

transforming water

© Urban Rivers

Suzanne Birch explains how technology and nature can work together to restore waterways around the world

With many urban areas around the world facing problems of water pollution and habitat degradation, the development of floating ecosystems opens up a whole new range of solutions. In the far north of Scotland, the small company Biomatrix Water works are on a mission to bring degraded water back to life, using its ecological technology of floating planted islands.

The islands consist of hollow frames that form a planting medium for native aquatic plants. When installed on the water, nature does the rest and improves the water quality through the process of phytoremediation, a symbiosis between aquatic plants and



Chicago kayakers on the regenerated Chicago river

Food growing at the edges of the transformed waterway



© Urban Rivers

ways

microorganisms to convert nutrients from the water into a food source. Because the plants grow in a hydroponic way – they are suspended directly into the water – they break down 10-20 times more nutrients than they would on shore. The plants can be especially selected to break down different kinds of pollutants. Underneath the water surface, a micro-wilderness of submerged plant roots creates the ideal habitat for millions of algae-eating zooplankton to thrive. These microbe communities spread out from the floating ecosystem to improve the water quality over a larger area. This way, contaminated water can be treated in a low-cost, zero-energy, safe and attractive way.

Multiple Benefits

Like any good permaculture system, the island elements fulfil multiple functions; apart from purifying the water, they provide safe and undisturbed wildlife habitat space in areas where there is often little, and they beautify and add value to hard-edged and unexciting water bodies.

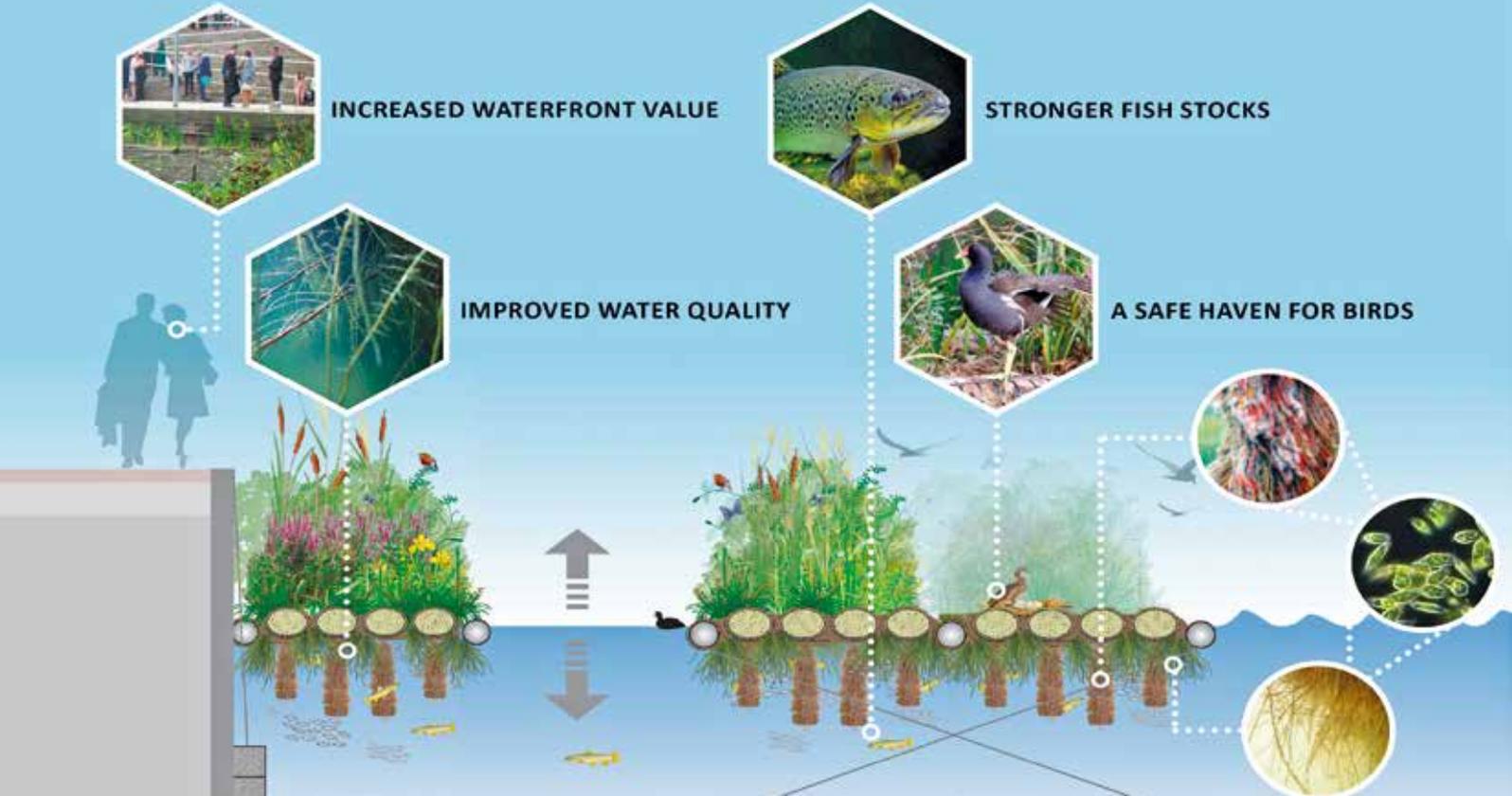
Many cities contain waterfront areas that are underused and undervalued. When urban water bodies are polluted, this often brings along a cascade of other problems; the waterfronts become unattractive and the water itself devoid of life, leading to public spaces being neglected and avoided by visitors and residents. To raise the water quality often

Experimental floating vegetable gardens softening a steel-cladded river wall in urban Chicago



ABOVE Manchester before and after the installation

BELOW The key benefits of a floating ecosystem



means application of expensive chemical measures that are not always working. Adding green space around waterways might be effective, but this is not always easy due to lack of space and the use of concrete water basins.

Installing a floating garden can be like an injection of life to bring this negative cycle around. It's an eye-catching feature that often draws people to the water and raises their curiosity. During project installations, people tend to flock to the site and many questions are asked. Volunteers, including children, often enjoy helping to plant the islands. We have led groups of primary school children in a learning experience discovering topics like aquatic ecology, biomimicry, water quality and environment, all while planting and installing a project together. At the end of the day, a floating garden was brought into place and within a few months, the islands were thriving and the resident water birds were raising their young amongst the plants.

Floating ecosystems provide an ideal nesting and preening habitat for water birds, offering sheltered spaces that are safe from disturbance. Specially tailored bird platforms can be combined with the planted islands to create space for different bird species. Judging from the amount of bird droppings and old nests we find during island inspections, these platforms are well used by a variety of birds such as coots, ducks, swans and herons. Also different amphibians and insects have been found to make use of the ecosystems. Habitat space is also created below the water surface for fish, tadpoles and aquatic microbes. The plant roots provide a submerged shelter and feeding ground for different animals.

With Biomatrix Water, we have transformed hundreds of water bodies worldwide from dull and neglected features into thriving water parkways, without disrupting the existing infrastructure. Materials for the island frames are carefully selected to contain as much recycled content as possible and to be completely non-toxic. The islands and anchors are tested for strength and durability, as water conditions on site can be dynamic and harsh. Floating gardens have been installed in areas susceptible to typhoons as well as areas suffering from severe frosts, and the islands have proven to withstand the environmental conditions season after season.

Because the project sites are so diverse and on so many different scales, the floating gardens come in a range of modular shaped components that can be connected together to make islands of almost any thinkable shape and size. These island parts can be combined and clustered to form archipelagos or single islands, or can be anchored to the water's edge to form a floating river or canal bank.

Growing Food on the Chicago River

It's always a pleasure to work with clients in this field as they are often passionate about their local environment and come up with their own visions and applications for the islands. One such example is the non-profit organisation Urban Rivers in Chicago, with whom we worked closely together to provide floating vegetable gardens on the

Chicago River. In June 2017, we installed 139m² (1,500ft²) of floating ecosystems along the riverbank that were planted with more than 1,500 plants of 40 native species, including vegetables and herbs. This project has turned into a living example of 'river-ponics', where the river essentially acts as a giant liquid fertiliser to nourish the crops growing on the islands. The crops will be tested after the first harvest to find traces of toxicity and to determine the suitability for human consumption. But whether or not the tests are positive, part of the project's goals have already been reached. The water quality in the project area has increased significantly and various species of wildlife have turned up which were previously absent. Water birds are attracted to the floating wetlands for the shelter they provide, and many were found to be nesting on the islands just a couple of months after installation. Countless numbers of insects are being seen, including the monarch butterfly and many other pollinating species, and there is plenty of evidence of fish feeding around the islands.

Amazingly, this project has been exclusively crowdfunded through a high level of community engagement. Urban Rivers had been working for two years before the campaign was launched to build partnerships and gain support for their mission to clean up the Chicago River. The Kickstarter campaign was launched with a big party, which brought partners together and introduced some new faces to the project. The enthusiasm of Urban Rivers was contagious as other organisations and even Kickstarter itself started spreading news about the project campaign. When the team from Biomatrix Water arrived in Chicago to help install the floating gardens, no less than 50 volunteers turned up to help and to see the floating islands up close.

The floating park can be accessed via kayak, as it is installed near Kayak Chicago, the leading kayak operation in the city, so visitors can continue to engage with the floating riverbank and see how it changes over time. The river and its floating park are continually being monitored by volunteer River Rangers, who regularly patrol the river by kayak to remove trash and weeds and observe the islands' impact on the immediate environment.

The 1,500ft² park is not finished yet, as the floating river park is envisioned to be a mile long by 2020.

Meanwhile, at home in Scotland we continue to build upon our concept, developing new visions and product improvements for the floating gardens. Some exciting ideas are waiting to come into fruition, including a floating recreational park and even a floating ecovillage with food-growing spaces on water.

Suzanne Birch works as a landscape architect for Biomatrix Water. She has a background in permaculture design and is also a visual artist and illustrator.

Contact Biomatrix Water via solutions@biomatrixwater.com, 01309 678 100 or via the website: www.biomatrixwater.com

To learn more and support the Chicago River rehabilitation, visit: <http://urbanriv.org>