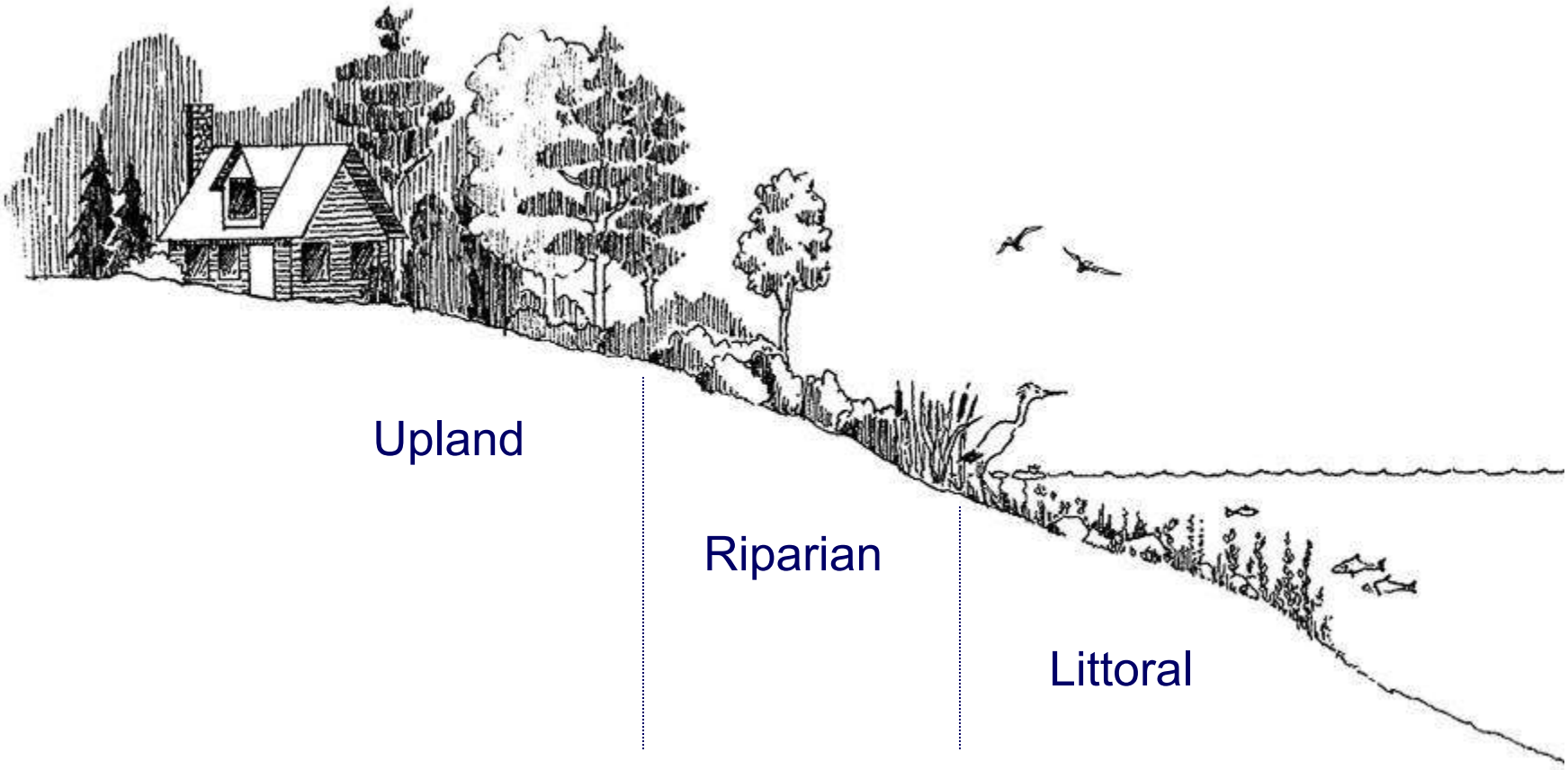
Healthy Shorelines

The Shoreline Area



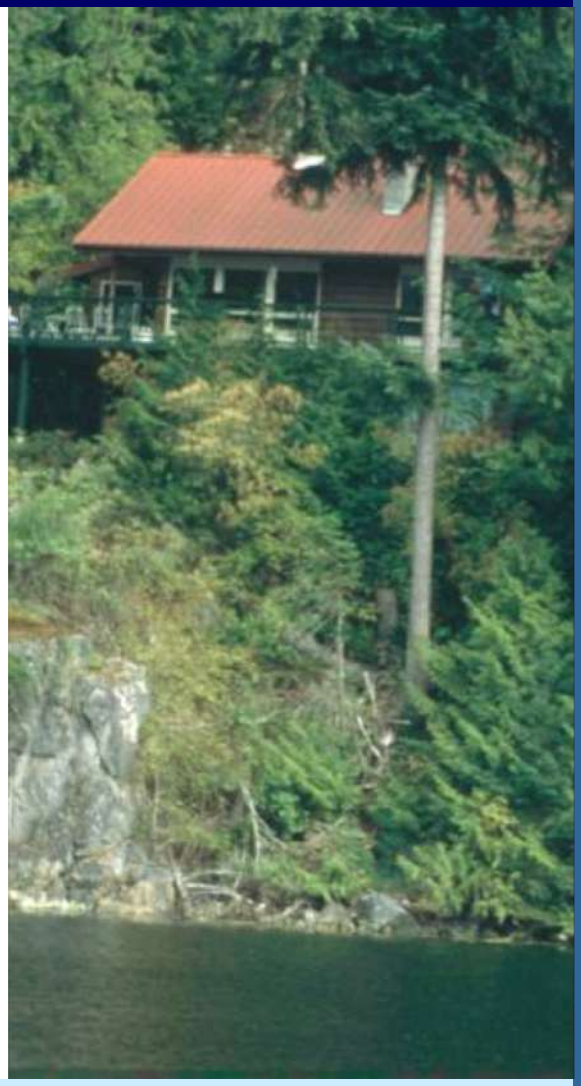
The Shoreline Ecosystem

What Shorelines Do…

1. Provide food & habitat
2. Filter chemicals, sediment & bacteria
3. Prevent soil erosion
4. Reduce impacts of flooding
5. Provide source of enjoyment

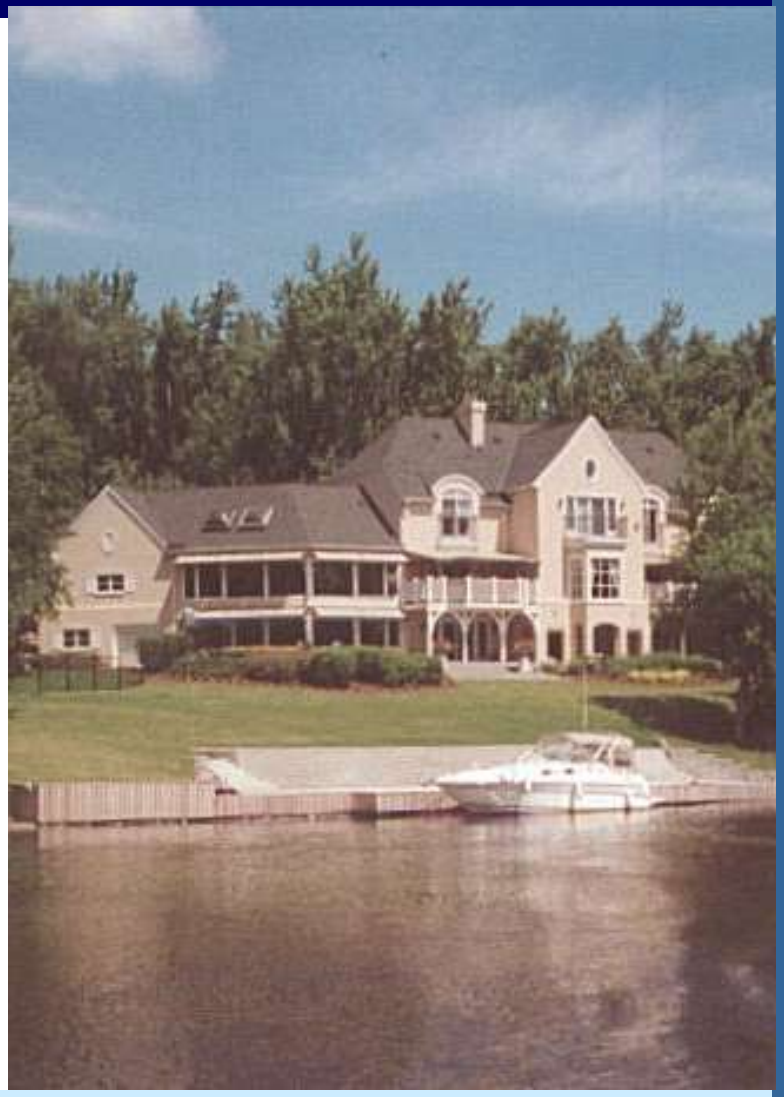
Signs of a Healthy Shoreline

- Lots of native vegetation
- Different levels of vegetation
- Dead snags and stones
- Things look “wild”
- Birds, fish and other wildlife



Signs of an *Unhealthy* Shoreline

- Little or no vegetation
- Lawn right to water
- Hardened shoreline



The Benefits of a Healthy Shoreline

1. A more resilient ecosystem
2. Clean water
3. Safe and healthy areas for recreation

The Benefits of a Healthy Shoreline (cont'd)

4. Increased property values

5. Less maintenance work and costs

6. A better quality of life

The Beauty of the Buffer

How to Build a Buffer

Natural

Enhanced

Landscaped

Taking Action

- Conserve water
- Maintain your septic system
- Use alternative cleaners
- Reduce run-off
- Build an environment-friendly dock
- Be a green boater

What Else Can We Do?

Get informed and make the right choices !

With Our Thanks…

- J.W. McConnell Family Foundation
- Rideau Valley Conservation Authority
- Ontario Stewardship
- Leeds County Stewardship Council
- Lanark County Stewardship Council
- Big Rideau Lakes Association
- The Watershed
- Eastern Ontario Model Forest

Managing Shoreline Erosion

Erosion: A Natural Process

- Proceeds very slowly
- Important part of ecosystem function

Courtesy of: Ed Klekowski

Natural Causes of Erosion

- Wind
- Ice
- Water movement
  - Wave energy
  - Currents
  - Changing water levels
  - Rain/run-off
- Gravity

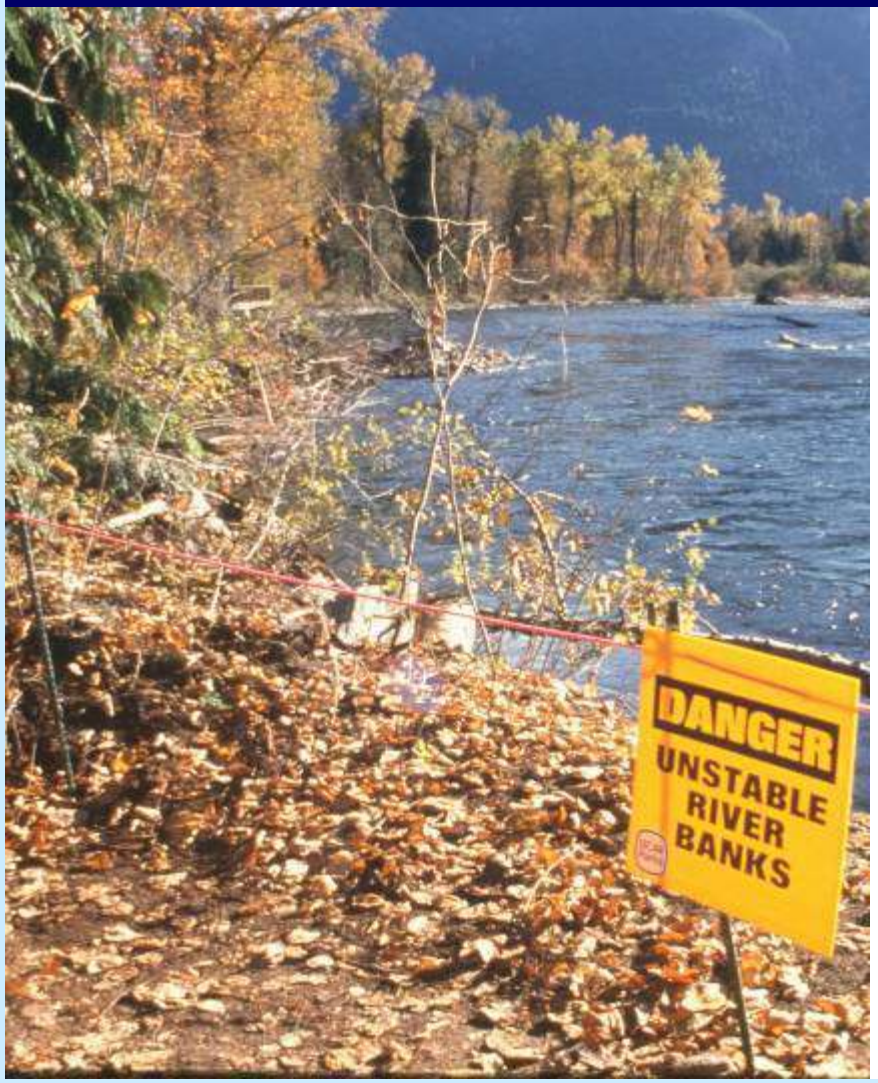
Human Disturbances

- Removal of shoreline vegetation
- Run-off from paved surfaces
- Boat wake

Human Disturbances

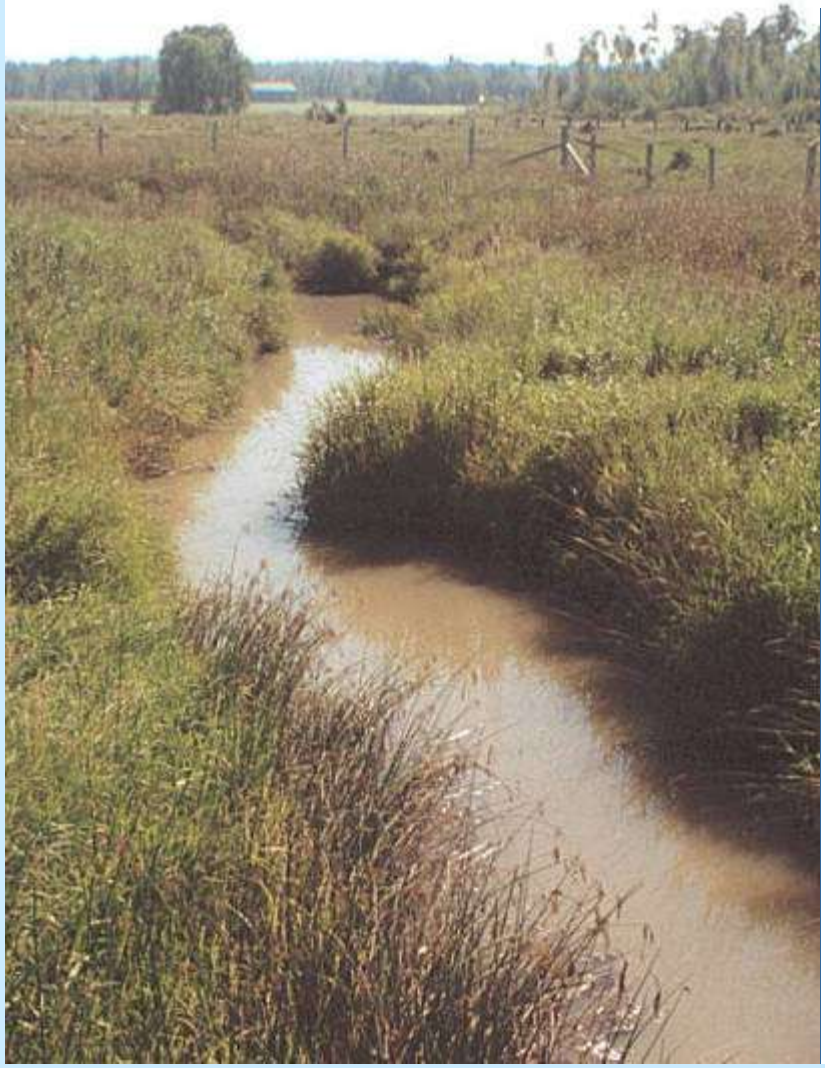
- Construction on or near the shoreline
- Heavy foot traffic
- Shoreline alteration

The Impacts of Erosion



1. Loss of valuable waterfront property
2. Unsafe areas
3. Loss of habitat

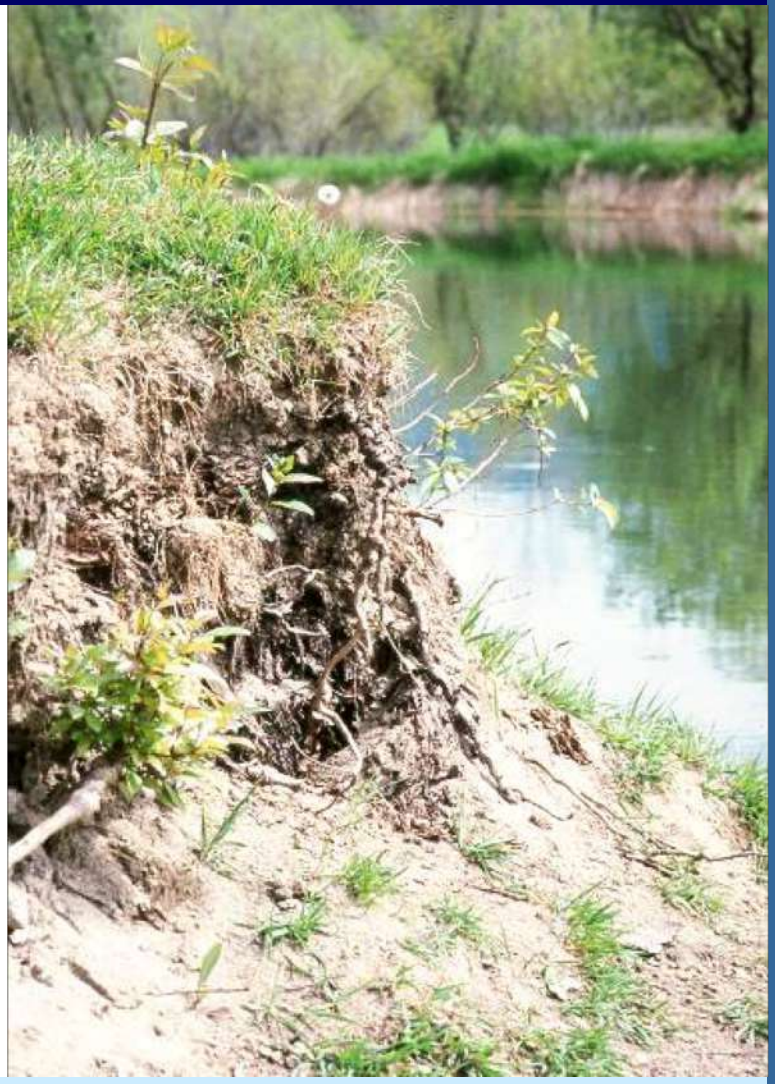
The Impacts of Erosion



4. Changes the characteristics of the bottom
5. Reduces water clarity
6. Increases water temperature
7. Releases chemicals/nutrients into the water

Signs of Erosion

- Areas of exposed soil
- Rills and gullies
- Slumping, undercut banks
- Formation of sandbars and “islands”



More Signs of Erosion

- Cloudy water
- Stream or river becoming wide and shallow
- Receding shorelines
- Leaning & downed trees & exposed roots

How To *Prevent* Erosion

1. Protect the natural shoreline
2. Reduce run-off from impermeable surfaces
3. Minimize wake from boats and other motorized watercraft
4. Take precautions during construction

How To *Prevent* Erosion

5. Limit foot traffic in erosion prone areas
6. Contour and cover pathways
7. Avoid alterations to water courses

How to *Control* Erosion

1. Identify:
   - Cause of erosion
   - Type of erosion
   - Extent of problem
   - Site conditions

2. Select most suitable control method

Control Methods

A. Natural buffers

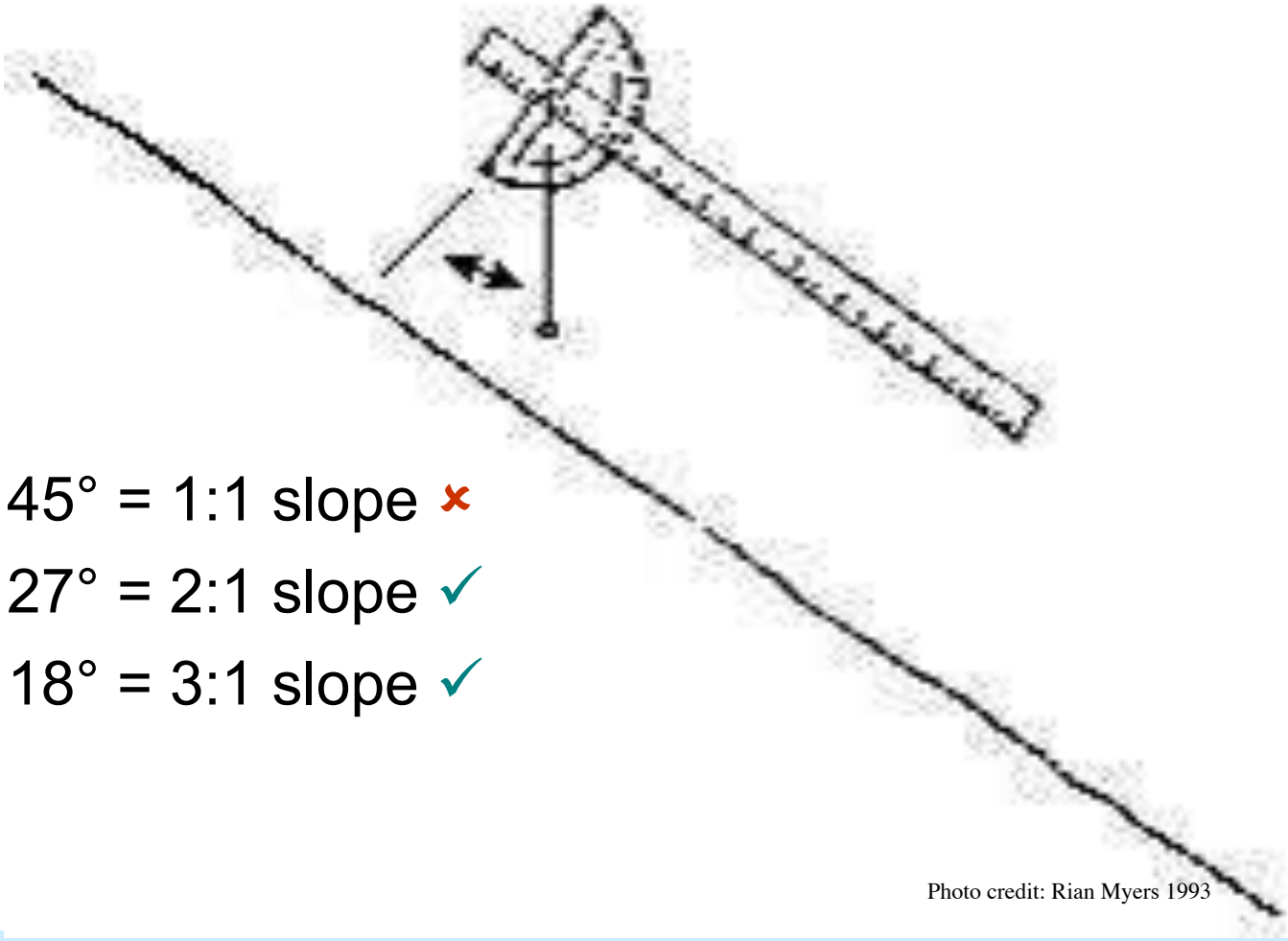
B. Bioengineering

C. Hardened structures

A. Natural Buffer

B. Soil Bioengineering

Slope Preparation



45° = 1:1 slope ✘

27° = 2:1 slope ✓

18° = 3:1 slope ✓

Photo credit: Rian Myers 1993

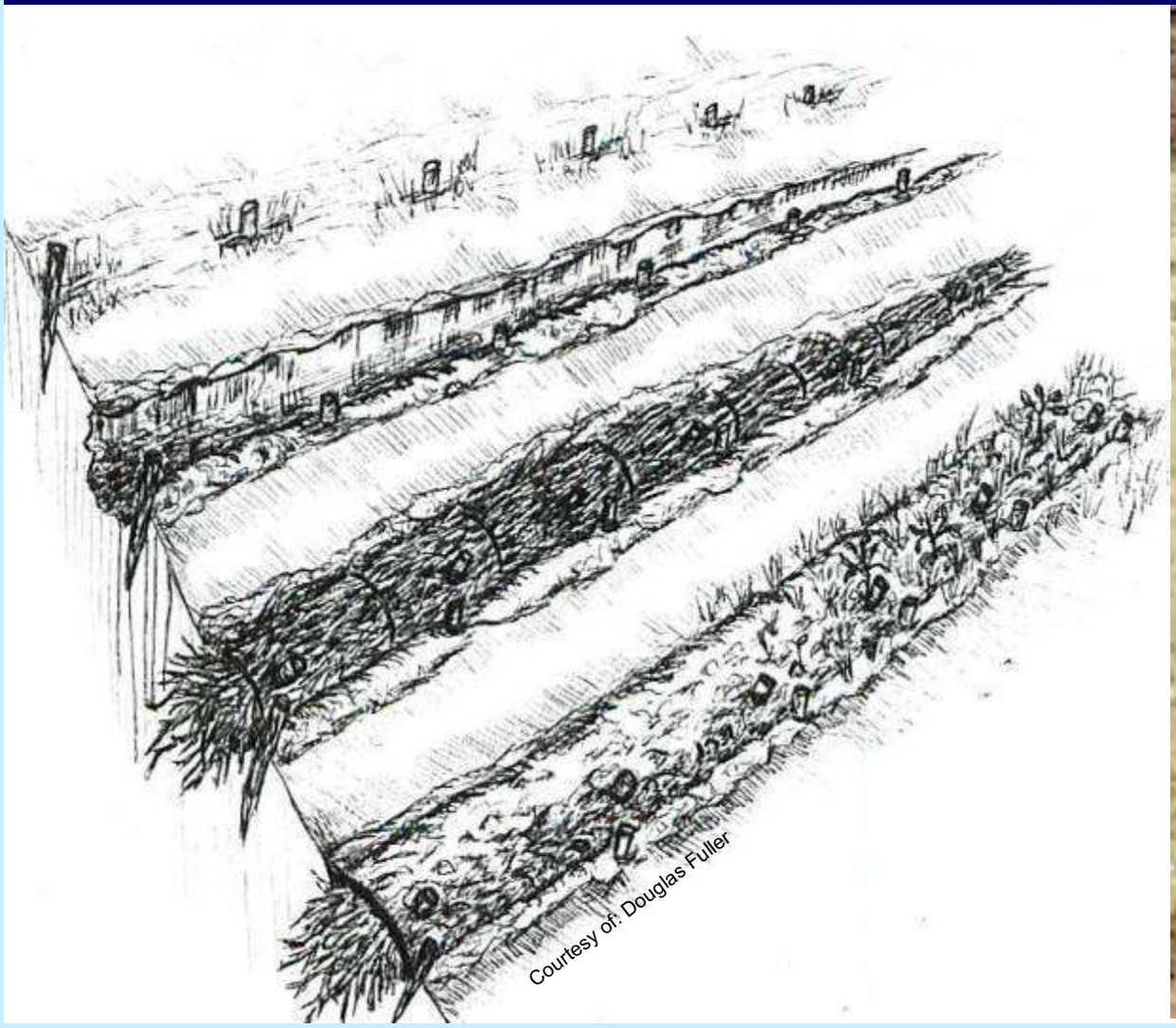
Bioengineering Techniques *above* the Water

- Live staking
- Fascines (wattles/bundles)
- Brush layers
- Brush mattresses

Live Staking

Courtesy of: Carolyn Dindorf

Fascines

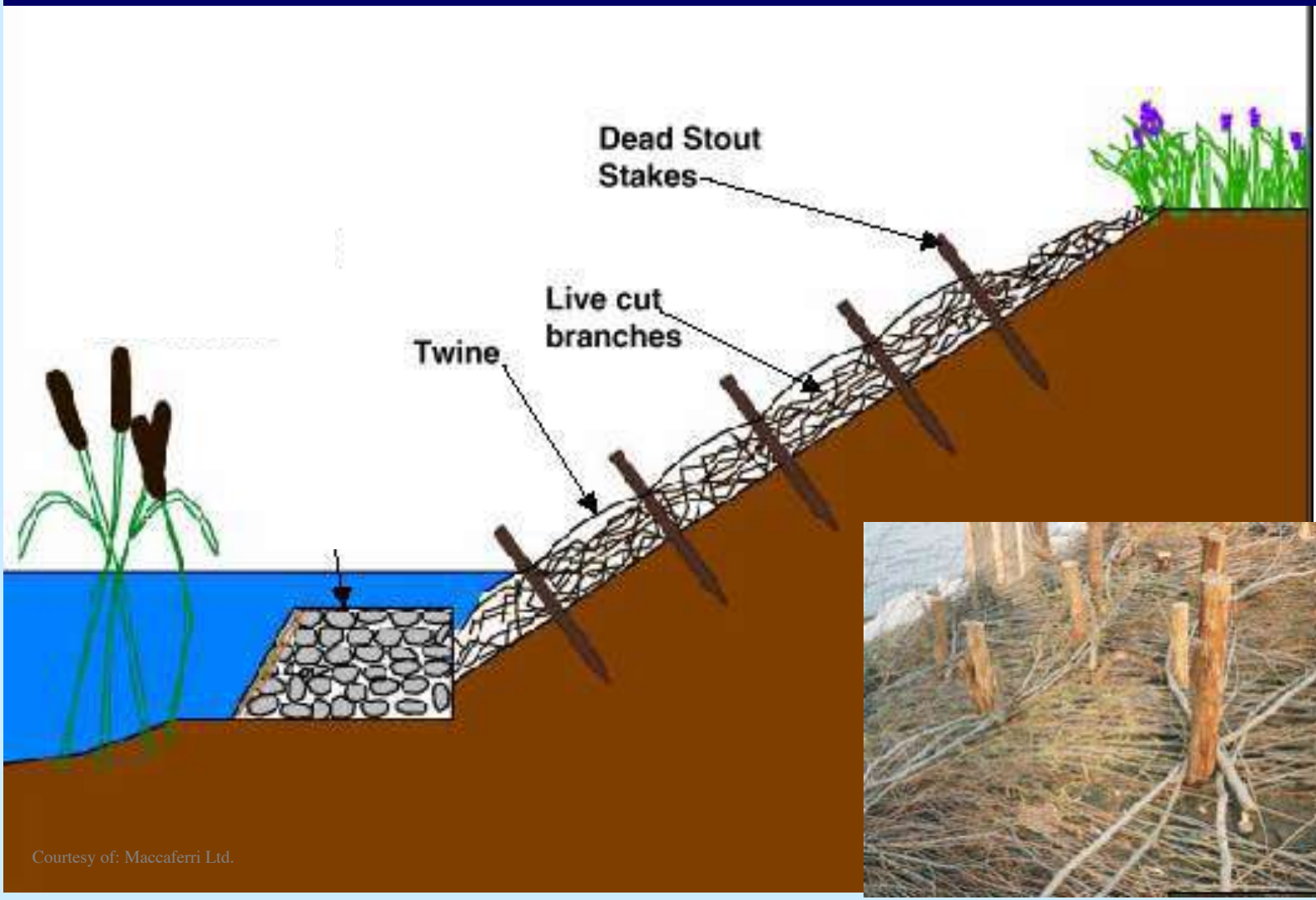



Courtesy of Maccaferri Ltd.

Brush Layers

Photo credit: Environment Canada

Brush Mattresses



Courtesy of: Maccaferri Ltd.

Maintenance

Recommended Native Species

- Red-Osier Dogwood (*Cornus stolonifera*)
- Silky Dogwood (*Cornus obliqua*)
- Grey Dogwood (*Cornus racemosa*)

Recommended Native Species

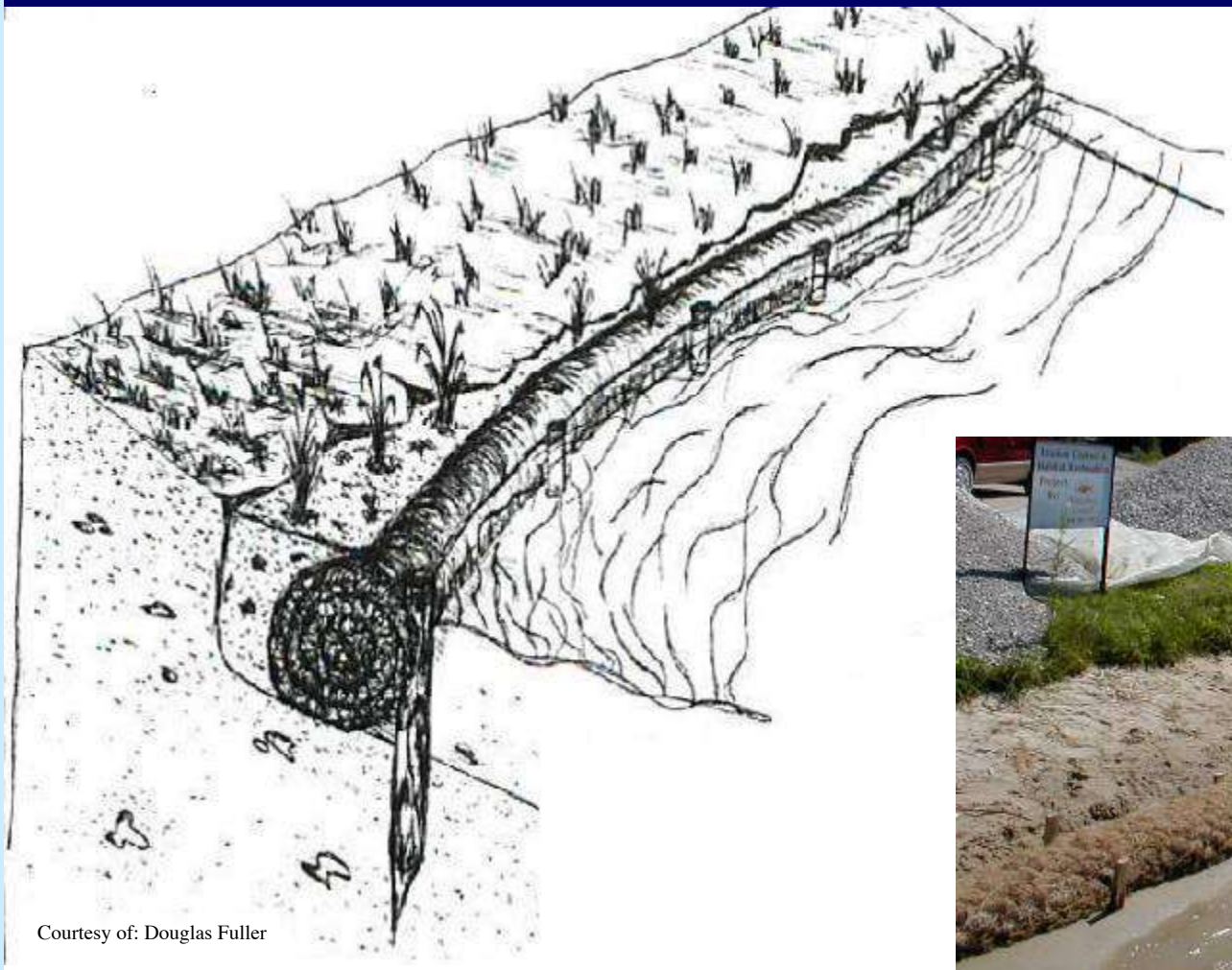
- Pussy Willow
  (Salix discolor)
- Shining Willow
  (Salix lucida)
- Shrub Willow
  (Salix eriocephala)

Gathering Plant Material

Bioengineering Techniques *In* the Water

- Fibre rolls
- Brush bundles
- Plant anchors

Fibre Rolls



Courtesy of: Douglas Fuller

Brush bundles

Plant Anchors

- Fibre mats
- Fibre bags

Courtesy of Maccaferri Ltd.

Case Study

C. Hardened Structures

- Break walls
- Gabion baskets
- Riprap

Breakwalls

Retiring Your Breakwall

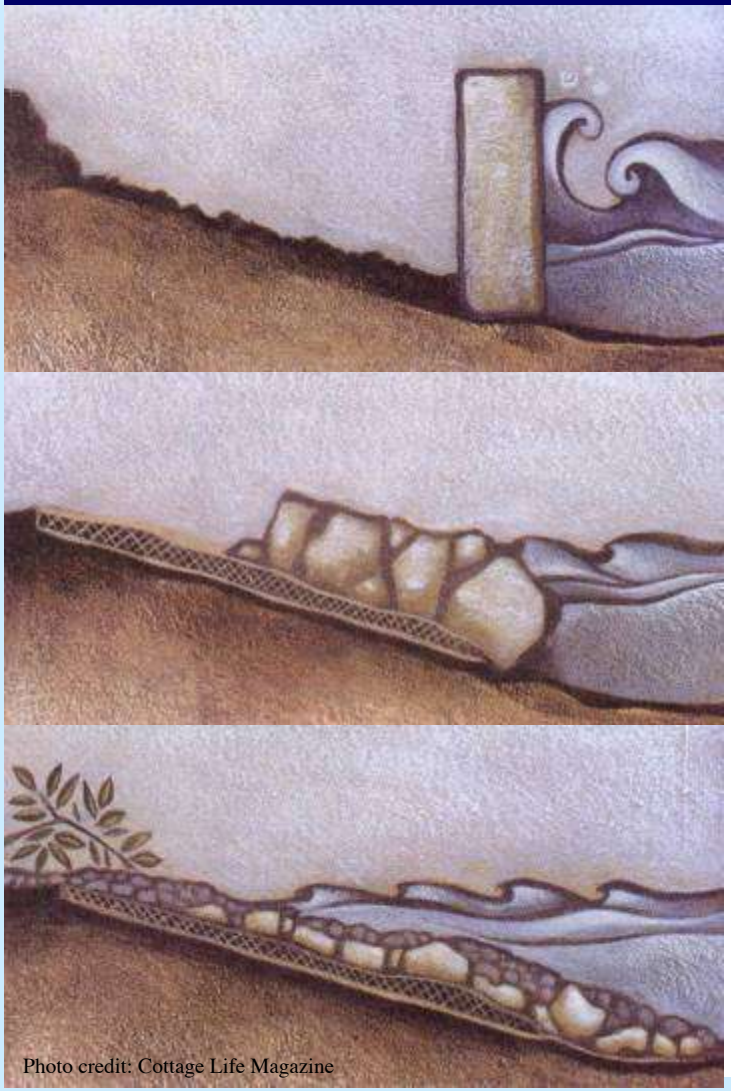


Photo credit: Cottage Life Magazine

1. Dig it out
2. Break it down
3. Plant it

Gabion Baskets

Riprap

Courtesy of: Douglas Fuller

Approvals

Contact:

- Conservation Authority
- Ministry Of Natural Resources
- Department of Fisheries and Oceans
- Parks Canada

Managing Erosion

1. Practice erosion prevention
2. Understand the source of erosion
3. Research your options
4. Make an informed decision

Onsite Wastewater Treatment Systems

What is a Septic System?

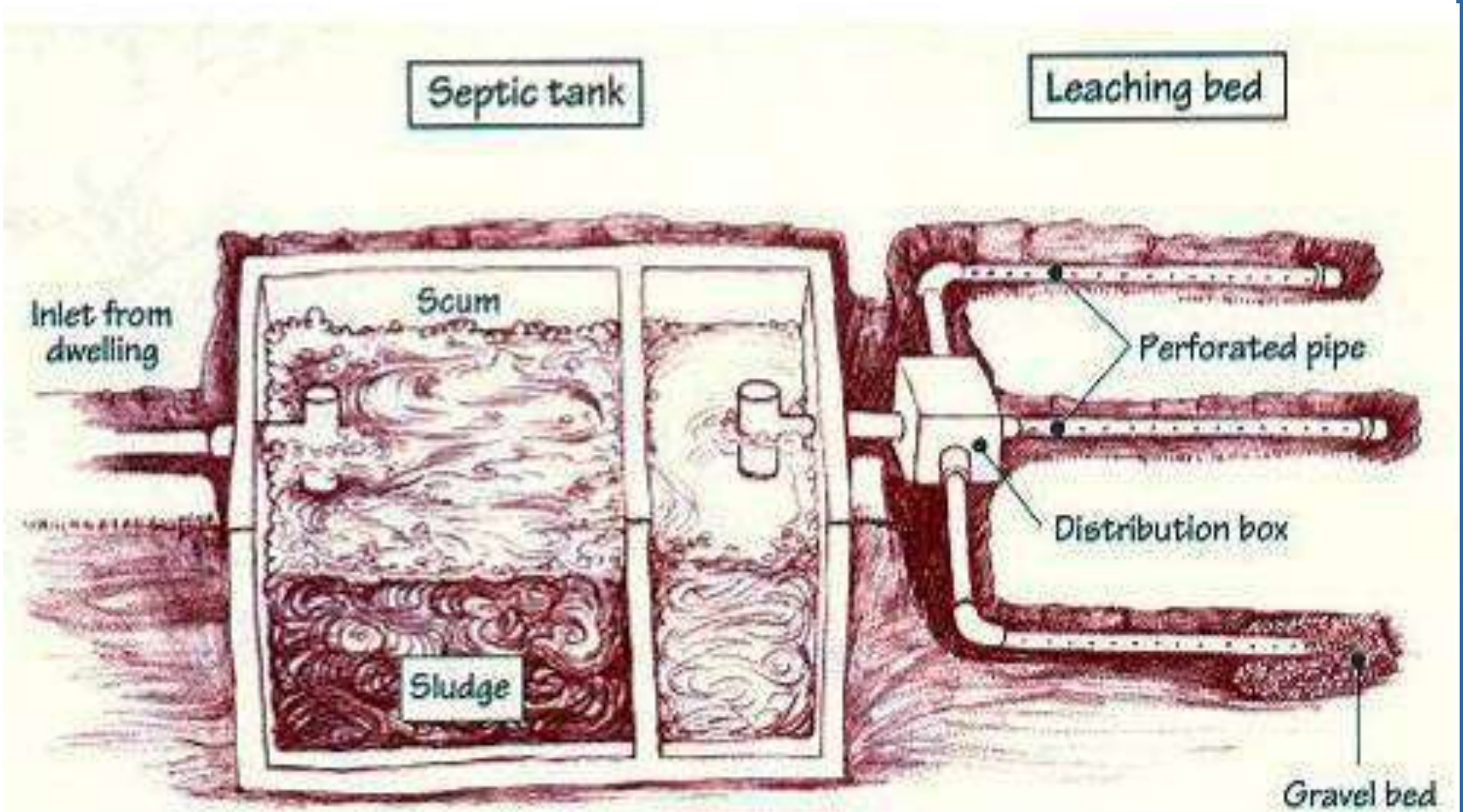
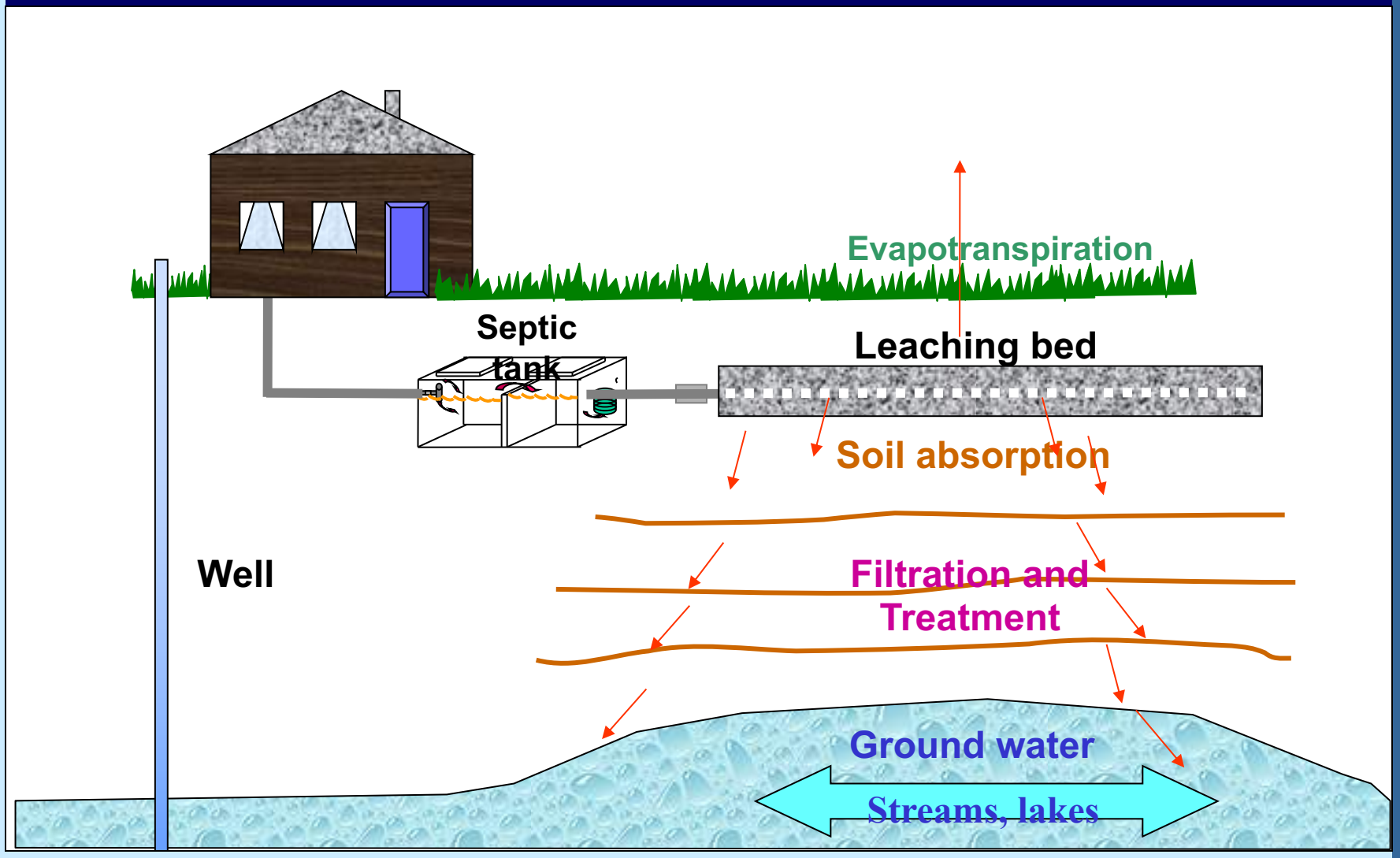


Photo credit: MOEE

Waste to Water

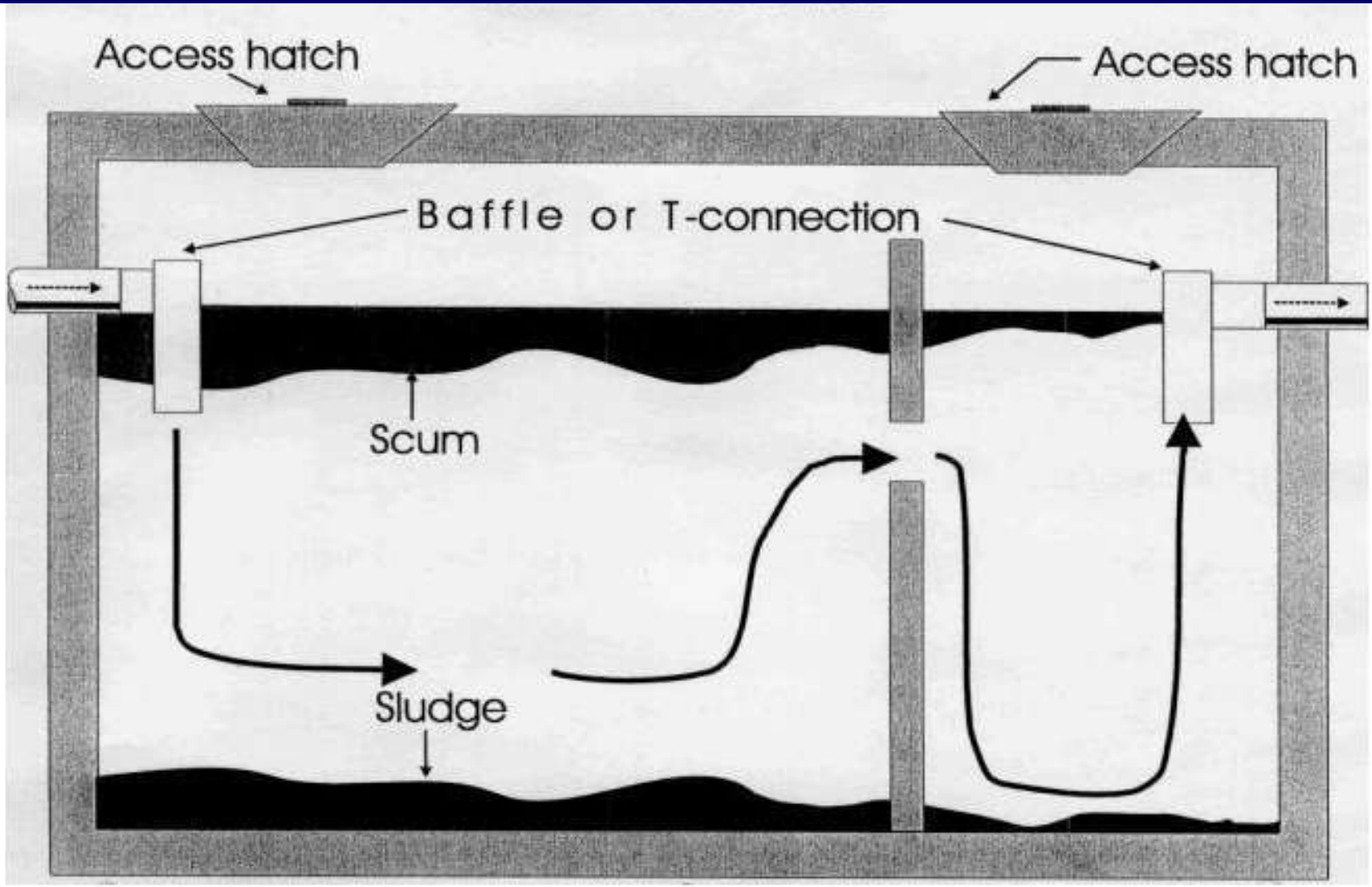


The Septic Tank

- Inlet pipe
- Baffles
- Water & anaerobic bacteria
- Chambers
- Partition wall with holes
- Effluent filter
- Outlet pipe

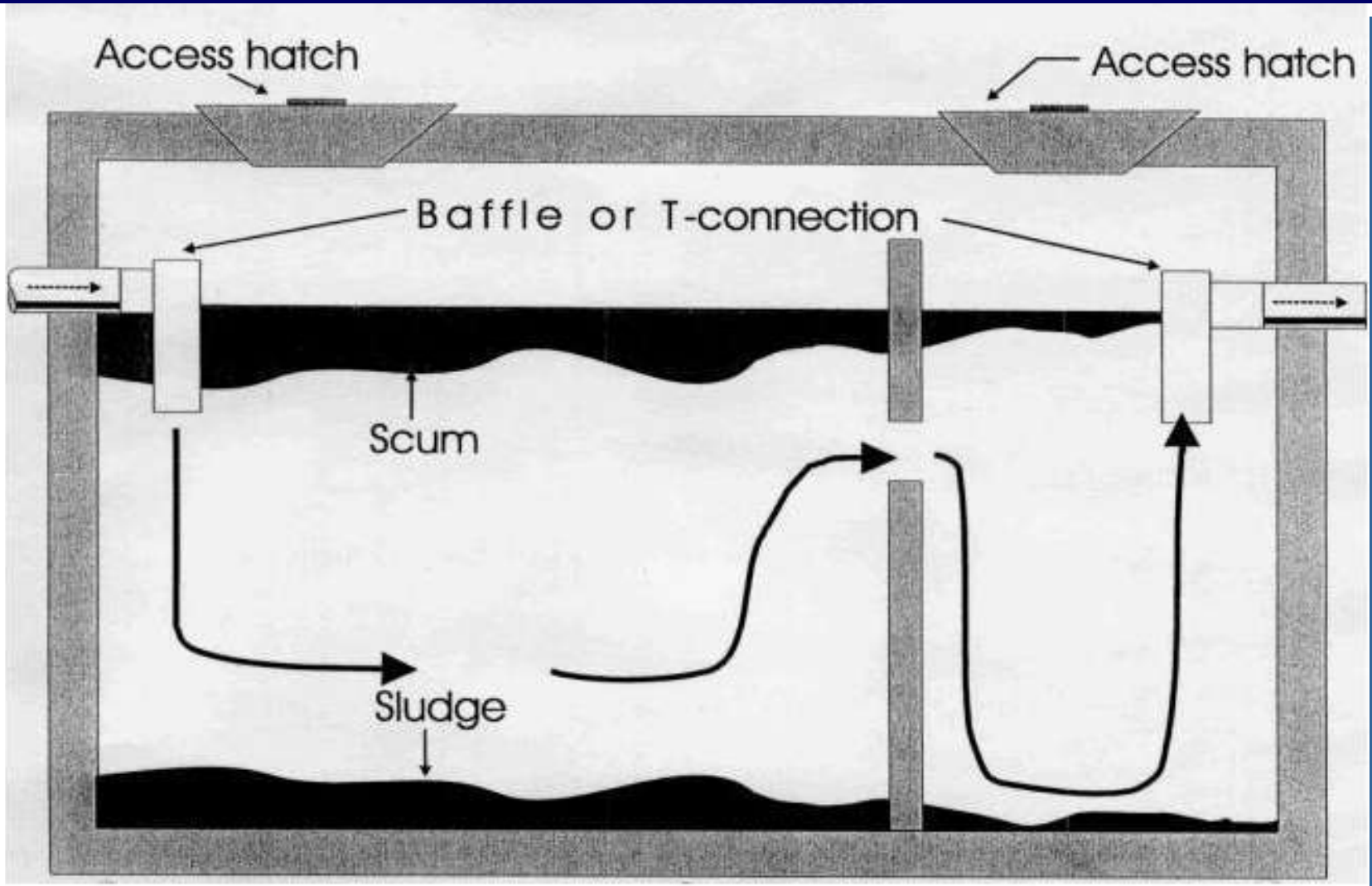
Inlet Baffles

Flow Through the Tank



Partition wall

Flow Through the Tank (cont'd)



Effluent Filters

Zabel Effluent Filter

OSI Biotube Filter

The Distribution System

- Pump
- Distribution box
- Distribution pipes

Distribution Box

The Leaching Bed

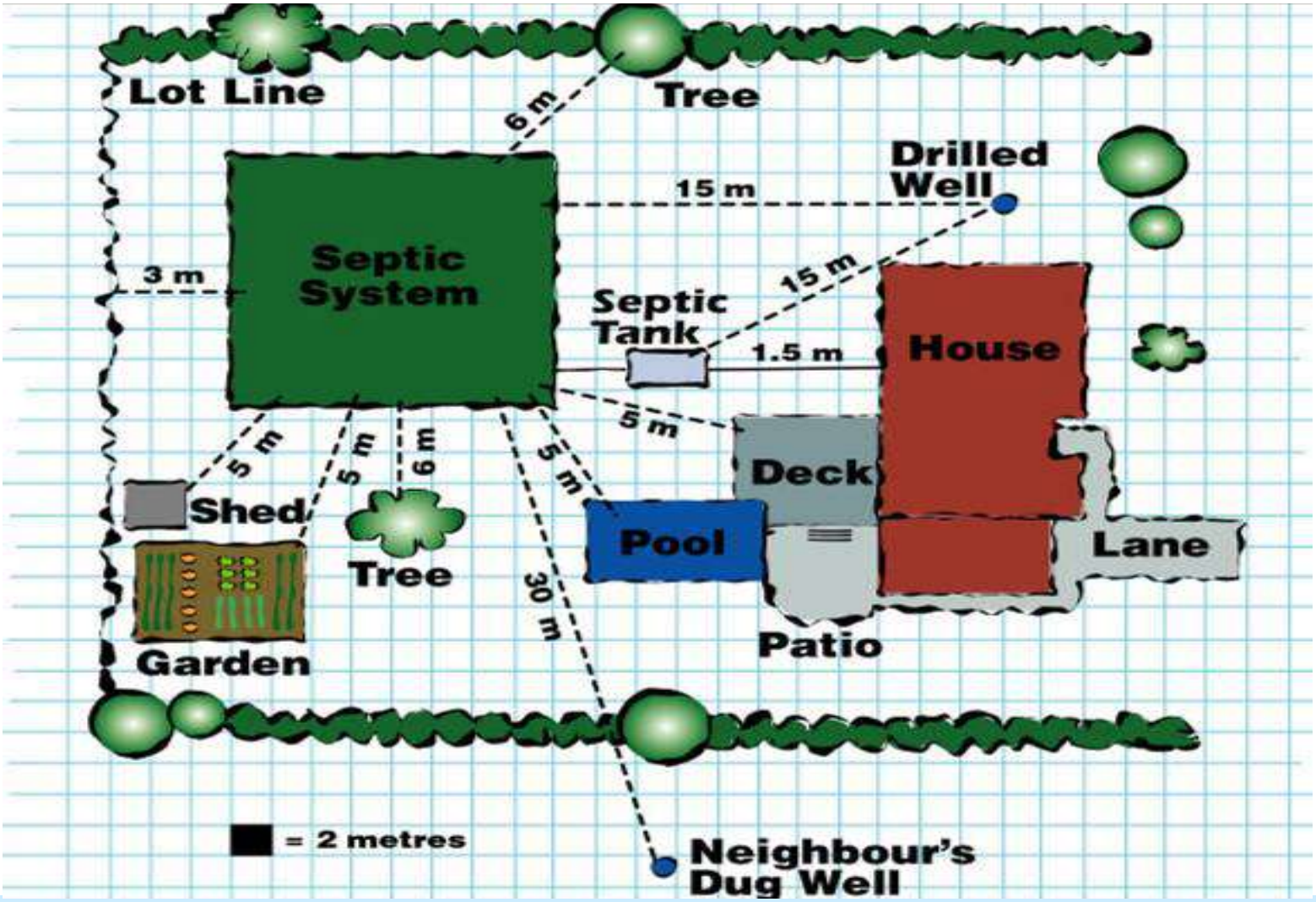
The Importance of Soil

Septic System Capacity

Determined by:

- House size
- Bedrooms
- Sinks, tubs, toilets
- Dishwashers, washing machines, water-using appliances

Location of a Septic System

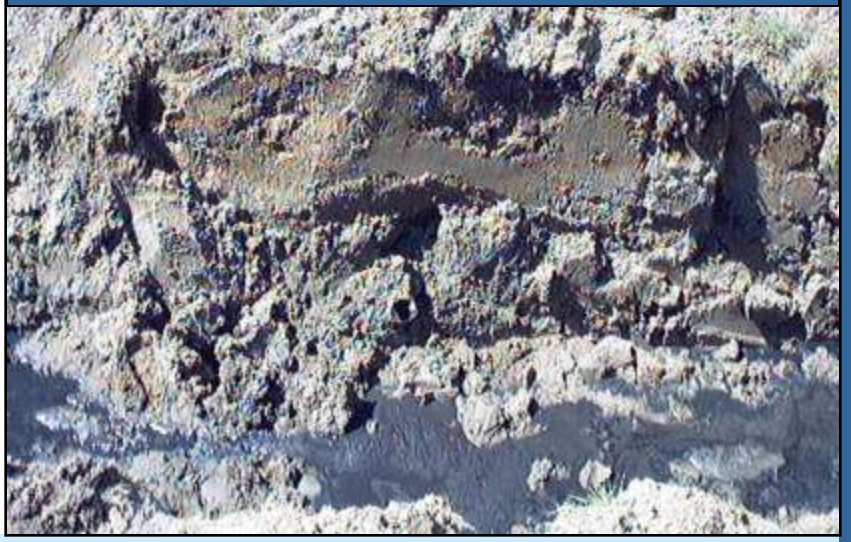


Causes of Failing Systems

- Improper siting or installation
- Undersized tank or leaching bed area

Causes of Failing Systems

- High groundwater table
- Broken piping and compacted soils
- Distribution box or header is off level
- Faulty pumps



Causes of Failing Systems

Poor maintenance:

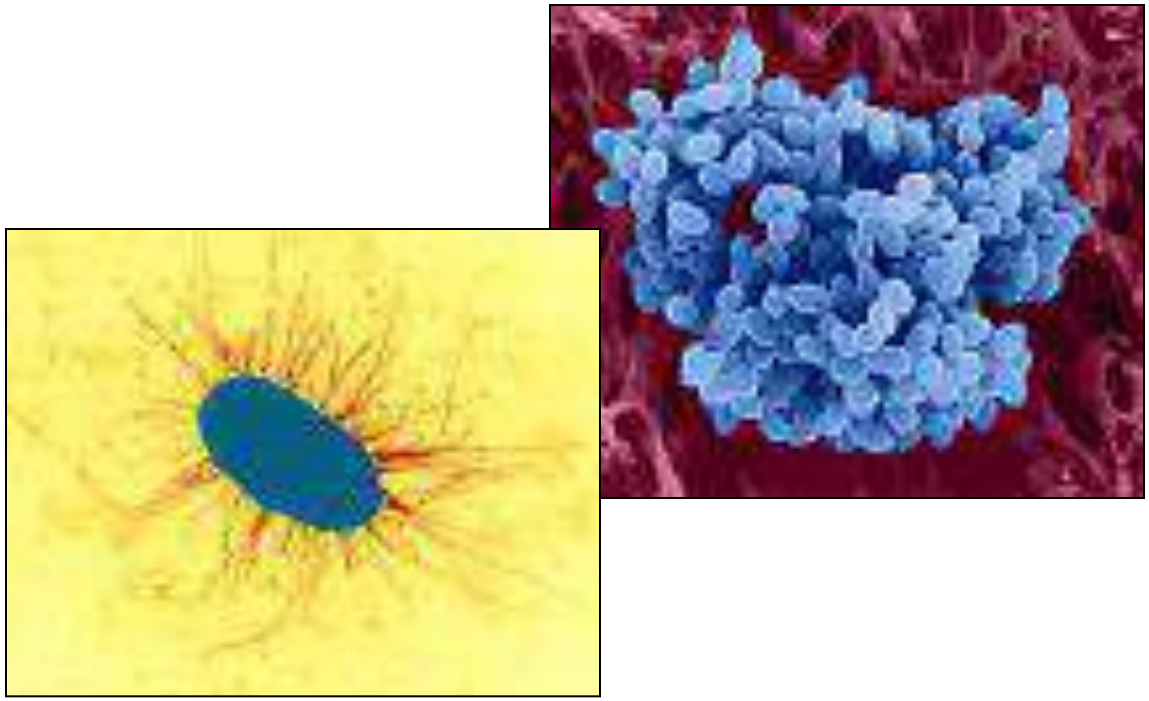
- Compacted soils and cracked pipes
- Poisoning of bacteria by chemicals
- Saturated leaching bed

How Do You Know If You Have a Problem?

- Lush patches of grass
- Soft & spongy ground
- Pools of dark water

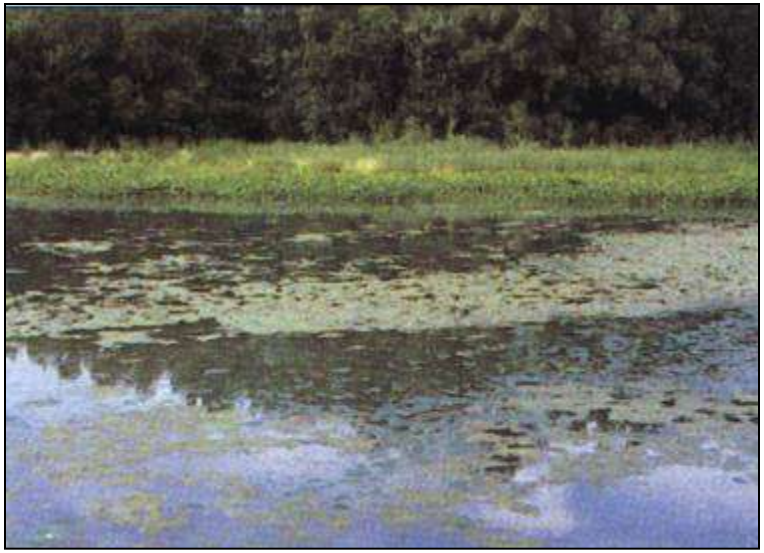
- Toilets & drains gurgling or backing up
- Odours

The Dangers



1. Bacterial contamination of drinking water

The Dangers



2. Nutrient loading

3. Costly repairs and replacement

Proper Maintenance

1. Regular pump-outs
2. Regular inspections
3. Protect the leaching bed
4. Control your inputs

1. Regular Pump-outs

Every 2-5 years

(Depending on system size and load)

2. Regular Inspections

- Be present for pumping
- Check scum and sludge depth
- Look for cracks
- Check seal on tank lids
- Listen for water
- Check interior of tank

DO NOT ENTER THE TANK AT ANY TIME

3. Protect the Leaching Bed

- Avoid compacting soils
- Avoid damaging pipes
- Avoid saturating leaching bed
- Avoid planting trees near bed

4. Control Your Inputs

- Conserve water
- Reduce chemical use
- Reduce solid waste

Unfriendly Items

- 2-3 ply toilet tissue or facial tissue
- Hair, dental floss, medicines
- Kitchen scraps (eg. fats, oils or greases)
- Chemical cleaners (eg. toilet sanitizers)
- Paints or solvents (eg. nail polish remover)
- Antifreeze, gas, motor oil
- Cigarette butts

Additives

1. Starters
2. Feeders
3. Cleaners

Look for an Environmental Choice Program seal of approval or better yet… Save your money!

Take Action

- Know your system
  - Where it is and how it works
  - Be alert to changes
- Prevent problems before they start
  - Regular pump-outs and inspections
  - Protect your leaching bed
  - Control what goes into your system
- Research, learn & share information

Sources of Information

www.orwc.uoguelph.ca

Ontario Rural Wastewater Centre

www.oowa.org

Alternative On-Site Technologies

- In use in Ontario since the 1970s
- Include secondary and tertiary treatment units as well as other technology

Favourable Site Conditions For Alternative Technology

- Cottages to full-time residences
- Proximity to lakes and rivers
- Shallow bedrock & high groundwater table
- Clay soils
- Sloped sites
- Large concentration of houses on private services

Norweco Unit Discharging to a Shallow Buried Trench Bed

Shallow Buried Trench Disposal Field

Clearstream Unit Discharging to an Area Bed

Waterloo Biofilter Installation: In-ground

Waterloo Biofilter Installation- Above Ground

Ecoflo Biofilter Treatment System

Ecoflo Distribution System

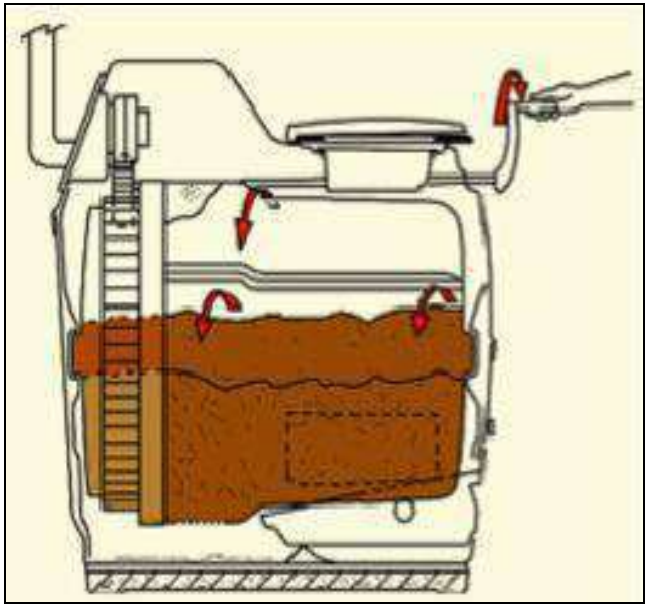
Various Ecoflo Installations

Improving Performance
Aerobic Treatment Units

The Wastewater Garden

- Treats all household wastewater (black + grey)
- Treats wastewater using water-loving plants
- Water removed by evapotranspiration)
- Zero discharge = no release of nutrients or pathogens

Composting Toilet



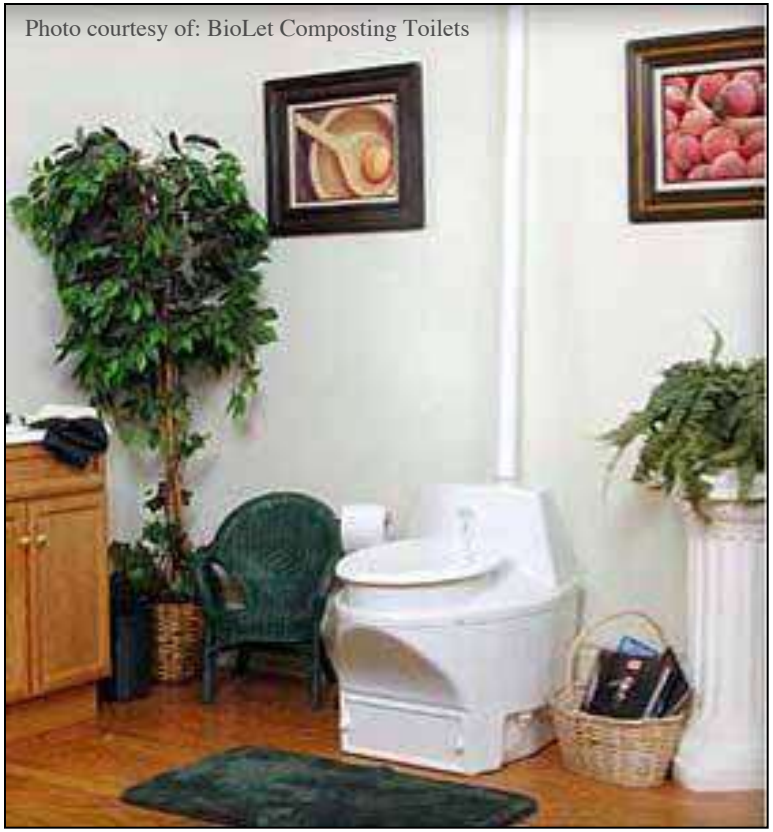


Photo courtesy of: BioLet Composting Toilets

Water Quality

Importance of Clean Water

- Health
- Environment
- Recreation
- Natural beauty

Water Pollution

Types of Pollution

- Chemicals
- Bacteria
- Sediment
- Nutrients

Sources of Pollution

- Industry
- Individuals

Surface Water vs Ground Water

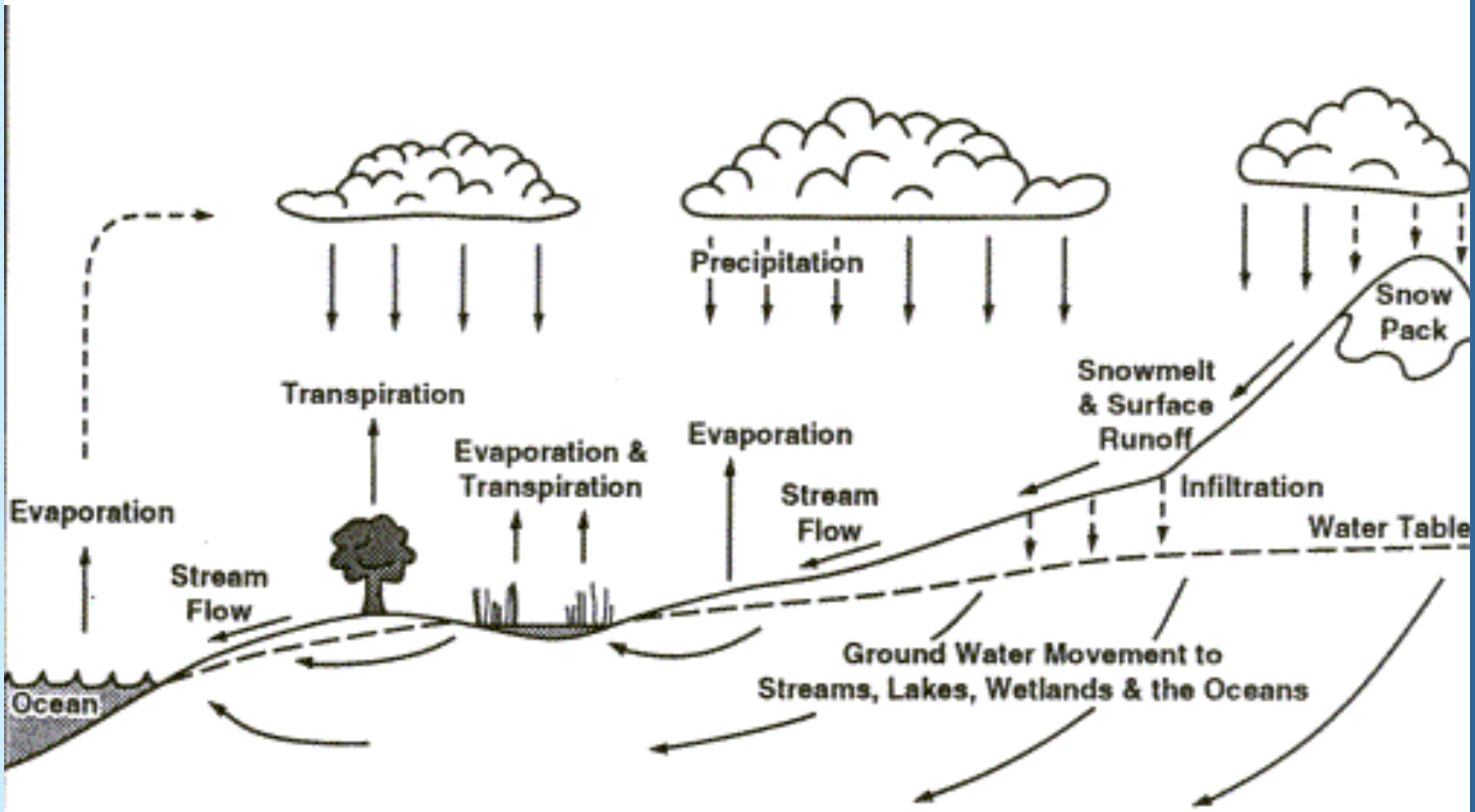


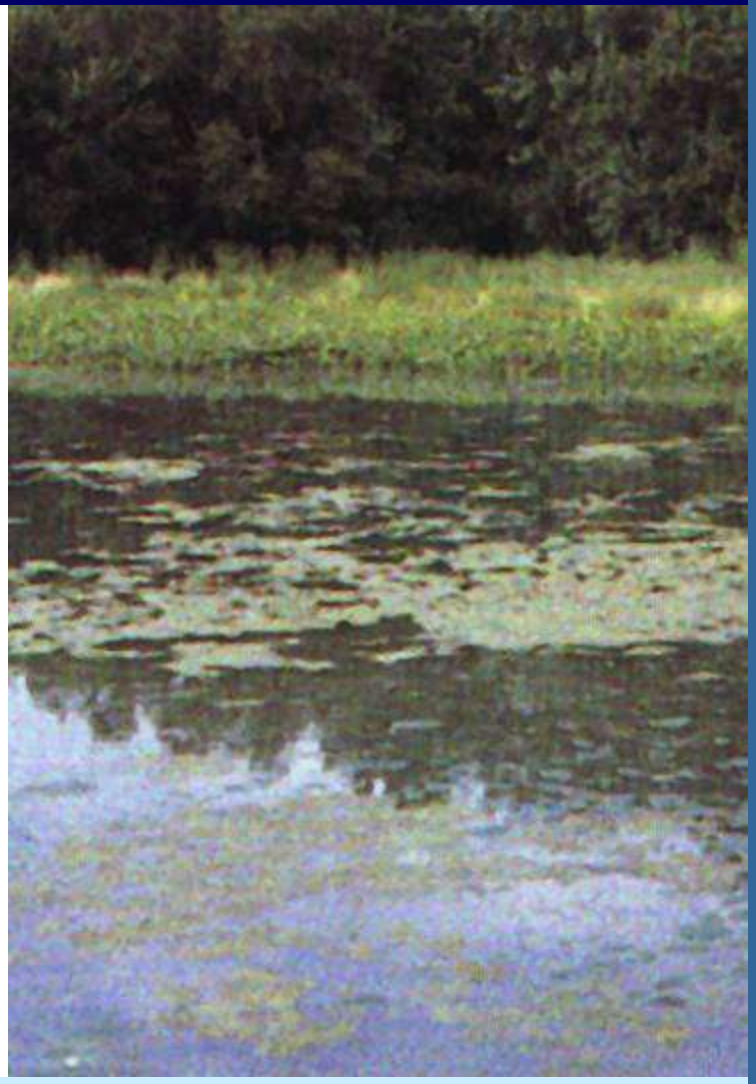
Photo credit: © American Ground Water Trust

How do Contaminants Get Into the Water?

1. Directly
2. Runoff
3. Wind
4. Leaching

What's Polluting Our Water?

1. Bacteria
2. Sediment
3. Nutrients
4. Chemicals



1. Bacteria

Sources:

- Human waste
- Manure, pet & wildlife deposits

Bacteria: Health Effects

- Stomach cramps
- Diarrhea
- Kidney failure
- Death (in rare cases)

Bacteria: Solutions

1. Proper septic system installation

2. Proper septic system maintenance
   - Regular inspections
   - Regular pump-outs
   - Reduce input
   - Protect filter bed
   - Improve system when increasing load

Bacteria: Solutions

3. Pick up after pets
4. Don’t feed the waterfowl

Photo credit: Wisconsin DNR

2. Sediment

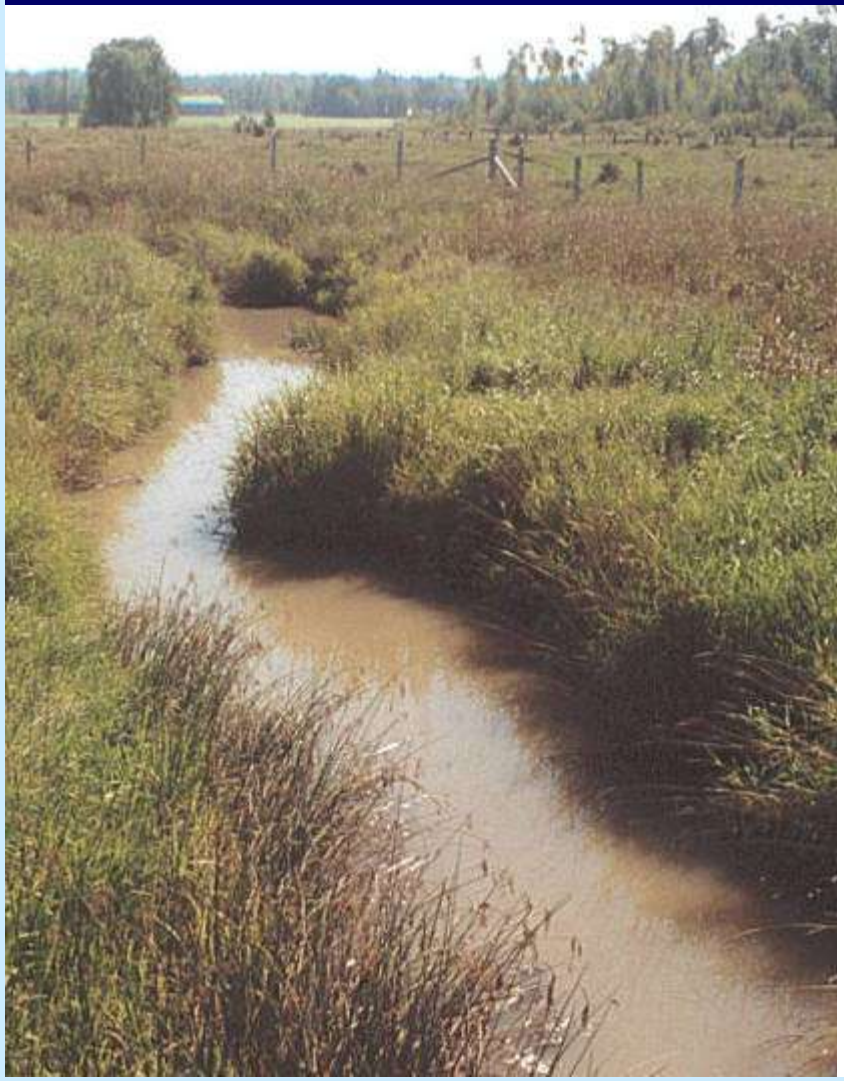
Sources:

- Dirt roads & paths
- Gardens & farm fields
- Imported beach sand
- Construction

Increased by:

- Removing plants
- Adding hard surfaces
- Altering the natural watercourse

Sediment: Impacts



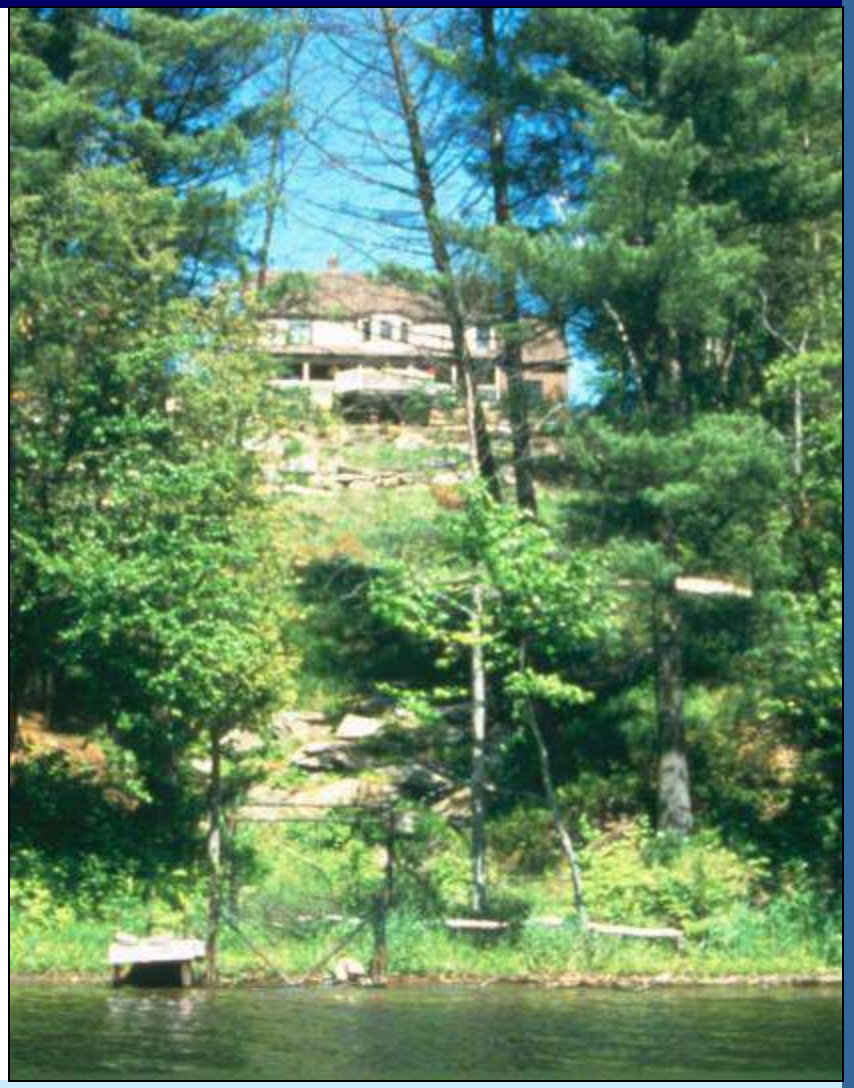
- Adds chemicals
- Adds nutrients
- Clouds the water

Sediment: Impacts

- Poor swimming
- Navigation problems

Sediment: Solutions

1. Maximize vegetation
2. Cover exposed soil
3. Minimize hard surfaces
4. Avoid altering water courses & shorelines



3. Nutrients

Sources:

- Fertilizers
- Detergents & cleaners
- Septic system leachate

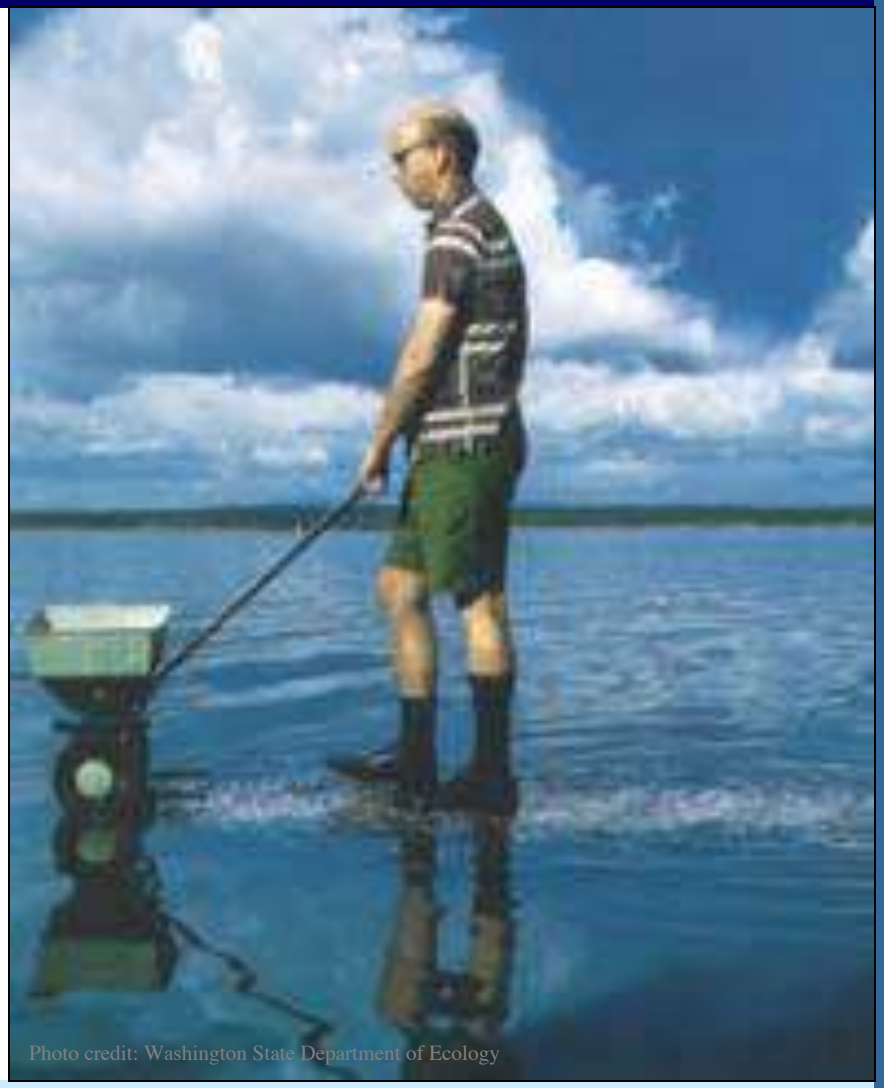


Photo credit: Washington State Department of Ecology

Nutrients: Impacts

Nutrients: Solutions

1. Use low phosphate detergents and cleaners

Nutrients: Solutions

2. Avoid the use of fertilizers

3. Maintain your septic system

4. Chemicals

Sources:

- Household cleaners
- Paints & solvents
- Gas, oil, antifreeze, break fluid & grease

Chemicals: Impacts

- Poses health risks to us
- Contaminates drinking water
- Alters pH balance
- Harmful to wildlife and aquatic life

Chemicals: Solutions

1. Alternative cleaners
   - Non-toxic
   - All ingredients disclosed
   - Plant-based
   - Phosphate & petroleum free
   - Biodegrade quickly

2. Vinegar, baking soda, borax

Chemicals: Solutions

3. Dispose of hazardous waste properly
4. Maintain cars and boats

Chemicals: Solutions

5. Fill up and repair away from the water
6. Clean-up spills properly & immediately

Water Testing

Testing Your Drinking Water

- Test for bacteria regularly
- Test for other contaminants if you suspect a problem

Interpreting Bacterial Test Results

- Only water with a count of 0 Total Coliform and/or 0 *E.coli* is safe to drink
- Sterilize contaminated water
- Identify source of problem & fix it
- Adopt preventative habits

Testing Your Surface Water

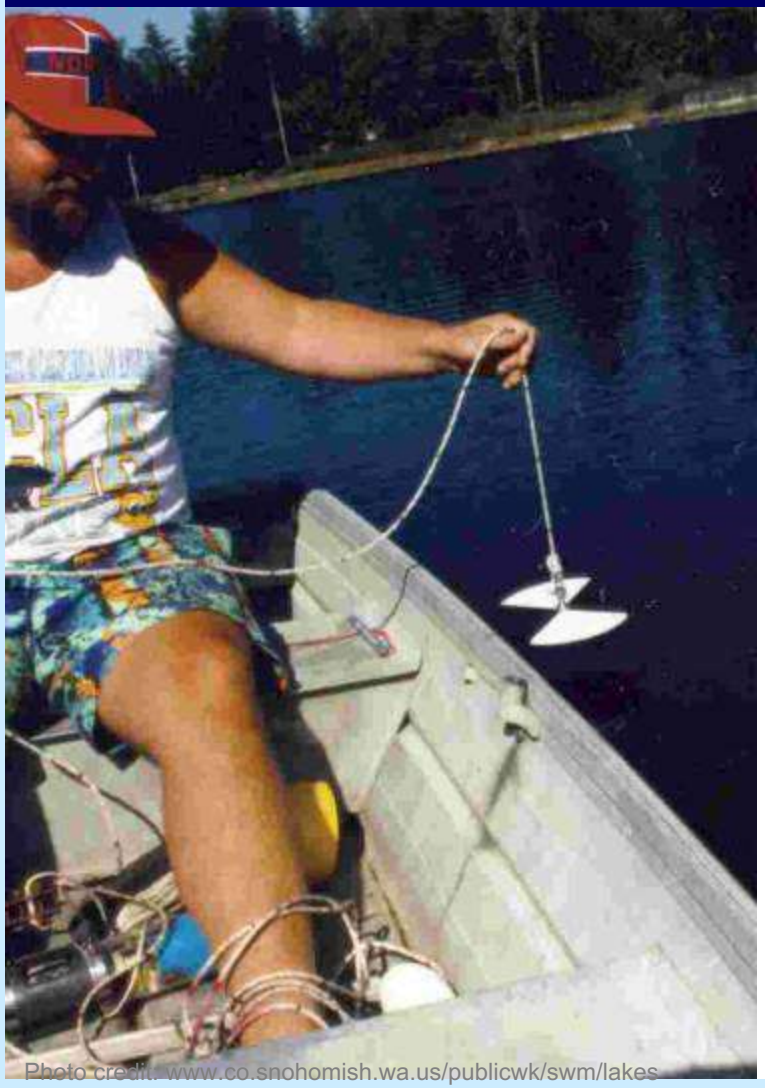


Photo credit: www.co.snohomish.wa.us/publicwk/swm/lakes

Professional tests:

- Take samples and send to a lab

Tests you can do yourself:

- Water clarity
- Temperature
- Dissolved oxygen
- Total phosphorus

Case Study: "Watershed Watch"

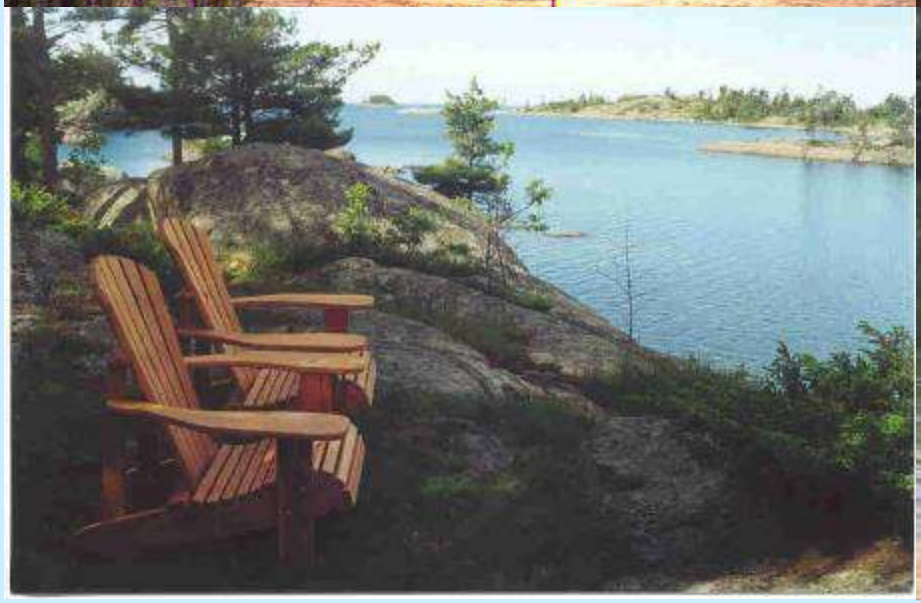
- Mississippi and Rideau Valley watersheds
- Relies heavily on volunteer monitoring
- Establishes baseline data
- Will give an indication of lake health

Every Little Bit Helps

- Take action!
- Encourage others
- Learn more

We Can Make a Difference…Together

Waterfront Recreation



Recreational Areas

A) On Shore

- Sharing the waterfront
- Beaches

B) Crossing Over

- Paths, stairs, bridges
- Docks

C) Making a Splash

- Boating
- Fishing
- Aquatic plants

A. On Shore

Clearing Space

Increased runoff = Poor water quality

Shoreline erosion = Loss of property

Eliminated habitat = Loss of wildlife

Sharing the Waterfront

Beaches

Photo credit: ontarioguide.com

Alternatives to Creating a Beach

- Use natural beaches
- Build beaches upland
- Use coarser gravel instead of sand
- Have a single access point to the water
- Build a swimming platform

B. Crossing Over

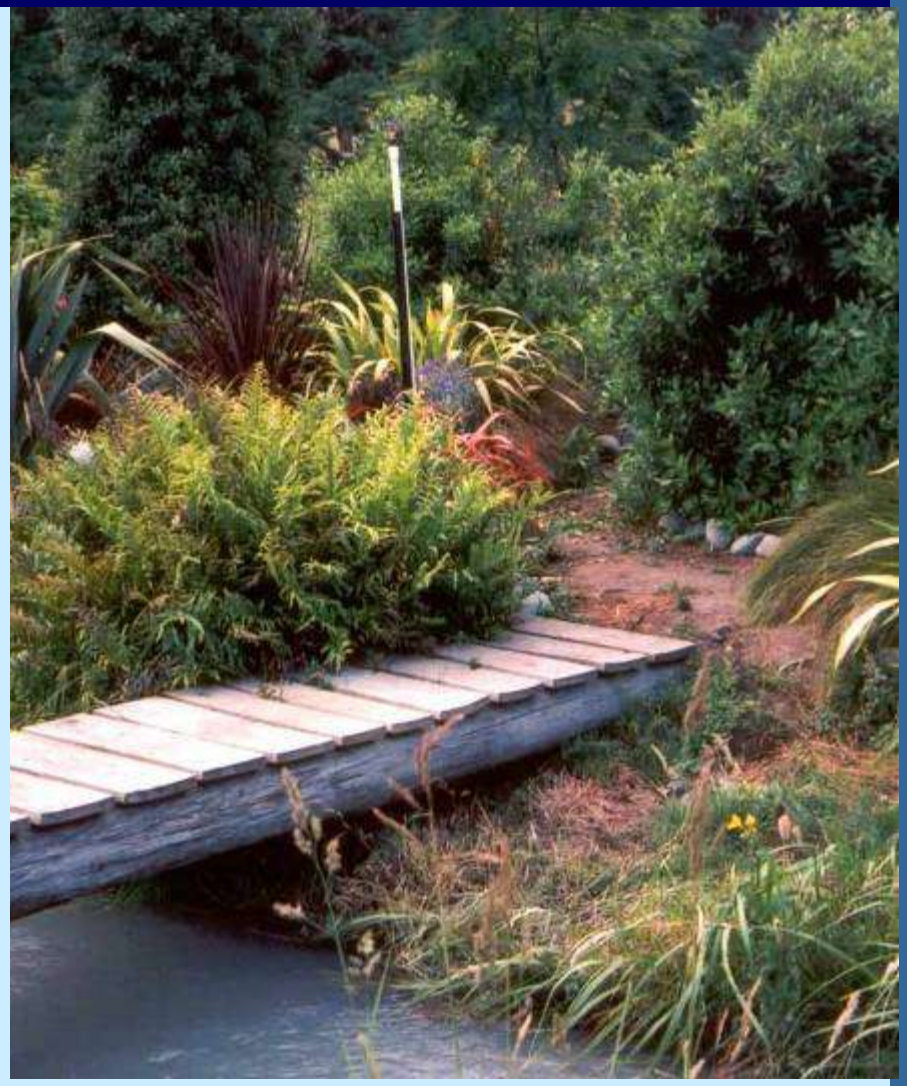
Pathways

Stairs & bridges

Docks

Pathways

Stairs and Bridges



Docks

What Kind of Dock Do I Need?

Approval Process

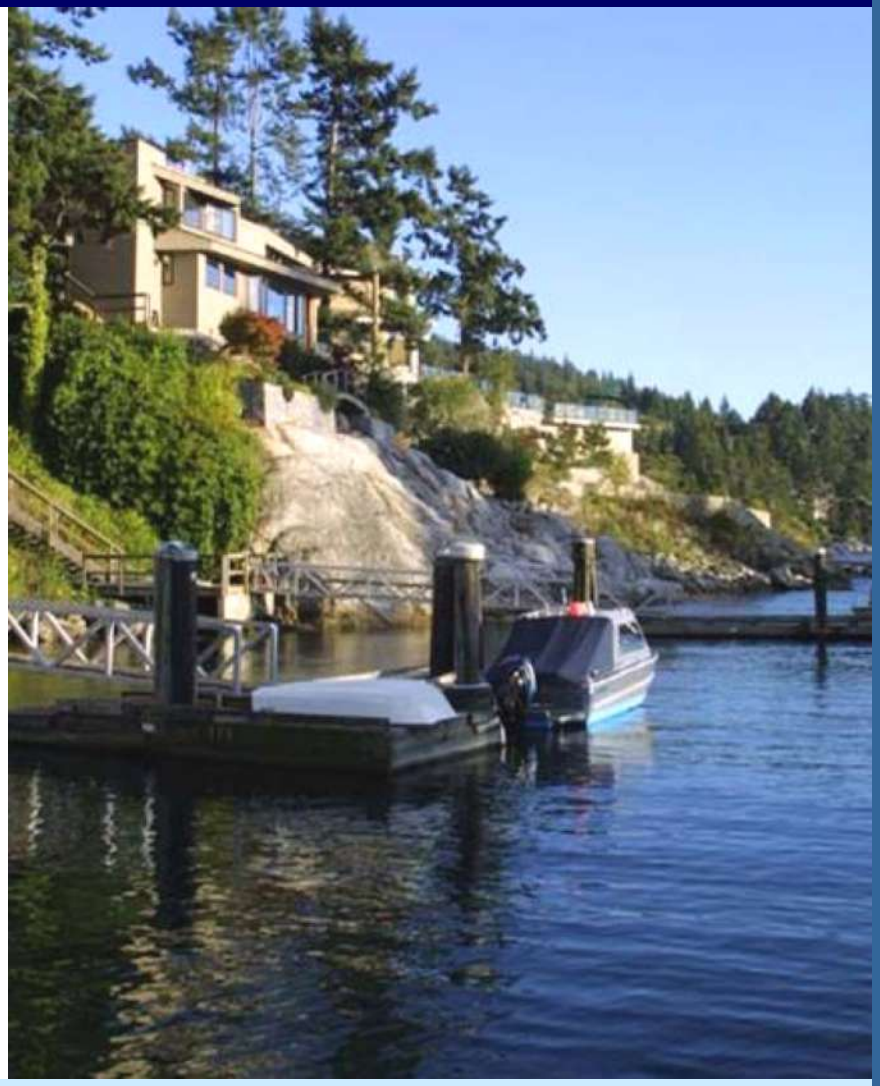
Agencies to consult:

- Conservation Authority
- Ministry of Natural Resources
- Parks Canada
- Department of Fisheries and Oceans

PLAN EARLY!

Types of Docks

1. Removable
2. Permanent
3. Specialty



1. Removable Docks

- Pipe docks
- Floating docks

Photo credit: Dock King

Pipe Docks

Photo credit: DFO/Cottage Life

Floating Docks

Photo credit: DFO/Cottage Life

2. Permanent Docks

- Crib docks
- Concrete piers

Crib Docks

Photo credit: DFO/Cottage Life

Concrete Piers

Photo credit: DFO/Cottage Life

3. Specialty Docks

- Cantilever docks
- Suspension docks

Photo credit: Dock King

Cantilever Docks

Photo credit: DFO/Cottage Life

Suspension Docks

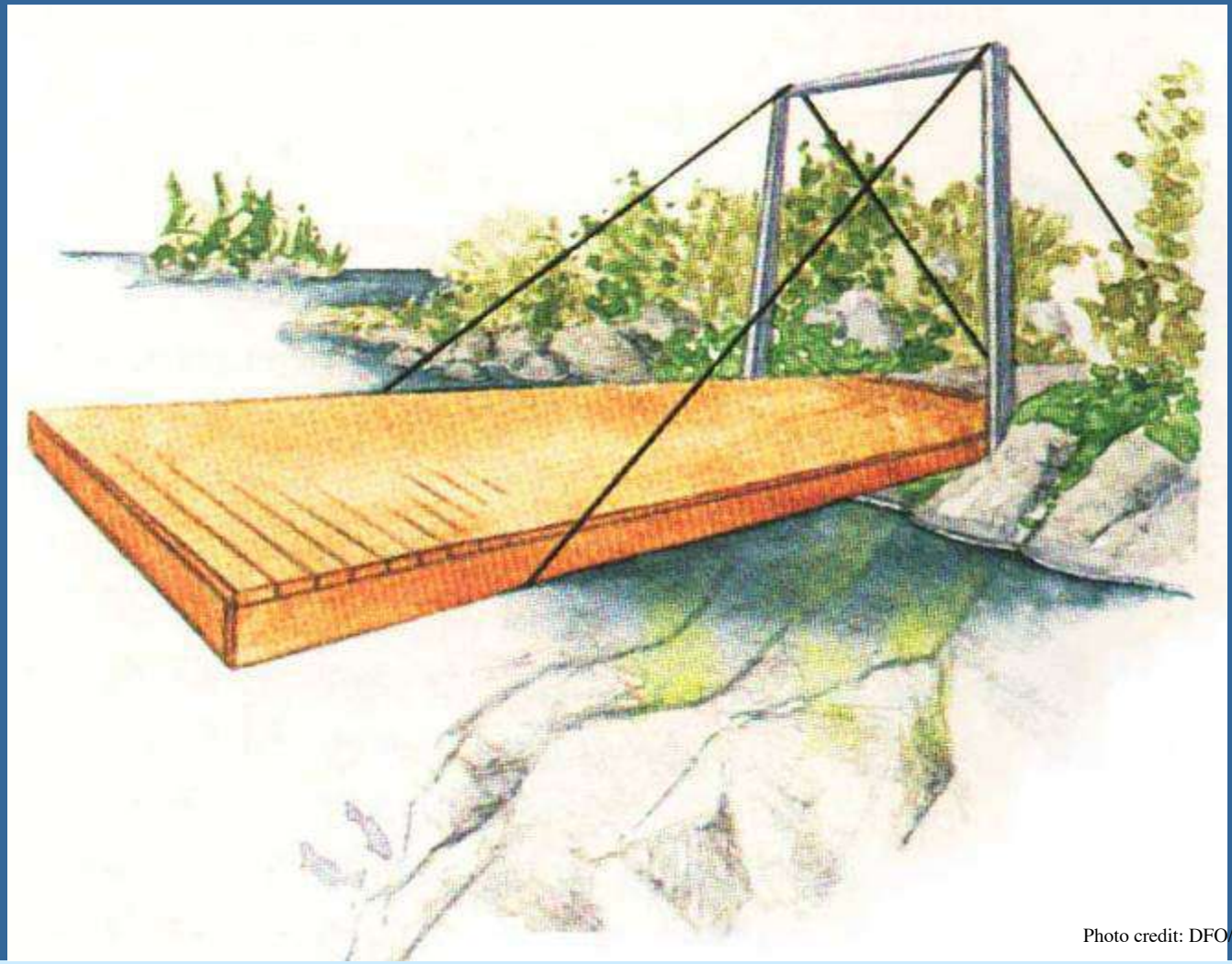


Photo credit: DFO/Cottage Life

C. Making a Splash

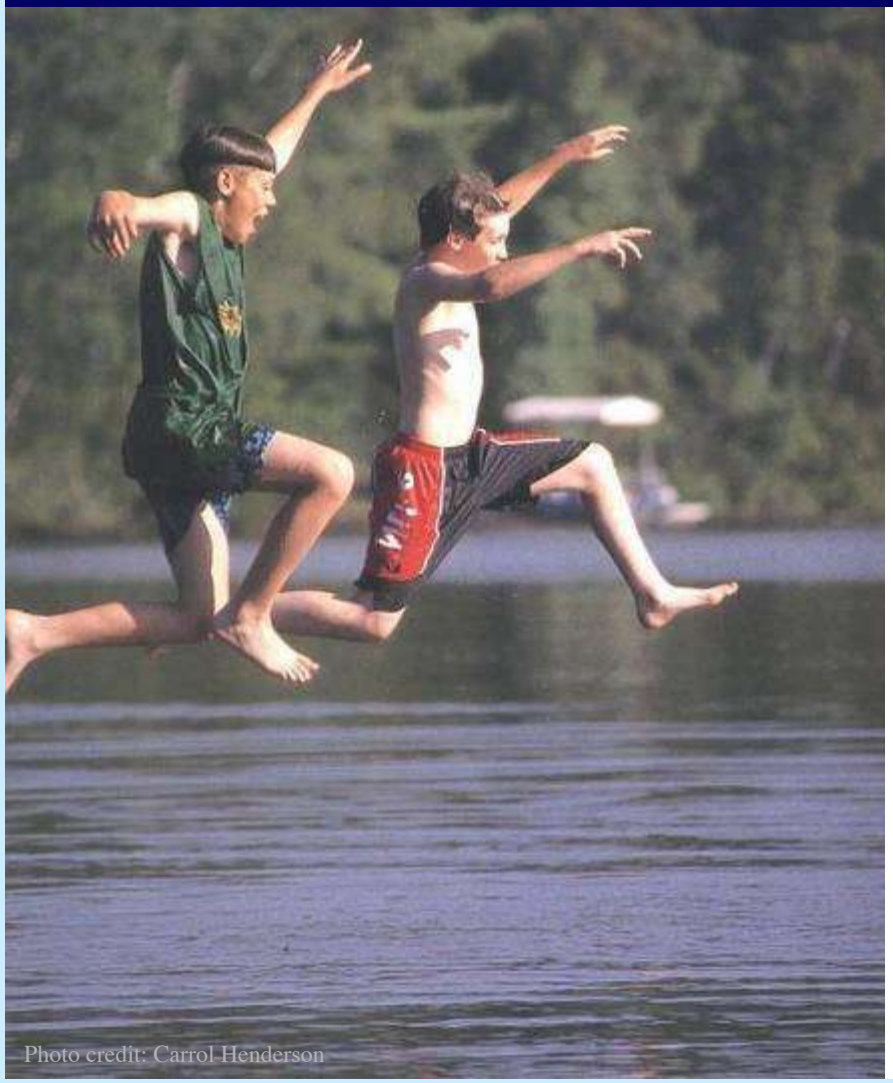


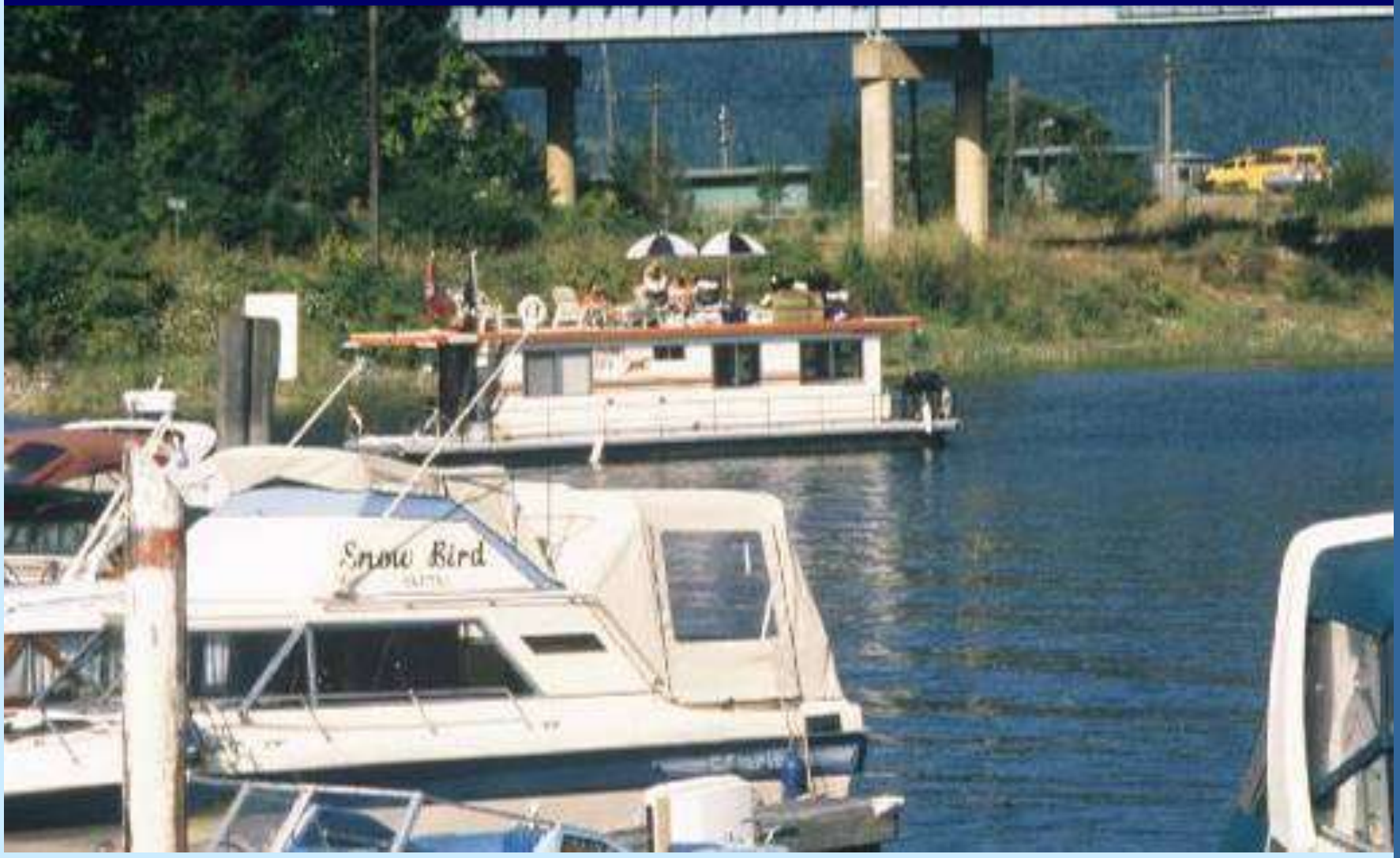
Photo credit: Carrol Henderson

- Boating
- Fishing
- Aquatic plants

Responsible Boating

- Maintain your boat
- Watch your wake
- Reduce noise
- Respect wildlife
- Clean your boat between waterbodies

Boat Maintenance



Watch Your Wake

Reducing Noise

Photo credit: Wisconsin DNR

Respect Wildlife

- Maintain your distance
- Bring your binoculars

Between Waterbodies

- Check boat equipment for hitchhikers
- Drain equipment & live wells
- Clean with hot water or high pressure
- Allow drying time


Photo credit: Ladd Johnson, NOAA/ Great Lakes Environmental Research Laboratory

Responsible Fishing

Photo credit: Wisconsin DNR

Hook, Line & Sinker

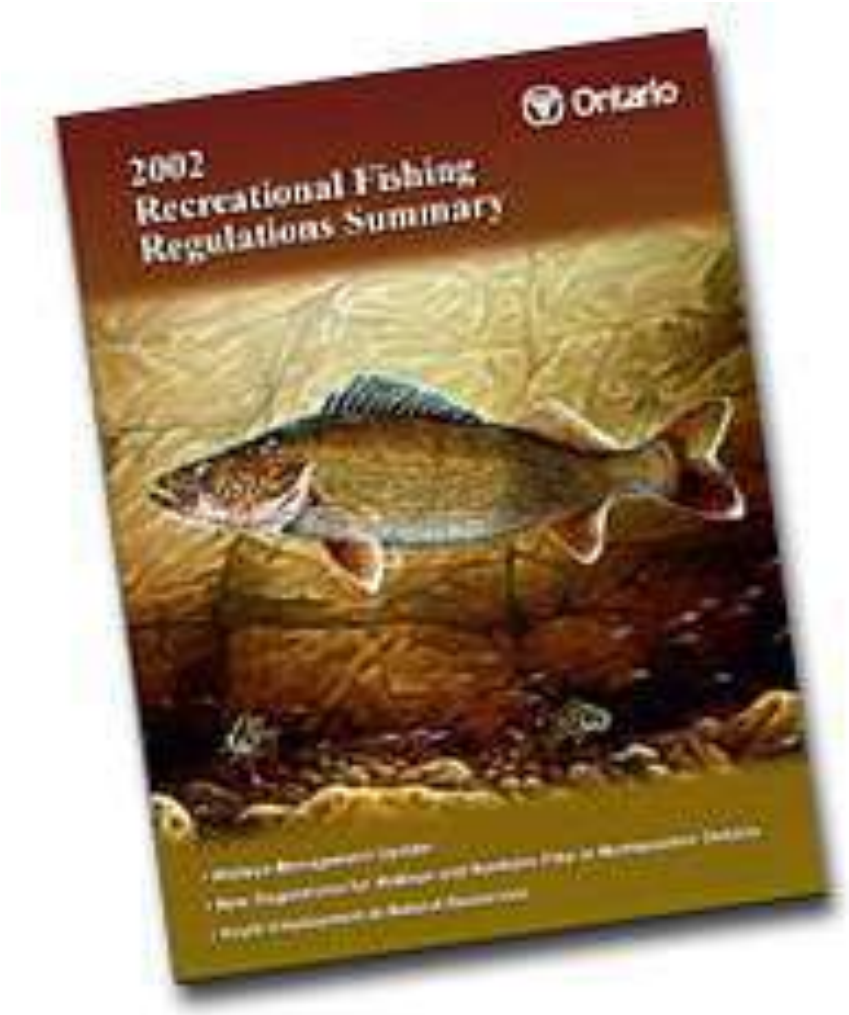
- Retrieve hooks & lures
- Unhook snags and avoid leaving line
- Use alternatives to lead sinkers
- “Match the hatch”

Handling Fish

Be kind:

- Keep fish out of water as short as possible
- Handle as little as possible
- Release gently

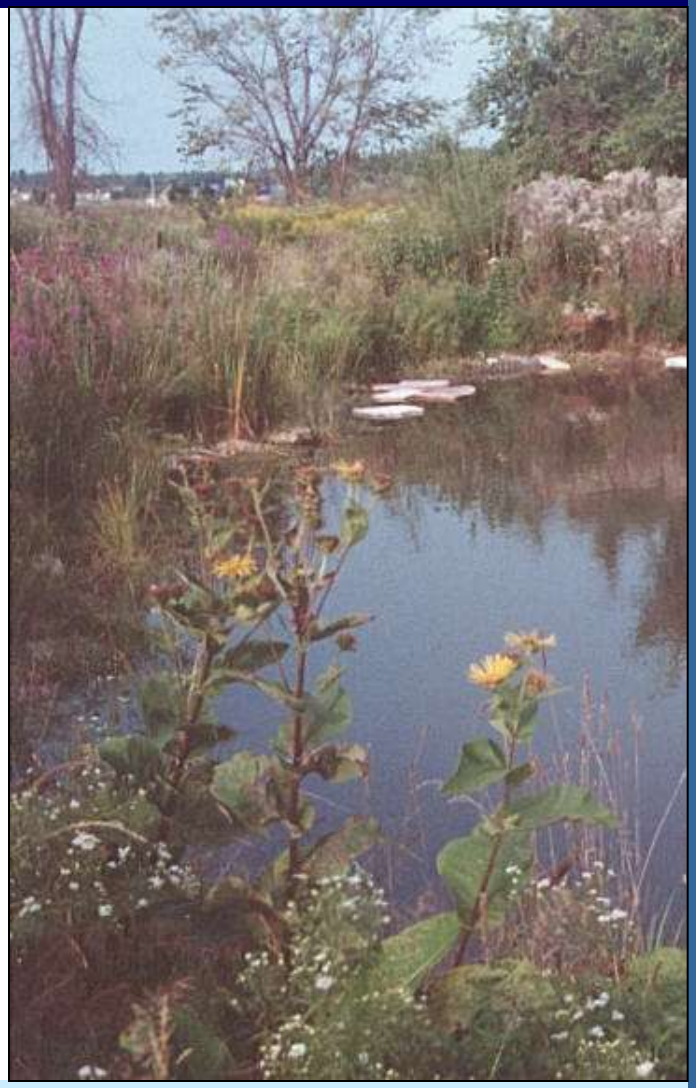
Regulations



Aquatic Plants

Benefits of Aquatic Plants

1. Prevent erosion
2. Protect water quality
3. Provide food & habitat
4. Protect nesting areas



The Consequences of Removal

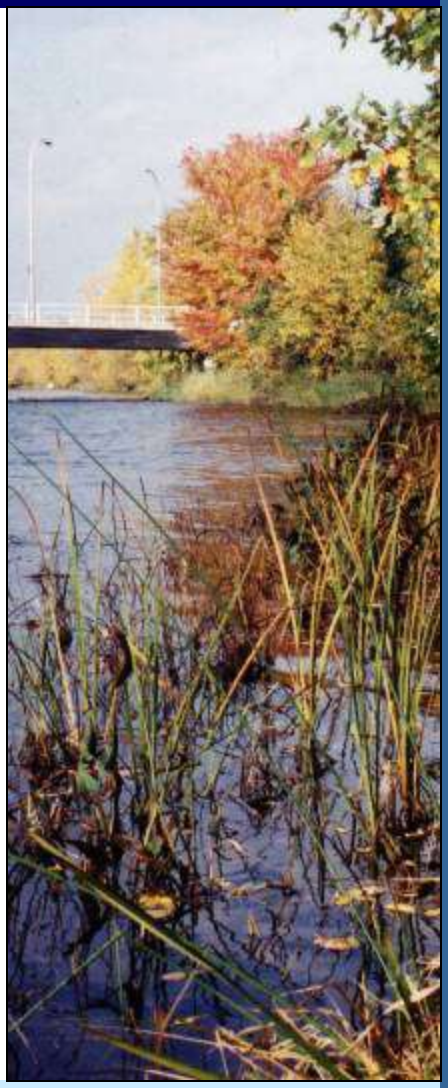
- Increased plant growth
- Invasion by new species
- Shoreline erosion
- Decline in water quality
- Loss of habitat and food sources

Considerations Prior to Plant Removal

- Are the plants native or exotic species?
- Has there been a change in the diversity or the extent of the plants?
- Are there natural or artificial growing conditions?

Managing Aquatic Plants

1. Managing nutrient inputs
2. Sharing the waterfront
3. Manual removal
4. Mechanical removal
5. Other types of removal



Managing Nutrient Inputs

- Use phosphate-free products
- Avoid fertilizing your lawn
- Keep grass clippings away from water
- Keep a well buffered shoreline
- Re-direct runoff away from the water
- Maintain your septic system
- Clean up after pets

Sharing the Waterfront

Photo credit: Wisconsin DNR

Permits and Regulations

- Ministry of Natural Resources
- Parks Canada
- Department of Fisheries and Oceans
- Ministry of the Environment (herbicides)

Manual Removal

- Foot traffic
- Hand pulling
- Raking & cutting

Mechanical Removal

Handheld power tools

Motorized machines

Other Types of Removal

- Bottom barriers
- Herbicides
- Water drawdown
- Biological control

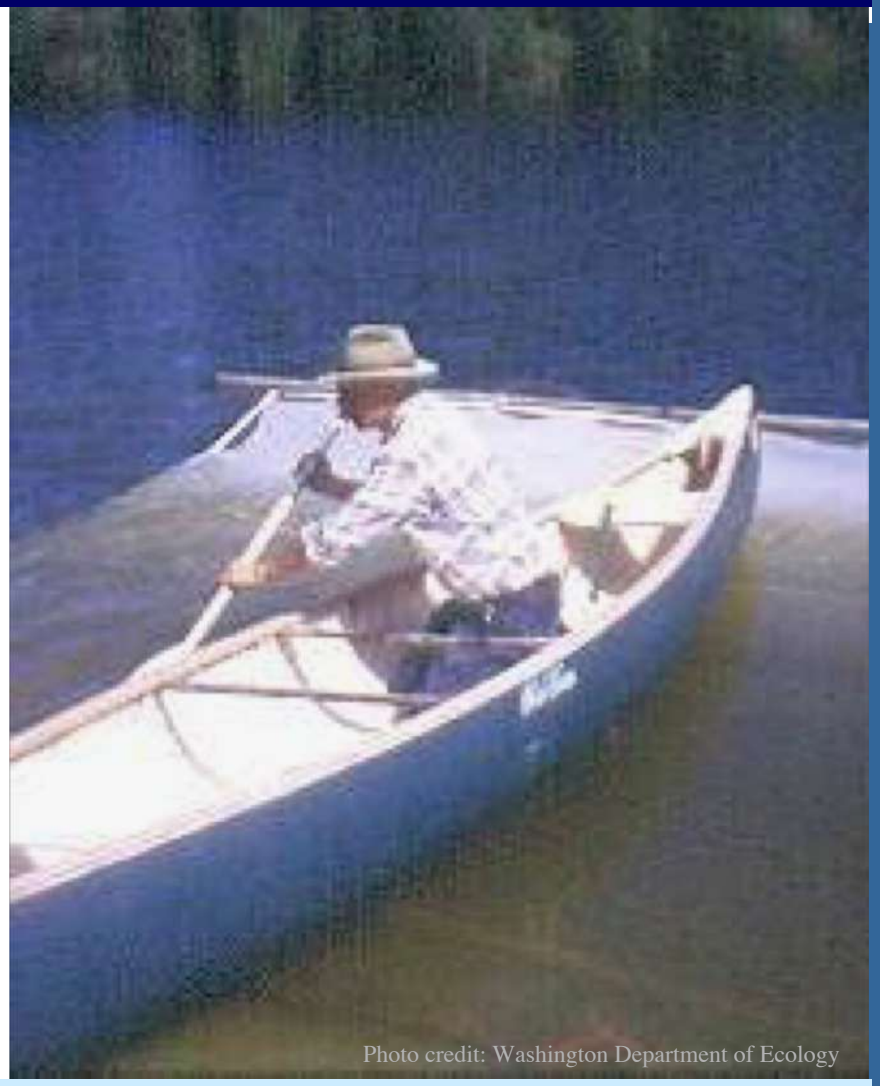


Photo credit: Washington Department of Ecology

Every Little Bit Helps