

Virginia Cooperative Extension

# Natural Resources and Environmental Management

A Program Focus of Virginia Cooperative Extension

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VIRGINIA POLYTECHNIC INSTITUTE  
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Virginia is a state blessed with a rich heritage of natural resources. From the sandy seashores and barrier islands of the East Coast to the spruce-topped mountains in the west, Virginians rely on natural resources for recreation and tourism, scenic beauty, and raw materials for industrial processing. Issues related to the use and management of natural resources, protection of the environment, and their relationship to our health, safety, and well-being swirl around us everyday. These issues are debated in the news media and on Main Street in towns and cities across the commonwealth. Virginians care about their environment—the quality of the air we breathe and the water we drink, where the municipal and industrial waste is being treated and how, what agricultural chemicals are being applied to our farm fields and how much drifts away or runs off into streams, how healthy our deer herd is and should we bring elk back into the state, and on and on.

Fortunately, Virginia is well equipped to deal with these issues through a host of professionally managed state agencies. Many of these agencies serve multiple roles, and all operate under citizen oversight and with clearly defined mission statements. Some have responsibility for the direct management of recreation land, water, and/or fish and wildlife resources. Examples are the Virginia Department of Forestry, Virginia Department of Game and Inland Fisheries, and Virginia Department of Conservation and Recreation. These three agencies, along with the Virginia Department of Environmental Quality, also serve as regulatory agencies—enforcing the many state and federal environmental laws and regulations.

There is another state agency that for many years has been dealing effectively with state and local natural resource and environmental issues—Virginia Cooperative Extension (VCE), an outreach program of Virginia's two land-grant universities,

Virginia Tech and Virginia State University. The mission of Virginia Cooperative Extension is to serve the needs of Virginians through education, linking the vast body of knowledge of the universities and their research capabilities, to help solve the problems of the state. Agriculture, family health and nutrition, community development, 4-H youth, and natural resources and the environment are the traditional areas of expertise for Virginia Cooperative Extension.

Virginia Cooperative Extension fulfills its mission by using locally-based Extension agents who operate out of local offices in all counties of the state and most cities, plus a cadre of university professors, called Extension specialists, based at the campuses and 12 Extension and research centers located throughout the state. VCE educators have always worked cooperatively with local citizens and governments, industry, and other state and federal agencies to conduct educational programs. In fact, the word *cooperative* has been part of our name since 1914. Each year, over 40,000 Virginians volunteer their time to help VCE fulfill its mission, an extraordinary display of support. Within VCE, the Natural Resources and Environmental Management program area involves agents and specialists from throughout the organization. Many issues related to natural resources and the environment are interdisciplinary, and require expertise from many different fields to address. For example, protecting water quality in a stream flowing through an active farm may require the talents of crop and soil, and animal science agents, as well as fisheries, forestry, and waste management specialists. Within VCE there is a multi-college, multi-disciplinary support team that assists in identifying training needs, supports training and inter-disciplinary work, and communicates VCE expertise to outside stakeholders.

This bulletin further describes a few of the pressing natural resource and environmental issues common in Virginia, and how VCE is addressing them through education.

# F ORESTRY AND WILDLIFE

## Background and Major Issues

Virginia is a heavily forested state. From the mountains dominated by hardwoods in the far Southwest to the vast pine forests of the Southeast, virtually every county in the Commonwealth has a forestland base that supports some type of forest products industry. But our forests are much more than just a source of raw material for a large and varied industry. Forests also provide food and cover for an incredible diversity of wildlife, help cleanse the air and provide oxygen, store carbon thus helping to reduce the greenhouse effect, hold the soil in place and cycle clean water and nutrients, provide for outdoor recreation opportunities, and provide us with clean and healthy landscapes that make Virginia a prime tourist state. What kind of shape are Virginia's forests in? On the whole, pretty good shape. The harvest of trees for wood products is lower than the amount of wood being grown—a statistic that is not true in some other southern states. Virginia has about 15.4 million acres of commercial forestland, and private individuals own 77 percent of this land. Timber represents the number one crop in the state, with over \$200 million of stumpage sold by landowners each year. Throughout Virginia the forest industry contributes about \$9.8 billion annually to the state's economy, and accounts for over 228,370 jobs.

But there are some critical issues facing Virginia's forests, the citizens who own those forests, the natural resource professionals who manage them, and the forest products industry. Declining forest health is always a concern. Foreign pests like the gypsy moth and hemlock woolly adelgid are causing alarm in some parts of the state, while native pests like the southern pine



beetle often rise to epidemic levels. Introduced exotic plant species are choking out native plants and trees. Fragmentation of landscapes and ownerships, and deforestation, or the conversion of forestland to other uses like residential and commercial, are making it difficult to manage forests for timber and wildlife habitat. Wetlands and other important, non-forest wildlife habitats are decreasing. Negative interactions between people and wild animals are becoming more common as residences spring up in forested landscapes. Likewise, city people moving to the country often bring city values and have difficulty tolerating traditional practices in rural areas, like farming and timber harvesting. Increased residential development in forested landscapes also brings safety issues, such as fire danger. Decades of fire prevention and control also have created some problems, as fire intolerant tree species have become more prevalent in our forests, and native fuel loads rise to the point where fires, when they do occur, become more dangerous. Water quality issues from forestry practices such as timber harvesting and site preparation for planting are important throughout the state, as is basic management knowledge



for both landowners and foresters alike. Landowners need to know about the services and assistance available to them so they can be better stewards of the land, and foresters need to keep current on the latest methods of management and tools that are changing yearly in our technologically advanced world. With all of these issues there is a common denominator—education. With

education, these issues can be tackled in innovative and highly effective ways. VCE Extension agents and specialists, cooperating professors from Virginia Tech, and volunteer professionals assisting us have been working cooperatively to provide wide ranging and highly effective natural resources educational programs throughout the commonwealth since 1925. VCE can deliver fac-

tual, research-based knowledge to a wide variety of clientele on a timely basis. It is what we do!

## Educational Programs

- Forest Landowner Education Program – Shortcourses offered each spring and fall for forest landowners throughout the state. Topics include woodland management, wildlife management, and profitable timber harvesting and marketing.
- Forest Landowner Tours – Offered each fall in various locations around the state, in cooperation with many other forestry organizations. Feature woodland management, wildlife management, and the forest products industry.
- Continuing Education Programs for Foresters, Landowners and the Forest Products Industry – Offered statewide throughout the year, focusing on a wide variety of topics such as forest management, reforestation, taxes and investment analysis, silviculture, timber harvesting, mill technology and marketing, and more.
- Logger Education Program – Many shortcourses offered statewide throughout the year, focusing on forest harvesting practices, safety, use of best management practices to reduce environmental effects of logging, sustainable forestry, and business management.
- Youth and Teacher Education Program – A wide variety of forestry and natural resource educational programs for both teachers and school children directly. Summer teacher forestry and natural resources shortcourses are offered in several locations. Through the 4-H program, forestry educational programs and activities such as forestry judging and tree planting are offered. VCE co-sponsors the popular *National Project Learning Tree* program in the state with the Virginia Department of Forestry and the Virginia





Forestry Association.

- COVERTS Landowner Training Program – An annual program for selected landowners, focusing on wildlife habitat improvement and public policy issues. Landowners apply to attend a multi-day workshop, with expenses paid. Participants become part of a network of trained landowners who then assist other landowners in improving management on their lands.

## **Volunteers and Cooperators**

VCE regularly cooperates with a wide variety of agencies, companies, and organizations to deliver high quality educational programs. Often these cooperators provide direct financial support, or they may provide volunteer hosts or instructors. An abbreviated list follows:

- United States Department of Agriculture  
Forest Service
- United States Department of Interior  
National Park Service  
Fish and Wildlife Service
- Virginia Department of Agriculture and  
Consumer Services
- Virginia Department of Forestry
- Virginia Department of Game and Inland  
Fisheries
- Virginia Department of Conservation and  
Recreation
- Virginia Forestry Association
- Virginia Forest Products Association
- Ruffed Grouse Society
- Wild Turkey Federation
- Virginia's Forest Industry
- Association of Consulting Foresters
- Society of American Foresters
- Natural Resources Conservation Service
- Soil and Water Conservation Districts
- Resource Conservation and Development  
Districts
- The Nature Conservancy

# WATER QUALITY PROTECTION AND IMPROVEMENT

Virginia has an abundant supply of water. However, the quality of this resource is being threatened by both point and nonpoint sources of pollutants. For two decades, point sources have received most of the attention. But, in addition to point sources, nonpoint sources and land use issues are now receiving focused attention. Contamination of groundwater is also a major issue in many areas of Virginia.

Agricultural and residential/commercial use of fertilizers and pesticides often have a detrimental impact on both surface and groundwater (including well water) quality. Likewise, other sources of pollution, such as urban/residential use and disposal of chemicals and toxins, landfill operations, urban water runoff, and on-site sewage systems, all can have a detrimental impact on water resources. These detrimental impacts impose external costs to users of water resources by increasing treatment costs, reducing living resources, destroying habitat and, in some cases, posing human health risks. Federal, state, and in some cases, local officials have established water quality improvement and protection goals such as the 40 percent reduction by year 2000 of the 1985 base load of nitrogen and phosphorus entering the Chesapeake Bay, the "no net loss" of wetlands policy, or the 70 percent implementation of integrated pest management in the Bay area. Research and other sources of knowledge provide a base for Extension education programs on policies and practices to reach these established water quality goals. Extension faculty on the campuses and in the field are well positioned to provide education and training on agricultural and urban/residential recommended uses of fertilizers and pesticides, animal waste management, integrated pest management, use of chemicals and toxic materials, on-site sewage systems, and many



other environmental issues. Likewise, university faculty have the expertise to help develop and implement water quality policy and to provide a wide range of environmental education for elected/appointed officials. In addition, youth and adults working with youth need sound, balanced training and information concerning these issues.



## Educational Programs

- Household water quality testing and information programming.
- Turf and landscape urban nutrient management programs.
- Extension publications, fact sheets, and newsletters that address nutrient management practices, tools, and recommendations for use by field faculty, farmers, and others involved in nutrient management planning.
- Nutrient management training for nutrient management planners, land managers, fertilizer dealers, consultants, and farmers cosponsored by the Virginia Department of Conservation and Recreation.
- Local field days and seminars emphasizing the appropriate use of practices and tools to protect water quality.
- Water quality educational programs as part of pesticide safety education programs including pesticide applicator training, commodity workshops and shortcourses, field days, demonstrations, and winter Extension schools.
- Sustainable agriculture and integrated pest management practices programs with an emphasis toward reducing adverse water quality impacts of pesticide use.
- Publication of information on land, growth, and stewardship-based water quality and other related environmental issues to inform local officials, state agency personnel and Extension agents so that leaders will possess sufficient

knowledge of these issues for use in development and implementation of water quality management programs.

- Publication of information on relationship of economic development and water quality to inform local officials, state agency personnel, and Extension agents so that leaders will possess sufficient knowledge of these issues to effectively implement programs that provide a balance between economic development and environmental quality and will understand that the two can actually complement each other for sustainability of both.
- Publication of information on market-based approaches such as trading nutrients to efficiently and equitably implement water quality programs, providing education to local officials, state agency personnel, and Extension agents so they can effectively implement programs to better meet water quality goals.
- Sessions on public policy issues, goals, and implementation programs, including: general nonpoint pollution management, pollution prevention, toxins, wetlands management, living resources, health risks, and integrated pest management, etc., to citizens of the commonwealth.



## **Volunteers and Cooperators**

- United States Department of Agriculture  
Cooperative State Research, Education,  
and Extension Service
- US Environmental Protection Agency
- Chesapeake Bay Local Assistance Board
- Virginia Department of Environmental Quality
- Virginia Soil and Water Conservation Districts
- Virginia Division of Soil and Water Conservation

# WASTE MANAGEMENT AND ENVIRONMENTAL QUALITY

## Background and Major Issues

Protection of our air, water, soil, and biological resources from the detrimental effects of poorly managed solid and liquid wastes is in the forefront of the public consciousness. Controversy regarding the causes, impacts, and potential solutions to environmental problems continues to grow. Increasing regulation limits choices and forces behavior changes. Public information and misinformation politicizes the issues and forces

policy choices, while marketplace decisions complicate the issues. Individuals and communities are concerned about the hazards of environmental mismanagement and desire a proactive approach to reducing pollution and resource depletion.

Nutrients, pathogens, trace elements, and toxic organic compounds in wastes (i.e., municipal, biosolids, agricultural) applied to soil can have a detrimental impact on natural resources. Wastes should be used in a manner that protects air, soil, water, and biological resources from these potential contaminants.

Alternative approaches to solid waste management are required in Virginia. Landfill space is rapidly being depleted and new landfills are extremely expensive. More than 50 percent of the solid waste stream is organic and potentially recyclable through direct utilization or after composting. Composting can convert biologically unstable wastes prone to odor generation and possessing potential for water contamination by toxic organic-, nutrient- and metal-enriched leachate into commercially beneficial and environmentally manageable material.

Waste managers require greater knowledge of technologies and practices for recycling of



wastes. Local governments require information to make decisions that are in the best interest of Virginia citizens. Research is available on reduction techniques and educational programs are needed on cost effective management practices. Virginia Cooperative Extension can provide the knowledge to develop waste management and utilization plans, provide the basis for sound regulations, and assist landowners with efficiently implementing waste management and utilization plans. Stakeholders include all Virginians, and specifically include regulatory agencies, local government decision-makers, farmers, composters, and waste managers and applicators.

## Educational Programs

- Biosolids use educational programs are offered on an as needed basis through VCE for farmers and agricultural organizations, local government, and citizens.
- Compost operator training programs are offered periodically for waste managers, private composters, and consultants.
- Nutrient management certification training is offered in conjunction with the Virginia Department of Conservation and Recreation several times each year.
- Extension bulletins, fact sheets, and newsletters that address new technologies and best management practices are available for dissemination to waste managers, composters, farmers, consultants, and others involved in waste recycling and nutrient management.



## Volunteers and Cooperators

VCE regularly cooperates with a wide variety of agencies, companies, and organizations to deliver high quality educational programs. Often these cooperators provide direct financial support, or they may provide volunteer hosts or

instructors. An abbreviated list follows:

- Soil and Water Conservation Districts
- United States Department of Agriculture  
Natural Resources Conservation Service
- Virginia Agricultural Council
  - Virginia Corn Board
  - Virginia Department of Agriculture and Consumer Services
  - Virginia Department of Conservation and Recreation
  - Virginia Department of Environmental Quality, Waste and Water Division
  - Virginia Department of Health
  - Virginia Farm Bureau
- Virginia Recycling Association
- Virginia Small Grains Board
- Virginia Soybean Board



# 4-H NATURAL RESOURCE AND ENVIRONMENTAL EDUCATION

## Background and Major Issues

The Virginia 4-H Program has almost 125,000 youth enrolled as participating 4-Hers. Of these, approximately 32,000 youth participate in environment/natural resource-related educational projects each year. An additional 22,000 youth participate in natural resource programs during 4-H camping sessions. The Virginia 4-H Program has ten curriculum component committees that design, develop, and implement youth programming throughout the state. The largest and most active committee is the 4-H Natural Resources and Environmental Education Curriculum Component. It has six standing subcommittees that manage programming in their respective areas.

## Educational Programs

- The 4-H Forestry Subcommittee coordinates the 4-H Tree Identification, Pine Seedling, Chestnut, and Long-leaf Pine Projects. It provides training for 4-H Forestry instructors and manages the State Forestry Judging Competition. It supports the Department of Forestry's State Forestry Camp and uses the *National Project Learning Tree program* as a primary educational tool for youth and adult training. The subcommittee coordinated the Virginia - Costa Rica Forestry Exchange Program involving youth and adults in a two-week cultural exchange in January and July.
- The 4-H Wildlife Subcommittee is currently developing a new series of Junior 4-H Wildlife Projects. These will consist of nine project guides dealing with a variety of wildlife topics. The committee also coordinates the 4-H Wildlife Habitat Evaluation Program, which is a local, state, and national competitive event in



wildlife identification, foods, management and land use. The committee uses *National Project WILD* as one of its primary educational tools.

- The 4-H Environmental Education Subcommittee provides teacher/leader training and youth programs in aquatic/marine science, general environmental education, and water quality monitoring. Seven youth marine/aquatic education projects, three Chesapeake Bay education projects, and two leader project guides provide instructional support for the program. A memorandum of agreement with the Virginia Association of Soil and Water Conservation Districts provides recognition of 4-H youth participating in the Association's Envirothon Competition and Soil and Water Conservation Camp. Through a cooperative agreement with the Natural Resource Conservation Service and several state and public agencies/ organizations, a traveling water quality education exhibit has been created, called the *Water Wizard Van*. The *Van* will be housed at Virginia's six 4-H Educational Centers on a rotational basis for use within each Center's service area. The committee uses *National Projects WET and Aquatic WILD*, *Give Water a Hand Guide*, and numerous other curricula to support its programming.



- The 4-H Outdoor Adventure Subcommittee oversees training and educational programs with an emphasis on outdoor living, initiative, and challenge skills. Overnight camping, canoeing, rock climbing, and caving are included in leader-led events. Instructor training includes American Camping Association Living Skills Instructor Course,

high-adventure workshops, risk management, and program organization. All six 4-H Centers offer high and low ropes challenge courses in addition to the adventure programming mentioned above.

- The Sports Fishing Education Subcommittee is

currently developing a 17-part Fishing Education Instructor Guide to support the program statewide. The program is supported by a National Fishing Education Conference and two statewide instructor workshops have been held. Currently, 4-H Fishing Camps are held at Holiday Lake and Northern Virginia 4-H Centers.

- The Shooting Education Subcommittee oversees local, district, and state training and competitive events in air rifle, pistol, small-bore rifle, shotgun, archery, and muzzleloaders. It coordinates 4-H training and certification in all shooting sports disciplines and cooperates with the Virginia Department of Game and Inland Fisheries in hunter education instruction and with the National Rifle Association in instructor training. All programs are affiliated with the National Rifle Association and American Camping Association and supported by the Virginia Department of Game and Inland Fisheries. Shooting Sports Education Camps are held at Holiday Lake and Northern Virginia 4-H Centers. State competitions include the State BB/Air Rifle Match and the State Hunter Education Championship. In addition, the non-competitive Sports-a-Field Event is a family-oriented introductory program in hunter and shooting education.



## **Volunteers and Cooperators**

- Society of American Foresters
- Virginia Tech Student Chapter
- United States Department of Agriculture  
Forest Service
- Virginia Department of Game and Inland Fisheries
- Virginia Department of Environmental Quality
- Virginia Department of Forestry
- Virginia Division of State Parks
- Virginia Division of Soil and Water Conservation

- Virginia Forestry Educational Foundation
- Virginia Institute of Marine Science
- Virginia Living Museum
- Natural Resource Conservation Service
- Mid-Atlantic Marine Education Association
- Trout Unlimited
- Give Water A Hand

# MINED LAND RESTORATION AND DEVELOPMENT

## Background and Major Issues

Coal mining is the major industry in southwestern Virginia's Buchanan, Dickenson, and Wise Counties. Coal mining is also an important industry in Lee, Scott, Russell, and Tazewell Counties. Although Virginia is the nation's seventh-largest coal-producing state, coal mining is confined to a relatively small region of the state; virtually the entire coal producing region is affected, directly or indirectly, by coal mining. Unemployment and poverty rates are high in Virginia's coal-mining counties. During 1995, when Virginia's statewide unemployment rate ranged between 5 and 6 percent, unemployment rates in the seven coal-producing counties remained in double digits.

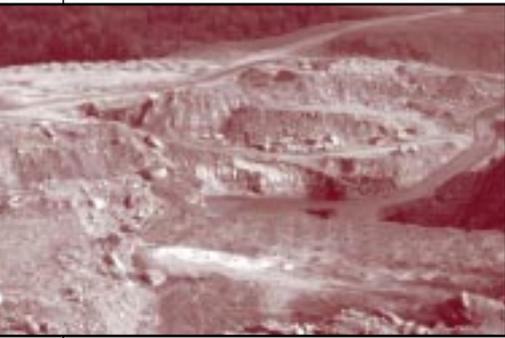


Steep terrain, which constrains land use, is a major factor that limits economic opportunity in southwestern Virginia's coal-producing region. The region's steep terrain has a negative effect on the competitiveness of coal-mining firms, and it increases the costs of environmental protection that must be borne by Virginia coal-mining firms. Steep terrain, and associated geological characteristics, also affect quality of life experienced by area residents. The region's groundwater resources are not plentiful, and are often of poor quality. Provision of public services, such as centralized water and sewerage, is costly, and economic development is hindered. The potential of coal mining to create reclaimed lands suitable for economically valued use has not been realized.

Coal mining has a major impact on quality of life in the coal-producing counties. Historically, the coal industry has been responsible for at least 50 percent of the total economic activity in the three major coal-producing counties.

Virginia coal mine employment has declined by nearly one-third from levels of 10 to 15 years ago. Future projections indicate that the coal production declines of the early 1990s will continue - thus, additional loss of coal mining jobs is likely. The Virginia coal industry is suffering for a number of reasons, including the region's steep terrain, high environmental compliance costs, and continuing depletion of coal reserves.

Coal mining also affects the environment, although those effects have been dramatically reduced since implementation of a 1977 federal law. The federal law, however, imposed costs on

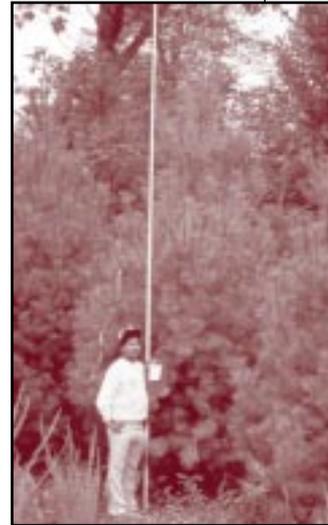


Virginia's coal industry. Due to steep terrain, Virginia coal producers bear environmental compliance costs that exceed those borne by operators in most other states. High environmental compliance costs have had a negative effect on the Virginia coal industry's ability to compete in national and global coal markets.

Another problem affecting Virginia's coal-mining counties is the impact of current mine reclamation practices on reclaimed land use. Experience has shown that coal-mined land can be reclaimed to support economically valued uses such as forestry, housing, and livestock production. Reclaimed mine areas can serve as excellent wildlife habitat, if reclamation procedures appropriate to that land use are employed. Due in part to the federal mine reclamation law, current reclamation practices generally do not maximize post-mining land use potentials. An associated problem is that thousands of potentially productive mined acres, including some which were reclaimed prior to the federal reclamation law, are not being utilized to their full economic potential.

Since 1980, Virginia Tech's *Powell River Project* has developed mine reclamation, environmental protection, and mined land management technologies, in cooperation with the coal industry

and state and federal agencies that regulate mine reclamation practices, such as the Virginia Department of Mines, Minerals, and Energy and the US Office of Surface Mining, Reclamation and Enforcement. Mine reclamation and environmental protection technologies developed through research can reduce the coal industry's environmental compliance costs while improving post-mining land use potentials, environmental quality, and wildlife habitat. Implementation of new technologies is often hindered by a variety of factors. These include lack of awareness by landowners, coal mine operators, and regulatory agency employees, and lack of background scientific knowledge by mine employees. In recent years, VCE has been developing and disseminating information that is utilized and assists regional efforts to deal positively with other natural resource concerns that affect the quality of life in the coalfield region. Central to this effort has been a cooperative state/industry partnership known as the *Powell River Project*. Administered by Virginia Tech, the *Powell River Project* maintains a central office and educational site in Wise County.



## Educational Programs

- Field demonstrations of new technologies developed through research.
- Workshops for mining industry and regulatory agency employees.
- Publication of research results as practical “how to” guidelines that are available to the industry and regulatory agency personnel.
- Youth education programs provided to local grammar school and high school students, and to students enrolled in Environmental Science curricula at local community colleges.

## Volunteers and Cooperators

- Clinchfield Coal Co.
- Clinch Valley College, University of Virginia
- Cumberland Plateau Planning District Commission

- Lenowisco Planning District Commission
- Mountain Empire Community College
- The Nature Conservancy
- Red River Coal Co.
- Southwest Virginia Community College



- Southwest Virginia Public Education Consortium
- Virginia Coalfield Economic Development Authority
- Virginia Department of Mines, Minerals and Energy
- Virginia Department of Health
- Virginia Department of Environmental Quality
- Virginia Department of Forestry
- Virginia Department of Game and Inland Fisheries
- Virginia Division of Soil and Water Conservation
- Virginia Coal Association
- Virginia Coal Council
- Virginia Mining Association
- Department of Agriculture
  - Natural Resources Conservation Service
  - Forest Service, Jefferson National Forest
- Office of Surface Mining

Virginia Cooperative Extension provides an effective conduit for the transfer of research-based knowledge from the university to the citizens of the commonwealth. Through the myriad of educational programs and materials such as bulletins and videotapes, and the availability of free, Web-based information, VCE is responding to the needs of Virginia's citizens, industries, governmental agencies, and others. A leader in the development and use of information technology, VCE is also ready to assist in providing the latest information via electronic delivery. All local VCE offices are now hard-wired to promote effective communication and transfer of educational materials via the World Wide Web. Increasingly, Web-based software is being used to facilitate meetings, conduct training, transfer information and images rapidly, and conduct surveys.

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