EFFECTIVENESS OF FILTER STRIPS FOR NUTRIENT REMOVAL

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WHAT IS A RIPARIAN FILTER STRIP

- A PLANTED OR NATURAL VEGETATIVE BUFFER IN THE AREA THAT LINKS TERRESTRIAL AND AQUATIC HABITATS

- SERVES AS:
  - FILTER
  - TRANSFORMER
  - SINK
FEATURES BENEFITING FROM VEGETATIVE FILTER STRIPS

- PERENNIAL AND TEMPORARY STREAMS OR DITCHES
- LAKES AND PONDS
- WETLANDS
- KARST FEATURES AND CREVISED BEDROCK
- WELLS
FILTER STRIP GOALS
- FILTER SEDIMENT
- STABILIZE BANKS
- WILDLIFE HABITAT
FILTERING SEDIMENT IS THE MOST IMPORTANT FUNCTION

• AS FLOW VELOCITY SLOWS, SEDIMENT SETTLES OUT
• SHEET FLOW REQUIRED
• NEED TO REMOVE SUSPENDED CLAY
• FILTERING AFFECTED BY:
  - SOIL POROSITY
  - VEGETATION TYPE
  - SLOPE
  - AGE
  - MANAGEMENT
  - RUNOFF VOLUME
FILTER STRIPS ARE A LIVING SILT FENCE
MECHANISMS THAT REMOVE POLLUTANTS IN FILTER STRIPS

- NUTRIENTS STORED IN SOIL
- PHOSPHORUS FIXED ON MINERAL SITES
- NITRATE-N DENITRIFIES
- PLANT UPTAKE
- STORAGE IN PLANT TISSUE (ESPECIALLY TREES)
  - HARVESTED AND REMOVED
  - MAY BE RELEASED FROM VEGETATION
- MICROBES BREAKDOWN ORGANICS
EXAMPLE 1: RIPARIAN FILTER STRIP INSTALLATION

- WESTERN SAUK CO.
- CROPPED UP TO STREAM EDGE
- CHANNELIZED UPLAND RUNOFF
- AREA CONSISTENTLY WET
- COST SHARING >$100/ACRE/YR
- 60 FT. FILTER STRIP
SITE PRIOR TO ESTABLISHMENT
MAY, 1999
FOLLOWING CLIPPING AUGUST, 1999
1 JUNE 2000
SAUK CO.
7 in./24 hrs.
EXAMPLE 2: FENCING, STREAMBANK STABILIZATION, AND FILTER STRIP INSTALLATION

- BROWN CO., 200 MILES
- $500/A PERMANENT EASEMENTS
- LIVESTOCK IN RIPARIAN AREA
- STREAM BANK STABILIZED
- FILTER STRIP INSTALLED
- LANDSCAPE RECOVERS QUICKLY
Ashwaubenon Creek Tributary, Brown Co. (Source: Bill Hafs)

Before

Two years later
Multi-Species Riparian Buffer Strip Model

Fast growing tree species

Slow growing tree species

Streambank Plantings

Stream

Crop

Shrubs

Grass

RUNOFF

INfiltration

SUBSURFACE FLOW
RELATIONSHIP BETWEEN STORM INTENSITY AND RUNOFF AMOUNT

ROBINSON et al., 1996
RELATIONSHIP BETWEEN STORM INTENSITY AND RUNOFF SEDIMENT CONTENT

ROBINSON et al., 1996
EFFECT OF BUFFER WIDTH ON SEDIMENT DEPOSITION

Smith, 1992
## VEGETATION TYPE AND NUTRIENT REMOVAL

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LEE et al., 1999
BUFFER EFFECT ON NUTRIENT REMOVAL FOLLOWING MANURE APPLICATION

Chaubey et al., 1995
DENITRIFICATION IS A MAJOR PROCESS

• OCCURS IN ROOTZONE AREA WHERE CARBON IS AVAILABLE
• MOST ACTIVE IN THE FIRST 15-30 FT.
• RANGE 18 – 55 lb N/A/YR
• VARIES DEPENDING ON SITE CONDITIONS
• YEAR-ROUND IN WARMER CLIMATES
NITRATE AND CHLORIDE IN SHALLOW GROUNDWATER MOVING FROM AN AG. FIELD

JACOBS AND GILLIAM, 1985
REMOVAL OF SUBSURFACE NITRATE-N IN RIPARIAN FORESTS FILTERS

GILLIAM et al., 1997
MANAGEMENT OF FILTER STRIPS

• PROTECT FROM GRAZING
  • FENCE MAINTENANCE, FLOOD DAMAGE
  • CATTLE CROSSINGS
  • MANAGED GRAZING

• MOW
  • BRUSH CONTROL
  • HARVEST GRASS

• AVOID VEHICLE TRAFFIC IN FILTER STRIP
OTHER CONSIDERATIONS

COMBINE WITH UPLAND PRACTICES

SITE IN THE UPPER PART OF WATERSHEDS