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United States Department of Agriculture

Healthy Landscapes & Soils Promote Clean Water & Healthy Streams

2016 EPA Region 6 Stormwater Conference

Oklahoma City, OK

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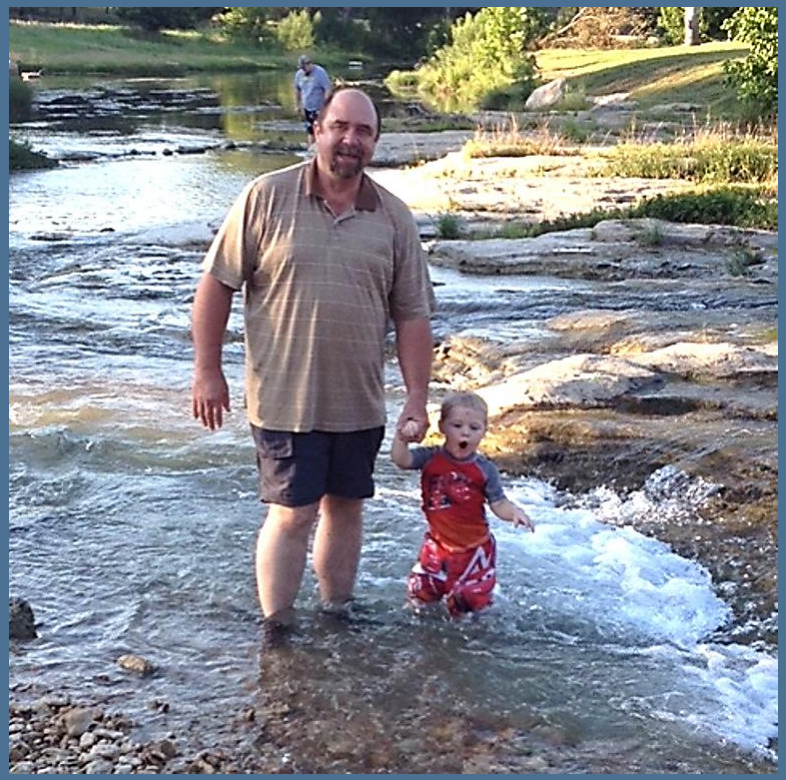
What is Healthy?

WHAT DO WE VALUE ABOUT HEALTHY STREAMS?



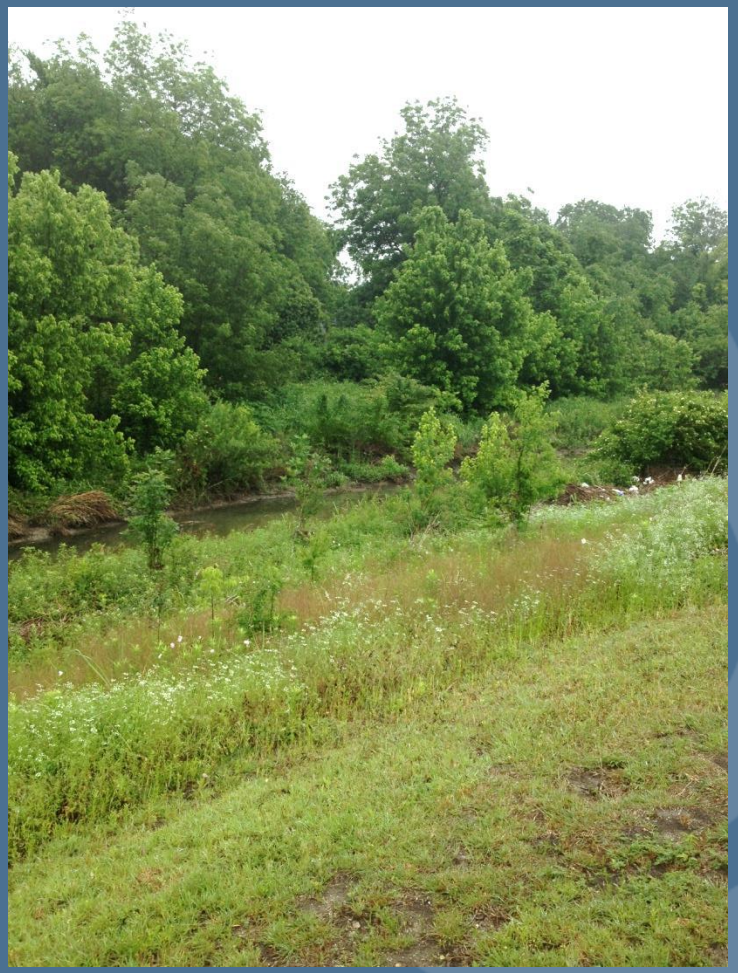
- Clean Water
- Fish and Aquatic Habitat
- Natural Scenic Beauty
- Recreation
- Wildlife Habitat
- Abundant Forage for Livestock
- Reliable Water Source

FUNCTIONS OF A STREAM

- Transport Water
- Transport and Deposit Sediment
- Provide Food, Shelter and Other Biological Functions for Fish and Wildlife

THE WORK OF A PROPERLY FUNCTIONING RIPARIAN AREA

- Dissipate Stream Energy
- Reduce Erosion
- Trap Sediment
- Store Water
- Retain Floodwater
- Recharge Groundwater
- Provide a Sustainable Base Flow



What Should a Healthy Stream Look Like?

HEALTHY RIPARIAN AREAS IMPROVE WATER QUALITY

- The soils present in a healthy riparian area act like a sponge storing large amounts of water that will be filtered to the ground and then slowly released back into the stream as base flow or infiltrate into the underground aquifer.
- As flood waters spread over the riparian area and onto the floodplain, water velocities are reduced causing some of the sediments, nutrients and other pollutants to settle out of the water column.

HEALTHY RIPARIAN AREAS IMPROVE WATER QUALITY

- Dense vegetation and trees in healthy riparian areas work to dissipate flood water energy, by slowing the flow of water and allowing more time for infiltration.

- Trees and grasses in riparian area stabilize stream banks and reduce bank erosion.

HINDRANCES TO A HEALTHY STREAM

- Land Disturbances
- Excessive Concentration of Animals
- Artificial Manipulations
- Excessive Traffic
- Woody Removal
- Excessive Withdrawals

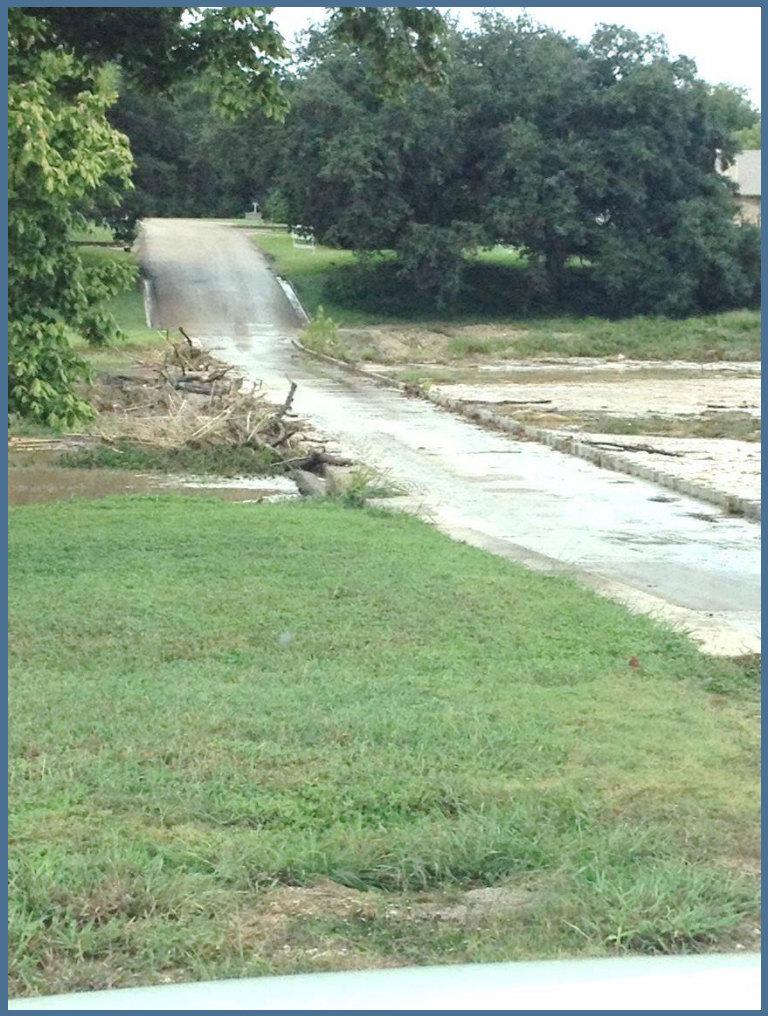
LAND DISTURBANCES

- Developing the Riparian Area.
- Landscaping the Riparian Area.
- Mowing and/or Spraying too close to the Stream.
- Farming too close to the Creek.

EXCESSIVE ANIMAL CONCENTRATIONS

- Wildlife (Feral Hogs, Deer, Exotics, Ducks, Bats etc..)
- Pets
- Overgrazing of Livestock Along the Edge of a Stream

ARTIFICIAL MANIPULATION



- Bridges and Stream Crossings
- Manipulations to the Stream Bank
- Structures in the Riparian Area
- Stream Straightening
- Berms, Diversions Dams and Levee Systems

EXCESSIVE TRAFFIC

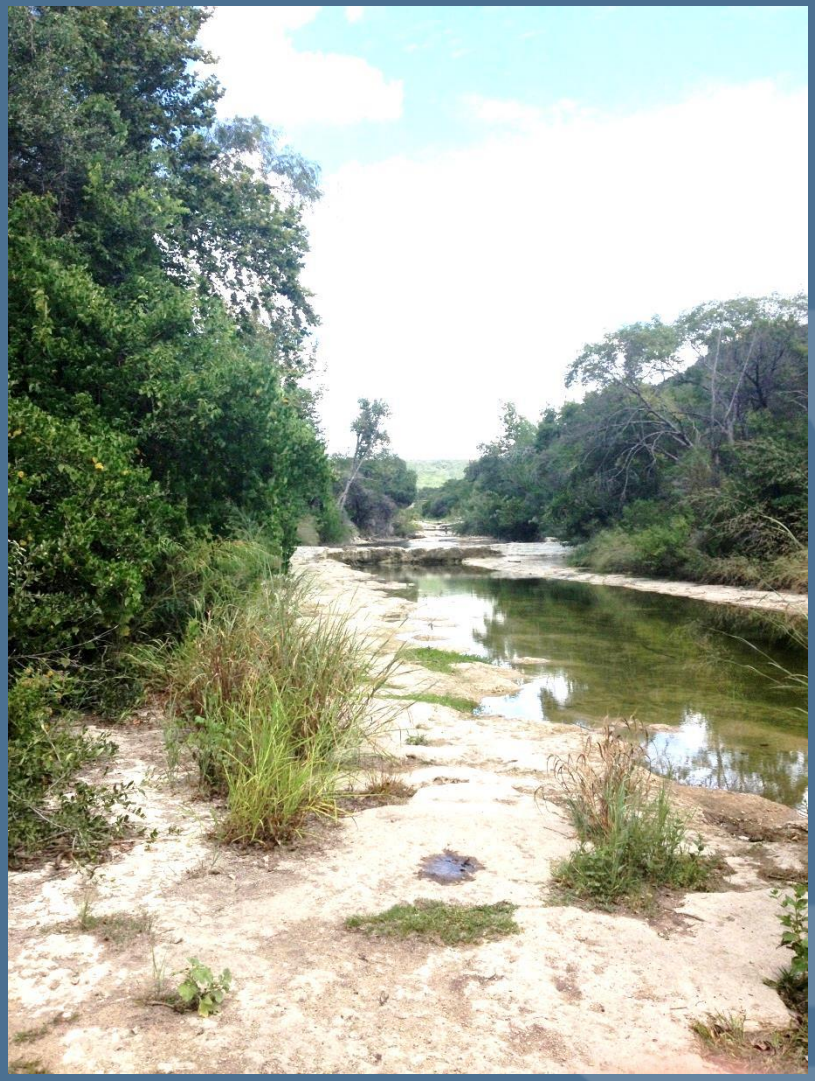
- Vehicle Traffic
- Foot Traffic

REMOVAL OF WOOD

- Removing and/or Thinning of Trees and Woody Vegetation in the Riparian Area
- Removing Woody Debris From the Stream Channel

EXCESSIVE WITHDRAWALS

- Dams
- Diversions
- Alluvial Pumping



Are We Treating a Problem or the Symptom

Many times the riparian “problems” we are challenged to fix, are only the symptoms of an issue that is occurring somewhere else.

Example: Heavy bank erosion in a bend in the river.

- If the bank erosion is a threat to life, property, or safety, we would need to armor the bank and stabilize it to prevent further erosion.
- However, the real problem may be increased flow due to poor infiltration and excessive runoff on the uplands.
- If we armor the bank and stabilize it, odds are erosion will occur somewhere else.

Key: In order to fix the problem you must treat the resource concern rather than the symptoms.

If we are only treating the symptom, our fix may actually cause more problems.

Anything that we do in the riparian and/or stream will cause a change in the dynamics of the stream.

Dynamics of a Stable Stream

Dynamics of a Stable Stream

When changes are made in the watershed or stream, the stream will adjust to try and fix itself.

DYNAMICS OF A STABLE STREAM (CONTINUED)

- Lateral migration and erosion does not necessarily indicate instability.
- Streams are dynamic systems.
- A change in one variable will cause an adjustment in another.
- The stream, floodplain, riparian area and uplands are all interconnected.

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Healthy Soils Are The Foundation of Healthy Ecosystems

HEALTHY SOILS ARE THE FOUNDATION OF HEALTHY ECOSYSTEMS

Healthy soil gives us clean air and water, bountiful crops and forests, productive grazing lands, diverse wildlife, and beautiful landscapes. Soil does all this by performing five essential functions:

Regulate and partition water

Sustaining plant and animal life

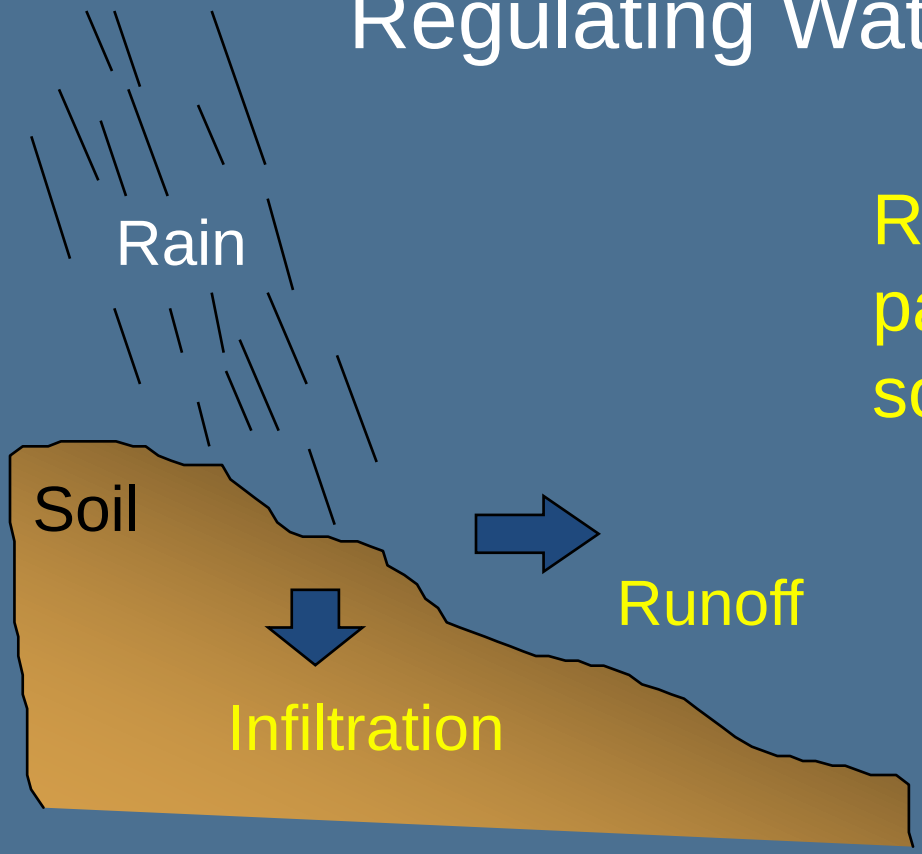
Filtering and buffering potential pollutants

Cycling nutrients

Physical stability and support

Soil Functions

Regulating Water Flow

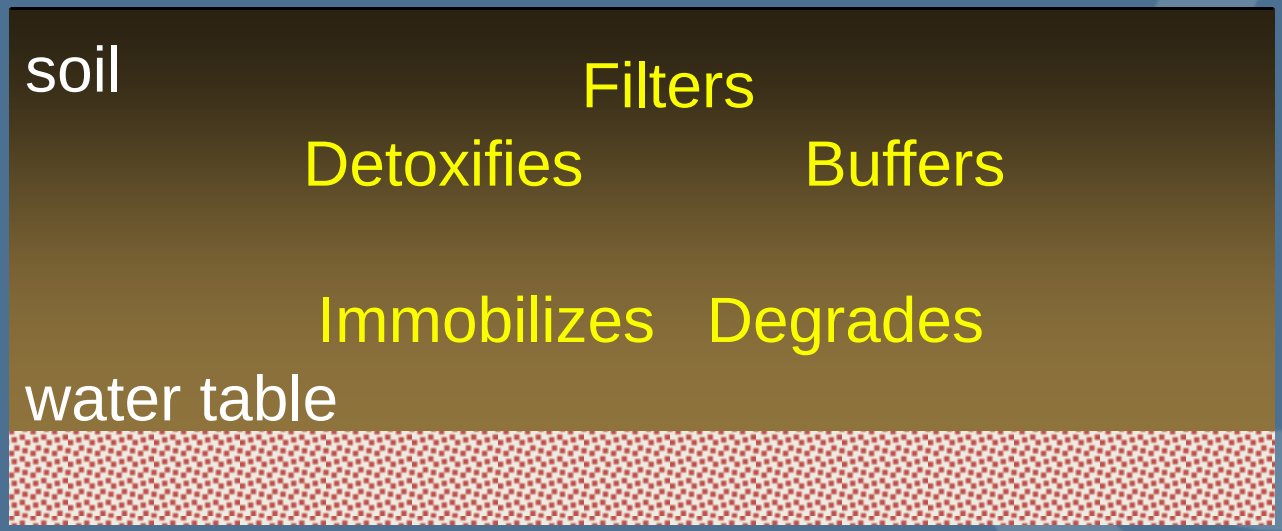


Regulating and partitioning water and solute flow

Soil Functions

Filtering and Buffering

Organic & Inorganic materials



Healthy Soils Make Sense for Water Quality and Quantity

- The soil's water-holding capacity reduces runoff, and increases the availability of water to plants during droughts.
- Good infiltration keeps nutrients and sediment from loading into lakes, rivers, and streams.
- Healthy soils do a better job of filtering and buffering organic and inorganic materials which helps to protect our groundwater.

Four Basic Principals for Improving Soil Health

1. Keep the soil covered as much as possible.
2. Disturb the soil as little as possible
3. Keep plants growing throughout the year to feed the soil
4. Grow a diverse mixture of plants.

How Healthy Are Urban Soils

- Urban soils are typically disturbed.
- Urban soils are relatively sterile - little or no organic material and reduced biological activity.
- Urban soils are often composed of subsoils, not top soils.
- Urban soils are often highly compacted which reduces infiltration.
- Urban soils are often planted with a single species with little or no diversity of cover.
- Urban soils are often heavily fertilized and treated excessively with pesticides.

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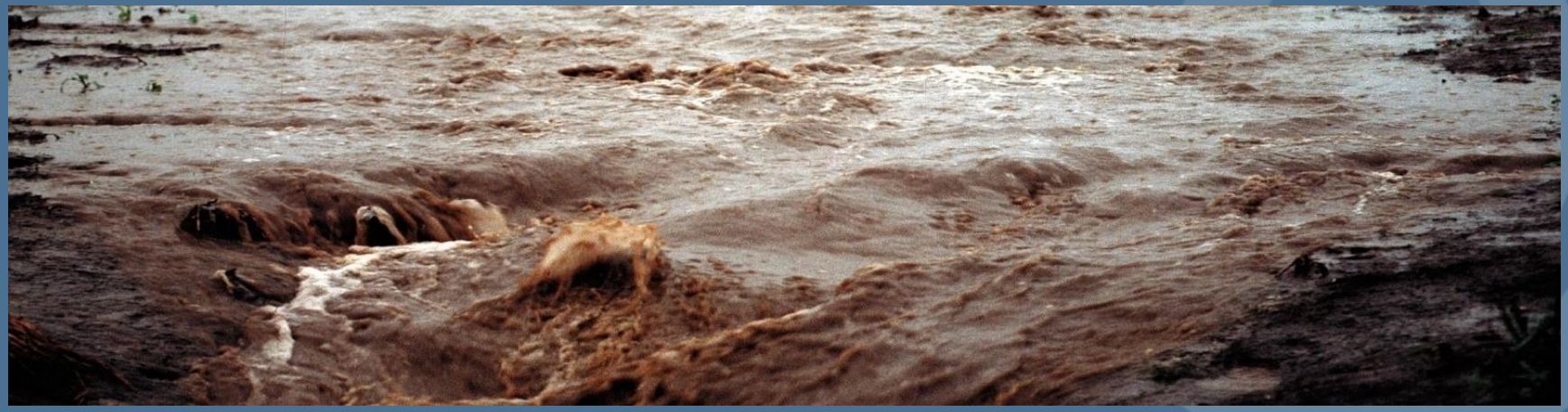
Maybe Soil Health Should be Part of Our Solution to Storm Water Runoff



The ACT
Avoid, Control or Trap

When performing conservation planning with landowners emphasize a “systems approach” to address their resource concerns. When you consider water quality, encourage producers to select practices that address the concept for Avoiding, Controlling, or Trapping pollutants, or “ACT.”

Avoid

Avoidance helps manage nutrients and sediment source control from agricultural lands, including animal production facilities. Practices such as ***Nutrient Management***, ***Cover Crop***, and ***Conservation Crop Rotation*** help producers avoid pollution by reducing the amount of nutrients available in runoff or leaching into water bodies and watersheds. Practices such as cover crops and crop rotation help take up nutrients to avoid potential runoff and pollution. Crop rotations that include differing crops, such as legumes, can limit amounts of commercial nutrients applied.

Control

Land treatment in fields or facilities that prevents the loss of pollutants includes practices such as conservation tillage and residue management, which improve infiltration, reduce runoff, and control erosion. Specific practices such as ***No-till/Strip/Till/Direct Seed***, ***Mulch Tillage***, and ***Ridge Till*** are foundation practices to recommend to producers. Practices such as ***Cover Crop*** will also do double duty by helping with Avoidance as well as Controlling. Other facilitating practices, such as ***Terraces*** or ***Stripcropping***, help control erosion and may manage runoff to reduce nutrients loading.

Trap

The last line of defense against potential pollutants is to trap them. Practices such as ***Contour Buffers***, ***Filter Strips***, ***Riparian Buffers*** and the suite of ***wetland practices to create, enhance, and/or restore wetlands*** all serve to trap and uptake nutrients before entering water bodies.

Nutrient Management

Managing the amount (rate), source, placement (method of application), and timing of plant nutrients and soil amendments.

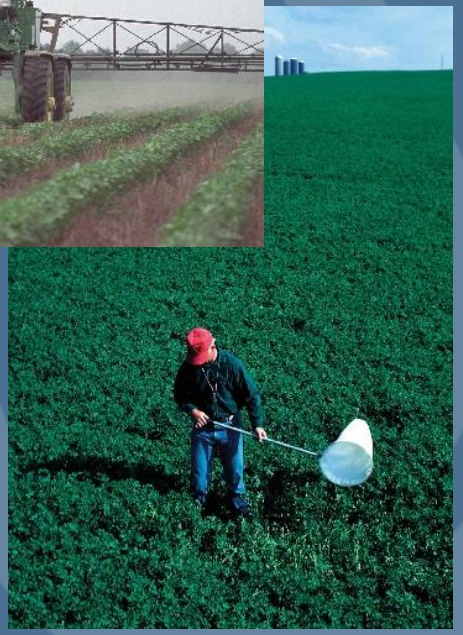
Purpose

- To budget, supply, and conserve nutrients for plant production.
- To minimize agricultural nonpoint source pollution of surface and groundwater resources.
- To properly utilize manure or organic by-products as a plant nutrient source.
- To protect air quality by reducing odors, nitrogen emissions (ammonia, oxides of nitrogen), and the formation of atmospheric particulates.
- To maintain or improve the physical, chemical, and biological condition of soil.

Integrated Pest Management

Integrated Pest Management -managing agricultural pest infestations (including weeds, insects, and diseases) to reduce adverse effects on plant growth, crop productions, and environmental resources.

- From a NRCS Standpoint it's a site-specific combination of pest prevention, pest avoidance, pest monitoring, and pest suppression strategies.
- IPM strategies ("PAMS" or Prevention, Avoidance, Monitoring and Suppression) shall be employed to prevent or mitigate pest management risks for identified natural resource concerns.
- For identified water quality concerns related to pesticide leaching, solution runoff and adsorbed runoff, the current version of the USDA-NRCS WIN-PST program will be used to evaluate potential risks to humans and/or fish, as appropriate, for each pesticide to be used.



HEALTHY UPLANDS IMPROVE WATER QUALITY

We just can't continue to do whatever we please on the uplands and expect the riparian area to filter and clean our runoff before it enters the stream.

HEALTHY UPLANDS IMPROVE WATER QUALITY

Runoff that occurs on the uplands, is channeled into drainages along highways, and then runs into the stream at a crossing completely misses the filtering effects of the riparian buffer.

It's Complicated

- The environment is basically one large complex system. It is all interconnected.
- Problems Should be Addressed at the Watershed Scale.
- We can try to "localize" the problem to reduce complexity, however the variables at play are probably still innumerable.
- All projects that we undertake in a stream or riparian area must be carefully studied.


Battle Starts Here

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QUESTIONS?

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