SECTION I

BACKGROUND

SUMMARY OF SECTION I

- Discusses the important role of local governments in creating effective nonpoint source (NPS) pollution control programs
- Describes the causes and sources of NPS pollution
- Provides an overview of NPS pollution control measures
- Identifies various approaches local governments can take to implement NPS pollution control measures

THE IMPORTANT ROLE OF LOCAL GOVERNMENTS

This guidebook is designed to help local jurisdictions prevent and control nonpoint source (NPS) pollution and reduce water quality problems in their communities. Without the help of local governments, adequate prevention and control of NPS pollution will not happen.

The guidebook is not intended to regulate or mandate local government activities, nor to serve as a design standards manual for practices or facilities. It summarizes the existing regulations related to NPS pollution, discusses legislative and policy trends, and provides examples of NPS control practices for use by local government.

The U.S. Congress has declared the intention of the federal government to abate and control nonpoint source pollution through three federal laws: the creation and reauthorization of the Federal Clean Water Act (FCWA); the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA); and the Safe Drinking Water Act (SDWA). That charge is also passed on to each state. Oregon recognizes its responsibility to develop a program that works statewide, and has information and technical resources to support that effort.

The state also recognizes the critical role played by local jurisdictions—cities, counties, regional governments, and special districts—to create programs that work locally. These jurisdictions regulate and control activities that affect the land and the water flowing over it—by development regulation, by planning and constructing public facilities, and by creating performance

standards for land managers and owners. Most often, Oregon's local jurisdictions deal with the people who daily develop and use the land, deposit materials on or near watercourses, or otherwise take actions that affect water quality. This contact occurs as part of local permitting activities, during implementation of local comprehensive plans, or in the course of delivering a particular service (e.g., streets, sewers, and parks).

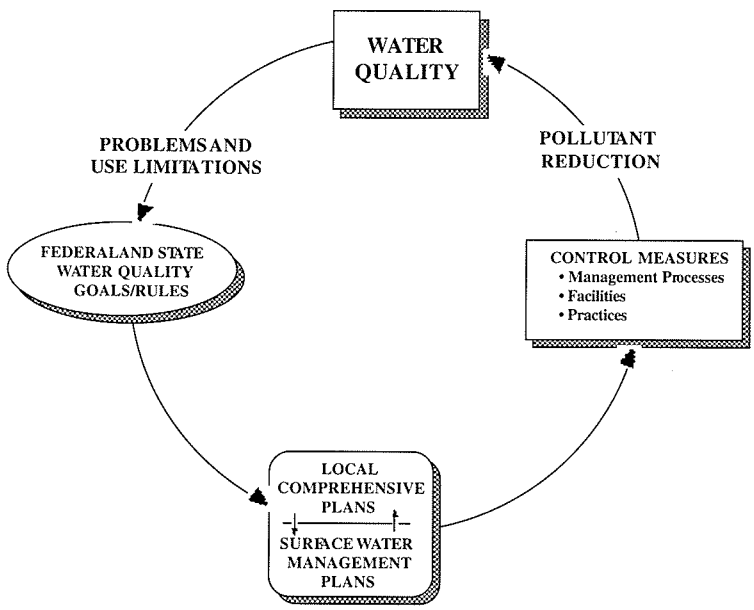
Local land use planning includes developing inventories of important resources and creating policies to protect, prioritize, or otherwise allocate resource use. These decisions are based upon local values, but must comply with Oregon's statewide planning goals. The zoning and other regulations used to implement the local comprehensive plan contain processes for controlling the siting of roadways, marinas, wellfields, industries, and countless other uses that directly or indirectly affect water quality.

Local jurisdictions can also work with other agencies such as the U.S. Forest Service and soil and water conservation districts to implement NPS pollution control measures in agricultural and forest harvest areas.

No one program is sufficient to address a subject as diverse as NPS pollution, but every community in Oregon has the existing legal authorities and processes needed to address many aspects of NPS pollution control.

This guidebook identifies control measures that can be used to prevent NPS pollution in an efficient and cost-effective manner. With this guidebook and the technical resources available in state agencies, local governments can choose among the various measures to find the optimal approach for a particular activity, site, or watershed.

NONPOINT SOURCE POLLUTION CONTROL PROCESS



State and local governments have the opportunity to establish a strong partnership by combining resources and acting together. This team approach is particularly important when limited financial resources are available to take on new tasks. The variety of options available to local governments puts them in a position to take a real leadership role in protecting Oregon's water quality.

THE NONPOINT SOURCE POLLUTION PROBLEM

OVERVIEW

Most NPS pollution problems originate with water flowing past exposed pollutant sources. Although soil is the predominant pollutant, other materials can be involved, such as industrial, agricultural, and forestry-related chemicals; farm materials such as manure; mine tailings; or simply street dirt from impervious surfaces such as asphalt. Agricultural land uses are often the major contributor to NPS pollution (1988 Oregon Statewide Assessment of Nonpoint Sources of Water Pollution, DEQ, 1988) but on-site spills, urban development, forestry activities, highway maintenance, and runoff from urban uses are also involved.

Suspended sediments and nutrients such as nitrogen and phosphorus are the predominant NPS pollutants. (See the American Planning Association newsletter on NPS pollution in Appendix A.) Oil and grease are major contaminants, in addition to salts, metals, reduced dissolved oxygen, and toxic organic chemicals. Metals, pesticides, other inorganics and some pathogens affect water bodies in many places throughout the state. Because of the nature of estuaries and their uses, many of these pollutants are of critical concern in coastal waters.

An excellent source of information about water quality in Oregon is the 305b Report prepared by DEQ every 2 years. This report is required by the Federal Clean Water Act, Section 305b, and contains data about all types of environmental issues and about the progress being made to improve conditions. While the document contains considerable technical information, it is written in a manner that allows the interested citizen to review and understand it.

HYDROLOGY AND WATER QUALITY

When water hits the ground, two processes can occur. First, the water may infiltrate into the groundwater, leaching or picking up chemicals as it moves through the soil and rock zones. Plants may take up, or transpire, some of this water and pass it into the atmosphere. Complex groundwater interactions with soil, soil microbes, and air can either raise or lower the concentrations of the various chemicals present.

Second, the water may move as surface water. After precipitation or flowing water detaches and picks up soil particles or other pollutants, it flows over the ground surface and transports the pollutants downstream. The pollutant transport process that follows entrainment is also complex. This involves deposition (sedimentation), re-entrainment, and re-deposition. Since the transport of contaminants down through a stream system is primarily dependent on high flows, the rate that pollutants move through even a small watershed can vary from days to many years in the same watershed. The most important hydrologic variables affecting this process are stream gradient (steepness) and runoff velocities, which increase or decrease because of stream flow or

precipitation. Other important variables include soil type and the amount of exposed soil or pollutant. Land development exposes soil and often increases flood flows, which increases erosion.

As runoff flows through stream pools, ponds, lakes, and wetland systems, the pollutants being transported can settle out or be otherwise removed, reducing their concentration in the water. This natural process can present major problems, such as the impairment of fish spawning areas by sediment deposition. On the other hand, deposition also provides "water treatment" if the facilities involved have been constructed or adapted and maintained for water quality improvement purposes.

While most NPS problems originate with precipitation striking, or water flowing past, exposed pollutant sources, there are exceptions, such as on-site wastewater systems that discharge directly to the groundwater. Groundwater usually discharges into surface water and vice versa, so nonpoint sources that affect one will usually affect the other.

Temperature problems are usually classed as nonpoint source problems. They commonly result from the removal of streamside vegetation that would otherwise protect the water from direct sunlight. Summer flow reduction can also increase temperature. These flow reductions can result from degraded riparian area and less infiltration to groundwater storage because of additional impervious cover (such as asphalt).

ENVIRONMENTAL, SOCIAL, AND ECONOMIC IMPACTS

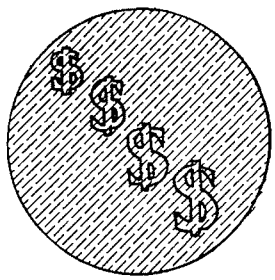
The continued degradation by pollutants such as silt, pesticides, nutrients, pathogens, and metals affects the use of rivers, creeks, lakes, and estuaries throughout each basin in Oregon.

Groundwater and wellhead areas are increasingly threatened by a variety of pollutants, and costly remedial or preventive activities must be undertaken to protect the public health.

No one knows the total cost of NPS pollution in terms of illness, expense, or lost quality of life. Yet, everyone knows of places where they can no longer fish or swim without concern. The social effect of so many small losses to the quality of life cannot be quantified. It is, however, reflected in people's growing skepticism about the future of our nation and our communities, and about the ability of public officials to effectively address persistent problems.

The economic costs to build water treatment systems, treat people made ill by exposure to contaminants in the water, or construct NPS pollution remedial systems can be significant. These actions are taken to protect ourselves from pollutants that do not need to be in the water to begin with. Other costs can include the effect on local economies from lost

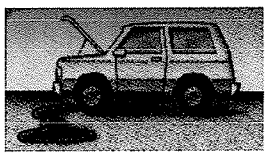
tourism, lost fish resources or the loss of funds used for pollution control that could have been available for other community needs.



The best solution is to avoid contaminating the water in the first place. The solution to pollution is prevention.

NONPOINT SOURCES OF WATER POLLUTION

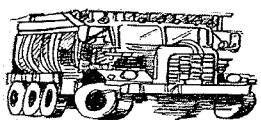
Most NPS pollution results from disturbances, alterations, or uses of the land surface. Nonpoint sources can be generally grouped by the types of land use listed below. This list shows the percentage of pollution caused by each use statewide and describes the most immediate impacts. In addition to the intensity of the NPS pollution activity, the real extent of the type of activity is important to consider.



Urban (11.8%)—includes residential, transportation, commercial, and industrial uses. Impacts: Toxic substances enter the food chain; petroleum products are harmful to fish and wildlife; excessive nutrients increase algal blooms; water quality is reduced.

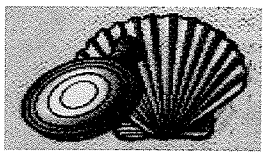
Agriculture (38.7%)—includes range and field activities. Impacts: Bacteria and nutrients increase in streams; increased temperature damages fish habitat; erosion and vegetative loss occur; bacteria can cause human illness; algal growth increases.

Forestry (17.4%)—includes logging and related road construction. Impacts: Increased temperatures and turbidity harm aquatic life; sediment buries fish habitat; habitat area is lost from other effects.



Mining (5.2%)—(Not addressed in this guidebook.) Impacts: toxics can enter streams; erosion can alter streams.

Construction (3.3%). Impacts: Erosion can destroy aquatic life; toxics have long-term impacts on fish and wildlife; flooding can occur more frequently, while less water is available for aquatic life in the summer.



Marine recreation (13.8%)—includes boating and other marine activities. (Not addressed in this guidebook.) Impacts: Pollutants such as oil, toxics, and debris can reduce or kill fish and wildlife; bacteria can make humans ill.

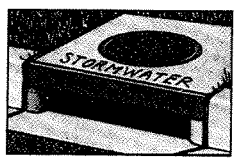
Natural (9.7%)—includes natural erosion and naturally occurring nutrients. Impacts: Streams can usually handle some pollutants, but humans accelerate the NPS pollution process and disrupt the natural balance.

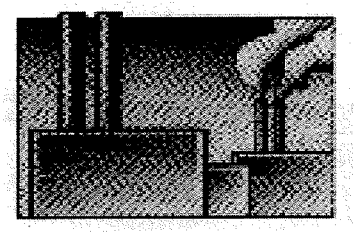
Urban

Urban NPS pollution is similar for residential, transportation, commercial, and industrial activities. Most of the problems originate when water flows past soil, exposed chemicals, or impervious surfaces such as streets, driveways, and roofs. Erosion from construction activities is also a major concern in urban areas. "Street dirt" can contain contaminants such as heavy metals, organic chemicals of various types, phosphorous, oil, and grease.

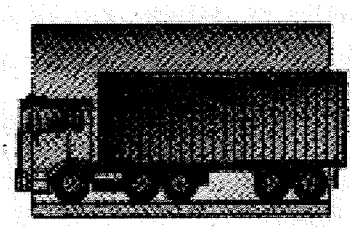
Residential sources include:

- Septic tanks (not addressed in this guidebook), which produce primarily oxygen-demanding pollutants, nitrates, and bacteria
- Stormwater systems
- Lawn and garden chemical use
- Garbage transfer and recycling stations
- Incinerators and trash-burning sites
- Vehicles (e.g., petroleum products)
- Erosion caused by soil exposure or high runoff velocities from impervious surfaces
- Golf courses
- Disposal or accidental releases of various chemicals





Industrial areas (for example, loading docks or storage areas where hazardous materials are exposed) can release industrial chemicals to storm drains, streams, and groundwater. Many industrial NPS problems result from accidents such as fires, spills, and leaks involving warehouses, manufacturing plants, storage/loading areas, and transport vehicles.



Commercial areas (such as commercial sales or service areas) vary widely in their NPS pollution potential, depending on the materials that are stored, used, or transported on the site and the landscaping programs that are used.

All three urban sources can be addressed through the various control measures discussed in Sections III and IV.

Agriculture, Forestry, and Mining

Soil erosion is the primary NPS concern in farm, forest, and mining areas. Suspended solids (sediments), phosphorous, temperature changes, timing of pollutant release, and attached metals can all be involved.

Agricultural runoff can include fertilizers, herbicides, and pesticides in the water or attached to the soil. The exposure of stored chemicals or waste (such as manure) to precipitation can also cause problems in a farming area. While agricultural contributions of phosphorus, nitrogen, and herbicides or pesticides to surface water and groundwater are of concern, erosion (sedimentation) is the most significant problem.

Forestry practices also affect surface waters through erosion, particularly from logging roads and skid trails. Forest chemicals can be contributed through poor storage or application practices, as well as leaks or spills. Forest residues, such as the vegetation remaining after the forest is harvested, are usually a minor factor.

Mining can affect surface water and groundwater through the leaching of heavy metals and other chemicals to surface water and groundwater systems. Most leaching occurs in tailings piles or ponds, but can also occur from whatever mining surface is exposed to air and water. NPS pollution control measures relating to mining are not addressed in this guidebook.

GRESHAM EROSION CONTROL TECHNICAL GUIDANCE HANDBOOK

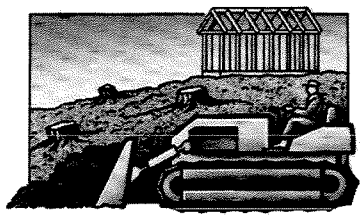
The City of Gresham developed a guidebook to reduce the amount of soil materials removed from construction sites. The guidebook is used by the city for its construction projects, as well as by private builders and contractors that work within the city limits. The primary concern was soils eroding from sites because of storm runoff.

The guidebook contains a number of effective management practices for reducing and controlling soil erosion during construction. It is anticipated that these practices will also help contain any on-site chemical spills.

Since adoption, the city has found the guide to be helpful in preventing soil erosion.

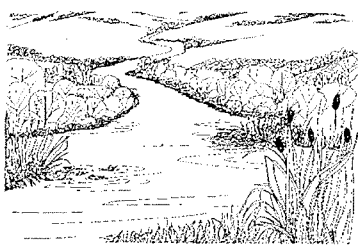
Construction

Soil erosion and the subsequent downstream sedimentation are the primary problems associated with construction activities in urban, agricultural, and forestry areas. Because of the high degree of soil exposure involved, construction activities are a major source of water quality problems. This is particularly true in a watershed where new projects start up as others end; the watershed may be exposed to extremely high erosion rates for decades, even though individual projects may last only a few years. Polluted sediments can destroy the usefulness of spawning beds. Stored chemicals, building materials, road surface treatments, and landscaping/weed control practices can also affect water quality.



Stream Alteration and Riparian Disturbances

Stream alteration and riparian disturbance can result from any of the preceding uses. Stream alterations can expose the beds and banks of streams to the forces of erosion, particularly during high-flow periods. During high flows, many of the sediment particles are quickly washed through the stream system. If downstream water resources can absorb the loadings, this process may have little effect on water quality. However, much of the entrained soil will be deposited downstream and act as a source for continuing erosion and deposition processes. This results in serious downstream problems, particularly for fish.

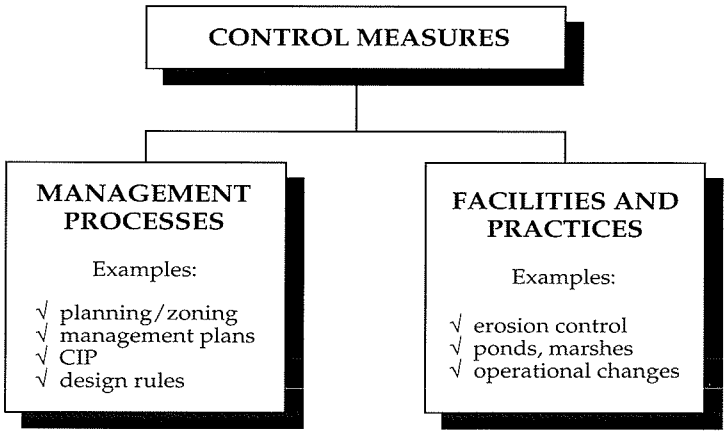


Watershed alterations, such as urbanization and the loss of vegetative cover, are an important factor in stream alteration. They create higher runoff velocities and consequently more channel erosion.

AN OVERVIEW OF NPS POLLUTION CONTROL MEASURES

This guidebook presents a variety of NPS pollution control measures. These measures, which emphasize prevention, can be classified into two categories:

- Management processes
- Facilities and practices



Management processes include authorities and functions that are currently available to local governments and can be used to address NPS pollution control. They particularly emphasize pollution prevention and include:

- Comprehensive planning
- Land use regulation (e.g., zoning regulations or development permits)
- Surface water management plans
- Watershed planning
- Capital improvement programs
- Design/construction standards
- Local agency coordination

Section III describes these management processes in more detail.

Facilities and practices are constructed facilities or operational practices that can be used to prevent or remedy NPS pollution. Examples include:

- Erosion control practices.
- Ponds, marshes, and sediment trap facilities for sediment deposition. These facilities can also include other water quality functions, where vegetation filtration or soil infiltration processes are used to provide biochemical removal of various chemicals.
- The protection of various pollutant sources, such as chemical storage areas.

- Conservative application practices for herbicides, pesticides, and fertilizers, as well as alternative practices.
- The adjustment of land development, farm, and forest harvesting practices so they are more responsive to water quality issues.
- Protection of sensitive areas such as steep slopes, erodible soils, streams, wetlands, and riparian areas.

Section IV gives detailed descriptions of these facilities and practices for urban (residential, commercial, and industrial), agriculture, and forestry uses. Mining, marine recreation, and on-site wastewater systems are not addressed in Section IV.

These control measures provide local governments with a number of options for dealing with the many NPS pollution situations arising in their communities. Once an inventory of existing conditions has been prepared, local officials can develop an appropriate list of control measures adapted specifically to their communities. A complete NPS pollution control program must be composed of several elements from each of the two major categories.

By understanding when and why to use these various systems and practices, local officials can provide valuable resource protection for their communities and become an important part of the national system for protecting the environment.

IMPLEMENTATION APPROACHES

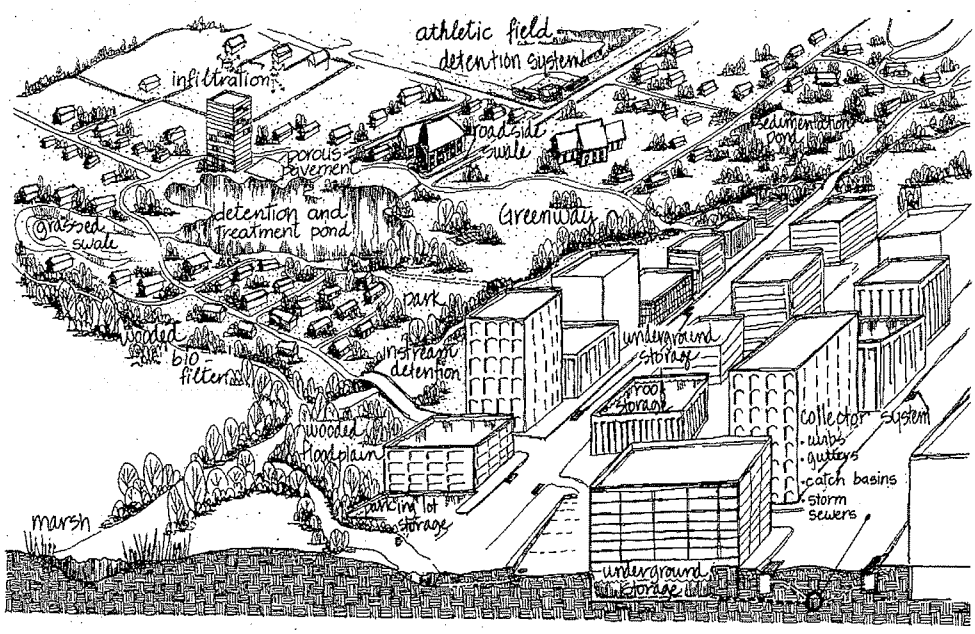
A number of approaches are possible for implementing NPS pollution control. They range from those that are low cost and politically acceptable to those that require more effort and commitment.

One approach is to rely on information and education programs to achieve voluntary compliance. Voluntary approaches have been extensively used over the last two decades, particularly for agriculture, and have had modest success. Opinions vary about the potential of these information and voluntary compliance programs, but very few people, if any, believe they will do the job alone.

Another approach is to combine information, education, and voluntary compliance with a stronger, more active role for state and local government. With this approach, the local jurisdiction coordinates and, if necessary, regulates activities that affect the quality of waters within its jurisdiction. This can include coordination/negotiation sessions with federal land management agencies, such as the U.S. Forest Service or the U.S. Bureau of Land Management. It can also involve a stronger proactive local role to support the enforcement of federal and state water quality laws and regulations.

In urban areas, both site development requirements and regional public water quality facilities are needed. Site development requirements are needed for both the construction and post-construction periods. They involve erosion control, special protection zones, remedial facilities such as sedimentation ponds, and the reduction of impervious surfaces (e.g., minimizing road widths and roof areas). Since many parts of an urban/suburban area are already developed and site-by-site retrofitting site is difficult, if not impossible, regional NPS control facilities may also be required. Such facilities treat surface waters coming from the developed urban surfaces, primarily impervious areas such as streets and driveways.

The most productive approach is one that is receiving increased federal and state emphasis. It involves the participation of multiple jurisdictions and disciplines in watershed planning and management to address NPS problems, followed by enforceable regulations and regional public facilities. This is now being done in many communities in Oregon.



Whatever approach is used, special attention must be given to public participation options to ensure that the best method for informing and involving the public is used. Section III contains more information about reaching citizens in the community.