit of P.

Cyanobacterial blooms have taken off in calm warm summer conditions, particularly in 2023, following a three-to-four-year period characterised by water clarification due to rapidly proliferating Zebra mussel filter feeding on algae. Recent blooms have been dominated by potential toxin producing *Microcystis*, a cyanobacterial species known to be unpalatable to Zebra Mussel. Thus, the current noxious blooms are very probably triggered by Zebra Mussel grazing preferentially on more palatable algal species while leaving a ready supply of nutrients. *Microcystis* blooms are also known to be more likely when to P:N ratios are skewed in favour of phosphorus.

Some cyanobacterial species can fix N from air and/or water. There is a risk that N becomes less limiting which could promote even more algal growth! There is also the issue of increasing atmospheric ammonia deposition further providing N to bacteria.

The sources of nutrients are well rehearsed – fertilisers, slurry, urban wastewater, and domestic wastewater treatment systems (DWWTW/ septic tanks). In recent times, farming with long term housed animals has effectively broken the natural safe link between the amount of land available



and the stock held. Imported concentrate feeds for these cattle are importing nutrient over and above fertiliser use. Some housed animals such as pigs and chickens, and any of the manures retained in the catchment, are entirely based on imported nutrient.

The case for public ownership

The Shaftesbury estate has held ownership of the bed and soil of Lough Neagh since the 19th century. IFM notes that there have been calls for the lough to be taken into public ownership to address the problems that led to unprecedented algal blooms in 2023. IFM recognise that public ownership could and should enable more integrated allocation of responsibilities to public bodies and coordination of strategic action planning. We endorse the Earl of Shaftesbury, Nicholas Ashley-Cooper's, position on the need for a centrally managed government body with the authority to regulate activities impacting the lough's health and protection.

It is important to also recognise that the problems arise from the entire catchment area that drains into the lake and not directly from activities requiring consent of the owner of the bed and soil of the lake alone.

Solutions

Inputs of both nutrients (N and P) need to be controlled and reduced. Controlling P by proxy through N regulations has not worked.

In addition to regulating N, there must be a focus on P to bring the ratio of N to P back toward that of natural plant uptake.

Stop adding inorganic P on the premise that it just might be limiting grass/crop growth. This is unlikely and soil testing data is available and free to farmers under current schemes to reinforce this. That adding inorganic P has always been done does not mean it is needed now and will as such, be an avoidable cost.

Revisit NI Water activities and nutrient stripping. It is likely that more towns and/or smaller works need to be brought into the mix.

Provide advice to householders with DWWTW/ septic tanks on reducing nutrient outputs, such as Low P detergents. A media campaign is needed.

Promote, explain, and support the use of nature-based solutions. This should be central to price control period processes by the water utility regulator. Solutions include buffer strips along watercourses and enhancing wetland areas to retain nutrients. It is important that agriculture policy develops whereby land use subsidies encourage these actions as well as good farming practice as regards nutrient management. This informed and regulated in line with soil testing data.

It shall be necessary to take a hard look at stock levels. Further expansion may be environmentally untenable, certainly without alternative treatment and use of some part of the excrements such as for digestion or energy. Technical solutions such as re-engineering the animal and feed will be a meaningful contributor to solutions only if expansion/ intensification is curtailed.



As the DAERA NI Minister has stated, IFM would reiterate that efforts shall have to be maintained for decades if the lake is to recover. History and restoration ecology have shown this is possible.

Conclusion

IFM acknowledge that what we have rehearsed above is well understood by policy makers and scientific advisers in NI. It is our position that the difficult long-term transition to reduce nutrient inputs to the lake must be embarked upon as a matter of urgency. Brave and robust agriculture and development planning policy change and/or implementation is essential. A reformed NI executive has this opportunity to support and establish this change process. IFM hope that political will exists to do so.

The Institute of Fisheries Management promotes, for the benefit of biodiversity and society, the understanding of sustainable fisheries management and aquatic ecosystem protection