Impacts of Stormwater

Department of Public Works

Urbanization

- Prior to land development, Andover was primarily forested in pine, oak, and maple.
- Natural stormwater protection was provided by the forest system intercepting rainfall in the canopy, reducing erosion and the deposition of sediment in waterways.
- Trees and other vegetative cover evapotranspirated at least 40% of the rainfall.
- Large amounts of runoff was absorbed in the forest duff layer that released it *slowly* to the streams and to the ground water.

Hydrologic Changes

As development occurs and population grows, land is cleared for lawns and impervious surfaces such as rooftops, roads, and parking lots. Maintained landscapes have much higher runoff characteristics than natural vegetation. Drainage patterns are irrevocably altered in the following ways:

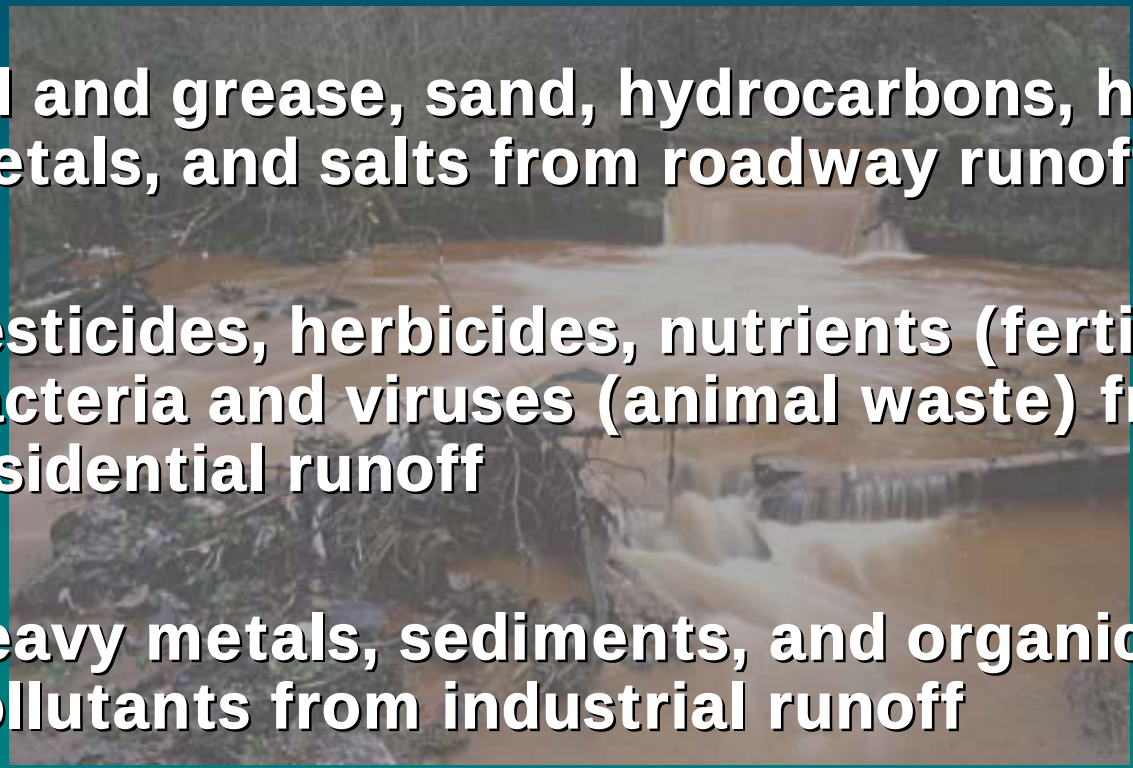
- Increased volume and rate of surface runoff
- Decreased time for runoff to reach natural receiving waters

→ FLOODING

- Reduced groundwater recharge

Water Quality Changes

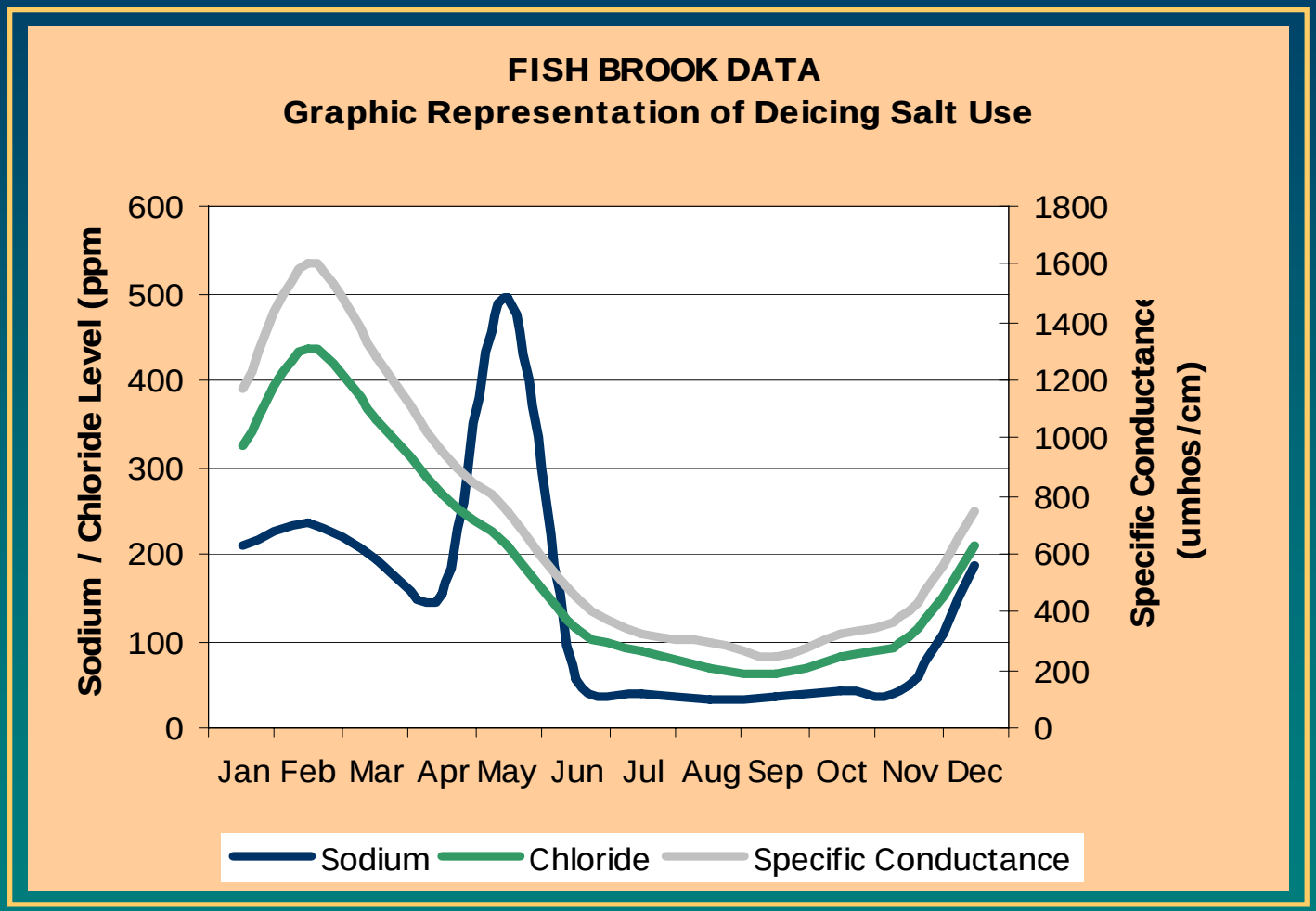
Development also causes an increase in the types and quantities of pollutants in the surface and ground waters. Runoff from developed areas has been shown to contain many different types of pollutants such as:



- **Oil and grease, sand, hydrocarbons, heavy metals, and salts from roadway runoff**
- **Pesticides, herbicides, nutrients (fertilizer), bacteria and viruses (animal waste) from residential runoff**
- **Heavy metals, sediments, and organic pollutants from industrial runoff**

Road Salts Contaminate Drinking Water Supplies

Tests Show High Sodium Levels During Spring Thaw



Andover Surface Water Quality Trend

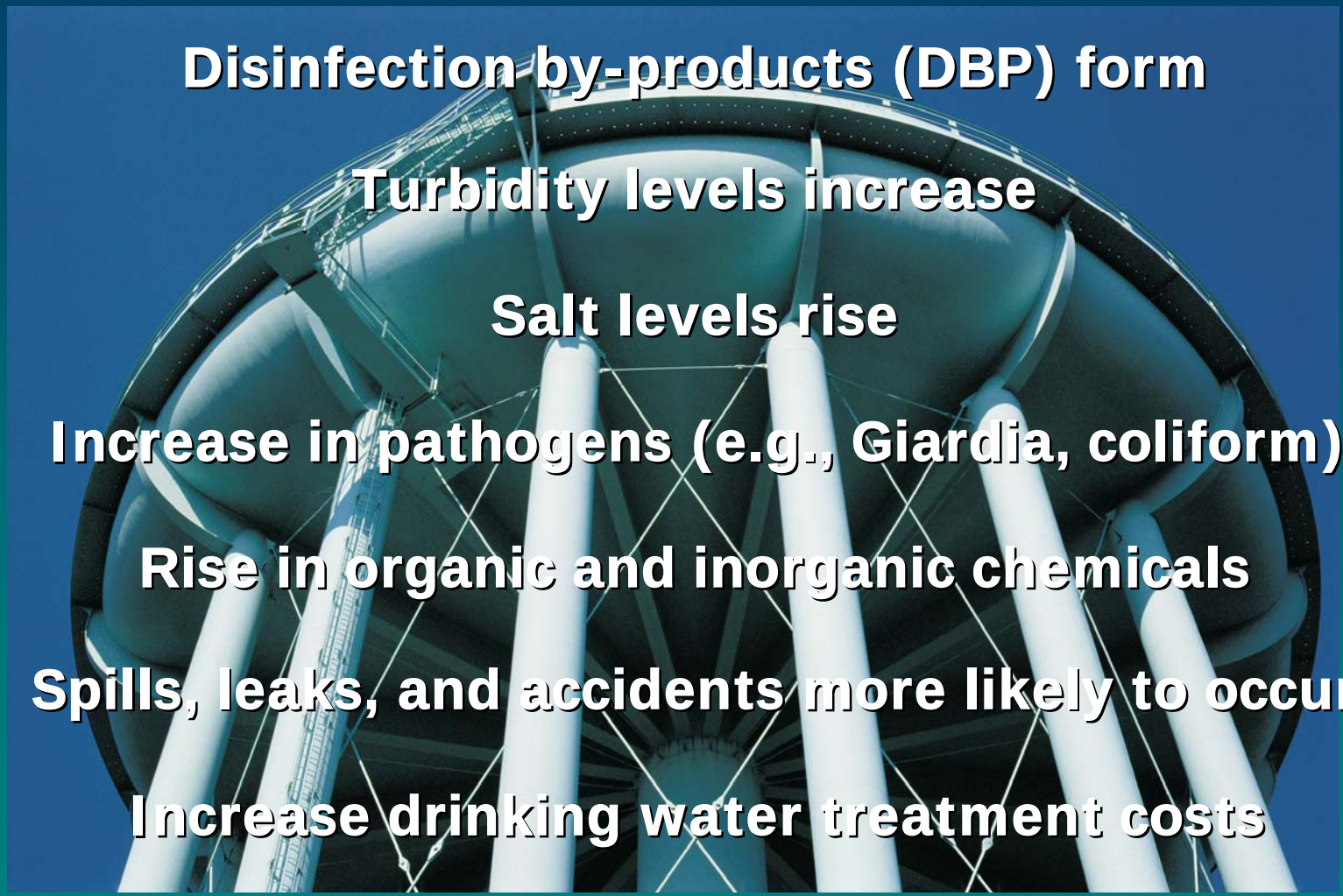
Biological Changes

Biological systems in the environment are altered from hydrologic and water quality changes. In particular, aquatic life is affected by development in the following ways:

- **Aquatic habitats are altered with stream changes due to increased flows**
- **Natural riffles, and streamside pools are altered or destroyed**
- **Spawning areas may be lost**
- **Increased sediments suffocate aquatic species**
- **The complex food web is altered**

Geese in Urban Areas Contribute Nutrients and Bacteria to Surface Water

Impacts of Development on Drinking Water Supplies



Disinfection by-products (DBP) form

Turbidity levels increase

Salt levels rise

Increase in pathogens (e.g., Giardia, coliform)

Rise in organic and inorganic chemicals

Spills, leaks, and accidents more likely to occur

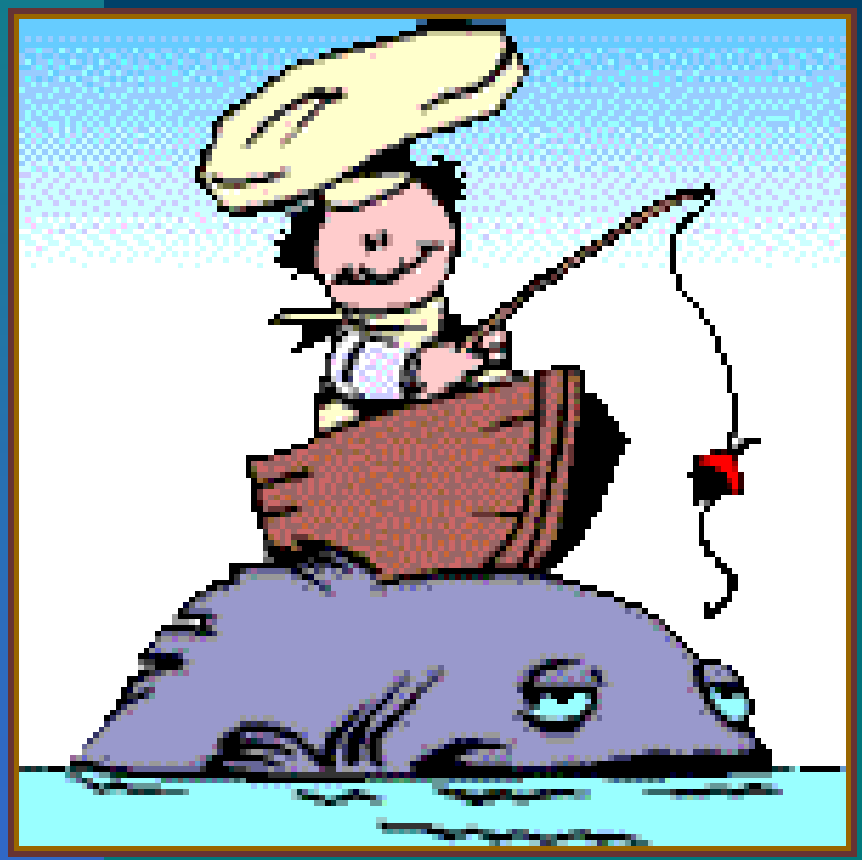
Increase drinking water treatment costs

Land Use and Our Lifestyles

Development, as we practice it today, is incompatible with the achievement of sustainable ecosystems. Engineered stormwater systems can *reduce* the negative impacts of development to water quality and hydrology, but there is more to do:

- **Change public attitudes toward chemical use**
- **Promote natural lawn care practices**
- **Reduce artificially landscaped areas**
- **Reduce the amount of impervious surfaces**

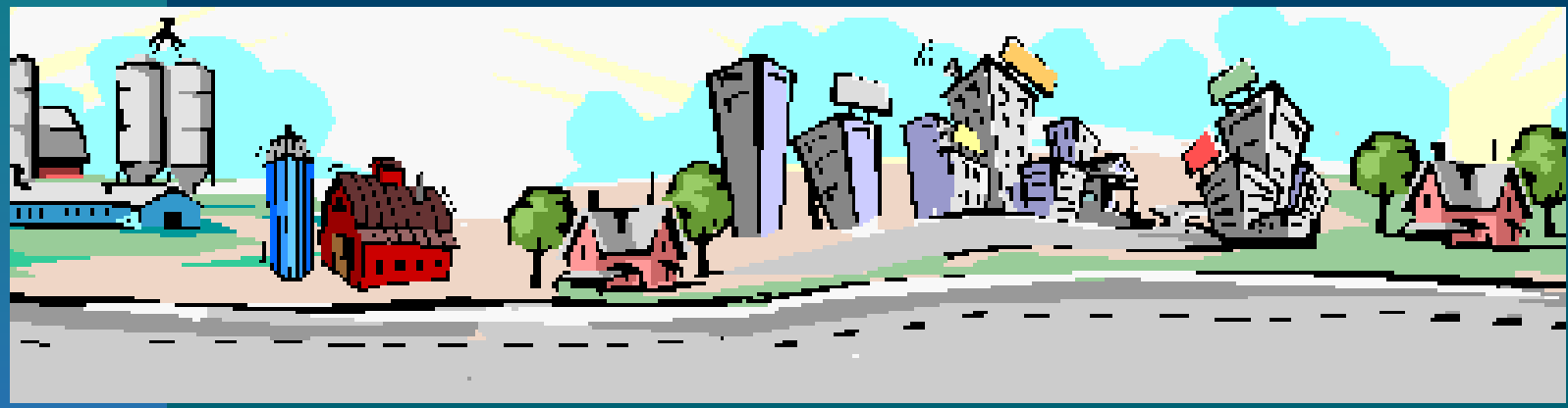
Water Flows Downhill



.... and we're catching less of it today

What does that mean?

More Roads = More Runoff



- Roads cause runoff to rivers and oceans
- = Less water goes into the ground
- = Less freshwater

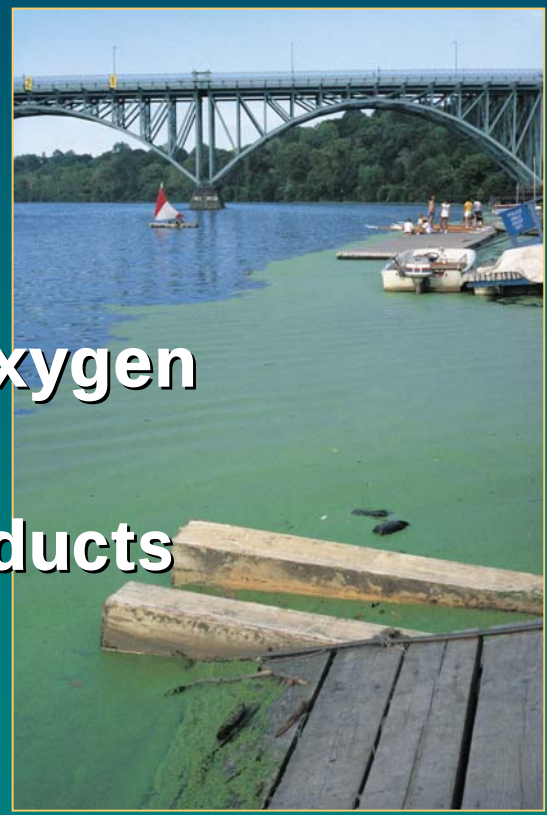
Stormwater Wetlands Provide

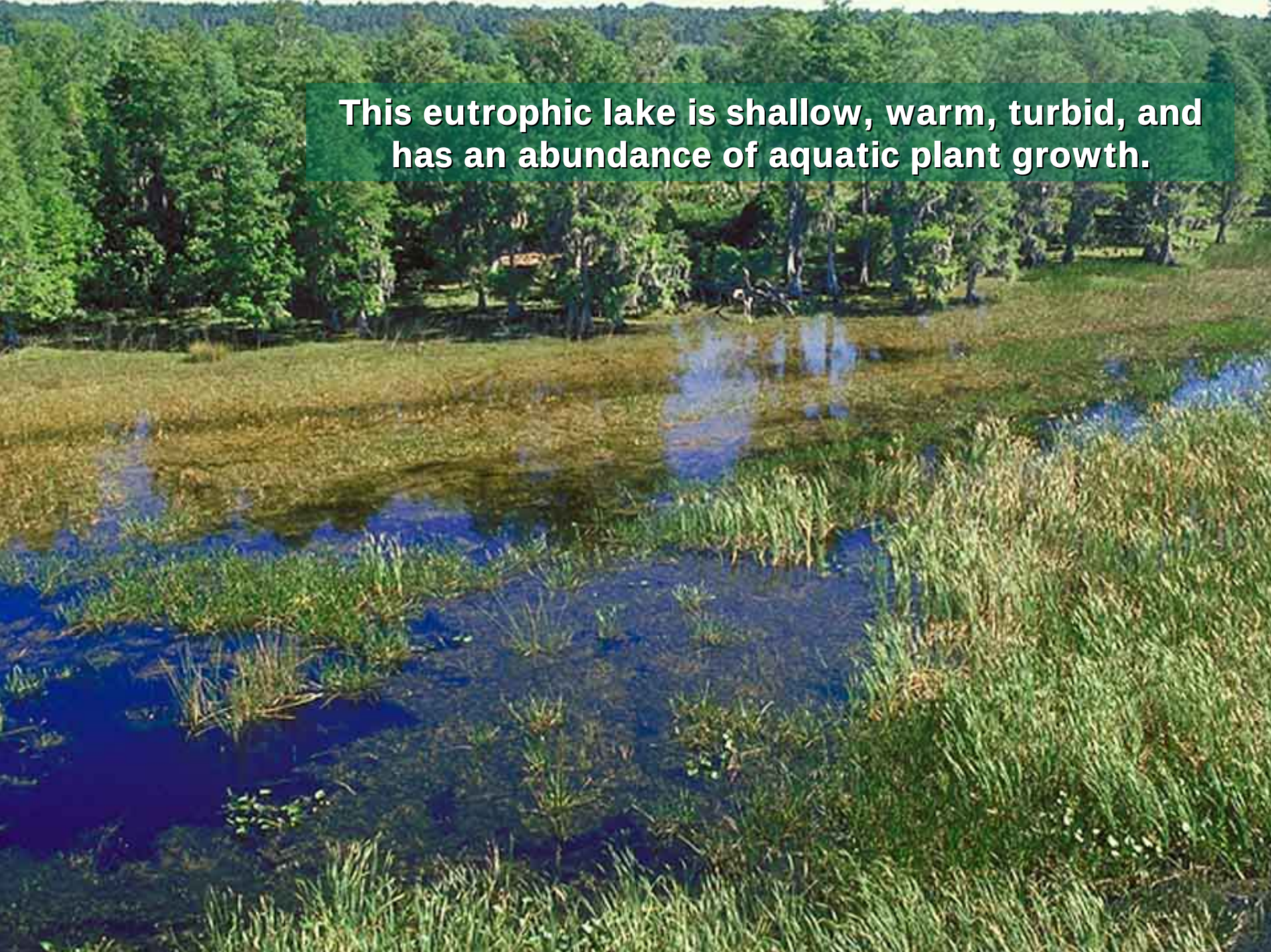
- Stormwater Retention
- Pollutant Removal
- Habitat Protection

Impacts of Fertilizers on Waterways

Fertilizers contain large amounts of nutrients such as nitrogen and phosphorous that can wash into ponds, lakes and streams, leading to eutrophication (overgrowth of aquatic plants). Eutrophic conditions in a drinking water reservoir cause:

- Nuisance algal blooms
- Taste and odor problems
- Fish kills due to low dissolved oxygen
- Formation of disinfection byproducts
- Increased drinking water costs




This eutrophic lake is shallow, warm, turbid, and has an abundance of aquatic plant growth.

Impacts of Pesticides and Herbicides in the Environment

Pesticides are substances that kill bugs and animals. Herbicides are substances that kill weeds and plants. Widespread use of these chemicals is both a major environmental problem and a public health issue. Pesticides and herbicides:

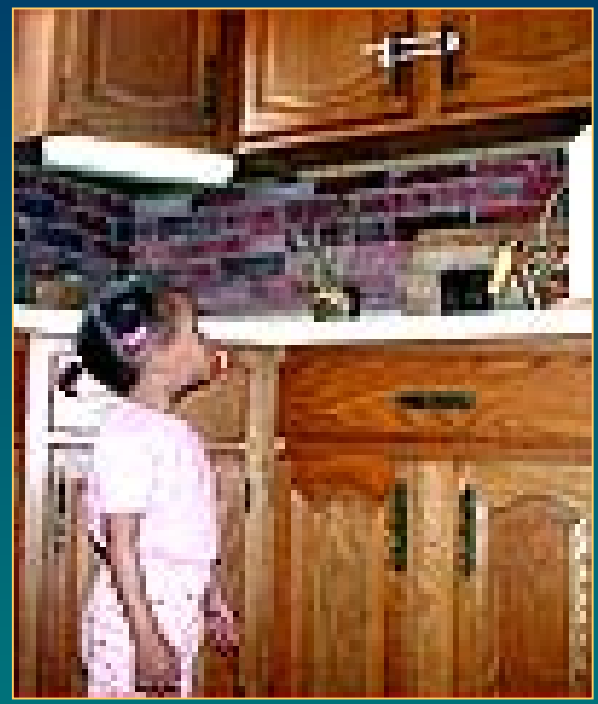
- Can harm non-target organisms such as humans, pets, and beneficial wildlife
- May cause cause serious health effects in children and adults

When it rains, these toxic materials can run off into your drinking water supply

Public Education and Participation

Andover Has:

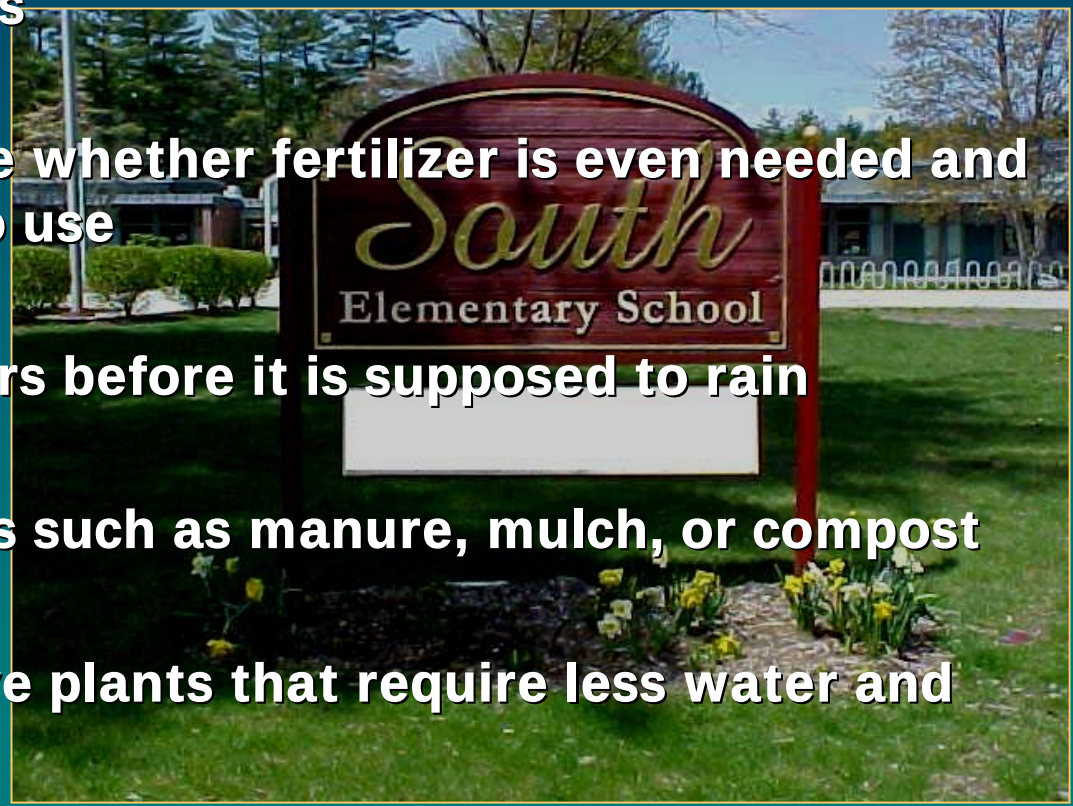
- Board of Health Policy on Pesticide Use
- Watershed Advisory Committee
- Organic Lawn Care Workshops



Keep children away from pesticides

Landscape Tips

- Make use of natural, organic alternatives to lawn care and pest-related problems
- Test soil to determine whether fertilizer is even needed and the proper amount to use
- NEVER apply fertilizers before it is supposed to rain
- Use organic fertilizers such as manure, mulch, or compost
- Landscape with native plants that require less water and fewer pesticides.



Down the Drain it Goes

- Andover has miles of storm drains, many leading to our drinking water supply
- Storm drains are a major transit mechanism for pollution of all kinds

PLEASE DO NOT

Dump oil, paint, antifreeze or cleaning solutions down the storm drain

Household Hazardous Waste

WHAT TO DO:

- Save these materials in a safe place & take them to the town's household hazardous waste collection site

- For more information, call

  the Department of Public Works

  978-623-8350

Pet Waste Impacts Stormwater

- 41% of people own dogs
- Pet wastes contribute to water quality problems
- Andover has a pet waste bylaw
- Pick up after your pet

Car Washing Impacts

- Research claims that 55-70% of households wash their own cars
- Wash water drains directly to the street and eventually to the storm drain

Bring your automobile to a car wash center where wash water is recycled.

Stormwater Pollution Prevention Websites

EPA Office of Wetlands, Oceans and Watersheds Nonpoint Source
http://www.epa.gov/OWOW/NPS/index.html

EPA Office of Pollution Prevention and Toxics
http://www.epa.gov/p2/index.html

Massachusetts Department of Environmental Protection
www.state.ma.us/dep/brp/stormwtr/stormhom.htm

The Stormwater Managers Resource Center
www.stormwatercenter.net