

Floating Treatment Wetlands

**KEEPING OUR
FRESH WATER
CLEAN AND
HEALTHY**

Freshwater lakes around the world are in trouble.

Urbanization, waste treatment, landscape changes, agriculture and natural resource extraction cause runoff of nutrients, contaminants, petroleum products and organic materials into freshwater lakes around the world.

Harnessing the natural ability of plants and microbes to absorb nutrients (such as phosphorus and nitrogen) and break down contaminants through biological processes can prove an effective and sustainable way to improve freshwater lake health.

WETLANDS FOR REMEDIATION

The use of wetlands for bioremediation to capture and remove contaminants and nutrients is widely practised around the world.

Wetlands can improve the quality of storm water runoff, manage watershed nutrients, and treat wastewater and other industrial contaminants.

Wetlands rely on natural processes to biologically filter water as it passes through shallow areas of dense aquatic vegetation and permeable bottom soils. The primary mechanisms for nutrient removal are transformation and uptake by microbes and plants, assimilation and absorption into organic and inorganic sediments, and conversion into gas.



HOW DO FLOATING TREATMENT WETLANDS WORK?

Floating treatment wetlands (FTWs) or islands are small artificial platforms that allow these aquatic emergent plants to grow in water that is typically too deep for them. Their roots spread through the floating islands and down into the water, creating dense columns of roots with lots of surface area.

Not only do the plants take up nutrients and contaminants themselves, the plant roots and floating island material provide extensive surface area for microbes to grow—forming a slimy layer or

biofilm. The biofilm is where the majority of nutrient uptake and degradation occurs in an FTW system, with up to 80 per cent by the microbe community.

The unique ecosystem that develops creates the potential to capture nutrients and transform common pollutants that would otherwise plague and harm our lakes into harmless by-products.





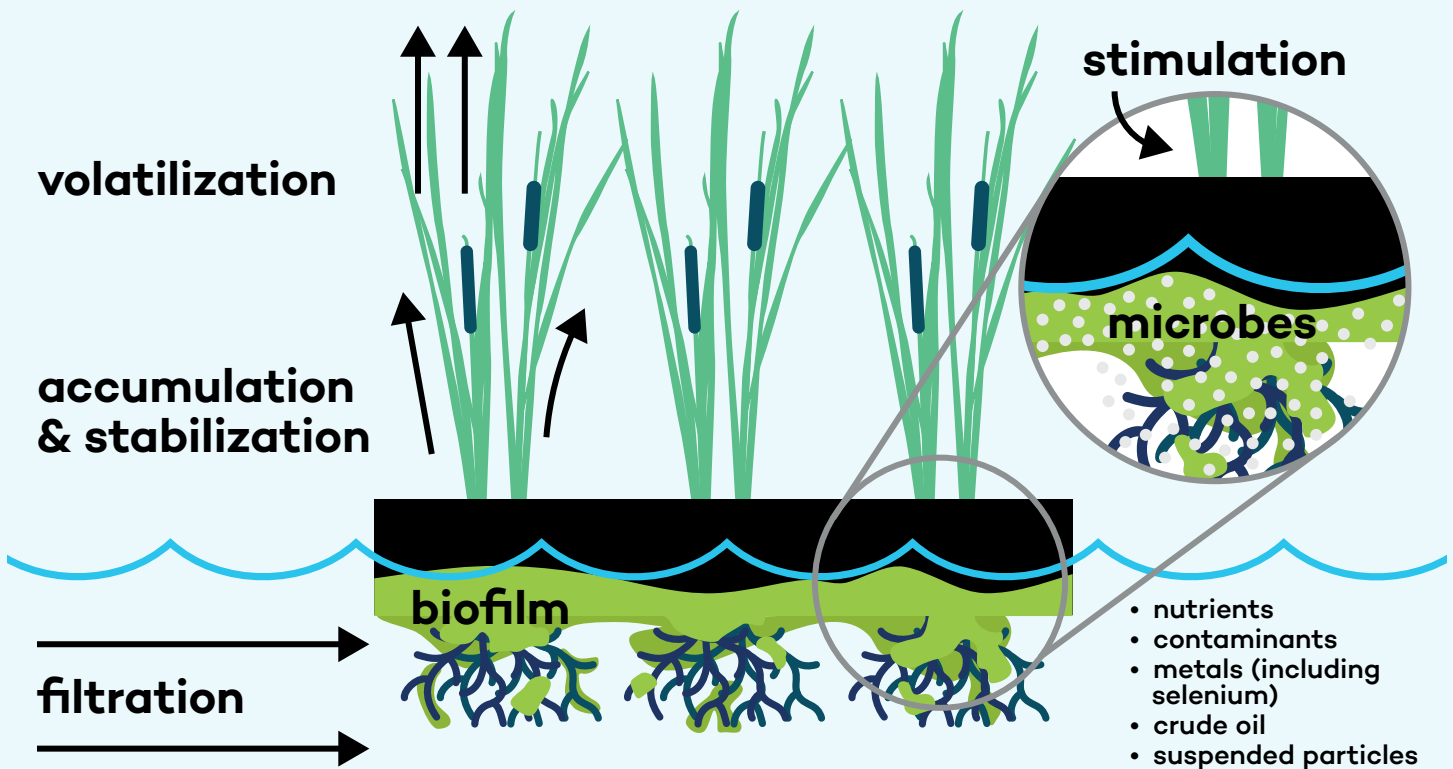
HOW DO WE KNOW FTWs WORK?

For the past decade, our research has explored sustainable water and land management that both creates opportunities for economic growth and improves the environment. We have shown that, by harvesting cattail, nutrients (such as phosphorus) taken up during growth and stored within the plant are permanently removed from the soil.

In a study at the University of Manitoba, we also discovered that FTW plants can be effective at removing certain pharmaceuticals and herbicides from freshwater bodies—which proves significant when we consider the increasing number of those elements that are entering our freshwater systems.

We are now exploring the potential for FTWs to help clean up oil spills (of crude oil and diluted bitumen) in a planned study at IISD Experimental Lakes Area.

Over the last few years, we have deployed a number of floating wetlands in various locations, from the IISD Experimental Lakes Area in northwestern Ontario for research to a “real-world” application in a residential stormwater pond in Lorette, Manitoba. We are also collaborating with other organizations, for example with Assiniboine Park in Winnipeg on the new FTW they deployed in the duck pond.



HOW AND WHERE CAN YOU USE FTWs?

There are many freshwater bodies in which floating wetlands can be deployed in order to improve the quality of water. These include lakes, streams, stormwater ponds, wastewater lagoons, landfill leachate and tailings ponds, and oil spill sites.



HOW EFFECTIVE CAN FTWs BE?

Some of our results have been staggering!

When we placed a series of FTWs in two lakes at IISD Experimental Lakes Area, we intentionally selected

one lake that was high in phosphorus (Lake 227) and one that had normal levels (Lake 114).

We discovered that the cattail plants in Lake 227 had eight times the productivity and five times the amount of root growth than those left in Lake 114, and had absorbed four times the amount of phosphorus. This clearly demonstrates the effectiveness of plants and FTWs in removing excess phosphorus from lakes.

And we are not alone. There are plenty of examples from around the world on the effectiveness of FTW systems used in real-world applications to effectively remove nutrients and improve water quality in waste lagoons and stormwater ponds and lakes.



If you want to learn more about the benefits that FTWs could bring to bodies of fresh water close to you, or if you are interested in deploying them yourself, contact:

Richard Grosshans, Bioeconomy Lead, International Institute for Sustainable Development
rgrosshans@iisd.ca
+1 (204) 958 7700 ex. 718