Best Management Practices in Agriculture and Forestry

Extension Division

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BEST MANAGEMENT PRACTICES IN AGRICULTURE AND FORESTRY

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Best Management Practices
In
Agriculture and Forestry

Water and water quality affect us all. Are you interested in:

1. Adequate and safe water for your stock and crops?
2. Prolonged life for your equipment and ponds?
3. Good water quality downstream as well as upstream?
4. Retention of your top soil?
5. Utilization of your fertilizer by your crops?
6. Longer use and fewer repairs for access roads?
7. Recreation for your family?

The Best Management Practices program now being implemented by your local Soil Conservation Service office can help you achieve these seven items. The local Extension Agent has information about Best Management Practices, too.

What Are Best Management Practices?

Best Management Practices (BMP) are structural and management practices that can be used to reduce or eliminate conditions which degrade the quality of groundwater or surface waters such as streams, ponds, lakes, bays, etc. BMPs deal with conditions such as erosion and soil loss to streams, loss of fertilizer by runoff or leaching, contamination of water by pesticides, and handling of animal wastes. Many BMPs have been used for over 40 years in soil and water conservation programs. Some examples of BMPs are:

1. Controlled feed and water access areas for animals (Figure 1)
2. Sod filter strips
3. Diversion ditches
4. Crop residue use
5. Timing and placement of fertilizer
6. Drainage dips in forestry access roads
7. Revegetation
8. No-till planting
9. Proper use, storage, and disposal of pesticide and containers.

These practices and a planning approach to using the practices are detailed in BMP Handbooks. Six technical handbooks have been developed:

1. Agriculture
2. Forestry
3. Hydrologic Modifications
4. Sources Affecting Groundwater
5. Surface Mining
6. Urban

In addition, a **Management Handbook** for implementing these BMPs for the six areas listed above has also been developed.

This publication will discuss only the general aspects of two of these handbooks: Agriculture and Forestry. Separate publications will be forthcoming for specific commodities within these two areas.

These two handbooks were developed by technical committees familiar with production and conservation practices. The handbooks were then reviewed and revised after comment by a citizen advisory committee made up of representatives from agricultural, forestry, and conservation groups. Private citizens also submitted comments. A typical BMP specification page in the Agriculture BMP Handbook is shown in Figure 2.

What Is The Purpose of a BMP?

A BMP is used to eliminate or reduce nonpoint source pollution. **Nonpoint source pollution** is any pollution which cannot be traced to a specific identifiable facility or site or that does not have a specific point of entry into a watercourse. It is pollution that originates from a spread-out area such as a field, woodlot, or livestock facility. Rain or snow-melt picks up and transports the pollution as it flows. It may flow on top of the land, seep through embankments, or percolate down through the soil.

Since a cornfield differs somewhat from a pasture or a logging operation, the nature of the pollution will be varied. Thus, many factors must

be considered when evaluating the type and amount of the nonpoint pollution. Soil type, slope of the land, land use, weather conditions, cultivation procedures, harvesting practices, and machinery used are just a few of the factors that affect the generation of nonpoint pollution.

The purpose of BMPs is to manage the land, crops and animals to reduce nonpoint pollution. Because agricultural and forestry operations vary from one site to another, the types of BMPs that can be used to control the pollution may be quite different. A BMP must fit into a plan for a specific site and operation. Several site considerations and BMPs used in locating a logging road are shown in Figure 3. The goal of the plan and the BMPs is to effectively control nonpoint pollution.

FIGURE 1

Several BMPs used in this pasture for sheep, are shown in pictures below. (1) Fence to keep animals out of stream. (2) Feed, water, and shade are located several hundred feet from stream. (3) Sod filter strip between pasture and stream. Note that grazing density is such that sod has not been worn down to bare soil.

What Are Some of the Nonpoint Source Pollutants?

Several types of pollutions may be generated by agricultural or forestry operations. These can be classified in several broad categories:

1. Sediments - the most common and widespread pollutant from all agricultural and forestry operations. In addition to the sediment there may be other pollutants adsorbed on the sediment.
2. Nutrients - contributed by fertilizers and animal wastes.
3. Organics - animal wastes, crop residues, and forest cover add to the pollutant load.
4. Chemicals - pesticides, herbicides, and fire retardants can end up in the water and the food chain.
5. Salts - where irrigation is used, salts can be leached out of the grounds and end up in water courses.
6. Disease-producing organisms - always a potential problem when wastes are applied to ground surfaces.

Controlling these pollutants results in several benefits. First, the water quality is maintained. Second, and perhaps of more importance to you, you retain your top soil, fertilizer, and organic matter which should improve or maintain the quality of your operation. Also, the pesticides, herbicides, and disease-producing organisms won't create a health problem for you, your neighbors, or your livestock.

How Are BMPs Selected?

Benefits usually have a cost. Because of a capital cost associated with some of the BMPs, a management plan should be developed before implementing any of the practices. Technical planning help is available from the Soil Conservation Service for agricultural plans. The Virginia Division of Forestry offers technical planning assistance for forestry operations.

BMPs should be selected after careful examination of the planned operation. Consideration should be given to alternative practices that will keep the plan flexible for future changes. Figure 4, for example, is the BMP standard that outlines an approach for optimizing pest control practices.

The economics and the practicality of the overall plan are weighted heavily in selecting BMPs. Cost-sharing funds are available thru the Agricultural Stabilization and Conservation Service which administers the Agriculture Conservation Program.

FIGURE 2

Below is a typical page from Agriculture Best Management Practice Handbook showing a BMP standard and specification.

SOIL TESTING AND PLANT ANALYSIS
(Std & Spec 2.17)

Definition

The chemical analysis of the soil or plants to assess the available nutrient status as related to crop growth.

Purpose

To determine the amounts of fertilizer and lime that are required for optimum crop growth. This will insure maximum vegetative cover for the soil and avoid the application of excess commercial fertilizers that can lead to increased water pollution.

Conditions Where Practice Applies

Wherever crops are grown.

Planning Considerations

In production of crops today, it is critical that the farmer apply fertilizer at the proper level if he is to realize a profit from his investment. Too little fertilizer will result in lowered crop yields and quality and a reduction in income. Too much fertilizer wastes critical farm capital and increases the chances for pollution of the environment. The best means of determining a crop's fertilizer needs is by soil testing. Soil samples should be collected every 2 to 3 years or whenever a crop rotation is changed, and analyzed by a reputable soil testing laboratory to determine fertilizer and lime needs. Information on the proper procedure for sampling soil and laboratories that test soils can be obtained from any Virginia Cooperative Extension Service Office.

Plant analysis, while also used to determine a crop's fertilizer needs, is used today only to a limited extent because of the cost involved. However, it is a useful means of detecting nutrient imbalances in the plant (deficiencies, excesses) when crops are growing poorly and a nutritional problem is suspected.

What Is Needed for a Nonpoint Source Management Plan?

The landowner is the key to the plan. Involvement by the landowner is essential. The SCS can help develop the plan but only the landowner can supply the information necessary for developing the plan. The information needed is:

1. Location and boundaries of the property.
2. Land use, both existing and planned.
3. Map of land showing streams, soil types, slopes or contours, and any underground drainage.
4. Evaluation of existing land use.
5. Any present erosion or pollution problems.

Once this information has been analyzed a plan can be developed. The plan should:

1. Be efficient from the user's viewpoint.
2. Be adaptable to future changes in technology or user's needs.
3. Be effective in controlling nonpoint pollution.
4. Be acceptable to the landowner.

The final part of the planning effort is to develop an implementation schedule. In the case of logging operations, the landowner is responsible for the plan. However, responsibility for implementation of the plan should be included in the timber sale contract with the logger.

With adequate involvement by both the landowner, SCS, and the Division of Forestry, the plan and its implementation should accrue benefits to the landowner or user. The success of the nonpoint source plan depends on the active participation by the landowner or user.

What Is The Basis of This Program?

The 1972 Federal Water Pollution Control Act Amendments set as its goal to "restore and maintain the chemical, physical, and biological integrity of the nation's waters" by 1985. As a

part of this Act, Section 208 provided a mechanism for planning, implementing, and coordinating efforts to control point and nonpoint sources of pollution. The Virginia State Water Control Board was delegated the administering agency for the "208 Planning" program.

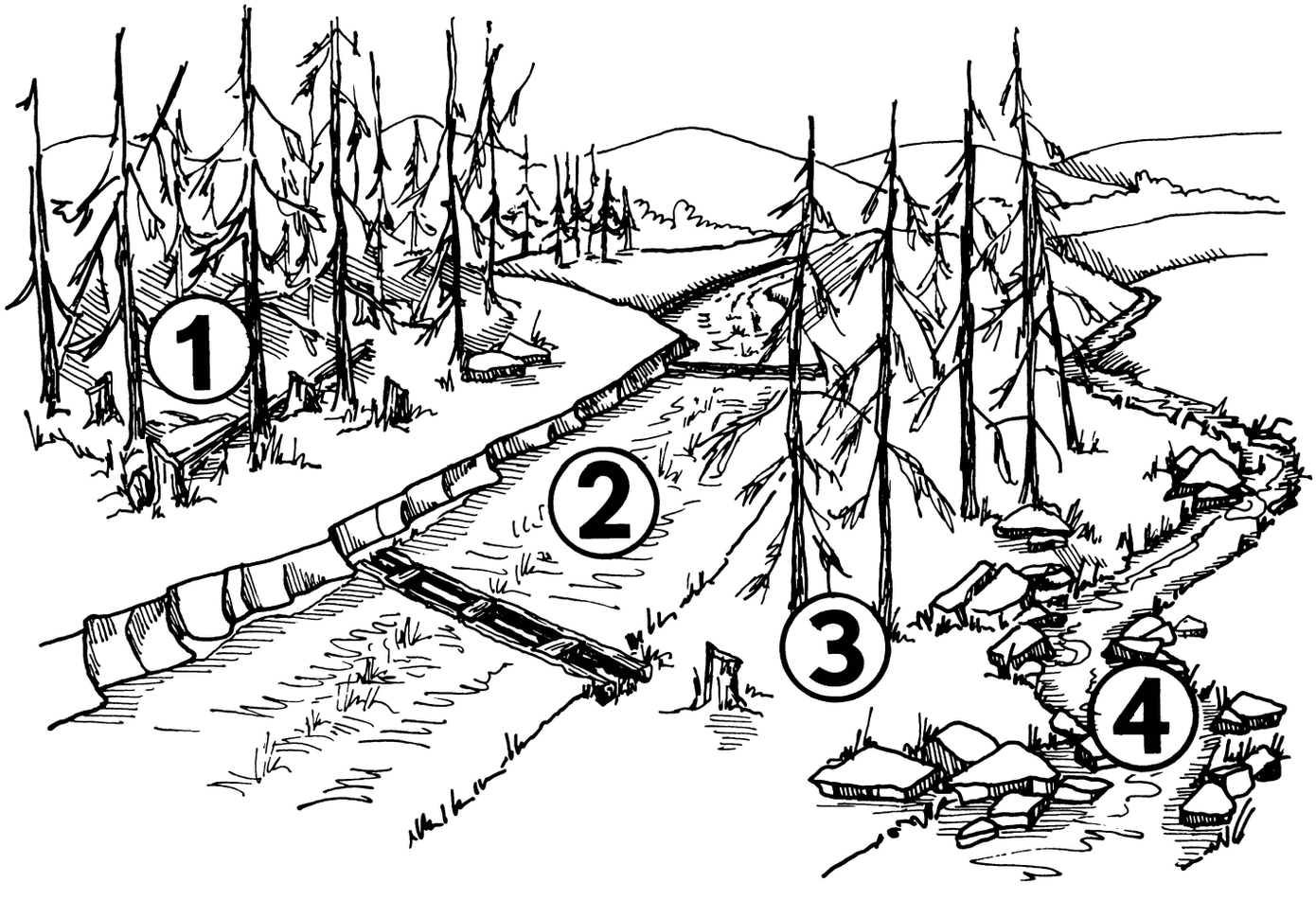
Virginia developed a non-regulatory program to meet the needs of this Act in the area of nonpoint source pollution. The thrust of the agricultural program is to have private landowners work with local soil and water conservation district officials to develop a plan for reducing or eliminating water pollution from their properties.

What Is A Non-Regulatory Program?

Basically, the non-regulatory approach gives to the local farmer or landowner responsibility for developing a plan to protect water quality. This plan, as described in a previous section, involves BMPs. In such a non-regulatory program, the participants are not required to obtain any special permits or licenses or to submit any periodic reports. However, as part of a federal program, Virginia's efforts to control nonpoint source pollution will be reviewed by the Environmental Protection Agency. If EPA finds the Virginia program to be weak or ineffective, then a regulatory program with reports, plans,

FIGURE 3

In locating a logging road consideration is given to access to trees (1), slope of road (2), rainfall and runoff, and location of nearby streams (4). BMPs illustrated in this scene are open top culverts (2) spaced according to the slope of the road, cutting road along contours, and a filter strip (3) between stream and area to be logged or graded for a road.



inspections, etc. will be required.

The effectiveness of Virginia's agriculture program will be evaluated by several measures to be reported annually by the Soil and Water Conservation District:

1. The acres adequately protected.
2. Acres benefitted by BMPs.
3. Amount of farmland under conservation plans in the district.
4. Number of fish kills and shellfish bed closures due to agricultural pesticide use.
5. Education programs on proper application, use, and disposal of pesticides and fertilizers.
6. Number of partial and total waste management systems installed.
7. Cost-share funds expended and acres accomplished under the cost-share program.
8. Resources committed by the management agencies to the program.

The forestry program will be reported using the following parameters:

1. Number of landowners and total acreage participating in the Cooperative Forest Management Program.
2. Number of landowners contacted under the Cooperative Forest Management Program.
3. Number of projects and number of acres where recommended BMPs were utilized in the priority watersheds.
4. Number and total length in miles of logging road stabilization demonstration.
5. Number and description of any BMP education program conducted.
6. Individual research involving forestry nonpoint source pollution.
7. Cost-share funds expended and acres accomplished under the cost-share program.
8. Resources committed by the Division of Forestry to the program.

Although the purpose of the program is to improve and maintain water quality, the benefits are many. The seven items at the beginning of this publication have short and long term savings and benefits. The non-regulatory program saves time and money as compared to a regulatory approach. Thus, the participation and use of BMPs by everyone insures the continuation of the non-regulatory program and benefits us all.

Where Is Assistance Available?

Several agencies are involved in the program. The Extension Agent can supply general information and educational materials. The local Soil Conservation Service office can give technical assistance in developing a plan and selecting appropriate BMPs. The local ASCS office will administer financial assistance to cost share the implementation of BMPs. In addition, the Division of Forestry should be contacted for any logging or forestry operations.

FIGURE 4

Below is an example of a BMP standard that considers alternatives in the development of a plan.

DETERMINATION OF OPTIMUM PEST CONTROL PRACTICE
(Std & Spec 3.03)

Definition

A decision-making process that considers alternatives available and selects the best pest control techiques for an operation by an analytical process.

Purpose

To determine which practice or combination of practices will achieve optimum pest control in the light of effectiveness, safety, cost and impact on the environment.

Conditions Where Practice Applies

Wherever pests reach a concentration such that they become a problem to crop production or other agricultural activities.

Planning Considerations

Whenever considering any type of pest control program, the land user should obtain the recommendations of specialists in the Extension Service at VPI&SU on optimum methods and procedures to use.

To determine the best course of action to pursue, one should go through the following steps in sequence:

1. **Decide whether the pest problem is of sufficient severity to warrant initiation of a control program.**
2. **If control is warranted, consider the possible alternative methods:**
   a. **Chemical**
   b. **Mechanical**
   c. **Non-chemical (cultural; e.g. resistant varieties, biological controls, etc.)**
   d. **Combination of a, b, and c (integrated pest management)**
3. **Once a control method is selected, steps should then be considered that would make that particular program most effective with a minimum expenditure of time, money and resources.**
4. **Extension Service personnel should be called on to help optimize the selected method of control.**