

A photograph of a pond with numerous green lily pads and a single white water lily flower in bloom. The water is dark and reflects the surrounding environment. The text is overlaid on a dark grey rectangular background on the right side of the image.

# WATER QUALITY & INVASIVE SPECIES

How changes in water quality affect  
aquatic plant communities



# Water Quality

Water quality describes characteristics of a waterbody as it pertains to ecosystem health, safe drinking water, recreation, pollution, etc. The standard of what is considered “good” or “poor” water quality is dependent on the context. For example, the water quality standards used for safe drinking water are different from those used for safe recreation and different still when considering other organisms.

AQUATIC PLANT COMMUNITIES BOTH  
INFLUENCE AND ARE INFLUENCED BY WATER  
QUALITY



*Lobelia dortmata*



# Common Water Quality Parameters



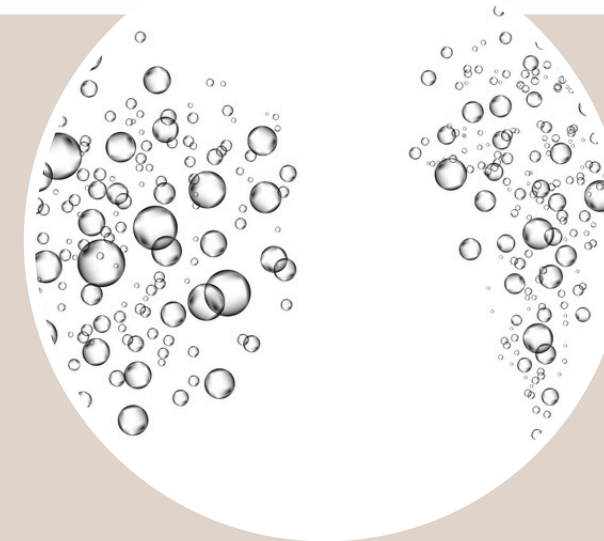
## Water Clarity

- Measures the amount of suspended solids in the water
- Most easily measured using a Secchi disk
- light meter instruments can give a more precise reading
- Photosynthesis requires a certain amount of sunlight to penetrate through the water - the clearer the water is, the more plant life can photosynthesis



## Temperature

- Water temperature can be measured using a standard pool thermometer, fishfinders, or more instrumentation for depth profiles
- warmer temperatures affect turnover/mixing rates
- Implications for D.O. concentrations, plant/algae growth, fish habitat



## Dissolved Oxygen

- The concentration of dissolved oxygen in water that is useable to organisms
- Seasonal turnover and photosynthesis oxygenate the water, while too much microbial action depletes the oxygen stores
- Among other organisms, fish are susceptible to low dissolved oxygen - can result in fish kills
- Dead zones - areas where there is not enough usable oxygen for organisms to survive



## Total Phosphorus

- Refers to the concentration of phosphorus in its many different forms
- Phosphorus, among many other elements, is essential to aquatic organisms
- Phosphorus is the limiting nutrient for aquatic plants and algae
- In Ontario, the recommended that TP concentrations remain under 20  $\mu\text{g}/\text{L}$  to avoid potentially harmful algal blooms



# Changes in Water Quality

## ***Natural Shifts in Quality***

Storm events will turn up the lake, resuspending sediment and washing new soils, debris, and potentially contaminants into the lake. These inputs load the lake with additional nutrients and increases lake turbidity which can influence water quality.

There are natural process that shift the chemical state of freshwater lakes.. these generally happen over a prolonged period of time. Aquatic plant communities can the adjust their composition to account for these changes

## ***Human Disturbances***

Human activity in and around lakes play a large role in the changes in water quality. Human disturbances tend to happen more acutely and more frequently than natural disturbances, which make them more difficult for the ecosystem to absorb.





# Human Disturbances affecting water quality

- **Mismanaged Sewage Systems**

*Sewage runoff high amounts of phosphorus, suspended solids, and potentially contaminants that reduce water quality*

- **Municipal/Industrial Effluent**

*Similar to sewage systems but at a larger scale. Wastewater treatment has come a long way, but none-the-less it is still a constant source of inputs that the lake needs to manage*

- **Nearshore/ In-water Construction**

*Loosened soils from the removal of vegetation and fresh fill materials erode into the lake creating a point source input of nutrients and increased turbidity.*

- **Removal of Vegetation**

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# Aquatic Plants Influence Water Quality

Aquatic plants provide a number of **ecosystem services** that improve water quality

## ● Erosion Control

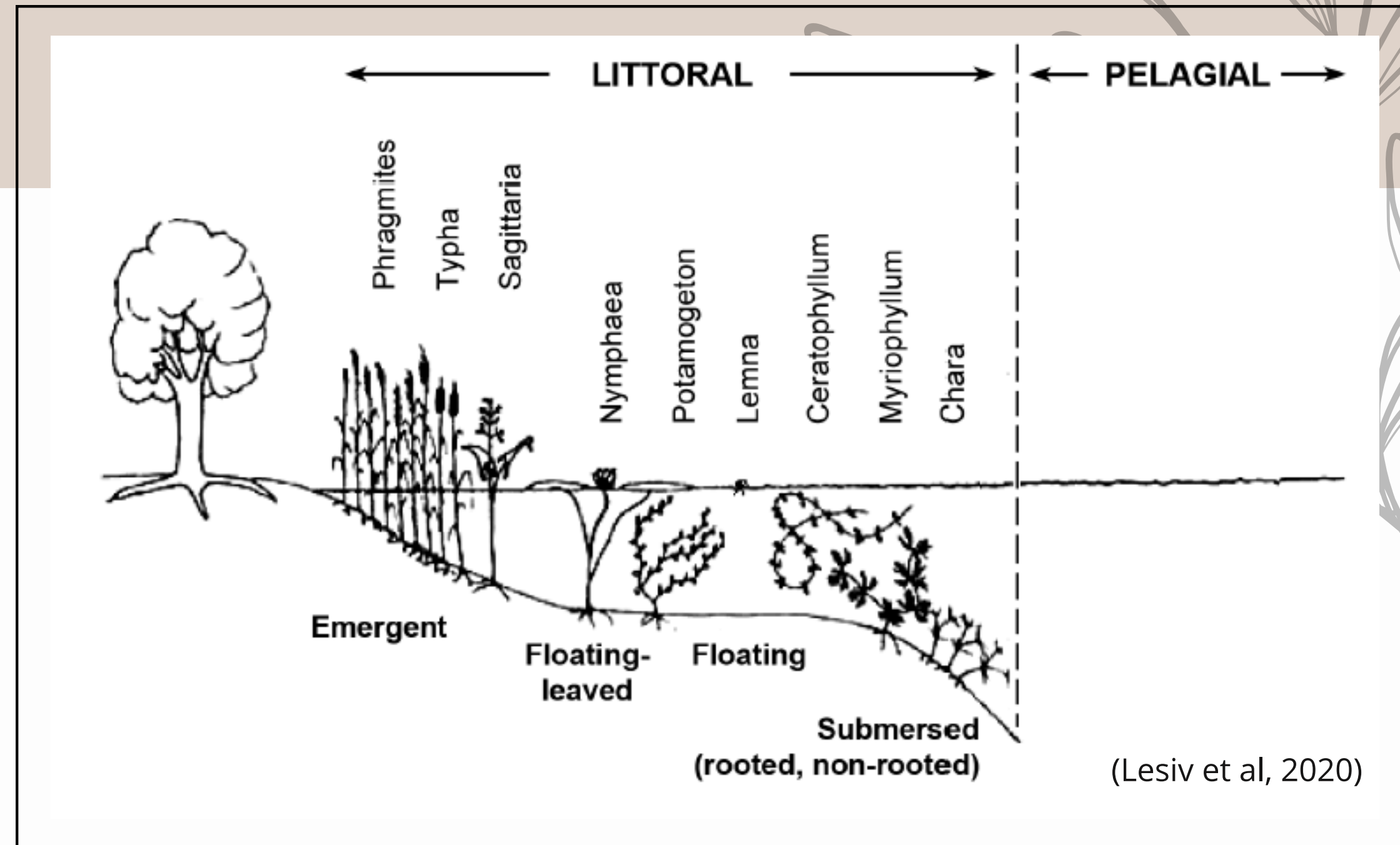
*Slows water movement so particles being dragged into the lake have time to settle, reducing turbidity and increasing water clarity*

## ● Nutrient Cycling

*Uptake of nutrients from sediment and directly from water column which limits the amount available to algae and improves water clarity, production of oxygen during photosynthesis increases D.O.*

## ● Pollution Retention

*Some species are able to physically immobilize contaminants in their below and/or above ground tissues, while others are able to transform contaminants into a less harmful form*



Loss of aquatic plants =  
Loss of ecosystem services =  
Reduced water quality



# Water Quality Influences Aquatic Plant Communities

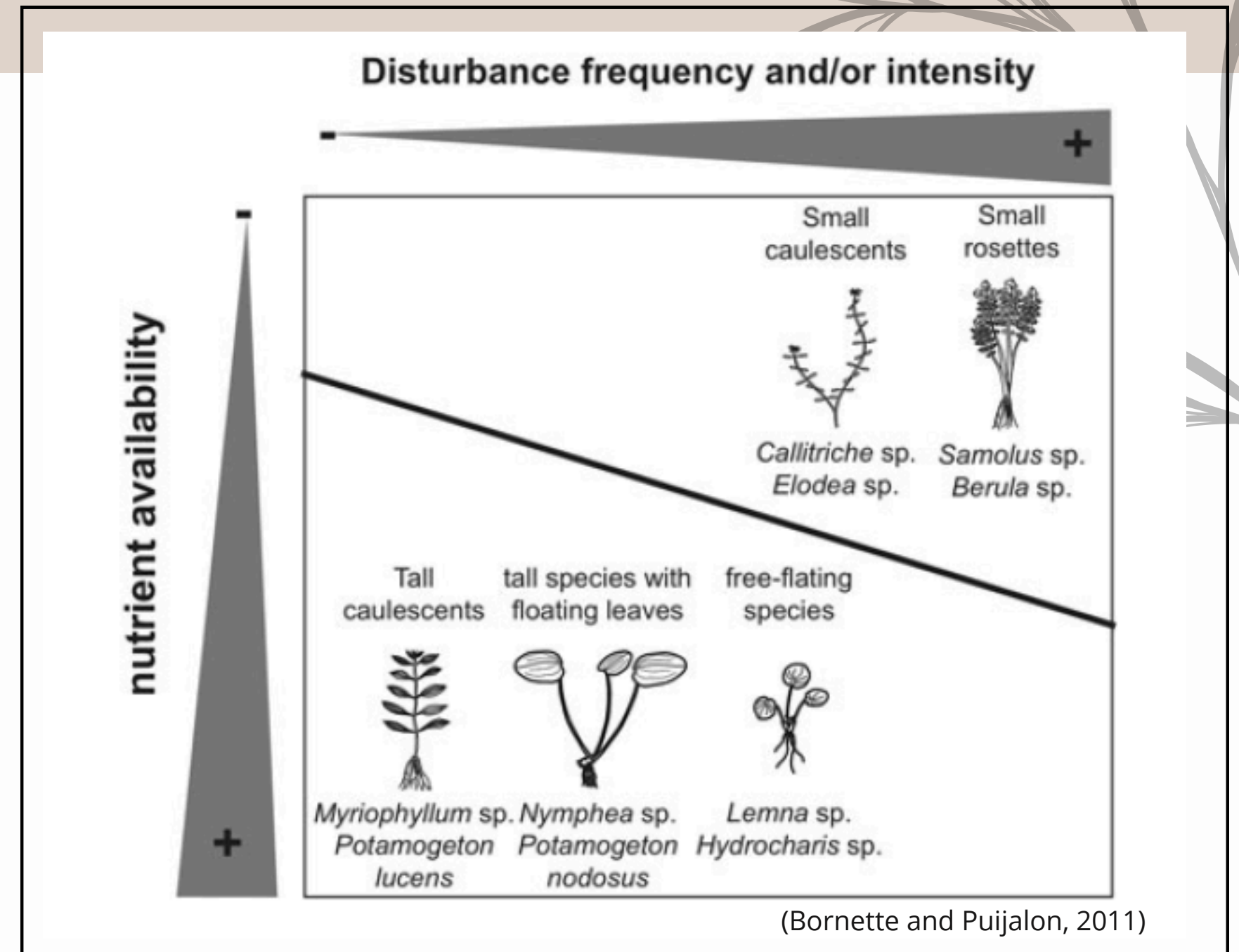
Similar to terrestrial plants, aquatic plants grow in a variety of habitats and **each species has a range of tolerances it can survive in**. While some of these habitat requirements are physical (sediment type, amount of wave action, etc.), **some requirements are related to water quality**.

## ● Nutrient Availability

While some species thrive in highly organic, nutrient rich, lakes, others are better suited to less productive lakes or areas of lakes. It is usually related to how the plant uses the nutrients.

## ● Water Transparency

Like terrestrial plants, some species are more shade-tolerant than others. When there is greater water clarity, the sunlight can penetrate further into the lake, supporting a greater array of growth forms. When water is less clear, the stand is dominated by plants that can grow to the surface of the water



The assembly of plants in a given area will be driven, in part, by water quality.





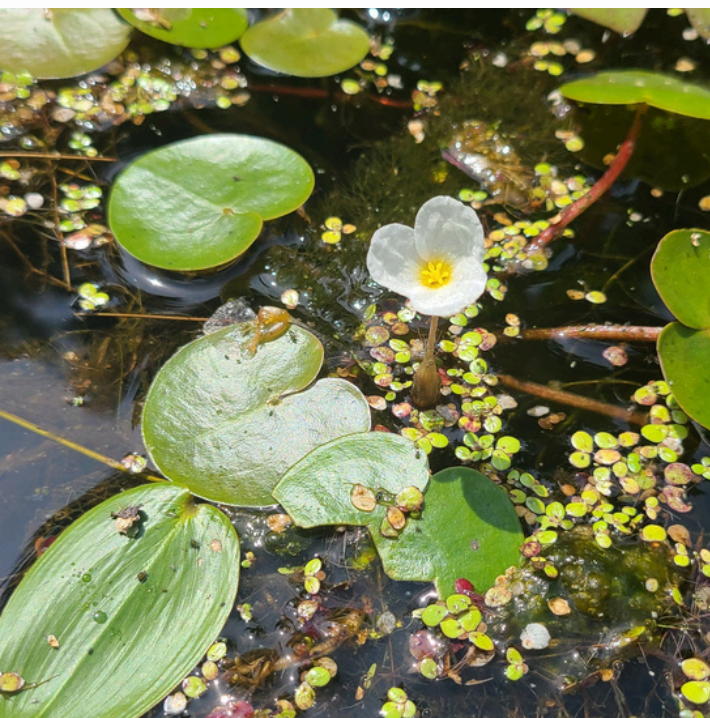
# Invasive Species

Once they find a location to establish, invasive species begin to **compete** with the **native species** for **space**, **light**, and **nutrients**. Often we find that invasive species tend to have a **competitive edge** in disturbed locations, so more often we see that they proliferate in both pristine and not-so-pristine areas.



**Aquatic Invasive Species tend to...**

- establish quickly
- have a wider range of tolerances than native species
- monopolize resources



Creating disturbance and neglecting water quality actively selects for invasive species





# What to do?

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- **Ensure you are maintaining your septic system properly**

*Have a professional check out your septic system to make sure it is working properly and have your tank pumped regularly*

*More info: <https://foca.on.ca/septic-systems/>*

- **Get involved!**

*There are so many excellent volunteer programs geared towards the monitoring and improvement of water quality in Ontario.*

*More info: <https://foca.on.ca/lake-partner-program/>,*

*<http://loveyourlake.ca/contact/>, [www.klsa.ca](http://www.klsa.ca)*

- **Reduce your use of fertilizers**

*Remember that lush green grass and gardens often means a lush green aquatic plants (and sometimes algae) along your shore.*

*Instead, try coarser compost materials that breakdown slowly.*

- **Leave native plant stands intact**

*Though even **native plants** can grow to **nuisance levels**, their presence signals **high concentration of TP**. If removed, algae will use the nutrients instead, which can cause further degradation of water quality (reduced water clarity, reduced D.O.). Before choosing to remove plants from your waterfront, consider what other factors might be contributing to their abundance and manage those instead.*





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Thank you!