Erosion Control: Sediment Basins & Traps

Often the erosion and sediment control plan for a construction site, particularly a large site, includes a sediment basin or trap (we’ll go into the difference in a moment). This article will try to give an introduction to this commonly used Best Management Practice that minimizes sediment pollution.

You may be familiar with filter fabric fence, also called silt fence. That is the black fencing you see staked around small areas of earth disturbance. The use of sediment basins and traps is necessary when the area of disturbed soil is too great for silt fence alone, usually when sites are around one acre in size or larger.

The concept of sediment basins and traps is really quite simple. Construct an embankment or dam at the lowest elevation of the construction site where all the water will drain to, and ‘trap’ it. Then construct channels to direct all the site runoff into the basin. There, the sediment laden (muddy) water is held for a period of time so the eroded soil particles can either settle on the bottom or pass through a sediment removal structure and the filtered water can continue on its way.

The difference between a basin and a trap depends on the size of the project and drainage area that contributes to the device. Traps can handle drainage areas up to five acres and basins handle sites five acres and above.

While the concept of sediment basins is rather simple, their design is a little more complicated.

Financial and other support for this project is provided by the Pennsylvania Association of Conservation Districts through a grant from the Pennsylvania Department of Environmental Protection under Section 319 of the Clean Water Act, administered by the US Environmental Protection Agency.
When the Nutrient Management Plan is complete, it will be an agreement between the writer and the farm operator (manager) as to what Best Management Practices (BMPs) may need to be implemented to correct runoff of water and/or manure. There will be a manure application chart identifying the fields where and when manure will be applied. The plan writer will prioritize the fields in order of those which will see the greatest return with the application of manure due to their testing the lowest for N, P, and K. This chart will also identify fields where there is too much phosphorus or are too close to water and therefore manure can not be spread there at all. This manure application chart will be the final result of taking in the information of soil test results, nutrient needs of the crop, crop yield, residual nitrogen from legumes and of past manure applications, the decomposition of organic matter, calibration of the manure applicator, and nutrient analysis of manure. This chart will show the needs of the crop, subtracting the nutrient value of the manure, and provide the nutrients needed from a fertilizer source.

If you would like to learn more about a Nutrient Management Plan contact Mark Muir at 814-676-2832.

Sediment Basins Continued

One of the main components to basins is the size needed for each construction site. Design criteria are different for traps and basins, but both require storage capacity for both the dewatering zone (total area that drains to the structure) — and sediment storage (the area of earth disturbance contributing sediment to the structure). This can be up to 6000 cubic feet of volume per acre draining into the basin. Maintenance of the basin is also very important. Since the nature of the structure is to trap sediments, they have to be cleaned out regularly during construction to maintain the proper sediment storage capacity. So how do these structures remove the sediment? This is handled by an ‘outlet structure’. Sediment traps typically use a rock filter faced with filter fabric constructed in the embankment that holds the sediment back and let the cleaner water pass through. Sediment basins typically use either a perforated riser or a skimmer. A riser is basically a vertical pipe with holes drilled in it that slowly lets water drain as the sediment settles on the bottom.

A skimmer is a floating device connected to the outlet that drains water from the top. This type of device is more desirable. After a rain storm, the water in a basin is cleaner at the surface, because the sediment settles out sooner. Draining the water through a skimmer releases the cleanest water first. Imagine a glass of water with soil in it. Shake it up and set it down for a half hour. Where is the cleanest water?

As the Ag Tech for the Venango Conservation District, I have the good fortune in most cases of saving farmers both time and money. This year, with input costs of fertilizer and fuel being higher than anyone would have ever thought, a little time planning could save some significant money. I would like to address the application of manure and look at manure as a source of nutrients.

In the past, spreading manure was something we did “cause we had to and, more times than not, the fields closest to the barn got the most (especially in the winter when the weather was just too miserable to go any further with that open cab tractor). Who would have thought that “stuff” was worth much? Well it is, especially nowadays with fertilizer over $900 a ton. Figuring out how much a crop can utilize the nitrogen, phosphorus, potassium and other nutrients in manure can greatly reduce the money paid to the fertilizer dealer.

According to the Penn State Agronomy Guide: “Approximately three-fourths of the nitrogen utilized by crops is taken up from the atmosphere on a farm, and in the purchased feed and supplements fed to the livestock, may be recycled back to crop fields in manure.” The availability of the nutrients to the crop depends on how the manure is applied and how long until it’s incorporated into the soil. There are differences in the nutrient value of manure based upon the type and age of animals, so it’s recommended to have it tested yearly.

Here’s a quick quiz: list the type of animal with the highest to lowest nutrient value of their manure:

A) lactating dairy cow
B) steer
C) beef cow and calf
D) nursery swine
E) sheep
F) horse

Well, how did you do?
Answer high to low:
D, B, E, A, F, C

One of the resources available to a livestock operation is a Nutrient Management Plan (NMP) which takes in information from all over your operation and sets up a game plan for the next three years. During the initial farm visit, the nutrient management specialist who will write your nutrient management plan will ask several questions while noting the location of water sources and erosion, etc.

MEET OUR NEW STAFF

MARK MUIR
AGRICULTURAL RESOURCE TECHNICIAN

Good day! I have twenty years of retail experience in the Agricultural Market managing farm center cooperatives. I graduated with a Bachelor of Science in Animal Husbandry and a course completion in ecology and evolutionary biology. As an employee of the Venango Conservation District, it is a pleasure to assist people in raising a crop and/or livestock by showing them that conserving our water and soil will actually save them time and money.

I encourage farmers to set up a Nutrient Management Plan for their operation. After management data is collected: soil tests, manure samples, crop ratios, etc. a three year plan is created which can save the farmer money and improve yields. As the price of diesel fuel climbs above $5.00/gallon and fertilizer continues to climb over $900/bush, utilizing Best Management Practices and Nutrient Management Plans will enhance farm production and protect natural resources.

SCIENTIFIC FUN FACT: SHINE ON HARVEST MOON!

The Harvest Moon is the full moon nearest the Autumnal Equinox (around September 23rd). The Harvest Moon should not be mistaken with the Hunters Moon which is the first full moon after the Harvest Moon. The Harvest Moon’s name can be traced back to Native American’s who kept track of the seasons by giving distinctive names to each full moon. Some studies indicate that males on the Harvest Moon are more likely to migrate. Here’s what happens: the moon usually rises about 50 minutes later each night, but near the Autumnal Equinox, the moon rises only about 30 minutes later each night. This earlier rise means a shorter time period between sunset and moonrise. The light from the moon at Harvest Moon, helps farmers see late into the night to bring in their harvests. Two out of three years, the Harvest Moon occurs in September, otherwise it occurs in October. In 2008, it is expected September 15th.
IN AGRICULTURE

WHAT CAN IT COME FROM?
Nonpoint sources of pollution can be divided into six different categories:

1. NUTRIENTS are nitrogen and phosphorous. These chemicals make up fertilizers that people use to grow plants. Other sources of these chemicals include sewage, animal waste, automotive exhaust, and industrial wastes. Excess nutrients in water can promote algae growth which can cause foul water, and use up oxygen needed by aquatic life. 80% of nitrates and 75% of phosphates that are added to lakes and streams in the US are the result of human activities.

2. PATHOGENS are disease-causing microorganisms like bacteria and viruses. Pathogens come from fecal waste. Pathogens can cause serious health problems and impair recreational water use.

3. TRASH often starts as street litter that is carried by wind or water runoff to waterways. Plastic bags, fast food wrappers, even shopping carts, find their way into our local streams and ditches. This type of pollution can be a health hazard to aquatic organisms and animals found in wetland habitats.

4. TOXIC CHEMICALS include heavy metals and pesticides, petroleum products, and other chemicals. Because many of these toxic chemicals are resistant to breakdown, they tend to be passed along the food chain.

5. SEDIMENT in particles of sand, dirt, and gravel that are eroded by water runoff. When rain water picks up these particles, they travel to local waterways where they are deposited. Sediment in water can block sunlight from getting to aquatic plants, it can clog fish gills and smother fish larva. It can alter stream flow and damage aquatic habitat.

6. INCREASED TEMPERATURES, or Thermal Pollution, is a category of pollution that is a result of a transfer of heat to the waterway. Streamside vegetation provides shade to waterways. When this vegetation is removed, the sun’s heat warms the water. Impervious surfaces like roof tops and roadways are heated by the sun. When rain water hits these surfaces it is warmed and runs off to local waterways. Cold water aquatic species can be killed off by these warming temperatures. Warmer temperatures can also decrease oxygen concentrations and create a more favorable environment for pathogens.

Examples of timber harvest Erosion and Sedimentation BMPs are: • properly planned and permitted stream crossings • properly constructed roads and trails • use of silt fences and water bars and vegetative buffers trips • use of cross drains and culverts at roads and trails • proper trail, road and land retirement

The Venango Conservation District is delegated by the PA Department of Environmental Protection to work with Erosion & Sedimentation (E&S) activities in Venango County. The District reviews E&S plans and conducts site inspections to monitor compliance with the plan. The District also provides education on E&S BMPs.

CONSTRUCTION AREA BMPs
Proper planning and development of communities and roadways is vital to Venango County. Poorly planned construction activities, however can be a major source of water quality impairment. Erosion from unprotected construction sites may approach 20,000 to 40,000 times the amount of water from farms and woodlands. In an effort to combat sediment pollution in our waterways, DEP’s Chapter 102 Erosion & Sediment Control regulations state that for all projects that disturb the earth over 5,000 square feet, an E&S Plan must be developed, implemented and be available on site. Proper planning and use of E&S BMPs are key to a project’s success in protection of local waterways. Some examples of construction area E&S BMPs are: • development & implementation of a construction area E&S plan • use of silt fencing or straw bale barriers • installation of sediment basins • seeding and mulching exposed soil • minimizing areas of exposed soil

Rain water can pick up pollutants from your backyard and carry them off to your local waterways.

Nutrient Pollution
Just like from farm fields, you could be adding fertilizers and pesticides to your lawn and garden, but are you applying the right amount? Too much can be washed away with rain water and can contribute to non point source pollution in your neighborhood.

Sedimentation Pollution, coming from loose or poorly vegetated soil areas or driveways on your property could be adding non point source pollution to your local waterways.

Heated water can be a pollutant. The roof of your property buildings and driveways can absorb heat from the sun everyday. When rain water then hits these surfaces, the water temperature rises, and runs off to your neighborhood streams and rivers.

Pathogen Pollution can originate from your backyard from improperly working septic systems or even pet waste.

Toxic Chemical Pollution can come from your backyard could include oil, household cleaners, excess pesticides, and other household chemicals that you may be disposing on your property.

There are a lot of ways that you can reduce non point source pollution in your own backyard.

Backyard BMPs include:
• use of pervious surfaces on your property
• allow thick vegetation or buffer strips to grow along waterways on your property
• reduce the amount of stormwater rushing across your property with the use of a rain barrel
• use natural alternatives to household chemicals
• plant vegetation to cover bare soil areas on your property
• utilize hazardous waste collections in your area

The Venango Conservation District strives to reduce nonpoint source pollution in Venango County through providing education, technical assistance and funding sources to implement Best Management Practices or BMPs.

We the 2002 Census reported over 28 million of Pennsylvania’s farmlands serve many important purposes such as growing crops, grazing use, pasturing use, and timber land. Improperly managed farmland activities can affect water quality.
Nonpoint source pollution from agricultural areas can be reduced by using Best Management Practices (BMPs). The practices are designed to reduce nonpoint source pollution, increase productivity and save farmers money in the long run.

BMPs in agriculture

The Venango Conservation District can help Venango County farmers learn about nonpoint source pollution and what BMPs could be incorporated on their farm to reduce pollution. We can even provide some funding to install BMPs like installation of buffer strips, or education about no-till farming practices or rotational grazing.

Sedimentation Pollution can be a result of loosened or poorly vegetated dirt areas. When farmers plow their fields it loosens that soil that is easily washed away with rain water. Heavily grazed fields may not have enough vegetation or have trampled soil that is easily washed away with rain water. Heavily grazed fields may not have enough vegetation or have trampled soil that is easily washed away with rain water.
Please take a few minutes and give us some feedback on our newsletter.

We greatly appreciate your time!

In order to better serve Venango County, we would like to know more about you:

Would you categorize yourself as someone who might use nonpoint source Best Management Practices for:

☐ Earth Disturbance  ☐ Agricultural Activities  ☐ Backyard Activities

Would you be interested in working with the Venango Conservation District to learn more about installing Best Management Practices?

☐ Yes  ☐ No

In what ways has this newsletter better informed you about nonpoint source pollution and actions you can take to improve water quality?

Any additional comments?