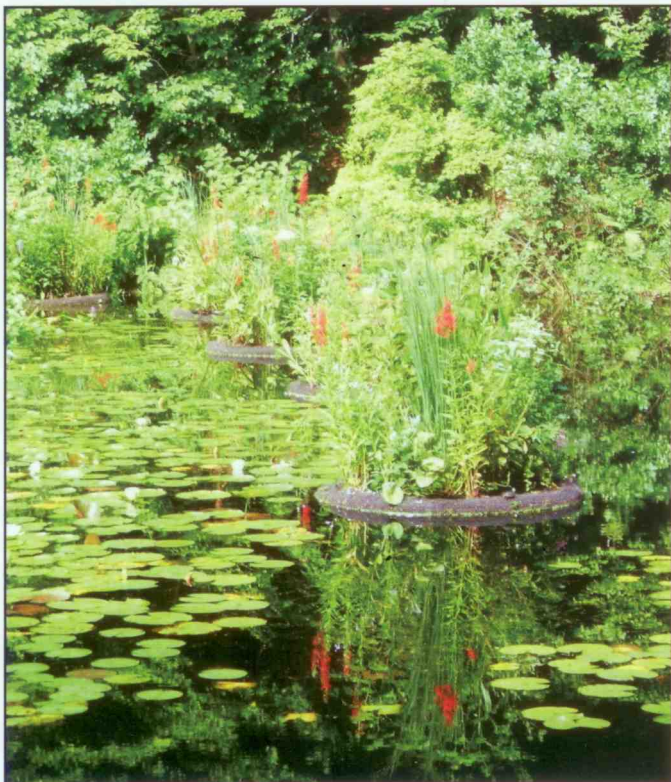




BIOHAVEN FLOATING ISLANDS

Biohavens are plantable floating island devices that provide a range of water treatment, habitat creation and aesthetic benefits for stormwater detention ponds, wetlands and water features. The units mimic the behaviour of natural floating islands and by virtue of their construction, provide a totally natural appearance as opposed to the float-borne platforms commonly used for these applications.



Garden in the woods

The appropriate interception and treatment of urban runoff, variously containing sediments, nutrients, pollutants or toxicants, is essential for the protection of streams, rivers and wetlands. In the urban sector, stormwater retention ponds provide frontline support within a somewhat limited arsenal of management tools. Recently a new technology, BioHaven® Floating Islands, has revolutionised the manner in which retention ponds may be effectively integrated into stormwater management planning for new developments. Additionally, they offer a wide range of options for the rehabilitation or enhancement of artificial water features.

The functional value of stormwater retention ponds is limited by a number of factors: they are typically prone to large fluctuations in water levels, rendering the creation of vegetated shorelines or in-pond submerged vegetation difficult. They often have steep banks with very little shoreline to work with. Vegetated ponds work poorly in a stochastic system – i.e. plugs of stormwater flow at irregular intervals. This, in turn, limits the options for maintaining a constantly-submerged and circulating environment, in which the essential biological engine, the 'biofilm' or layer of bacteria adhering to the submerged surfaces of aquatic plants, is continually active. The largest component of the water treatment services provided by these systems occurs in the biofilm layer. Variable water levels, with constant exposure, desiccation and loss of the biofilm layer, results in the 'biological engine' of the pond not always being 'switched on' and ready to process new batches of stormwater. Retention ponds are further constrained by the limited space available in which to construct them, plus many other limiting factors.

BioHaven floating islands are the outcome of a process of bio-mimicking or bio-mimetics, a process whereby natural processes of form and function are integrated with artificial systems. Floating Island International has, based on the attributes of natural floating islands, created a product that closely mimics nature. Natural floating islands are by no means new to science: they have been described over a period of 300 years (e.g. Van Duzer, 2004). What is new is the manner in which the BioHaven technology has so successfully mimicked nature.

The islands, or concentrated floating wetlands, are formed from a recycled, nonwoven and nontoxic polyester fibre matrix, bound with a UV-resistant latex binder – creating a structure akin to a woven pot-scourer – approximately 0.2m in depth and with a tensile strength in excess of 3 000 kg. The result is a massive surface area per square metre of island, with one square metre of island providing 220m² meters of total surface area on which the biofilm can form. In a conventional, reeded surface flow wetland,



Island being planted



Large island being planted



Islands being prepared for bank stabilisation



Newly planted island being floated



Newly vegetated island



Wiconisco water treatment facility in Wisconsin, USA

this 1m² would equate to 145m² of reedbed, operated continuously at an average depth of 0.3 m! The saving for land area is immediately apparent, as are the cost savings in terms of construction, establishment and operation.

With respect to water treatment, sustained functioning of the BioHaven biofilm is always 'switched on' and is independent of water depth in the pond. Thus the BioHaven-equipped pond is not constrained by biological lag time – i.e. until the biofilm is regenerated after a period of low water levels and exposed plant and inert surfaces typical of a conventional pond or small reedbed. System start-up and establishment is also much shorter, with BioHaven islands becoming fully vegetated and established within as little as 60 days.

Although the BioHaven island can be utilised solely as a biofilm support system, the islands can also be planted with aquatic or terrestrial vegetation in accordance with the client's requirements. Given that the treatment function is now independent of vegetation on the shorelines, problems of unsightly, exposed shorelines are now completely resolved and other means

of constructing the pond sides and edges can be considered. Retention ponds, or sectors thereof, can now be made deeper, thus enhancing the hydrodynamic stability and reducing the risk of sediment washout. Pond cleaning and maintenance aspects are rendered significantly easier.

Over 3 100 launches of BioHaven islands have been made worldwide since the release of the product in 2005. The water treatment capabilities have been subjected to peer-reviewed scientific scrutiny by two organisations, the New Zealand Institute of Water and Atmospheric Research (NIWA, Headley and Tanner, 2006; Tanner and Headley, 2008) and the Montana Board of Research and Commercialisation Technology (Stewart, 2007). The published results of these investigations have shown that significantly higher levels of nutrient assimilation and toxicant (e.g. trace metals) sequestration are possible using BioHavens, as opposed to conventional wetland processes. Efficacy has also been demonstrated in a Yale University study on the mitigation of oestrogen impacts on fish. While local performance data is still to be assembled, reports from other

