

Devils Lake Water Improvement District  
Save Our Shorelines Committee  
Floating Garden Project  
August 2017 - July 2018

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## Project overview

The Devils Lake floating garden project was created as a way to promote lake re-vegetation in a way that doesn't require full bank stabilization, concrete or dock removal, and/or the need for extensive permitting.

The project was inspired by the floating gardens of Amsterdam, Netherlands. In an effort to achieve DLWID's goal of 20% lake vegetation, the floating garden offers an alternative to lakeshore restoration projects that require unimpaired shorelines, with ample planting media.

Wetland plants perform the vital task of storing toxins and chemicals. Organic matter is aerobically (using oxygen) broken down and the nutrients are made available to plant life. When soils become waterlogged, as in a wetland, the oxygen is used up in the decomposition process and an anaerobic condition occurs. However, wetland plants have adapted to this condition by developing aerating tissue (aerenchyma) consisting of a network of thin-walled cells which provide plant roots with oxygen and maintain buoyancy. The oxygen is released through the roots of the plants, creating an environment in which microorganisms (and other animals and fish) can live. These microorganisms feed on the dissolved nutrients so that decomposition can continue (Colleen Stuckey, Hansen's Northwest Native Plant Database).

The floating garden is a suspended structure of PVC pipes, connectors, empty plastic water bottles, lattice, and planting baskets. It is anchored to a homeowner's dock or concrete barrier. The wetland-like, aquaponic conditions allow for aquatic and non-aquatic species to grow in close contact with the lake, extracting nutrients from the nitrogen-rich bottom of the lake. In addition, the aquaponic plants clean the water, creating a healthy environment for fish to thrive. Small fish swim among the roots looking for shelter and food. The plants do not need to expend energy on an extensive root system to find the food they need, so all of their energy goes into upward leaf growth. The floating garden is virtually maintenance-free, requiring an optional light spring cleaning and weeding once a year. No watering or fertilizing is needed.

Floating gardens in Amsterdam, Netherlands May 2017:



## Supplies

Saguaro Traditional 4x8 Lattice #1 @ \$29.99  
Amazon HG9SQBK 9" Square Baskets #24 @ \$1.55ea = \$37.00  
4"x10' S&D Solid Sewer & Drain Pipe #3 @ \$7.99ea \$23.97  
Elbow 90 PVC S&D 4" HXH #4 @ \$6.99ea =\$27.96  
Purple Primer 4OZ #1 @ \$3.99  
PVC Hot Cement Rain-R-Shine #1 @ \$4.59  
Tee Joints #2 @ \$6.99ea = \$13.98  
Cable Ties 15" White 100 pack \$12.99  
Cable Ties 7-3/4" Black 100 pack \$6.99  
Plastic empty water bottles with caps #40-#60, depending on your floating garden size.

Our sources for these supplies were Ace Hardware, Amazon, Bear Valley, Blake's Nursery and generous lakefront owners plant donations. Total cost in July 2017 was in the range of \$140.00 to \$150.00.

## Plant list

Experiment with vegetables, herbs, and other plants. Each basket (we used 24 baskets) should contain one plant. They will grow! Duplicates of plants in the garden provide balance and beauty. A good sources for water-loving plants is the DLWID GardenSmart publication, pages 45-51, available in the DLWID office and at all DLWID Board meetings.

These and other experimental plants have been thriving in the demonstration floating garden on Devils Lake for a year:

Scirpus microcarpus (Small fruit bulrush)  
Scirpus zebrinus (Zebra rush)  
Eleocharis calva (Spike sedge)  
Eleocharis ovata (Ovid spike rush)  
Deschampsia cespitos (Tufted hair-grass)  
Carex stipata (Awl sedge)  
Carex obnupta (Slough sedge)  
Mimulus lewisii (Purple Monkey flower)  
Lupinus rivularis (River lupine)  
Rosemary  
Basil  
Miniature Sweet Flag  
Chameleon Plant

## Construction

The finished island size is approximately 4 feet by 8 feet (48 inches by 94 inches). These demonstration floating garden measurements may be adjusted to fit your lakefront needs.

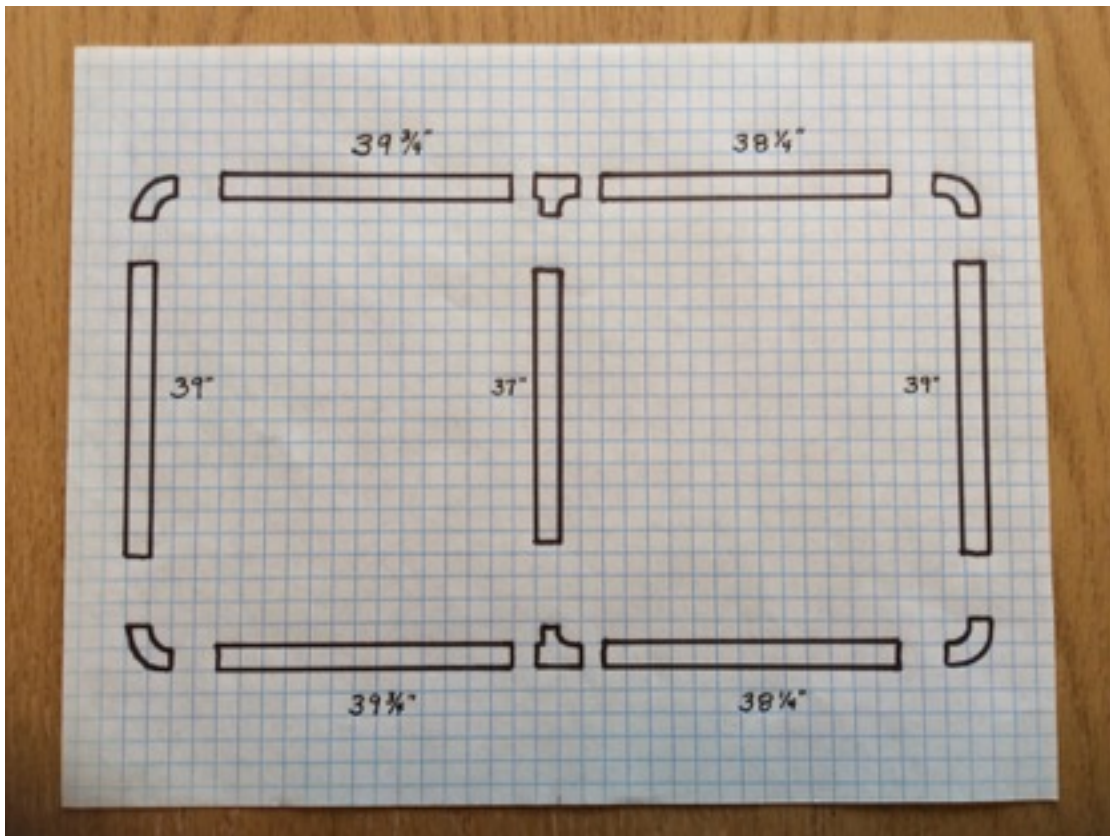
1. To assemble the island, cut the PVC pipes into seven pieces as shown in the diagram below:

2 x 39 inches

2 x 39 and 3/4 inches

2 x 39 inches

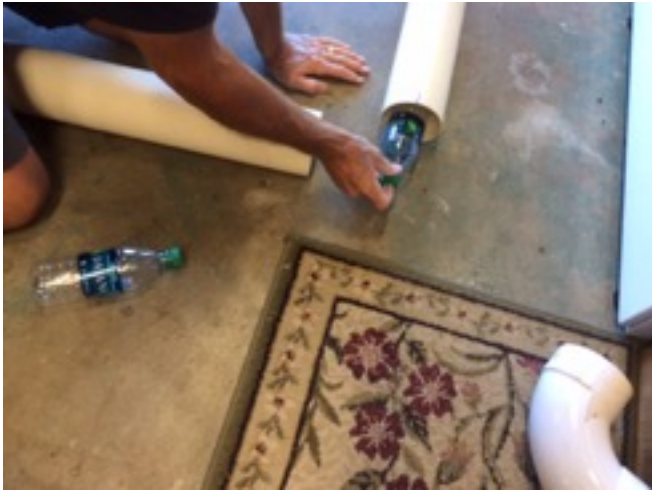
1 x 37 inches



2. Fill the two 39 inch pipes (outside short edges of island) with empty water bottles (to add flotation in case of a leak in the PVC pipes). Position all the writing on the PVC pipes facing the bottom of the island where the lattice will be zip-tied to them.

- 3.** Prepare the ends of these two 39 inch pipes with Purple Primer per instructions on the package. Apply PVC Hot Cement glue per instructions and attach the four corner elbow joints to the ends.
- 4.** Fill the 37 inch (center) pipe with water bottles and apply Primer and Hot Cement to each end. Attach the two T-joints to the ends with the short ends of the T-joint facing the same 39 inch pipe. The T-joints are responsible for the 39 and 3/4 inch and 38 and 1/4 inch measurements to create the two long sides of the island.
- 5.** Prepare the ends of the 37 inch (center) pipe with Primer and Hot Cement and attach to the centers of the two T-joints.
- 6.** Fill the two 39 and 3/4 inch pipes with water bottles and apply the Primer and Hot Cement to the pipe ends. Insert the prepared pipe ends into the short ends of the two T-joints.
- 7.** Fill the two 38 and 1/4 inch pipes with water bottles and apply the Primer and Hot Cement to the pipe ends. Insert the prepared pipe ends into the long ends of the T-joint.
- 8.** When all of the PVC pipes are filled with water bottles, prepare the ends of the long sides of the island with Primer and Hot Cement. Attach these to the four corner elbow joints.
- 9.** Attach the lattice using white zip-ties to the PVC pipe (with the writing on the pipe facing the lattice, as planned at the beginning of the project).
- 10.** Attach the plastic plant baskets to the lattice using the black zip-ties. (If the holes in the bottom of the baskets are small, drill between them to make larger holes to provide more space for the plant roots).
- 11.** Tie ropes to each end of the island and lower into the water in a shallow area where you can easily add the plants.
- 12.** Line the baskets with sheets of newspaper to hold the plant root balls. These papers will disintegrate once the aquaponic plant is established and begins rooting in the floating island environment.
- 13.** Plant each basket with your favorite plants from the list above and any experimental, non-invasive, plants you want to try. Place shorter plants in the outside rows of baskets and taller plants (sedges, rushes) in the inside baskets.

## Construction Stages





**Floating Garden August 2017**



## Floating Garden July 2018



The DLWID demonstration floating garden on Devils Lake has been anchored by ropes from a fixed dock since August 2017. The floating garden was weeded in March and invasive “volunteer” plants were removed. Once the garden is constructed and populated with plants it takes care of itself.

Floating gardens are a convenient solution to lake shore planting. The plants utilize the lake nutrients to produce foliage and an efficient root system. They are an easy to maintain and beautiful lakeside property addition.