

Analysis of Nonpoint Source Pollution in the Galien River Watershed

Galien River Steering Committee Meeting

December 6, 2004

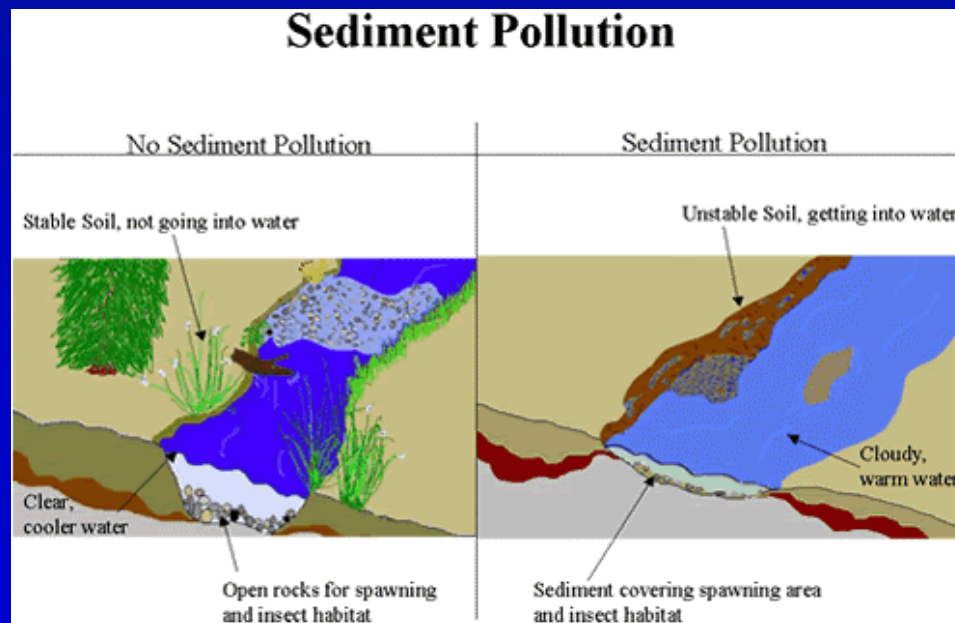


Galien River Watershed

- **Nonpoint Source (NPS) Pollutants of Concern**
 - *E. coli*
 - Sediment
 - Nutrients
 - Obstructions and debris
 - Altered hydrology
 - Chemicals
 - Increased temperatures
 - Invasive species
 - Urban storm water runoff

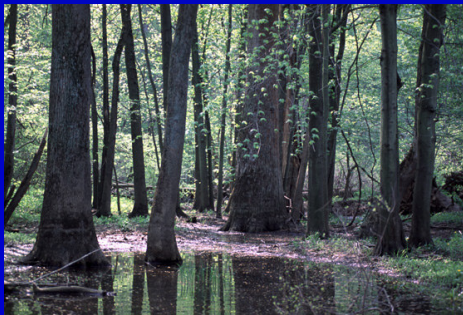
Definition of Sediment Pollution

- Sediment pollution is an excessive amount of organic and inorganic particles entering the stream system
- Sedimentation is the act or process of depositing sediment



Why Sediment is a Problem

- Decreases sunlight penetration impacting plant growth
- Absorbs heat, warming up the water body
- Reduces dissolved oxygen
- Covers fish spawning grounds, decreasing fish production
- Covers insect habitat decreasing food source



Sources of Sediment

- Known Sources
 - Agricultural runoff
 - Construction sites
 - Gully erosion
 - Road/stream crossings





Agricultural Runoff



Construction Sites



Gully Erosion



Road/Stream Crossings

Causes of the Sources of Sediment

- Known Causes
 - Conventional tillage practices and livestock/vehicle access
 - Lack of proper soil erosion and sedimentation control (SESC) practices
 - Lack of filter strips and stabilized outlets
 - Lack of maintenance and improperly managed stormwater





Unrestricted Livestock Access



Lack of Stabilized Outlets



Lack of Sufficient Buffer/Filter Strip

Sediment Loadings and Reductions

Agricultural Runoff

Contributing area (Agricultural land within watershed)	Soil loss before treatment (RUSLE - using 10% cover)	Area of conservation tillage (Soils with erosion rate above "T")	Soil loss after treatment (RUSLE - using 30% cover)	Tillage sediment reduction [(Soil loss before - soil loss after) x delivery ratio]
35,217 acres	86,918 tons/year	11,576 acres	69,588 tons/year	8,665 tons/year

Sediment Loadings and Reductions

All NPS Sites

Total soil loss before treatment (Existing soil loss before best management practices (BMPs) implemented)	Total soil loss after treatment (Soil loss after BMPs implemented)	Total sediment reduction (Reduction in sediment loading as a result of BMPs implemented)
87,242 tons/year	69,588 tons/year	8,989 tons/year

What Actions Need to be Taken

- Goal
 - Prevent soil erosion and reduce sedimentation in river and streams
- Objectives
 - Encourage cover crops
 - Promote no-till farming
 - Review SESC inspection and enforcement
 - Increase use and quality of filter strips and windbreaks
 - Improve degraded habitats
 - Stabilize tile outlets and road crossings

What Actions Need to be Taken

- Structural and Vegetative BMPs
 - Conservation tillage practices
 - Livestock exclusion fencing and stabilized crossings
 - Stream buffers/filter strips
 - Streambank stabilization (bioengineering)
 - Culvert and bridge improvements
 - Stabilized tile outlets (berm and tube)
 - Debris/obstruction management

What Actions Need to be Taken

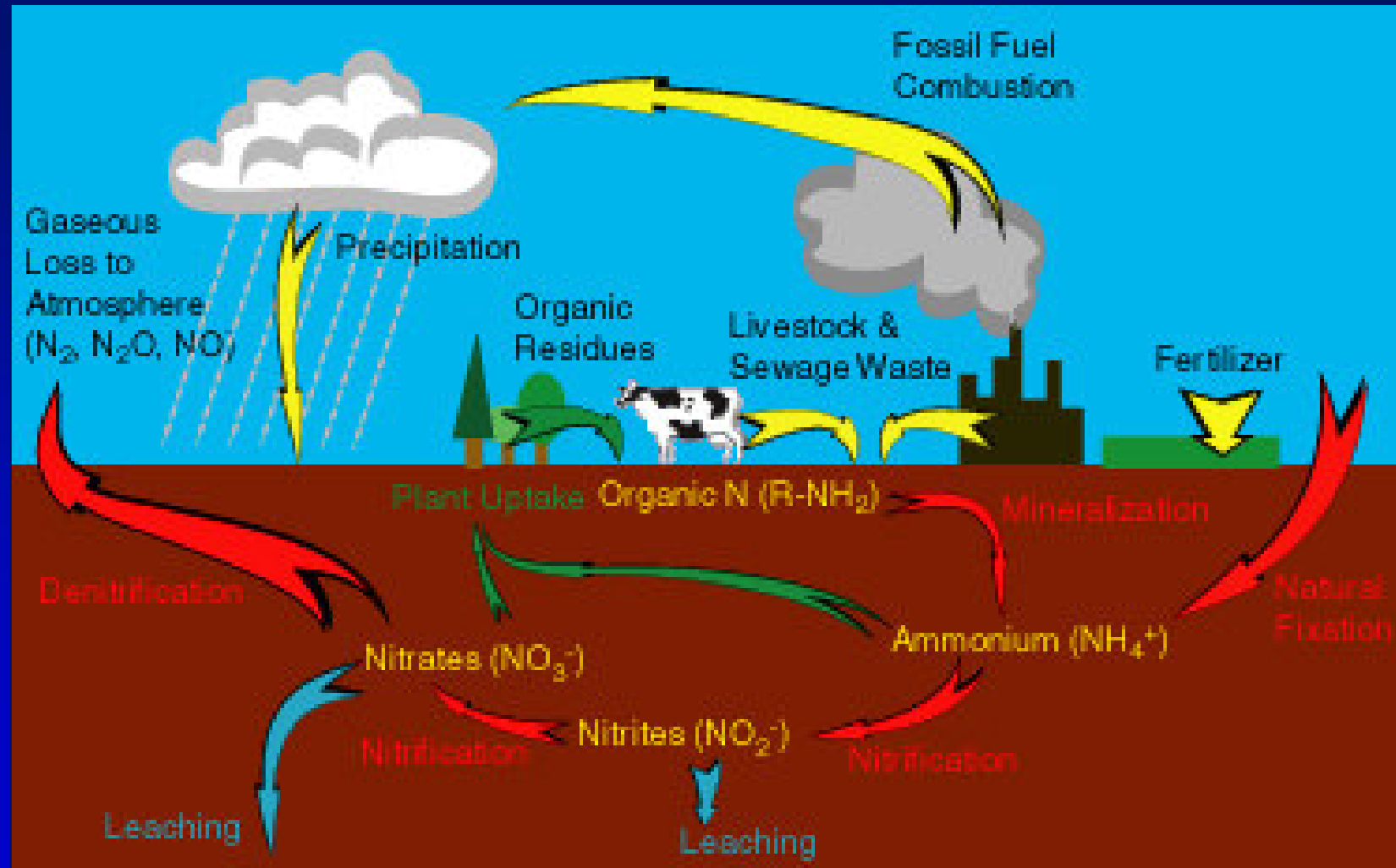
- Managerial BMPs
 - Turf management
 - Ordinance development and enforcement
- Community Outreach Program Implementation



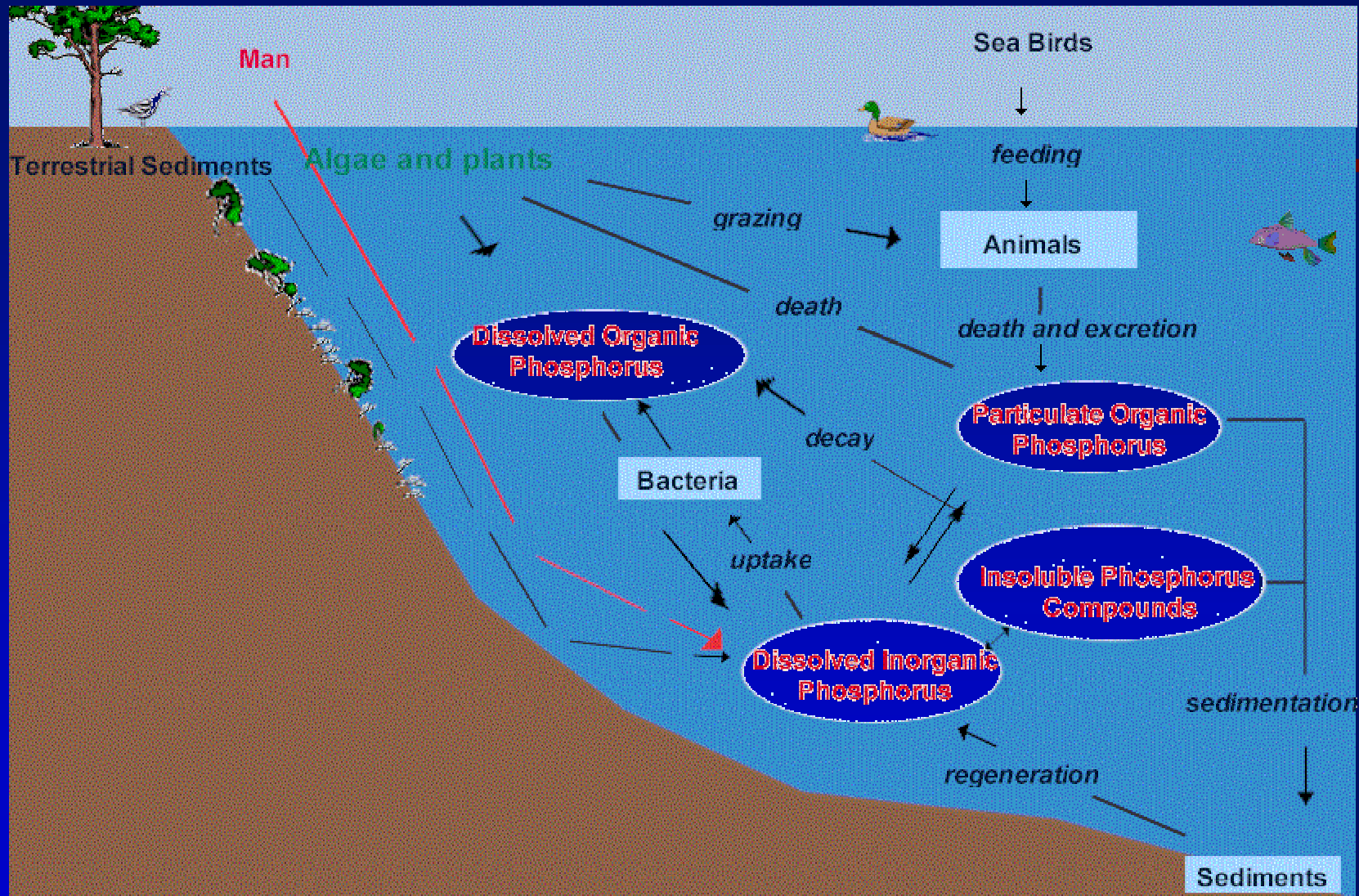
Definition of Nutrient Pollution

Although nutrients, like nitrogen and phosphorus, are essential to aquatic plant life, an excess of these nutrients can be harmful. This is called "nutrient pollution."

The Nitrogen Cycle



The Phosphorus Cycle



Why Excessive Nutrients are a Problem

- Excess amounts of nutrients cause algal blooms
- Blooms reduce the amount of available sunlight
- The loss of sunlight can kill the bloom
- Decay of the bloom depletes dissolved oxygen
- Fish and other species will die unless they move to other areas of suitable habitat
- Excessive nitrates leaching to groundwater can be harmful to humans and livestock



Sources of Excessive Nutrients

- Known Sources
 - Fertilizer applications
 - Human and animal wastes
 - Yard waste





Fertilizer Runoff



Animal Waste



Yard Wastes

Causes of the Sources of Excessive Nutrients

- Known Causes:
 - Improper and excessive fertilizer application
 - Failing septic systems
 - Leaking manure storage areas
 - Improper disposal of yard wastes
 - Lack of buffer strips



Nutrient Loadings and Reductions

Agricultural Runoff

Contributing area (Agricultural land within watershed)	Phosphorus and nitrogen content before treatment (RUSLE - using 10% cover)	Area of conservation tillage (Soils with erosion rate above "T")	Phosphorus and nitrogen content after treatment (RUSLE - using 30% cover)	Phosphorus and nitrogen reduction (Before Content - After Content)]
35,217 acres	55,445 lbs P/year 110,891 lbs N/year	11,576 acres	46,694 P lbs/year 93,388 N lbs/year	8,751 lbs P/year 17,502 lbs N/ year

Nutrient Loadings and Reductions

All NPS Sites

Before phosphorus and nitrogen content (Existing nutrient content before best management practices (BMPs) implemented)	After phosphorus and nitrogen content (Content reduction after BMPs implemented)	Phosphorus and nitrogen reduction (Reduction in loading as a result of BMPs implemented)
55,721 lbs P/year 111,442 lbs N/year	46,694 lbs P/year 93,388 lbs N/year	9,027 lbs P/year 18,053 lbs N/year

What Actions Need to be Taken

- Goal
 - Reduce nutrient (primarily phosphorus) loading
- Objectives
 - Increase use of filter strips and cattle exclusion fencing
 - Use integrated crop management
 - Practice better manure utilization
 - Address residential septic systems
 - Provide educational brochures

What Actions Need to be Taken

- Structural and Vegetative BMPs
 - Cover crops
 - Livestock exclusion fencing
 - Drop structures, weirs, and stone spillways
 - Geotextile vegetated chutes
 - Stabilized tile outlets (berm and tube)
 - Stream buffers/filter strips
 - Debris/obstruction management

What Actions Need to be Taken

- Managerial BMPs
 - Wetland restoration
 - Turf management
 - Ordinance development and enforcement
- Community Outreach Program Implementation
 - Volunteer cleanups



Next Steps

- Evaluate pollution loading and reduction calculations
- Set goals for pollution reductions
- Assess recommended BMPs
- Restate goals and recommendations for watershed
- Develop monitoring plan for long-term evaluation of watershed



The Galien River Watershed

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