



Serpentine Lake, Hyde Park

Floating havens

Leela O'Dea explains how floating wetlands are helping to improve water quality in lakes and rivers

Fifteen years ago the Water Framework Directive (WFD) was launched to improve the quality of our inland and coastal waters, through better land management, more sustainable use of our water and create better habitats for wildlife living in and around water.

This is no mean feat, when according to recent Environment Agency data only 17 per cent of England's rivers are in good health, with many impacted negatively by pollution from our roads, effluent, farms and historic mining

activities. At frog environmental we have been applying our new BioHaven floating wetlands to help rivers and lakes win the battle against pollutants.

BioHavens not only offer a natural biological treatment to improve water quality, but deliver a multitude of

“

Biohavens are typically planted with a variety of native wetland plant and wildflower species, including sedge, iris, rush, mint and purple loosestrife, all of which provide excellent habitat for insects and birds

ecosystem services.

The novel BioHaven design overcomes one of the key failings of other floating systems, as the system's internal buoyancy eliminates the need for an external frame – typically a weak link in an island structure.

Made from recycled plastic fibres bonded together to form a complex, three-dimensional structure, the BioHaven matrix provides strong and resilient support for plant growth as well as supporting the creation of peat.

BioHavens are planted typically with a variety of native wetland plant and wildflower species, including sedge, iris, rush, mint and purple loosestrife, all of which provide excellent habitat for insects and birds.

Microscopic organisms build-up naturally on the surface of the island and

also the plant roots to form a sticky layer, called a 'biofilm'. Within the biofilm, microbes break down simultaneously and cycle pollutants including phosphorus, nitrate, heavy metals and oils.

The influential role that micro-organisms play in water quality is both well researched and fascinating. In a healthy ecosystem, microbes usually take charge of the nutrient processing and in a head-to-head battle of survival, can out-consume and outgrow algae. However, unlike free-floating algae, microbes require a surface area upon which to proliferate and BioHaven is designed specifically to provide exactly the right platform for microbial growth and the subsequent development of biocomplexity.

At the base of the food chain, microbes also set the stage for biodiversity. Zooplankton, freshwater shrimp and countless other tiny life forms are given habitat and nutrition by the biofilm communities that form on BioHaven.

Frog environmental and Salix are using their experience of ecological engineering and natural water treatment processes to design versatile and cost effective floating treatment wetland projects using BioHaven with reference projects from across the world covering many different applications.

Factors affecting constructed wetland specification such as land take, clogging, loss of efficacy and the potential for high renovation costs are all issues that might be navigated by applying BioHaven. Of course, there is no doubting the benefits that constructed wetlands deliver around the world and BioHaven should not be seen as a rival to this approach, rather another tool in our armoury based on many of the same sound principles of biological water treatment.

System design is a critical aspect to treating water and peer reviewed studies have shown time and again that BioHaven can achieve significant

reductions in nutrients with low costs and low maintenance requirements. CH2M Hill recently showed in a trial how BioHaven can be used to polish wastewater and achieve a 40 per cent improvement in nutrient reduction compared to a control period.

The applications are wide ranging. BioHaven has been used with great effect in wastewater treatment, to landfill leachate and industrial wastewaters, as well as being an integral part of a sustainable urban drainage system.

The flexible nature of a BioHaven means that it can be retrofitted easily into almost any environment. The patented BioHaven design absorbs and dissipates wave energy making them excellent erosion control solutions and ensuring their durability in the harshest conditions.

Creating new habitat, linking existing habitats and improving fishery potential are also primary drivers for projects. Amongst many other projects in 2014, frog environmental worked with Salix and The Royal Parks to build a 210 square metre BioHaven Floating Wetland on the Serpentine in London's Hyde Park providing new habitat.

There is no magic bullet for restoring the health of our lakes and rivers, it will be a long process requiring the participation and cooperation of stakeholders throughout every catchment. What is certain is that research, development and innovative thinking has an important role to play in supporting those on the front line making decisions and undertaking the work that will lead directly to the rehabilitation of our aquatic ecosystems. ●

For more information visit www.frogenvironmental.co.uk

Leela O'Dea is technical director at frog environmental



Wastewater treatment lagoon in Kerepehi, New Zealand

BioHaven



Wildlife rafts at Bayne Street, Regent's Canal, London

■ BioHaven floating islands mimic the environmental benefits of wetlands in the natural world and provide a healthy habitat for the whole aquatic food chain.

■ BioHavens have been installed at more than 5,000 sites worldwide, including 30 in the UK.

■ Made from recycled, non-toxic plastic, the BioHaven material forms a dense but porous matrix

■ The matrix and high reactive area encourage the formation of biofilms and allow biogeochemical processes to take place.

■ Within the biofilm that forms, microbes break down harmful nutrients such as nitrates, ammonia, phosphorus and other water-borne pollutants, in turn reducing weed and algae growth.

■ Organic solids in the water stick to the biofilm and become the base of the freshwater food chain,

■ Plants seeded on the island grow hydroponically through the island, absorbing harmful nutrients and contaminants from the water while their roots offer beneficial microbial homes

■ BioHaven can be installed any time of year and they work to clean water environments all year round

■ They can be installed in still or flowing water

■ They create a resilient habitat which works well in both urban and rural environments