



Active Between Land and Water – Biologically Engineered Vegetation Systems for Waterways and Reservoirs

Introduction

BGS – Bestmann Green Systems is one of the leading worldwide manufacturers of biological engineering products and applications for waterways. The HQ of the company that has been in business for more than 30 years is located near Hamburg, Germany. Production of the company's proprietary products and systems, as well as its own seed and plant propagation is distributed throughout Germany and other countries, including Asia.

BGS provides its worldwide customers, including those in Korea and Japan, practical and transparent biological engineering systems to implement as environmentally friendly protection measures with its products, services and continuous product innovations. Manufacturing, trading, consultancy and installation (as requested) come all from one hand, providing a guarantee for optimal quality and cost-effective solutions. "Always a step ahead", is the motto at BGS, giving it a prominent position as a technology leader in biological engineering systems for waterways and reservoirs.

From the company's wide range of products, the following are introduced:

River bank, Lakeside Erosion Protection with Armaflor® Products

Pregrown Fibre Rolls™ anchored firmly in the subsoil will protect the toe of the slope and retain fill material. In cases with deeper undercutting, Rock Rolls™ offer a stable foundation for the pregrown Fibre Rolls™.



Fig. 1: Schematic application of BGS Pregrown Fibre Rolls™ and mats for erosion protection along river banks

In turbulent rivers and lakes the erosive forces may wash away soil, plants and seeds, so preventing the establishment of indigenous vegetation. Environmental as well as aesthetic solutions can be catered for by using fibre modules planted with woody or emergent species. Pregrown Plant Pallets™ and Plant Carpets™ are living, biodegradable filters, which collect and hold sediments. Densely planted and thoroughly rooted, they develop into a thriving wetland community.

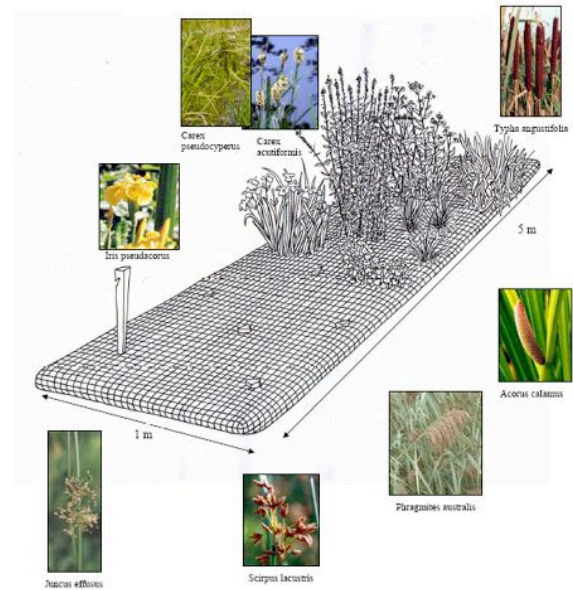
Examples of Armaflor® Product Applications:



Pflanzschema Armaflor® Röhricht-Vegetationsmatten

Typ VM/RM 5x1m

Pflanzschema: Hohe Arten H1.0



Pflanzdichte: ca. 16-20 Stück/m²

Stand: 10-2002 Änd. verb.

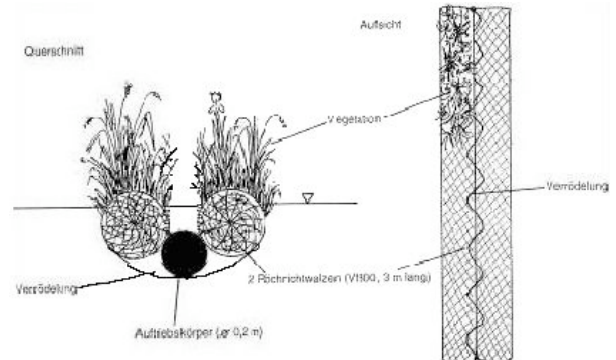
Floating Wetland Systems with Aqua Green® Products

BGS has developed a wide range of different floating wetland systems to meet its clients' demands for technical and landscape-aesthetic solutions. This demonstrates that BGS does not provide a one-fit-all system for floating wetlands, but can select the most suitable product or combination of products from its wide range of materials to respond to different hydrological and environmental conditions in Singapore's waterways and reservoirs.

The following products are introduced here:

1. AquaGreen® Felixfloß

This system involves the combination of two 200mm diameter Pregrown Fibre Rolls™ with a floatation device made of **Repotex® I2**, another BGS product. The total width of the AquaGreen® Felixfloß is 600 to 650mm. The unit length varies between 2,200 and 3,000 mm, with unlimited extension and configuration possibilities.



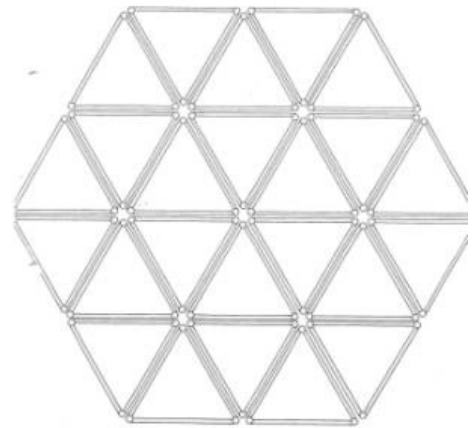
Due to its flexibility in creating units of different lengths or sizes, AquaGreen® Felixfloß systems are suitable to improve vertical canal and stream banks, for urban water edge treatment. In combination with other products, this system can be also used as retention and filtration barriers (e.g. oil).

2. AquaGreen® Floating Islands

There are a range of materials (stainless steel [VA4], PE) and sizes available. All AquaGreen® Floating Islands have a triangular shape that minimizes hydraulic resistance during stormwater events and allows an unlimited range of combination to create the desired shape and size. UV-resistant netting in combination with Armaflor® Products provides long-lasting, strong planting substrates, that varies between 4.1 and 16 sqm per unit.

Larger units of AquaGreen® Floating Islands support a load of up to 200kg in plant biomass. They can be further reinforced for specific applications. The systems are suitable for water and wastewater treatment through the extensive rhizosphere, providing an excellent growth medium for microorganism. Per sqm of planted reed, 120 sqm of rhizome surface area has been measured. AquaGreen® Floating Islands can also be designed as micro-habitats and breeding islands for waterfowl and fishes.

Examples of AquaGreen® Floating Islands Product Applications:



3. AquaGreen® Floating Reed Mats with Repotex®

The AquaGreen® Floating Reed Mats with Repotex® provide cost-effective solutions of BGS Floating Wetland Systems. These mats are made of a special synthetic material by BGS with different design characteristics, such as water absorption capacity, according to client requirements. In order to carry plant biomass on water, the AquaGreen® Floating Reed Mats with Repotex® have integrated buoyancy devices (see photo below, right) and can be combined with other plant substrate materials such as Armaflor® mats made from coconut fibre. The weight of the Repotex® mat material is approximately 200 – 500 gr/ m² with a height of between 20 to 30 mm. Repotex® allows optimal root growth through the material. The systems are suitable for water and wastewater treatment through the extensive rhizosphere grown through the substrate into the water column, providing an excellent growth medium for microorganisms. The systems are easy to maintain and harvest with custom-made harvesting machines as shown.

