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Moving Toward Sustainable Forestry:

Strategies For Forest Landowners

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Strategies For Forest Landowners

James T. Walters
&
James E. Johnson

Virginia Cooperative Extension

College of Natural Resources
— Department of Forestry

Virginia Polytechnic Institute and State University
Blacksburg, Virginia

Authors

James T. Walters is a former Extension Associate in Forestry with the Department of Forestry, College of Natural Resources, Virginia Tech. He is currently a Forester with Reisinger and Associates, Inc., a consulting forestry firm in Blacksburg, Virginia.

James E. Johnson is Associate Dean of Outreach in Virginia Tech's College of Natural Resources.

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Sustainable Forestry – What Does This Mean For Me?

What is Sustainable Forestry?

The forests of the United States have undergone substantial changes since European settlement in the 1600's. In colonial America, trees were viewed as weeds, and land was cleared to plant agricultural crops. Timber was used to make cabins, fences, and other structures important to frontier life. Forests continued to be cleared as the United States became an important member of the world's economy. Our forests were one of our most important resources and provided us with wood for housing, paper, and export goods. Forests were cut and the land cleared with little further thought. Deforestation then began to slow, but we still viewed the forest as an unlimited supply of timber, wildlife, homesites, and recreation opportunities. The increasing interest in the environment has now caused us to stand back and think about the sustainability of our forest practices.

Settlers obtained many products from the forest. This wagon contains firewood to heat homes in town.

Sustainable forestry involves managing our forests to meet the needs of today while leaving sufficient resources for future generations.

Sustainable forestry is simply managing forests to meet the needs of today while leaving sufficient resources for future generations. Sustainable management is founded upon a stewardship ethic that focuses on multiple-use forestry and conservation of soil, air, water, and habitat quality. Some of our forestlands have been managed sustainably for generations, but many have been poorly managed. Because forests are a valuable resource, we should manage them responsibly and be careful not to overexploit them.

Sustainable forestry is an important factor in sustainable community development, which allows communities to remain stable and viable. Forests can be an important factor in the well-being of a community. This is especially true in western Virginia, where forestland is a large portion of the land base. Our forests are a very valuable resource. They are also renewable - they are capable of being replaced by natural ecological cycles or sound management practices. Sustainable forestry shares two key components with sustainable development: it focuses on the needs of people and it recognizes that we have limited natural resources.

Many demands are placed on our forests.

People place many demands on forests. Forests are vital in sustaining life because they process carbon dioxide into oxygen, which is necessary for us to breathe. We make many types of wood products from the trees in our forests, including structural lumber, wood furniture, fuelwood, and pulp products such as paper and cardboard. Many people are interested in sustaining wildlife species, which require reliable cover and food. Recreational opportunities are in great demand and are becoming valuable resources for private landowners. We are also placing increasing value on the aesthetic quality of our forests; wooded homesites and sites with good views are much more valuable than cleared lots. Forests help to maintain water quality by filtering nutrients from runoff

Recreational and housing needs also place great demands on forests.

and preventing erosion. Finally, many landowners manage timber on their forestland to provide income when the timber is mature. All these demands are made on our forests at one time or another. The management of forests to meet more than one of these demands is called multiple-use management.

The limitations of the natural resources in our forests have become quite apparent in recent years. Increasing timber prices and legal battles over the use of national forests suggest that we must recognize these limitations and manage forests wisely. An important limitation of our forests is the acreage available for management. Many large tracts of forestland are being fragmented into stands too small to effectively manage. Others are being developed for other land uses. Current trends indicate that fragmentation and development will continue to reduce the total acreage of forestland. The second limitation of the forest is productivity. Some parts of the world, and even some parts of the United States, are recognizing the value of fertilizing forests to increase productivity, but fertilization is expensive, and it is not economically feasible in western Virginia. However, it is very important for us to maintain forest productivity through proper management. Some previous management practices have decreased productivity by negatively impacting the soil, changing the species composition, and degrading the genetic quality of forests. We must avoid these practices in the future and focus on strategies to improve productivity.

Why Practice Sustainable Forestry ?

There are many reasons for practicing sustainable forestry. The economic sustainability of some communities is directly related to the long-term success of the forest products industry. Furthermore, many people feel an ethical obligation to manage forests in a responsible manner. Sustainable forest management is also a means by which the forest is able to meet multiple demands.

Communities that are surrounded by extensive forest resources often have wood products companies as primary employers. These companies are important to the local economy because they provide stable jobs and support related industries such as logging and trucking. The success of wood products companies is important to the long-term prosperity of many rural communities. Forest products industries can be successful in the same location over a long period of time if there is a constant supply of timber. Sustainable forests provide a steady supply of timber for these manufacturers. Forests also provide opportunities for a host of recreational activities such as camping, hiking, hunting, fishing, horseback riding, mountain biking, and bird watching. These activities can generate substantial income for a community, and must be accommodated by forestry practices that are used to produce timber.

Forest products companies provide stable jobs in many communities.

Sustainable forestry practices can create financial gains for landowners and consumers of wood products. Poor forestry practices result in lower financial returns for landowners because future harvests are not as profitable. Proper management techniques allow landowners to have a continuing, periodic income from their timberland. Sustainable forestry can also result in more stable prices for wood

products such as lumber and paper because the supply of timber is more constant.

Many people are worried about the future of our environment and feel an obligation to maintain biological richness, productivity, and ecological processes. Environmental concerns are growing and receive a great deal of attention from the media and politicians. Many people want to manage our resources responsibly and are learning more about forestry so they can make informed forest management decisions. Some people are concerned about the supply of forest products. Others want to preserve certain characteristics of the forest for future generations. Examples of these characteristics include wilderness, beautiful scenery, and old growth. Sustainable forestry considers all these environmental concerns as important inputs to management decisions.

Public forest managers are continuously under the scrutiny of various forest user groups. Management decisions on public forests are very complex because of the many conflicting objectives of users. It is much easier for private forest landowners to make management decisions, because they generally have fewer management objectives. Sustainable forest management addresses multiple uses of forests by basing decisions on all objectives that are important to a landowner.

Perhaps the most important reason to practice sustainable forestry is that it is the right thing to do. Virginia's forests are abundant and trees are a renewable resource, but we must recognize that the amount of forestland is limited. Wise forest management will allow us to continue to enjoy the forest benefits that we have always taken for granted.

The Foundation of Sustainable Forest Management

The foundation of sustainable forest management lies in its mission, guiding principles, and objectives. The mission represents the ultimate goal of our management efforts - sustainable forests. More specifically, the mission of sustainable forest management is to utilize forests to meet the needs of today while leaving resources for future generations. The outputs of sustainable forest management are very diverse, ranging from wood products to the water that drains from the forest.

The mission of sustainable forestry is to utilize the forests to meet the needs of today while leaving resources for future generations.

Guiding principles are values and beliefs that form the basis for our management decisions. In sustainable forest management, these principles reflect the intent to conserve forest resources and to manage forests for diverse purposes. Management activities should protect the functions and characteristics of forests. We should also manage under a multiple-use management scheme, in which many forest uses and objectives are considered. Impacts of forest management activities on sites external to the forest should be minimized. We should try to protect unique and fragile areas that have important cultural, social, and ecological value. Finally, we should be considerate of the local economy and needs of local people. Our management activities should fall within all laws pertaining to such operations.

There are eight primary objectives in sustainable forest management. These objectives represent specific goals that will help us achieve the ultimate mission of sustainable forestry. There are often trade-offs among these objectives, so all must be considered while planning management activities. The objectives are:

1. Provide landowners with an integral role in forest management activities.
2. Minimize impacts of forest management activities on water quality.
3. Maintain and enhance timber productivity.
4. Protect special and unique areas.
5. Provide wildlife habitat.
6. Maintain aesthetic and recreational values of forests.

7. Provide landowners with opportunities and financial incentives to carry out sustainable forest management.

8. Provide opportunities for enhancing the local economy through forest practices.

How this Handbook is Organized

The eight chapters of this handbook parallel the eight objectives of sustainable forest management. Each chapter describes management strategies and activities that may be useful in meeting a particular objective. Management strategies are the means by which we can accomplish our overall goal of sustainable forest management. Management activities are the specific tasks we can perform in following a strategy. Each chapter also includes a list of references to other publications that discuss specific strategies and activities in more detail.

For example, the first chapter focuses on the role that landowners can have in managing their forests. Management strategies for landowners include determining your ownership objectives, preparing a forest management plan, seeking professional advice, and maintaining good contracts with forest workers. Each of these strategies is discussed in detail, including reasons why each is important and what you can do to fulfill each strategy. The chapter concludes with a list of resources that cover this subject in more detail.

Many landowners are interested only in specific objectives, such as promoting wildlife or managing for timber. However, it is important to read all objectives and think about how your particular management strategies and activities might interact with other forest uses. For example, you may be interested solely in your timberland as a financial investment, but you should consider the impact of your management activities on water quality, aesthetics, and wildlife habitat; it is not wise to ignore them.

This handbook is intended to be both a quick reference and a long-term learning tool. It is organized in a manner that is straightforward and clear. Additionally, the material is arranged so that it can be read in its entirety. Each of the objectives of sustainable forestry is equally important and should receive equal consideration. This consideration will be a very important part of successful forest management in the future.

CHAPTER 1

Your Role In Sustainable Forest Management

You can increase your role in forest management by:

1. *determining your objectives*
2. *developing a forest management plan*
3. *seeking professional advice*
4. *maintaining good legal contracts.*

There are many privileges associated with owning a tract of forestland. As a landowner, you generally have the right to use your property in any manner within the confines of state laws and local ordinances. You also have the right to earn money from various uses of your property. These privileges make up a large portion of the value of a property.

Along with the privileges of land ownership come several responsibilities. You are responsible for paying the property taxes assessed on your property, and you bear a great deal of liability involving your land. One important responsibility for you, as the owner of a forest property, is to be a good steward. Stewardship is the careful and responsible management of land entrusted to your care.

Although there are some laws that regulate the use of your property, ultimately you make all management decisions concerning stewardship. These decisions have a profound impact on the future value of your property. They can also affect the value of your neighbors' land. Therefore, these decisions should be considered and researched carefully. Gathering complete information about the impact of each choice will help you make better decisions. If you have hired a property manager such as a consulting forester, you should monitor the decisions he or she makes and insure that they reflect your intentions.

A landowner can certainly have a vital role in forest management.

Landowners may be involved in forest management at different levels. Some landowners make all management decisions, utilize the forest products from their land, and live on the property. Other landowners live in a city away from the property and have hired a property manager to perform all forest management activities. Regardless of your current level of involvement, you have the opportunity to determine your ownership objectives, devise a forest management plan, use professional advice when necessary, and maintain good legal contracts with everyone who works on your property. You should focus your effort on these four important management strategies.

Strategy #1: Determine Your Ownership Objectives

As a landowner, it is important to decide exactly what you expect to get from your property before any management planning can occur. Different ownership objectives may require different management strategies. Carrying out management activities without considering long-term objectives leads to unnecessary costs and disappointment.

For example, consider Joe Smith, who owns a sizable tract of timber in Bland County. Joe wants to operate a wildlife preserve on his property and guide hunts for trophy whitetail deer. He also wants to harvest timber on a periodic basis to provide additional income from the property. The forest management plan under these objectives might be different if Joe were interested only in providing a scenic view from his mountain cabin on the property. It is important for landowners like Joe to decide what they expect to get from their forest.

Some landowners do not realize the total value of the forest and do not know exactly what to manage for. Other landowners recognize the slow rate of change in the forest and consequently put off making management decisions. This procrastination can cost landowners a great

deal of money and keep them from realizing the true potential of their property. For example, if you plan on harvesting timber to pay college tuition for your children, then the income from that harvest is very important. If you do not make plans to maintain a healthy forest, an insect or disease outbreak could significantly decrease the value of the timber.

There are several activities that may help you decide upon the objectives for your property. These activities include investigating the options that are available for managing your property and scheduling a meeting with your heirs to determine long-term goals.

Management Activity: Investigate your Options

There are many different ways you can manage your property. Before you decide on your management objectives, it is a good idea to investigate the various possibilities. You may be surprised at the range and values of your management alternatives. There are several sources of information regarding markets for forest products and trends in forest management. Professional foresters and wildlife managers would certainly be valuable resources when investigating management alternatives. Some of the most common forest uses in western Virginia are timber production, providing wildlife habitat, producing non-timber products, recreation, aesthetic enjoyment, watershed protection, and investment.

A forester can give you an estimate of the value of your timber.

Timber production is a common objective of forest landowners. Although many owners may not harvest the timber on their property, they are still interested in increasing the value of the timber. Timber production is most often a secondary objective of landowners because the other values of the forest are more important to them. However, it is a good idea to know the value of the timber so that you can evaluate how important timber production is in relation to other forest uses.

Landowners manage the wildlife habitat on their property for a variety of reasons. Some landowners receive income from a hunting lease and are interested in increasing the value of that lease. Others want to have the opportunity to hunt on their own private land. Wildlife management may support a particular recreational interest of a landowner. For example, one landowner may manage for songbirds because he enjoys birdwatching on weekends. Wildlife can certainly have an aesthetic value on a forested property, particularly if the owner resides there. Finally, some landowners manage for wildlife because they feel an ethical obligation to provide a natural habitat.

Common forest uses include timber production, providing wildlife habitat, producing non-timber products, outdoor recreation, aesthetic enjoyment, watershed protection, and investment.

Non-timber forest products are found in many of Virginia's forests, but their importance is often not recognized or appreciated. Examples include nuts, fruit, ginseng, mushrooms, and vines. Some of these products can be harvested and marketed. It is a good idea to check out local markets for these products.

Landowners are often interested in the diverse recreational opportunities that are offered in a forest. Examples include hunting and fishing, camping, hiking, mountain biking, boating, swimming, horseback riding, and off-road vehicle use. There seem to be an unlimited number of things to do in the forest. Forested properties are weekend getaways or vacation spots for some landowners. Regardless of the recreational use that a landowner gets from a property, recreational facilities and opportunities certainly add real value to a property.

Aesthetic values are becoming more important as forested areas are developed for residential use. Aesthetic value is most important to a landowner living on the property. These landowners are often willing to absorb the lost income from not harvesting timber. An aesthetically pleasing property undoubtedly has greater real estate value than an unattractive one. Landowners who have not seen a timber harvest may not recognize the value of aesthetics. It is important to consider aesthetics as a secondary objective.

Forests provide clean water because they filter nutrients and slow runoff to prevent erosion and stream and lake siltation. This value is very important on some properties, such as those with springs or headwater streams. There are even laws forcing landowners to consider watershed protection as a management objective. However, watershed protection is very compatible with most other forest uses, even properly conducted timber harvests.

Forests have been recognized as a good source of clean water.

Forests can have great value as real estate and as a source of timber. Some investors have recognized this value and have diversified their portfolio by purchasing timberland. These investors are receiving a good return for the risk associated with forestry, particularly when investing in real estate for development. Investors must be careful managers, because improper management decisions can cost a great deal of money. Although many forest landowners are not primarily interested in their property as an investment, it is a good idea to stay informed about the value of your property and look for ways to increase that value.

Management Activity: Hold a Meeting to Determine Objectives

One of the best ways to determine the ownership objectives for your forest property is to have a meeting with your children, heirs, or other future owners to discuss long-term plans for the property. The relatively slow development of forests makes it necessary to think about long-term goals. These goals should receive consideration as you formulate your own ownership objectives. This consideration and planning is a principal component of sustainable forest management.

There are several important issues when formulating a list of ownership objectives. If you live on the property, are you willing to do some of the management work yourself? Forestry work is not always complex, but can be labor-intensive. Will the management activities disrupt your lifestyle? Log trucks and chain saws are loud pieces of equipment and can become annoying. Do you have the money necessary to meet your objectives? Eventually, you will probably have to pay for some management activities as either investments or costs of ownership. Answering these questions will help you make realistic assumptions about what to expect from your property.

A meeting with your family will help in determining long-range objectives for your forest.

Do you wish to manage your property actively or passively? The best recommendation for some forest stands is to let them grow. Although it seems simple, this recommendation may best meet your ownership objectives. Some landowners are not willing to manage their property, but would rather let the forest change naturally. If you can count yourself in this group, then you may find that your management alternatives are greatly reduced. If, however, you are willing to actively manage your property, preparing and implementing your management plan will become major activities for you.

When you have considered these important factors, you can begin to formulate a list of ownership objectives. It is a good idea to write your objectives down on a piece of paper, think about them, and then decide which are the most important and which are simply things you would like to accomplish. Management objectives sometimes conflict, so assigning a relative importance to each is helpful.

When you have finished listing your objectives and their importance, put the paper away for several days. When you look at the list again, the relative importance of each objective may have changed, but you should still have the same objectives. If you have changed your objectives, it would be wise to review them and reconsider which are most important.

Strategy #2: Develop a Management Plan for your Property

A good plan is very important for managing a forest. It is a roadmap of the journey to meet your ownership objectives and will present a logical sequence of forest management activities for your property. A management plan saves you money in the long run because it discourages you from conducting management activities that do not correspond to your ownership objectives. Also, some of these activities, while providing income in the short run, can prevent you from ever realizing your goals because they are irreversible. For example, harvesting timber immediately adjacent to a trout stream may change the habitat in the stream and prevent you from establishing a strong population of native trout.

A good management plan will also allow you to work more efficiently with forest advisors. The plan should outline your ownership objectives and describe the resources available on your property. Your advisors will be able to quickly review the plan and save several hours, or even days, of preliminary work.

A forest management plan is an important tool in forest management.

A forest management plan will demonstrate your commitment to managing your property properly and profitably. Lending agencies, such as banks, are much more willing to approve your loan application if a management plan is written and in effect for the property. The plan also allows you to illustrate that you have established your ownership objectives and are managing your property to meet these objectives.

Writing a forest management plan requires a fair amount of technical knowledge. You may be well qualified to write your plan, but most times it is better to get professional assistance in preparing a draft. You should still, however, have an important role in developing the plan because your objectives are its foundation.

There are several activities related to management plans that you, as a landowner, can complete. Specifically, the most important activities are to make certain that the plan is complete, see that the plan is followed, update the plan as necessary, and keep records of the management activities recommended in the plan.

Management Activity: Develop a Complete Management Plan

The plan for your forest should contain complete information about managing the entire tract. If you get assistance in writing the plan, you should be sure that it includes several key components: a review of your ownership objectives, a description of the property, including a map, and a discussion of management recommendations.

The objectives section should provide a brief overview of your ownership objectives and describe the relative importance of each. This section is important because it will allow you to see why specific management recommendations are made for your forest.

The property description should contain ownership information. A legal description that refers to deedbook, tax parcel, and acreage of the tract should be the first part of the property description. Physical features such as topography, soils, climate, streams, and access should also be addressed. An inventory of timber, wildlife, recreational opportunities, and other resources should be included. The timber inventory breaks the property into stands based on types of trees, tree age, volume of timber products, and value of the timber. The wildlife inventory will identify species found on the tract and distinguish different habitats. The recreational inventory should list trails, campsites, and other recreational sites. Finally, the property description should include maps that highlight special features of the tract, such as rare or endangered species and habitats, or special historical or archaeological sites. These maps are generally based upon topographic maps that are available from the government and local sporting goods stores.

Key components of a forest management plan include:

1. *A review of objectives*
2. *A description of the property*
3. *Management recommendations.*

The management recommendations should consist of specific activities that can be performed in your forest over the planning horizon. Your planning horizon could be twenty-five years, or even as much as fifty years, but the recommendations should focus on the next five to ten years. A timeline should be included to clearly identify where and when each activity should occur.

Management Activity: Implement the Management Plan

A forest management plan is not very useful if it is not implemented. As the landowner, it is ultimately your responsibility to see that management activities are completed. Therefore, it is useful if you are familiar with the recommendations that have been made and when management activities should occur. A simple calendar with management activities would serve to remind when activities are due. It is important to follow recommendations to maximize the effectiveness of your plan and reduce costs. For example, a management plan may recommend planting trees during the year following a timber harvest. Failing to follow this recommendation would increase reforestation costs because the tract would be harder to plant later.

Management Activity: Update the Management Plan Periodically

Forests are certainly dynamic; they are always changing. Although trees grow slowly, fires, hurricanes, insect and disease outbreaks, and other disasters have profound and sudden impacts on the forest. Additionally, your ownership objectives may change over time. Therefore, it is important to update your management plan periodically to reflect changes in the forest's condition and your objectives. The period over which the plan should be updated varies from property to property because of differences in management recommendations and tract size. A good rule of thumb is to update your management plan every ten years. You probably can't update your plan too often.

Management Activity: Maintain Good Management Records

It is a good idea to update your forest management plan every ten years.

Good forest management records are important because they allow you to review results of past forest management activities, update tax accounts, and plan future management activities. Two primary types of records are of interest: management records and financial records. Management records focus on the results of your management activities. Financial records track revenues and expenses associated with managing your property. Financial records are very important when filing your annual tax return with the Internal Revenue Service. It would be wise to discuss these records with your tax advisor every year so that you can make plans to pay tax on income from your forest.

It is a good idea to store your records with the forest management plan. Some landowners place these materials in a three-ring binder so that everything is easily accessible and well organized. This also allows all of these materials to be transferred to your accountant, forester, logger, or management contractor.

Strategy #3: Seek Professional Advice when Necessary

Landowners frequently make decisions that will have an important impact on their forest. These decisions sometimes involve common-sense choices that landowners can make on their own. Some decisions, however, require a thorough understanding of a particular resource. In these situations, it is wise to seek advice from a forester, wildlife biologist, or other natural resource professional.

For example, a game biologist has a good knowledge of wildlife species such as whitetail deer, wild turkey, and black bear. If you wish to manage for these species, it would be a good idea to talk with a game biologist. Likewise, a consulting forester knows about current markets for timber products and has local industry contacts. Contacting a forester about a

timber sale would be a prudent decision. Special equipment may be required to carry out a management activity such as planting food plots or conducting a prescribed burn. Contracting with professionals who are equipped to offer these services can save you money and avoid potential problems.

There are many sources of professional assistance for forest landowners. These sources can be divided into four general categories: government agencies, private service providers, industry programs, and private organizations.

Government Agencies

The Virginia Department of Forestry (VDOF) is a state agency that offers many services for forest landowners. Foresters with knowledge of local forests and timber markets are assigned to each county. These foresters offer management advice and other services such as writing forest management plans, monitoring water quality, administering financial assistance programs, arranging for reforestation and prescribed burning, helping to prevent damage from insects and disease, and preventing and controlling wildfire. County foresters are not able to appraise your timber or administer a timber sale on your property. The telephone number and address of the VDOF forester in your county can be found in your local telephone book.

Government agencies can assist you in managing your forest, but it is best to contact your local agent.

The Virginia Department of Game and Inland Fisheries (VDGIF) is responsible for managing native fish and wildlife of the state on both public and private lands. The VDGIF offers services to landowners through county game wardens and regional wildlife biologists. Examples of the programs currently offered by the VDGIF include the Quail Management Program, the Deer Management Assistance Program, and the Damage Control Assistance Program. Biologists provide technical advice on habitat management (fish and wildlife), wetlands restoration, pond development, and population management. Department staff assist other state and federal agencies with management planning guidance. County game wardens can also help you uphold hunting regulations and prevent trespassing on your property. You can contact your game warden or district biologist for further information about the programs offered by the VDGIF.

Government agencies can assist you in managing your forest. It is best to work with local agents.

Virginia Cooperative Extension (VCE) of Virginia Tech is another state agency that can assist you in managing your forest. VCE is primarily responsible for offering educational programs, many of which focus on forest and wildlife management. The content of these programs ranges from property and income tax issues to wildlife damage control to plantation silviculture. VCE also develops and distributes educational materials. Your county Extension Agent can provide you with local knowledge and can direct you to Extension Specialists on particular topics.

Private Service Providers

Consulting foresters are private service providers who can offer you a wide range of services, some of which are also offered by the Virginia Department of Forestry. Consultants are generally more intimately involved with management of a property than a county forester because they are able to spend more time with the landowner. Services offered or arranged by a consultant might include timber inventory and valuation, timber sale administration, forest management planning, tree planting, site preparation, herbicide and fertilizer application, real estate appraisal, estate planning, and more specialized services. Consultants generally help you develop your management plan and then assist you in carrying out the management recommendations.

The consultants operating in Virginia have very diverse backgrounds. It is important to choose a consulting forester carefully, much as you would a family lawyer or doctor. The VDOF county forester can give you a list of consultants in

The Virginia Department of Forestry maintains a list of consulting foresters operating in your area.

your area. You should check the credentials of each forester and interview several before making a choice. A good consultant will understand your concerns and be willing to work with you to achieve your ownership objectives.

Contractors provide services that you may not be able to complete on your own. Examples of these services include site preparation, tree planting, timber harvesting, prescribed burning, and road building. Your county forester or consulting forester can arrange work on your property by these contractors. They know the reputations of the contractors operating in the area and can help you in overseeing contracted work.

A consulting forester can help you with many forest management activities.

Industry Programs

The primary industry program for assisting forest landowners is the landowner assistance program. Most large forest products companies have established programs with foresters who provide services such as management planning and administering management activities. Landowner assistance programs usually operate in areas near a company's mill or timberlands.

There is generally a contract between a landowner and the forest products company. The contract often states services that the company will provide and gives the company the "right of first refusal" of timber sold from the property. This means that when you sell timber, the company has the right to make the last bid on the timber or match any prior bids. However, you do not have to accept the company's bid on the timber if you can receive a higher price from another buyer.

Timber buyers from some mills can also offer services when a landowner decides to harvest timber. The forester can arrange for road building and sometimes provide assistance in reforestation. Type and availability of assistance varies widely. Checking with local timber buyers to determine if these services are locally available is a good idea.

Private Organizations

Landowner associations are private organizations composed of people like yourself who own forestland. These associations can be a good source of educational opportunities and sound advice. Landowner associations regularly have meetings where there are speakers on topics related to forest management. These meetings are a good place to make contacts with landowners and professionals who offer forestry services.

In Virginia, there are both local and statewide associations. The Virginia Forestry Association (VFA), founded in 1943, is the oldest, largest, and best-known. Headquartered in Richmond, the VFA offers conferences, educational programs, publications, and a quarterly magazine dealing with forestry and natural resources. The VFA also represents forest landowners and industry in political issues.

Landowner associations are a good source of recommendations when choosing professionals to assist you in managing your property. Members of these associations often have experiences with local foresters and wildlife managers. Furthermore, other landowners can recommend forest operators such as loggers, road contractors, and tree planters.

Other private organizations can provide you with information that is valuable when you are making decisions about your forest property. These organizations are often more specialized and can be very helpful when you have decided upon your ownership objectives. Examples of these organizations include the American Tree Farm System, The Nature Conservancy, the Izaak Walton League, the Wild Turkey Federation, the Ruffed Grouse Society, Ducks Unlimited, and the National Wildlife Federation.

Some Helpful Addresses:

Virginia Forestry Association
8810B Patterson Ave.
Richmond, VA 23229

Forest Landowner Association
P.O. Box 9538
Atlanta, GA 30347

Strategy #4: Maintain Good Legal Contracts

Legal contracts are important to you for a variety of reasons. They can reduce your liability when another person is on your property. Contracts assure you that people

who work for you will do the work they promise in a specified manner. A good contract may cost money in the short run, but can save you legal expenses and personal stress in the future. Most importantly, legal contracts help to assure that your good intentions are carried out and that the best results for your property are achieved.

A complete discussion of legal contracts would be very complex and is best left to you and your lawyer. However, there are several activities you can perform while managing your property that can help in all your legal agreements.

Management Activity: Ask your Forester about Contracts

An experienced forester has developed a good understanding of the items that need to be in a contract. Therefore, a forester is a good resource when you start developing your contract. Some foresters even have a general contract that can be tailored to meet your particular needs. It is wise to review your final contract with your forester because there may be technical issues that are missing or need to be specified.

Management Activity: Require Written Contracts from Everyone Who Works on your Property

Relying on written contracts with people and companies that work on your property is a good idea. You should even have a contract with your forester - many will require a service agreement before they will work for you. Some people may be hesitant about working with you if you require a contract. You should carefully consider whether you really want to deal with someone who is not willing to sign a contract to signify competence and intent.

Management Activity: Review All Contracts with your Lawyer

A forester is a good source of technical information when preparing your contract. It is always a good idea, however, to review each contract with your lawyer. A lawyer will be able to identify legal technicalities in the contract and will be better prepared to enforce the contract if necessary. Working with a lawyer may be expensive, but will be well worth it if you can prevent problems or be in a better position if a dispute should arise.

Requiring contracts with all contractors will reduce your liability and help to ensure that your good intentions are fulfilled.

For More Information

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CHAPTER 2

Forest Management And Water Quality

Clean water is a very important output of the forest.

Water quality is defined by its physical, chemical, and biological properties. Water quality indicates the suitability of water for a particular purpose, such as human consumption or fish habitat. The quality of water on a site is influenced by climate, geology, topography, vegetation, and disturbances. It is important to understand that natural water quality can be good or poor, and that water quality is not synonymous with water pollution.

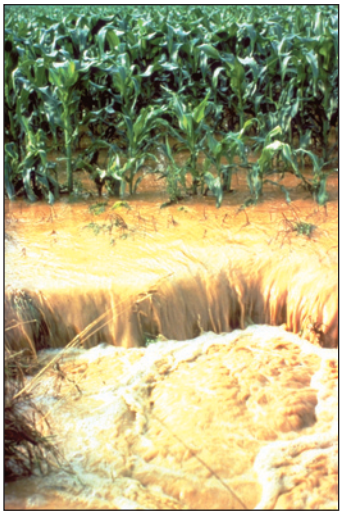
Forests generally have much better water quality than similar sites used for agriculture, industrial production, or residential areas. The importance of water quality in forests will increase as more forestland is developed for other land uses. Water quality in forests is most easily affected when we cause changes to the soil or leaf litter, or remove vegetation from the forest. However, sustainable forest management activities have very little long-term impact on water quality - even on the most sensitive sites.

Non-point source pollution (NPSP) usually refers to regional water quality degradation, where the source of the pollution is not easily identified. Important types of non-point source pollution are sediments, organic materials, nutrients, chemicals, and elevated temperature. Each of these types of NPSP influences an important component of water quality and stream habitat.

For example, nitrates in fertilizer may run off from a farmer's field into an adjacent stream. A small amount of this fertilizer may be absorbed into the natural system. However, if many farmers in the county had nitrate losses, the impacts on water quality could be very severe. Nitrate pollution can negatively affect drinking water and fish habitat.

There are several management strategies for preventing NPSP from your forest. These strategies include minimizing erosion of soil from your property, preventing losses of chemicals, avoiding temperature change in your streams, and protecting sensitive wetland areas.

Strategy #1: Minimize Soil Erosion from your Forest



Erosion occurs when water carries soil from a site.

Erosion occurs when water transports soil from one location to another. Soil erosion is a natural process that has certainly influenced the topography of Virginia. However, when erosion exceeds natural rates it can be a source of water pollution. Steep, bare slopes can cause very rapid runoff of rainwater and melting snow. If water travels across bare soil, the potential for erosion is much greater. The rapid flow of water will carry soil particles downstream until the flow becomes slower, and the soil particles will then be deposited on the bottom of the stream. This process is called sedimentation. Erosion and sedimentation decrease the sustainability of our forests.

Sedimentation can cause problems for many organisms that live in streams. When soil particles are flowing in the water, they can clog the gills of fish and disrupt mussel feeding and reproduction. When the sediment is deposited on the bottom of the stream, it can degrade habitat and smother aquatic life.

The Virginia Department of Forestry has developed a list of forest management activities that are recommended to prevent soil erosion. These activities are

Best Management Practices (BMP's) are management activities that can prevent soil erosion.

called Best Management Practices (BMP's). Most loggers and foresters are interested in implementing BMP's in forests where they work. Landowners can also implement several important BMP's that can protect water quality. These include: maintaining a vegetated Streamside Management Zone; ensuring that forest roads are properly located, designed, and constructed; ensuring that the timber buyer has a good harvesting plan; and enforcing the terms of your timber sale contract.

Management Activity: Maintain Streamside Management Zones

A streamside management zone (SMZ) is a vegetated strip of land adjacent to a stream, pond, lake or sinkhole. SMZ's are also frequently called riparian zones, riparian buffers, and filter strips. Maintenance of a vegetated SMZ prevents erosion by protecting the stream banks and slowing runoff into the stream. The Virginia Department of Forestry recommends using SMZ's, in conjunction with other Best Management Practices, to meet federal water quality standards.

A streamside management zone (SMZ) can prevent erosion in your forest.

It is very important to maintain vegetation and leaf litter in your SMZ. Leaf litter is composed of fresh and decomposed leaves on top of the soil. The litter layer and the roots of trees, shrubs, and grasses hold soil and organic matter in place. It is recommended that you do not remove understory vegetation and that you harvest no more than half of the tree crown coverage from your SMZ. Crown coverage is the area on the ground that is covered by the branches of your trees.

Many landowners prohibit the operation of equipment in their streamside management zones. The equipment used in forestry can cause damage to vegetation or the leaf litter in the SMZ and expose bare soil that is easily eroded. If you do harvest trees from the SMZ, consider requiring the logger to winch trees from the area.

The best width for your SMZ depends on several factors, including soil type, slope, and type of vegetation. The Department of Forestry recommends a buffer of at least 50 feet on each side of most streams. Intermittent streams, which flow only during wet periods, only require 25 feet on each side. However, a larger SMZ is appropriate for trout streams, streams that lead to municipal water supplies, and streams adjacent to steep slopes. It is wise to contact your county forester or consulting forester when you establish a streamside management zone. SMZ recommendations should be an integral part of your forest management plan.

Management Activity: Ensure that Forest Roads are Properly Located, Designed, and Constructed

Good roads are valuable assets to your forest because they give you access to perform management activities. Your forest roads must be large enough for use by log trucks and equipment if you plan to harvest timber. Road access is valuable and road maintenance costs can be very high, so it is important to carefully plan the road system for your forest.

A good road is a valuable asset in your forest.

Poorly designed and constructed roads are a major source of erosion from forests, particularly on the steep slopes found in western Virginia. Uncontrolled water drains from roads quickly, causing rapid runoff of large amounts of water that can cause erosion on your road, in your ditches, in the adjacent forest, and on the stream banks. This erosion results in the sedimentation of streams and rivers.

The best way to prevent erosion from your forest road is to manage water by slowing drainage and diverting runoff.

Important water management tools for forest roads include grading, water turnouts, dips, culverts, gravel, vegetation, daylighting, and stream crossing.

Slowing drainage allows water to soak into the soil. Diverting runoff distributes it from the road across the tract, so the leaf litter slows water velocity. A carefully designed plan that addresses drainage and runoff should be developed before you begin construction of your forest road.

A good road plan will locate the path of the road and describe how the road should be constructed. These details are important information for foresters, timber buyers, and road contractors because they are needed to prepare an estimate on the cost for the road. Basic water management tools that may be included in your road plan are road grade location, water turnouts, dips, ditches, culverts, gravel, vegetation, daylighting, stream crossings, and gates.

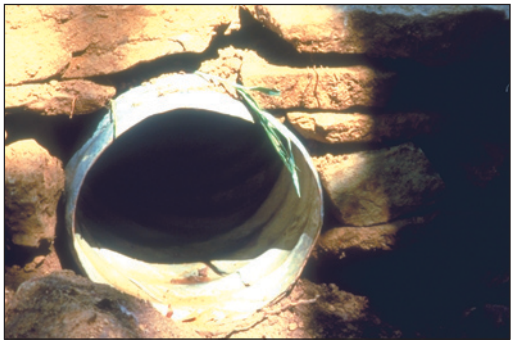
The location of road grades (or slope of the road) is important because water drains slower on a more level road. The best roads have gentle grades so that water runoff is slower. Roads on steep slopes are less desirable. Foresters usually measure road grades in "percent" slope. Basically, the higher the slope percentage, the steeper the road. The Virginia Department of Forestry recommends that road grades do not exceed 10%, but steeper slopes of 15% are acceptable for distances less than 200 feet. Strategically positioning roads along slopes can result in small grades on steep terrain like that in western Virginia. The road construction associated with minimizing the grade may increase costs, but it is less expensive than the poor access or high erosion rates commonly associated with poorly designed roads.

Slightly graded roads are more desirable than steep roads.

Rolling and broad-based dips are designed to remove water from the road by directing it into a drainage ditch or the forest litter layer. Dips are most commonly found on flatter roads, where water would form a channel in the road. Road dips are installed while your road is being graded and require no materials except gravel and rock.

A water turnout is a small diversion ditch that disperses water from the road's primary drainage ditch. Properly located turnouts reduce the cost of your road because they can be substituted for more expensive drainage structures. Water turnouts are easily constructed with regular road construction machinery. They direct water from the ditch into a brush pile, a small earth dam, or a pile of large rocks so that the water can drain through natural systems. Water turnouts require regular maintenance because they cease to work when they fill with sediment. Turnouts are very important near streamside management zones because they prevent runoff from forming a channel into the stream.

Culverts are designed to remove water from the road ditches. Metal or plastic culverts are commonly used, but a culvert made from logs or well pipe may be adequate for temporary drainage. Manufactured culverts are popular on permanent roads because they last longer and require less maintenance. Regardless of the culvert type, it is very important to use a culvert of sufficient size. In general, larger culverts are required for larger watersheds and for steeper terrain, which drains more quickly. The smallest culvert that may be used is 15 inches, but larger culverts are required in many situations. Your county forester can advise you on the proper culvert size for your forest road.



Culverts are commonly used in road construction.

Gravel is an important material in the construction of forest roads. It prevents erosion by dispersing the impact of raindrops and surface runoff. A stream of water that would cause erosion in bare soil may simply splash off gravel. Furthermore, a road with gravel has improved

trafficability during wet weather. Gravel provides a strong foundation for your road so that heavy equipment does not make ruts. In many areas of western Virginia, gravel is relatively inexpensive and should be used liberally. Your forester and road contractor can identify areas where gravel will be most beneficial.

Establishment of vegetation can be very effective for minimizing runoff on rarely traveled roads. Seeding of bare roads is recommended by the VDOF. There are a wide variety of plants that you can place on your roads, but grasses are most commonly planted. Grasses grow quickly, are easily planted, slow runoff tremendously, and have food value for some wildlife species. Furthermore, grasses do not block the road from occasional use. Farm supply stores generally sell varieties of grass that you can plant yourself and that will grow well in your area. They also carry straw and mulches that help grass to grow during dry summer months.

The Virginia Department of Forestry recommends seeding with a combination of main crop, legumes and grains/grasses to equal a total of 100 to 150 pounds of seed per acre. Common main crop grasses are ryegrass and fescue. Suggested legumes include lespedeza, crownvetch, flatpeas, and alfalfa. Grains and grasses that might grow well include red top grass, weeping lovegrass, foxtail millet, and hybrid bermudagrass.

A daylighted road will receive enough sunlight to dry quickly.

The use of exotic species is discouraged in sustainable forestry. However, exotic grasses are often seeded after a timber harvest because they are easier to establish than native grasses. They serve the immediate task of preventing erosion from bare soil. However, native grasses should also be seeded and encouraged so that they can take the place of exotics. Native species that you may be able to establish include switchgrass, big bluestem, Indiangrass, and gamagrass.

"Daylighting" refers to cutting trees adjacent to the roads that they would shade. The number of trees that should be

On A Side Note ...

Best Management Practices in a Typical Timber Sale

There are several stages in implementing Best Management Practices (BMP's) during a timber harvest. Although your forester can perform most of the tasks associated with BMP's, it is a good idea for you to understand how they will be conducted. The major stages in BMP implementation include harvest layout and planning, marking the streamside management zone (SMZ), installing roads and water management structures, logging the timber, and closing down the harvest. This case study will describe the activities involved in planning and implementing BMP's in a typical timber sale.

Layout and planning of the timber harvest is often considered the most important step in BMP implementation. When foresters begin the planning stage, they formulate strategies that will develop into a schedule of BMP activities. Much of the initial harvest planning will occur in the office. The forester and the logger work together to find the best locations for forest roads, log landings, and major skid trails. The forester also highlights sensitive areas, such as streams and fragile soils, that require special care. These features are often marked on a topographic map to pinpoint their exact locations.

The second stage of BMP planning for a harvest is to locate and mark important features in the forest. The forester usually goes to the harvest area and marks these areas with paint or surveyor's flagging. Generally, the forester marks the boundaries of the harvest area, the SMZ's, the location of any roads, and a desired location for the log landing. Any other special areas such as steep slopes, springs and sinkholes, fragile soils, or cultural features will also be marked. These features are often marked

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removed depends mostly on tree size and the season you plan to use the road. Roads that will be used in the winter must also be well daylighted because of the shorter days. In general, a road should receive sufficient direct sunlight every day so that drying can occur quickly.

Poorly designed stream crossings expose the stream banks to erosion and disturb the bottom of the stream. The county forester can help you to make decisions about stream crossings. Your forester is likely to recommend that you cross your stream with either a bridge or a culvert. Larger streams may require federal and state permits before stream crossings can be installed.

Bridges are the best type of permanent stream crossing, but they are also the most expensive to construct. If the forest road is not used on a regular basis, then a permanent bridge is probably not feasible. Temporary bridges are a good alternative if you will only use the stream crossing periodically. Some loggers and timber buyers may own a portable temporary bridge that they use during logging. You can also rent temporary bridges from local soil and water conservation districts and the Virginia Department of Forestry. Regardless of the type of bridge you use, the stream banks must provide a solid foundation for the bridge and the road should cross the stream at a right angle.

Bridges can be long-term road structures or simply a temporary structure for crossing a stream.

Culvert crossings are desirable for smaller streams because they are less expensive than bridges, but can still be used as a permanent crossing. The Department of Forestry has developed minimum culvert sizes for permanent and temporary stream crossings. Culverts should be placed in a location that provides a solid foundation

Best Management Practices continued

with paint or flagging of different colors. For example, the boundaries may be marked with pink paint, the SMZ's marked with blue, and the roads and landing in yellow.

When the harvest planning has been completed, construction of the road and logging areas can proceed. The most important duty of a landowner or forester is to assure that these structures are installed according to the standards in the harvest plan. The roads should follow the recommended route and should have all the designated drainage structures. The landings and main skid trails should be in designated locations and should meet the standards for slope and size. Close oversight of the installation of these features will help to clarify any misunderstandings before a feature is incorrectly established.

When logging begins, the landowner or forester should regularly monitor the job to ensure that the BMP's are implemented. The logger should be observing streamside management zones and buffers around sensitive areas. Additionally, the weather and condition of the site are typically monitored. If the site becomes too wet to operate, logging operations should cease. Timber sale contracts should allow operation only when soil conditions are suitable in order to avoid damage to the site and water quality.

When logging is completed on a particular site, it is important that the close-down activities are completed. In most situations, the logger is responsible for these activities. The landowner's role is to monitor the logger's work and check that activities are completed according to the standards in the harvest plan. For example, the landowner or forester needs to inspect the landing and skid trails to see that they have been graded, seeded, and that water bars have been installed as necessary. The road should be examined to ensure that it still meets the standards in the harvest plan. Finally, the county forester with the Virginia Department of Forestry is contacted to inspect the site for BMP compliance.

and should be covered with solid fill material. Improperly installed culverts can create erosion problems that can be very expensive to repair.

Rock fords are sometimes an adequate stream crossing, but cause more disturbance than bridges or culverts. The key to a successful ford crossing is to locate it in a wide, shallow site where the stream has a natural rock base and water levels are lower. Fords are ideally used only as a temporary crossing with little traffic. Fords should be placed where the road approaches the stream at a right angle and the banks are low and stable. Rock is generally placed on the approaches to a ford for at least 50 feet on each side of the stream.

A ford can be an acceptable temporary stream crossing.

A frequently overlooked, but very important, road structure is a gate. When you are finished using a road, you should install a locked gate to control access. Unauthorized use of the road can result in vandalism of water management structures. For example, a pickup truck could form ruts through water bars during wet periods. The water that flows from the road might then form a channel through the water bar, resulting in increased runoff velocity and erosion. Elaborate gates are not necessary to control access; a simple metal gate attached to wood posts will often suffice.

Regardless of the type of water management structures you use on your forest road, it is very important that the road be installed properly. You and the road contractor should reach an agreement on the type of road to be constructed and the standards the road must meet. These standards should be thoroughly outlined in the road building contract and pre-harvest plan. It might be helpful if the county forester is involved with the road design and installation. The forester can provide valuable input based on recent laws governing water quality and road construction. Finally, it is important to maintain your forest road by adding gravel when necessary, cleaning ditches and turnouts, grading the road, and replacing old culverts.

Management Activity: Ensure that the Timber Buyer Has a Good Harvesting Plan

A typical timber sale contract contains several conditions regarding water quality. Some contractual conditions, such as boundaries of the timber around streams, are found in the terms of the sale. Other conditions will place stipulations on the logistics of the timber harvest. In particular, these stipulations apply to the construction of skid trails and log landings and the "close-down" requirements for the harvest. It is a good idea to ensure that the timber buyer has a harvesting plan that considers these stipulations.

Skid trails are small, temporary roads used for dragging logs to the loading area. A logger generally makes several "primary" skid trails that branch out into the timber harvest area. These primary skid trails receive a great deal of skidder traffic during the harvest. The secondary skid trails are those that branch off from the primary trail.

Skid trails are small, temporary roads used for dragging logs to a loading area.

Skid trails are susceptible to erosion for several reasons. They are sometimes located on steep grades that drain quickly and concentrate water from the tract into a single channel. Skid trails generally contain exposed soil because the skidder churns up the leaf layer. Skidders can also rut the skid trail during wet weather, concentrating and channeling water. Finally, skid trails that are formed into the side of a hill with a bulldozer expose a large area of bare soil that is easily eroded. These skid trails are often referred to as "bladed" skid trails.

There are several precautions that can prevent erosion from skid trails during timber harvests. Grades of skid trails should be minimized by constructing trails along the contour of the land. Skid trail slopes of greater than 15% should be avoided. Water turnouts should be used to drain water from the skid trail along flatter sections. These turnouts are similar to those on your forest road. The logger can minimize the number of necessary skid trails by using longer winch cables. Loggers with special equipment, such as tracked skidders, may be able to continue operating during wet periods. However, loggers using conventional rubber-tired equipment should stop logging during wet weather in order to avoid deep rutting.

Log landings are the sites where logs are gathered and loaded onto log trucks. The size of log landings varies because of differences in terrain, tract size, timber type, and logging equipment. Log landings are potential erosion hazards because they expose a large area of bare soil.

Proper location is a key in preventing erosion from a log landing.

The best way to prevent erosion from a log landing is to locate a good site. The soil of a log landing should be stable and well-drained. The landing should be located on a very slight slope (2-5%) to ensure drainage. Water runoff from the landing should be directed away from major channels and into a buffer where it can be slowed and filtered. Logging slash is sometimes placed below the landing to help slow runoff and minimize erosion. These practices can prevent major erosion from log landings in your forest.

"Close-down" requirements outline the conditions that should be established before the logger leaves the site. The most common close-down requirements are those in the Virginia BMP Technical Guide - specifically, seeding skid trails and landings, building water bars in skid trails, and cleaning up cans, oil containers, and other trash.

Water bars are angled humps in a skid trail that divert water from the skid trail into the litter layer, vegetation, a ditch, or some other structure. Water bars are similar to road dips, but are bigger because they are generally located on steeper grades. The BMP's recommend that water bars be constructed on the skid trail immediately after the logger has finished using that trail. The Virginia Department of Forestry has created recommendations for the distances between water bars. Your county forester will help you decide where water bars should be placed.

Water bars are large humps that are used to divert water from skid trails.

Skid trails and landings should be seeded with a mixture of grasses that are quick-growing and provide thick cover. Grass slows runoff from skid trails and landings, and roots hold soil in place. The objective of seeding is to provide cover on bare soils as soon as possible. Many timber sale contracts require the purchaser to seed the site in a timely manner, after the harvest is completed. The logger often handles this responsibility.

There are two important things you can do to influence how the logger operates. First, you can specify in the contract that the logger must follow Best Management Practices. The BMP's outline all the erosion control measures described in this handbook. Second, you can meet with the timber purchaser to review water quality issues from the contract.

Management Activity: Enforce the Terms of your Contract

During and after a logging job, you can check to ensure that the water quality standards outlined in the terms of your timber sale contract are followed. The

county forester helps you with this task when performing logging inspections. One of the criteria of the VDOF's inspection relates to compliance with Best Management Practices. If the logging operation results in water pollution, the VDOF can recommend corrective action and stop the operation. If the recommended actions are not implemented, civil penalties can be assessed against the logger and landowner. The county forester may also look for other problems that may violate the standards in your logging contract.

Many landowners require timber buyers to provide a performance bond to ensure that BMP obligations are fulfilled. A performance bond is money that the purchaser gives a landowner to demonstrate the intention to fulfill the terms of the contract. The bond is deposited into the bank and is returned to the timber purchaser when logging is completed according to the contract. If the logging job does not meet contract standards, then the performance bond is used to pay for planting grass on landings and skid trails, repairing road damage, installing water bars, or performing other water management practices. Performance bonds simply serve as insurance that the purchaser will help you prevent damage to water quality.

Strategy #2: Prevent Runoff of Chemicals from your Forest

Pesticides and nutrients have long been recognized as pollutants of our water. Non-point sources of chemical pollution may be significant contributors to water quality problems in many areas. Nitrogen and phosphorus fertilizers are some of the most common non-point source pollutants, and are a far greater concern in agricultural areas than in the forest.

It is important to point out that these nutrients are important inputs to our

On A Side Note ...

Special Features in the Water Supply: Karst Terrain

Karst is composed of land that contains sinkholes, springs, and streams that drain into underground caverns and conduits. The caves and caverns in karst areas were formed over many years as limestone bedrock was dissolved by groundwater. Karst features are very important because they are a direct link to springs and wells from which we obtain drinking water. The caverns and caves in karst areas provide fragile habitats for many unique and rare creatures. Therefore, water quality is a vital issue in karst areas.

If you have a property in western Virginia, then there is a good chance that you are linked to karst terrain. The most obvious way to determine if you are in a karst area is to look for springs, sinkholes, or caves. If you have any of these features in your forest, then it is located on karst terrain. If these features are found on a neighbor's property, then it is likely that your property is also connected to underground karst structures.

There are several strategies for a forest landowner interested in preventing damage to water quality and karst features. A buffer of unmanaged forest should be established around streams, springs, sinkholes, and cave entrances. The buffer should be at least 50 feet wide, but a larger buffer would be more effective. Landings and skid trails should be positioned away from karst features and should not drain directly into the groundwater. Exposed soil can be seeded with quick-growing vegetation to prevent erosion of sediment into karst systems. Slash and other logging debris should not be placed near cave openings or sinkholes, where it can damage habitat and impede natural karst drainage processes. If karst features are abundant in your forest, you may want to talk with your forester about logging alternatives that are designed for minimal site impact.

If you have a cave, sinkhole, or other karst feature in your forest, it is a good idea to contact your soil and water district, which is part of the Virginia Department of Conservation and Recreation (DCR). The DCR is active in the conservation of karst. Proper advice can help you make good management decisions concerning your karst forest.

forests. Trees must have a certain amount of each of these nutrients in order to survive. The problem arises when there are more nutrients in the system than the trees can use. In these cases, the extra nutrients often leach from the site and enter our streams.

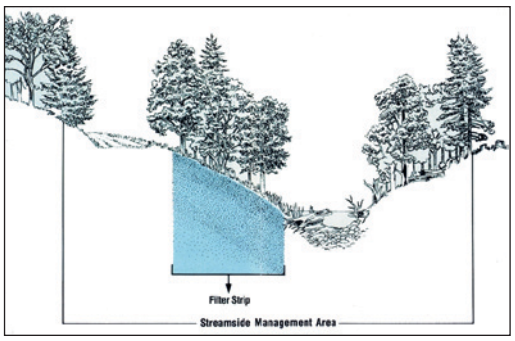
In a sustainably managed forest, there is no need for fertilizers. The natural nutrient cycle is sufficient to meet the needs of most forests. Forest fertilization would be sustainable only in restoring a site to a more natural state. If fertilization is recommended in your forest management plan, you should question the purpose of the activity and consider more sustainable management alternatives.

We can minimize non-point source chemical pollution by not allowing pesticides and fertilizers to enter our streams and by slowing the runoff of nutrients that are already in the system. In a sustainable forest, natural nutrient loss through leaching or runoff is minimal. Specific management activities that you can perform in your forest include maintaining a streamside management zone, managing fertilization efforts carefully, contracting with reputable fertilizer and pesticide applicators, and requiring forest management contractors to maintain a clean job site.

Management Activity: Maintain a Streamside Management Zone

A streamside management zone can reduce the runoff of fertilizer and pesticides into streams. Trees, bushes, and grasses filter nutrients from runoff, hence the term "filter strip." The SMZ is particularly successful in removing nutrients that are deficient in the soil. However, SMZ's are only marginally successful in removing large excesses of nutrients. Therefore, an SMZ is only the first step in managing chemical runoff.

The best width for the SMZ, relative to preventing runoff of fertilizers, depends on the concentration of nutrients in the water that drains through your forest. For example, if agricultural fields draining through your forest have been overly fertilized with nitrogen, then a wide SMZ might prevent excess nitrogen from entering the stream. If, however, the water that drains through your property is relatively chemical-free, then an SMZ of 50 feet would probably be sufficient. Your forester can help you determine how wide you should make your streamside management zone.



A streamside management zone can prevent excess nutrients from draining into streams.

An SMZ is most effective if you limit the management activities that occur within the buffer. Activities that could have the greatest impact on the ability of your buffer to filter chemical runoff are fertilization and pesticide application. Harvesting timber would also reduce the filtering capability of your SMZ because there would be fewer trees to remove nutrients. These issues should be addressed in your forest management plan. If you have any concerns about the impact of management activities within the SMZ, then it is best to prohibit activities in the area.

Management Activity: Manage Fertilization Efforts Carefully

You should cautiously consider your options before deciding to fertilize your forest. Fertilization may provide results on some poor sites, but there is certainly an opportunity to apply the wrong fertilizer and place excessive chemicals into your forest. There are not very many fertilizers that are designed for application in hardwood forests, so your options are often very limited. Unless your forester recommends it, you should avoid fertilizing your forest.

Management Activity: Contract with Reputable Fertilizer and Pesticide Applicators

You may choose the best fertilizer or pesticide for your forest, but improper application can still result in chemical runoff. A poor applicator may apply too much of

The Virginia Department of Agriculture and Consumer Services (VDACS) licenses pesticide contractors.

VDACS
PO Box 1163
Richmond, VA. 23218

the chemical, apply it unevenly, or apply the chemical outside your property. Fertilizer or pesticide might even be placed directly in a waterway, which certainly degrades water quality and is illegal in many cases. Therefore, it is important to select a contractor who will follow recommended application instructions.

There are several sources of information that can help you to choose among contractors. You can talk with your forester and other landowners who might have worked with the applicator on other properties. You can also investigate the licenses and registration of potential contractors - some are required by law to be licensed. Finally, you can meet with several contractors to look for a professional and responsible image. When you have completed these tasks, you can feel comfortable that you have chosen a contractor with a good reputation, image, and credentials.

Management Activity: Require Contractors to Maintain a Clean Job Site

When a forest management contractor such as a logger, herbicide applicator, or tree planter is working on your property, require that the job site be kept clean from trash and chemicals. In addition to making the job look better, you will be preventing chemicals from being spilled in your forest. In particular, you should investigate the contractor's waste management and equipment maintenance. The contractor should not leave containers that held oil, gas, pesticide, or other chemicals. Furthermore, the contractor should prevent equipment from leaking chemicals onto your site. It is a good idea to include a provision in your contract that pertains to waste management and equipment maintenance.

Avoid working with contractors that do not maintain a clean job site.

Strategy #3: Avoid Changing Water Temperature

Water temperature influences the type of aquatic life that will inhabit a stream. Temperature affects fish reproduction, growth, and development; concentrations of dissolved gases; and decay rates. Although every aquatic species has an optimal temperature, there is a larger range that it can tolerate. At extreme temperatures, the organism will die.

Shade helps to maintain cool temperatures in many forest streams.

Forest management activities can damage the habitat for aquatic species by increasing the stream water temperature. In particular, humans affect stream temperature by removing the trees that shade it and by increasing the runoff of warm water into the stream. One of the best methods of preventing temperature changes in a forest stream is to maintain a streamside management zone.

Management Activity: Maintain a Streamside Management Zone

An SMZ serves several purposes related to water temperature. It shades the stream from sunlight that can increase temperature. The SMZ slows runoff and allows it to soak into the groundwater, where it is cooled to a lower temperature. Establishing streamside management zones on tributaries can reduce the temperature of water entering your larger streams.

The best buffer width for maintaining stream temperature depends on topography, tree species and age, drainage, and other specific site characteristics. In general, if the trees close to the stream are sufficient to provide shade, then the buffer does not need to be very wide. Conversely, if the trees along the stream are short and do not provide shade for the stream, then a wider SMZ would be necessary to maintain temperature. A large

buffer would be necessary to slow runoff from large and steep areas, but a smaller buffer would be sufficient for areas that are small and flat. A forester can answer questions about streamside management zones and stream temperature.

Strategy #4: Protect Sensitive Wetland Areas

A wetland is an area that is covered by water or has very wet soils that support wet-site plant species. Although they are relatively uncommon in western Virginia, wetlands are unique and sensitive areas that sometimes support rare habitats and species. Managers of sustainable forests must give special consideration to wetlands and should focus efforts on careful management of these special areas.

Wetland areas should be carefully managed according to federal, state, and local laws.

Several activities will help to protect wetland areas and should be considered in management planning. These activities include carefully reviewing laws pertaining to your wetland and developing a team of professionals to make management recommendations.

Management Activity: Review Laws Pertaining to Wetlands

The Clean Water Act and other laws make you financially responsible for damage to water quality.

Several federal, state, and local laws relate to forest management in wetland areas. The most important of these is Section 404 of the Clean Water Act, which places restrictions on forest management activities in wetlands. The Clean Water Act specifically regulates mechanized land clearing and earthwork in wetlands, but some forest management activities are exempt from this law. It is wise to consult with your forester and the U.S. Army Corps of Engineers to determine if the Clean Water Act and other wetland laws pertain to your property. These laws should be addressed in your forest management plan. Because the laws are frequently updated, it is also a good idea to consult with the Corps of Engineers before performing any management activity in a wetland area.

Management Activity: Develop a Team of Professionals

The U.S. Army Corps of Engineers has regional offices in Dumfries, Staunton, Christiansburg, and Abingdon.

When you are managing a forest located in a wetland, it is important to have good management advice. Your advisors should know the restrictions that apply to your property and be familiar with forest management practices that preserve wetlands. The county forester or consulting forester should be able to give you general advice and direct you to wetland experts.

Experts in several governmental agencies can help you manage a wetland. The Department of Forestry employs several forest engineers who specialize in road building and timber harvesting in wetlands. The VDOF engineer can help you determine if your wetland can be harvested and can make recommendations on how to protect the site. The U.S. Army Corps of Engineers is responsible for administering permits for forest management in wetlands regulated by the Clean Water Act. You should contact the Corps of Engineers before beginning any management activity in a wetland.

When you are performing forest management activities on wetlands, it is very important to work with a contractor who has wetland experience. Your forester can recommend qualified road builders, loggers, and tree planters. These contractors may be more expensive than regular contractors, but the added cost should be well worth the assurance of a job well done.

For More Information

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CHAPTER 3

Maintaining And Enhancing Tree Growth

Maintaining and enhancing tree growth, or productivity, is an important part of sustainable forestry. Ideally, increasing productivity provides us with more forest products and reduces the amount of forestland that must be devoted to timber production. For example, if you can increase the productivity of your primary forest stands, then you can place less emphasis on timber production in your streamside management zones and special areas. As we place more demands on the forest, tree growth will become a key characteristic.

Forests grow slowly, but good management can enhance growth.

There are two ways to look at tree growth. In a biological sense, tree growth refers to increasing the size of trunks, branches, and roots. In an economic sense, growth refers to an increase in value. Tree value and usefulness as forest products, aesthetics, wildlife habitat, and other uses are related to tree size.

Productivity is influenced by many factors, but generally they can be divided into two broad groups: site characteristics and stand characteristics. Site characteristics are qualities of the land where the forest is located, and are usually related to either climate or soil. Stand characteristics are attributes of the timber in the forest. Examples of stand characteristics include tree size, health, and species.

Comparing the productivity of forests in western Virginia to that of forests in other regions is a difficult task. Our forests are more productive than those in some regions and less productive than others. However, for producing high-quality hardwood timber, our forests are more productive than forests in many regions. In fact, some of the best hardwood timber in the world comes from our Appalachian Mountains.

The most important limitation to productivity in many western Virginia forests is soil quality. The quality of a site in our region can often be estimated by investigating the rock found under the soil. In general, the sites that are located in limestone areas have high timber productivity. In contrast, the sites located in regions that contain shale are generally less productive. Forests on sandstone-based soils usually have intermediate timber productivity. The type of bedrock is important because limestone sites tend to have deeper, moister soils and more nutrients than sites with sandstone or shale.

There are several management strategies you can enact on your property to maintain and enhance timber productivity. These strategies include maintaining and improving site productivity, maintaining and improving the productivity of your current stand of timber, and establishing productive stands of new timber.

Management strategies for improving tree growth include:

1. *Enhancing site productivity*
2. *Improving the productivity of your current timber*
3. *Establishing productive new stands of timber.*

Strategy #1: Maintain and Enhance the Productivity of the Site

Many attributes of a site make it productive for growing timber. The climate and topography of the area are certainly important inputs to productivity. Sites that receive high amounts of precipitation are generally more productive than dry sites. Temperature can influence the length of the growing season and can cause defects that slow tree growth. Aspect of the topography has a significant influence on the type of vegetation that will grow on a particular site.

Site productivity has a significant impact on the growth of a forest. Coves are generally better sites than mountaintops.

Location of the forest on the mountain is important in determining timber productivity. Forests on tops of ridges are generally less productive than forests in coves and stream bottoms. Needless to say, there is not much that we can do to change the climate or topography of our forests.

The quality of the soil is another important factor in determining the productivity of a site. Soils that are deep, moist, and rich in nutrients usually support productive forests. Furthermore, in a productive forest, the tree roots are able to grow through the soil. Unproductive sites sometimes have hard, dense, and rocky soils that discourage root growth. For example, most tree roots do not grow well in soils with high clay content. Protecting and enhancing site characteristics can make your forest more productive. In particular, you can prevent soil erosion, fertilize special sites in your forest, prevent compaction during timber harvests, allow logging slash to decompose, and prevent livestock grazing.

Management Activity: Prevent Soil Erosion

Soil erosion can greatly decrease the productivity of your forest. Most soil nutrients are in the 6 to 12 inches directly below the leaf layer. Nutrient levels diminish dramatically at greater depths. If the surface soil is taken from the site by erosion, then the site becomes much less productive. You may remember that erosion is a natural process that occurs in all forests. While this is true, natural erosion is generally offset by the creation of new soil, so it usually does not affect site productivity. Our goal as forest managers is to prevent our management activities from causing erosion beyond natural levels. A sustainably managed forest will not have higher-than-normal erosion rates. Minimizing erosion helps maintain site productivity in our forests.

Erosion prevention measures, such as seeding with grass, are important in maintaining site prductivity.

Erosion control techniques were discussed in great detail in Chapter 2. We are particularly interested in preventing erosion from roads and timber harvests. Most erosion originates from these two practices. The primary strategies for erosion control on forest roads are to divert water from the road whenever possible and to slow runoff on the road. Our goal is to place runoff from the road into natural drainage systems. The key to preventing erosion from a timber harvest is the protection of sensitive areas such as skid trails and log landings. We generally protect these areas through careful harvest planning that outlines Best Management Practices for the forest.

Management Activity: Fertilize Special Sites

Trees need a variety of nutrients to grow. They get most of these from the soil. However, the soil in our forests sometimes does not contain enough of a particular nutrient. In these cases, nutrient deficiencies can limit site productivity. The most common nutrient deficiencies occur when there is not enough nitrogen, phosphorus, or potassium.

The most common nutrient deficiencies are nitrogen, potassium, and phosphorus.

Farmers have used fertilizers to increase the productivity of their crops for decades. Until recently, however, fertilization of forests was never considered a viable management option. Advancements in fertilizer technology and increasing timber prices have caused some forest landowners to think seriously about fertilizing the forest.

The use of fertilizer in forests should be carefully considered from the standpoint of sustainability. Sustainable forestry is about managing a renewable resource - the timber in our forests. Many of the fertilizers that can be applied to forests, however, are not renewable at the rates they are currently used. Therefore, the continuous fertilization of our forests over a long period of time is not a sustainable forestry practice.

There are special sites, however, that have been abused in the past and have lost some of their natural productivity. Fertilizing these sites just once or twice may help them to regain that lost productivity. For example, some sites in western Virginia that were farmed in the early 1900's have become much less productive. The agricultural practices on these sites depleted the supply of nutrients important for tree growth. It is very difficult for these sites to regain productivity without fertilization because natural development of nutrients is very slow. Fertilizing a site may increase the natural production of nutrients. In these cases, fertilization is a temporary measure we can use to restore a site to its natural productivity.

Forest fertilization is uncommon in western Virginia because it is very expensive. Increases in productivity do not usually offset fertilization costs. However, you may want to consider this as a management alternative if your forest contains special sites that would be improved by fertilization. Your forester or county Extension agent can give you more information about fertilization.

Management Activity: Prevent Soil Compaction in your Forest

Soil compaction occurs when the soil is squeezed together. When soil is compacted, the amount of air in the soil is decreased and the soil can become very hard. These soil conditions are not conducive to growing trees and other forest vegetation. Trees need softer soil so that their roots can grow. Softer soil contains more water and oxygen, which are important for good root growth. Soil compaction simply decreases the productivity of a forest site.

Soil is compacted whenever we step on it, but that compaction is insignificant. When a heavy machine drives across the soil, however, compaction can be much more severe. Therefore, compaction is a big concern whenever our forest management activities involve large machines.

Heavy machines used by loggers can cause severe compaction in some forests.

Certain soils are susceptible to compaction. In particular, soils that are moist or high in clay content are more easily compacted than dry and sandy soils. If the soil in your forest is sensitive, there are several steps you can take to prevent compaction. First, you can limit the use of heavy equipment on the site. If you want to harvest timber from a forest with sensitive soil, you should ask your forester about logging alternatives that do not use conventional machinery. If your site is fairly stable, you might be able to find a logger who uses lighter equipment with wide tires. This equipment compacts the site much less than ordinary logging equipment, but is more expensive to operate and is not well suited to extremely steep sites with large timber.

Restricting the operation of heavy equipment in your forest during the wet season also prevents compaction. Dry soil is much more stable than wet soil. Summer and fall are relatively dry seasons in western Virginia, and the soil in your forest is usually much more stable during these months. If heavy equipment operates only during the summer and fall, then compaction of your forest soil will probably be minimal.

Management Activity: Allow Logging Slash to Decompose

Logging slash is the wood debris left after a timber harvest and includes branches, chunks, bark, and stumps. Traditionally, logging slash has been left in

Logging slash decomposes and provides valuable nutrients for the soil.

the forest because there has been no market for these wood materials. Over the years following a timber harvest, slash decomposes, providing valuable nutrients for the soil, increasing organic matter in the soil, and improving soil structure. It also provides nesting and escape cover for wildlife. Decomposing slash is an important source of nutrients in a sustainable forest. Technological advancements in paper and wood product manufacturing, however, have increased the markets for smaller logs. The amount of slash that is left on the site has been decreasing steadily as these advancements have occurred.

The best way to ensure that logging slash is left in your forest after a timber harvest is to include a stipulation in your timber sale contract that addresses slash disposal. Most loggers in western Virginia leave the tops and branches of trees in the woods, but you may want to make sure that the logger does not pile all the logging slash near the landing. Your forester will be able to help you write the timber sale contract and work with the timber purchaser in order to leave logging slash in your forest.

Management Activity: Prevent Grazing in your Forest

Livestock grazing has been common in forests located on farms, but causes problems in these forests. Livestock often travel the same paths when they move from one location to another, causing soil compaction. They also increase the potential for erosion by exposing bare soil. Livestock damage the fine feeder

On A Side Note ...

Visually Acceptable Harvesting Alternatives

Increasing interest in the aesthetic value of the forest has stimulated the development of timber management techniques that have less disturbance on the appearance of the forest. One of the most promising of these techniques is the selective harvest of timber combined with timber stand improvement (TSI) practices. This technique is a visually acceptable manner of harvesting timber that can provide income from the forest.

Selective harvesting, combined with TSI, can be relatively easy to implement in your forest, but should be used judiciously. If this technique is improperly administered, it can result in a high-graded forest containing trees of little or no value. The first step in implementing this technique is to specify tree species and characteristics that will lead to a tree's being harvested. A forester can inspect your forest and help you to make these decisions. The forester should mark trees that are undesirable due to species or other characteristics such as size or poor form. These trees will be removed in the TSI cutting. For example, you might specify that only trees that are small, crooked, limby, or unhealthy should be cut. The resulting forest should contain healthy trees that will provide a wide range of values, including aesthetic enjoyment, wildlife habitat, and good timber growth.

An important step in administering a selective harvest with TSI is the creation and enforcement of a good contract. The contract should specify which trees are to be harvested and should place penalties on damage to residual trees. Furthermore, the contract should require the buyer to cut down marked trees, regardless of merchantability. Small trees that you want to be removed should be marked with paint at eye level and on the stump. When harvesting is completed, the only stumps that should be found are those with large diameters or painted bark. It is a good idea to require a performance bond from the purchaser so that you can repair any damages that occur during logging.

A properly implemented selective harvest with TSI can provide you with income from your forest while maintaining an acceptable appearance. A harvest of this type will generate a small income, but leave a much more valuable forest behind for future growth and development.

roots on your trees, making it more difficult for the trees to get water and nutrients from the soil. Finally, livestock frequently damage large roots and bark along the bases of trees, opening them to harmful insects, disease, and decay.

A fence can prevent livestock from grazing on the young trees in your forest.

Livestock graze on young trees in your forest. These young trees are very important because they will take the place of old trees that die or are harvested. Heavy grazing makes it difficult to establish a new stand of timber when the older trees are removed. Heavily grazed forests often look like parks because there is little vegetation in the understory. The result of grazing is a forest that is unhealthy and has reduced timber value. This type of forest is not sustainable.

The best way to prevent grazing in your forest is to build a fence that keeps livestock in the pasture. This fence does not have to be elaborate. Many landowners simply use barbed wire or high-tension fence to keep livestock out of their forests. Fencing your forest is a management activity that you can probably perform yourself and will be a valuable asset for your forest.

Biological productivity is the capacity of your forest to grow trees.

Economic productivity is related to how much your timber increases in value.

Strategy #2: Maintain and Improve the Productivity of your Current Stand of Timber

Many factors influence the productivity of your current stand of timber. For example, there is only a limited amount of nutrients and water available on the site. Trees must compete with each other and with other vegetation for these resources. Competition decreases the productivity of your timber.

The mixture of tree species in your stand also has an important impact on timber productivity, because some species grow faster than others. For example, yellow poplar grows very well in many of western Virginia's forests. Black locust grows more slowly and does not get as big as yellow poplar. Although black locust is an important component of our forests, yellow poplar is much more desirable in terms of timber production.

Insects and disease can have a tremendous impact on the productivity of timber in your forest. The gypsy moth, which eats the leaves of oaks and other trees, is a good example. Without leaves, these trees are much less productive. They also become less healthy and can even die if they are heavily defoliated or infected by a disease.

There are two primary ways we can improve the productivity of timber in our forests. First, we can improve the biological productivity of the timber and thus increase growth. Management activities that increase biological productivity include reducing competition and preventing insect and disease damage. Secondly, we can increase the economic productivity of the timber to make it more valuable. Management activities that increase economic productivity include removing unproductive trees from your forest and pruning trees. By increasing the productivity of our timber, we will increase the amount of timber that can be sustainably harvested from the forest. This will decrease the need to harvest timber in fragile and unique areas, which need to be managed according to their special needs.

Competition for resources, such as water and nutrients, is high in a young forest.

Management Activity: Reduce Competition in a Young Forest

A young stand of timber is one where the majority of trees are saplings - trees less than four inches in diameter. A young stand of timber might be found in forests where timber has been harvested, older trees have died, or a field has grown into a forest. The trees

in a young stand of timber are generally less than 15 years old.

There are several types of competition in a young timber stand. In very young stands, the trees must compete with grass, bushes, and other herbaceous species for nutrients, water, and sunlight. When the trees get older and grow taller, they are usually able to get plenty of sunlight. However, they still compete with herbaceous plants for water and nutrients. When the trees finally begin to branch out, they compete primarily with each other for sunlight. Their branches are fairly close to the branches of other trees, forming a compact canopy.

Natural resource managers often use the term "stocking" to refer to the number of trees found in the forest. Forests that are understocked have too few trees, while overstocked forests have too many trees. Forests that are well-stocked have an appropriate number of trees. Controlling competition is only important in overstocked forests because the trees are competing with each other for resources. In these forests, some trees would die naturally because there are insufficient resources to support all the trees. Understocked and well-stocked forests have less competition for resources, so competition control is not necessary. Your forester can tell you if your forest is overstocked.

The most common method of reducing competition in a young stand of timber is to control the growth of competing vegetation. We generally accomplish this by using herbicides or by cutting the competing trees. There are several techniques associated with each of these vegetation control strategies.

Herbicides are chemicals that are designed to control undesirable plants. Herbicides used in forestry are chemical compounds that disrupt plant metabolism, leading to death. Herbicides can be used to control competition in any young stand, and there are a variety of herbicides that can be used. Each is designed to control a particular type of vegetation. For example, some herbicides are designed to control grasses and others are designed to control small woody bushes. The best herbicide for controlling competition in your stand depends on the type of vegetation you need to control. If you want to control herbaceous vegetation in a very young stand, then the herbicide should be designed to control herbaceous growth. If you want to control trees that are competing for sunlight, then the herbicide should be designed for trees.

Herbicides must be used judiciously in sustainably managed forests in order to protect their natural character and features. The primary role of herbicides in sustainable forest management is in the restoration of improperly managed forests and abandoned agricultural fields. Herbicides might also be used to thin an overstocked stand. This would eventually occur naturally; we are simply accelerating it to reduce stress on residual trees. A herbicide treatment in these special cases is used to accelerate natural development.

Cutting down competing plants in your young forest is an option, but it can be very time-consuming. Young forests usually have many trees growing close together. However, you may be able to mow the herbaceous growth between young trees in a planted field. You could also use an axe, small chain saw, brush saw, or machete to control small trees in forests where sprouts are concentrated around old stumps.

Competing vegetation is an important concern in Christmas tree plantations.

There are relatively few young forests in western Virginia that receive competition control. Herbicides and manual control are often too expensive for individual landowners. However, a group of landowners might be able to provide sufficient demand to support a forest improvement crew. Furthermore, there are special instances in which your management

plan might recommend competition control as a viable option. Examples would be old fields that have been planted with trees.

Management Activity: Reduce Competition in an Older Forest

The two forest management practices for reducing competition in an older forest are thinning and prescribed burning. Thinning is the removal of trees from a forest to give the remaining trees room to grow. A thinning increases the growth of your forest and improves the health of remaining trees. Prescribed burning is the use of fire to control competition within the understory of a forest.

Thinning trees from your forest can reduce competition among dominant trees.

When you conduct a thinning, a logger will harvest a certain number of the trees in your forest. You may be able to sell these trees as pulpwood or sawtimber. The trees that are left after a thinning are called residual trees. They should be tall, healthy, and straight. Your forester will recommend how many trees to remove from your forest and mark those to be removed. Thinnings are usually conducted in forests that are overstocked. This information should be included in your forest management plan.

A crop tree release is a thinning used to concentrate resources on the best trees.

In the most common type of thinning, known as select thinning, the forester or landowner specifies exactly which trees to remove by marking them with paint or a ribbon. The logger then harvests the selected trees. Select thinnings usually produce very good results, but they are expensive to implement because every tree must be marked.

A special type of thinning that is gaining popularity is the crop tree release, a select thinning where special "crop" trees are encouraged. Crop trees are those that you plan to harvest when they are mature. They should be of a desirable species, straight, and free of defects. A crop tree thinning will focus water, nutrients, and sunlight on these trees. After the thinning, the crop trees should receive full sunlight and have room to grow on at least three sides. Trees that are not competing with the crop trees do not have to be thinned. Instead, they can be left to mature until the next harvest. They will improve the species diversity of your forest and may provide wildlife habitat or other non-timber benefits.

There are several factors you may want to consider when choosing a logger to conduct a thinning on your property. The logger should be able to thin the stand without damaging residual trees. A residual tree could be damaged by the logger felling a tree into its top and breaking out branches. Dragging a log against the trunk of a residual tree and scraping off bark would also result in damage. A logger could damage the site by compacting the soil with heavy equipment. Thinnings are best conducted by loggers with small equipment.

Forest thinning of poletimber and small sawtimber has not traditionally been popular in western Virginia because thinned trees had little market value, the increase in stand productivity was considered marginal, and labor-intensive logging systems resulted in high logging costs. Thinning is also impractical on steep slopes because there is too much damage to residual trees. However, thinning is becoming more popular as markets for pulpwood and strandwood increase, the value of sawtimber increases, and harvesting technology improves. Therefore, thinning may be a recommended practice in your forest management plan.

A prescribed burn in the understory has many benefits for an older forest.

Prescribed burning can be used in an older stand of timber to reduce competition within the understory. These fires are usually low- intensity blazes that are hot enough to kill understory trees and shrubs, but do not damage the bigger trees. Prescribed burning is also valuable because it encourages growth of herbaceous species important for wildlife, favors the growth of oak seedlings, and gives your forest a park-like appearance. Prescribed burning temporarily increases phosphorus, potassium, calcium, and other nutrients. Furthermore, periodic prescribed burning greatly reduces the chance of a severe wildfire in your forest by removing dead wood that could serve as fuel. Prescribed burning certainly has great advantages if you can manage it properly.

There are several concerns associated with prescribed burning. If a fire is not properly managed, it can get too hot and get into the crowns of big trees. Fire is particularly difficult to manage on steep slopes. If a fire gets too hot, the mature trees are likely to die and, more importantly, the fire becomes much harder to control. In these cases, liability is a very important issue. You are responsible for the neighbors' forests and for any buildings and homes that might be located adjacent to your property. Hot fires also remove the litter layer of leaves and expose bare soil, which is easily eroded on steep slopes. It is certainly wise to carefully consider any plan for prescribed burning and to work with a burning contractor who has the equipment and experience to control the fire.

Prescribed burning has not been common in western Virginia because all the benefits have not been fully considered. Burning is becoming more common, however, in areas where wildlife management is an important objective, where landowners want to establish an understory of oaks for regeneration, where wildfire is a concern, and where insects and disease are major problems. If you are interested in these objectives, you may want to talk with your forester about the possibility of conducting a prescribed burn in your forest.

Management Activity: Increase Growth and Value of your Timber through Timber Stand Improvement

Timber stand improvement (TSI) is a forest management practice that improves the timber quality of your forest by removing less desirable trees, vines, and shrubs. TSI is used in sustainable forestry to restore forests to a more natural state, in which valuable species such as oaks are prevalent. The vegetation removed in

On A Side Note ...

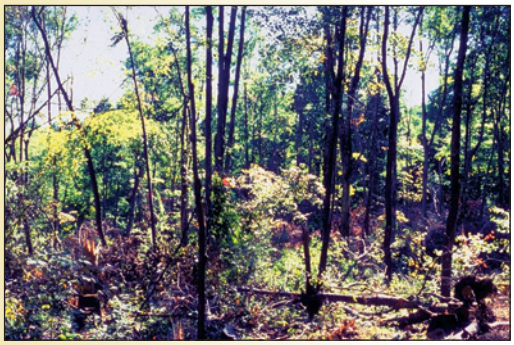
Clearcutting vs. Deforestation: The Clear Distinction

It is very important to recognize the difference between clearcutting and deforestation. Clearcutting is a regeneration system in which timber is harvested so that shade-intolerant seedlings and sprouts can receive enough sunlight to survive. In contrast, deforestation is the removal of trees without regenerating a new forest. Deforestation occurs when land is converted to another land use such as agriculture, mining, or residential development.

The differences between clearcutting and deforestation are substantial. Clearcutting can be conducted without damage to water quality, but a deforested site is likely to erode without some type of vegetative cover. Deforestation results in fragmented forests with smaller and less manageable tracts. However, a clearcut will regenerate with young trees within several years of harvest. Deforestation removes wildlife habitat, but clearcutting creates a productive early-successional habitat. A deforested stand carves a hole in a forested landscape, but a clearcut will quickly become part of a mosaic of different-aged forests. Finally, deforestation reduces the forest base that we have to provide future resources, but a clearcut establishes a new forest that will provide benefits for a future generation. Recognizing the difference between clearcutting and deforestation is an important step in understanding good forest management.

a timber stand improvement is usually not actually taken from the forest because it has little commercial value. Instead, it is killed and left to decompose. The remaining trees have less competition and there may be room for new trees to grow. Timber stand improvement is an important forest management activity if your ownership objectives include harvesting timber, but your forest has been poorly managed in the past.

There are several differences between forest thinning and timber stand improvement. Trees harvested in a thinning may be sold to a logger, but the trees removed in TSI usually have no commercial value. Thus, TSI usually results in a cost for the landowner. Furthermore, the focus of a forest thinning is different from that of timber stand improvement. Thinnings are used to improve the growth rate and species composition of the timber. Timber stand improvement will increase the growth of remaining trees, but it is used primarily to increase the value of the timber. Finally, the trees removed in a forest thinning are usually large, but trees and shrubs of all sizes might be removed in a timber stand improvement.



High-grading refers to a timber harvest where only the best trees are removed. High-grading reduces the productivity of the forest.

Timber stand improvement is useful in forests that have been "high-graded." "High-grading" is a term used to describe timber harvests in which only the best timber is removed. Low-value trees and trees with poor form are not removed during a high-grading harvest. These trees become the only source of seed in the new forest, and the trees in the new forest will likely be undesirable. High-grading is a very poor forest management practice. It is similar to a dairy farmer's selling the cows that produce the most milk, but keeping the ones that are not productive. This farmer would soon have a herd that does not produce very much milk.

Unfortunately, some of the forests in western Virginia have been severely high-graded. The landowners might have needed money at some point in time, and decided to harvest the timber. They probably did not seek assistance from the county forester or a consulting forester. These landowners might have received more money for their timber in the short term, but their forest was not very productive after the high-grading harvest. Aside from cutting every tree and starting a new forest, the best thing that can be done on high-graded forests is to perform a timber stand improvement.

The most common methods of killing undesirable vegetation are to apply a herbicide, cut it down, or girdle it. All three of these methods can be expensive to implement. Your forester can tell you more about the most common TSI activities in your local area.

Herbicides used in timber stand improvement are similar to those used in forest thinning. They contain chemical compounds that ultimately kill the tree. Application methods include spraying the bark of the tree or cutting the bark and spraying the exposed wood. The application technique will depend on the type of herbicide you plan to use.

Trees are rarely cut down in a timber stand improvement because there are more efficient ways to kill them. Cutting is most commonly used on vines and shrubs. A forest worker uses an axe, saw, or machete to cut the vine or shrub at the base. The best time to cut a vine is several years before a timber harvest. Sprouting of vines will be minimal if there is a heavy overstory.

Girdling is a technique where a knife or axe is used to cut a ring of bark from around a tree. The tree will then die because it cannot transfer water and nutrients from the roots to the leaves. Girdling is not very common today because modern herbicides are more effective and less expensive.

There are several opportunities to perform a timber stand improvement in your forest. You could do the work yourself, but this is hard work and is very time-consuming. The best opportunity to perform TSI work yourself is when you cut firewood from your forest. You can harvest trees that have little value as timber, but are good firewood. Your forester can recommend which types of trees are the best to cut from your forest.

You could also contact the county forester to see if there are any TSI contractors operating in your area. There may be a herbicide contractor or firewood cutter that you could hire to perform the TSI work. It is a good idea to ask the forester whether the contractor can choose which trees to remove, or if you should have those trees marked. You certainly do not want the contractor to remove good trees from your forest.

Another opportunity for TSI work on your property is when you have timber harvested. If you choose to harvest only a portion of your trees, you could specify in your contract that the logger has to either cut down or run over the undesirable trees in your forest. This contract stipulation would probably decrease the price of the timber, but would probably be cheaper than performing TSI work at another time. If you do not have this contract stipulation, you can still encourage regeneration of desirable trees by cutting or girdling the undesirable trees left following a harvest.

It is important to carefully consider all values of undesirable trees, however. Some trees may have little commercial timber value, but may be very valuable for wildlife food and cover. For example, a large, old, partly rotten beech tree may have many cavities for nesting and dens, and also may produce beech nuts for wildlife food.

Timber stand improvement has a specific place in sustainable forest management - as a restoration tool. Well-managed forests will not need improvement activities because they contain desirable trees of good form. TSI work in these forests to remove a few undesirable trees would not be economically feasible. Furthermore, commercially undesirable trees often have value aside from being useful for wood products.

Management Activity: Increase the Value of your Timber by Pruning

Pruning is the removal of branches from the trunk of a tree. Forest trees are pruned to promote clear, knot-free wood. Knots can reduce the value of lumber cut from the tree, particularly in the first log, where the most valuable lumber is located. Pruning is most important in limby species such as white pine.

Proper pruning of a tree's lower branches can improve the timber quality.

Trees often prune themselves. When the leaves on a branch do not receive much sunlight, the branch will eventually die. When the branch dies, the tree may heal around the base and the branch will fall off. This process is called natural pruning. Many of the tree species found in western Virginia are good natural pruners.

Some trees are poor natural pruners. When a branch on the tree dies, it does not fall off for a long time. Instead, the tree continues to grow around the dead limb. When the tree is harvested and lumber is cut from the log, the branch or knot will fall out, creating a hole in the lumber. Trees that are poor natural pruners include white pine and scarlet oak.

Pruning is not very common in western Virginia, because most of our trees are good natural pruners and pruning can be very expensive. You can encourage natural pruning by creating heavy competition when trees are young. White pines that compete with other trees for sunlight will grow taller so they can get as much light as possible. These trees will have

fewer lower limbs than those that do not have to compete for sunlight. A stand that is being managed to encourage natural pruning is overstocked during the period when the trees are growing tall enough to have a limb-free butt log. When trees are older, the stand can be thinned to encourage timber growth.

You can also prune limbs from trees in your forest by cutting them off, but this activity takes a great deal of work and time. Cutting limbs from the tree is sometimes called artificial pruning. The market for timber must be very good in order for artificial pruning to be profitable. Pruning efforts should be concentrated on potential crop trees, valuable species, and trees with low forks. You can discuss pruning with your forester to get more information about artificial pruning in your locality.

Management Activity: Prevent Insect and Disease Damage

The gypsy moth is a major concern for many landowners in western Virginia.

Insects and disease are natural components of a forest. They provide a natural method of replacing old trees with healthy new ones. However, you probably do not want to lose the value of the old trees. Therefore, you may want to manage your forest to prevent damage by insects and disease. If you do have problems with insects or disease, there are several alternatives for managing the damage.

A healthy forest is much more resistant to insects and diseases.

The first step in preventing damage by insects and disease is to monitor for infestations, thus giving yourself time to manage any outbreaks. Your management alternatives become limited if you do not find problems as soon as they occur.

Insects and disease have a much more severe impact on an unhealthy forest than on a healthy one. For example, gypsy moths may eat all the leaves from the trees in your forest. A healthy forest will probably just grow more leaves the next year. If your forest is unhealthy, however, the trees may not be able to grow new leaves and could become very weak. These weak trees would then be very susceptible to diseases and attacks by other insects.

The aerial application of pesticides can control some insect damage.

The keys to maintaining a healthy forest are to encourage a variety of tree species and to reduce competition among your trees. There are trees that should be able to grow naturally in your forest and remain fairly healthy. However, there are also trees that will not grow well on given sites. For example, red oak grows well on moist sites, but would be unhealthy on a dry site. When you perform a thinning in your forest, it is a good idea to leave trees that are well suited to the site. Furthermore, thinning increases the health of trees by reducing competition for resources such as water, nutrients, and sunlight.

There are several options for managing insect and disease outbreaks after they have occurred. There may be a pesticide treatment for the insect or disease that has infested your forest, but many are very expensive. These pesticides are usually developed for application to yard trees. The best option in many cases is to perform a salvage harvest on the affected trees. By removing these trees, you may remove some of the insects or disease and can increase the health of the other trees in your forest. You may also be able to sell the harvested trees.

In some cases, there may not be a way to combat insect and disease infestation. The insect or disease may be very strong, or your forest may have been unhealthy. In these cases, the only option you have is to accept the losses of mature trees and encourage the development of a new forest that will be healthier and more resistant to insects and disease.

Strategy #3: Establish Productive Stands of New Timber

There are many complex factors that shape a forest, but every forest goes through several distinct natural life cycles. Forests begin as a young stand of seedlings and saplings established in an abandoned field, a harvested forest, or an area with heavy insect, fire, or windthrow damage. The trees grow and begin to compete for light, water, and nutrients. This young stand will probably contain more than a thousand trees per acre, but some of the young trees will die. There just aren't enough resources to sustain all of the trees. However, the surviving trees will continue to grow until they are mature. The mature stand may contain only 40 trees per acre.

Even old growth forests must start out as a small crop of seedlings.

When trees in mature stands die, they are usually replaced by trees that didn't need much light to grow. These trees were the only ones that could survive in the shady understory. Trees that don't require much light are called shade-tolerant. When all the trees from the original stand have died, the forest will be primarily composed of shade-tolerant trees. The most common shade-tolerant species in western Virginia are beech, hemlock, and

Forests go through a repeating cycle that includes regeneration, maturity, and mortality.

On A Side Note ...

Shade Tolerance: Important Information for Forest Managers

Shade tolerance refers to the relative ability of a tree to grow under shade. Tolerance is an important factor in making forest management decisions. For example, if you are interested in growing seedlings that require direct sunlight, you will need to choose management practices that allow sunlight to reach the forest floor. Conversely, if the trees you desire do not require direct sunlight, you can choose management activities accordingly.

Tree species are commonly classified into three categories of shade tolerance: tolerant, intermediate, and intolerant. Trees that are shade-tolerant are readily able to reproduce and thrive under a thick canopy. In contrast, shade-intolerant species require direct sunlight to reproduce and grow. Intermediately tolerant species, as the classification suggests, require an intermediate level of sunlight. Trees that are commonly found in western Virginia forests are classified by shade tolerance in the following table.

Shade-Tolerant	Intermediate	Shade-Intolerant
sugar maple	red oak	black walnut
beech	white oak	black cherry
basswood	black oak	chestnut oak
dogwood	white pine	scarlet oak
hornbeam	ash	yellow poplar
red spruce	hickory	sweetgum
rhododendron	red maple	Virginia pine
	sweet birch	pitch pine
	sycamore	Table mountain pine
	sourwood	red cedar
	blackgum	black locust
	Fraser fir	sassafras

sugar maple. These trees can continue to thrive in a mature forest.

The forest will remain in a mature stage with shade-tolerant trees until some type of natural disturbance occurs. This disturbance could be a large forest fire, an outbreak of insects or disease, or a very severe windstorm. After the disturbance, the forest will start over again as a new stand of seedlings and saplings. It is important to note that this could occur before the forest has had a chance to develop into a stand of shade-tolerant trees. This has traditionally been the case in many of the forests in western Virginia.

There are many opportunities for humans to intervene in the natural life cycle of the forest. These human impacts are sometimes accidental. For example, a careless camper may start a wildfire in an immature forest. This fire could cause the forest to start over as a stand of seedlings and saplings. However, we sometimes intervene in the natural life cycle of the forest for a particular reason. We might harvest timber in the forest or perform a timber stand improvement to encourage valuable timber species. We often influence natural forest cycles to produce forest products. Many of the products we desire come from trees that are not shade-tolerant. We sometimes intervene in natural cycles to promote and encourage the growth of commercially valuable species. Oaks and pines are examples of species that are not shade-tolerant.

When we conduct forest management activities, we are not necessarily changing the natural life cycle of the forest. We simply encourage the forest to move to a new stage in the cycle. For example, when we harvest timber, we encourage the forest to start over again as seedlings and saplings. When we thin trees from the forest, we encourage the remaining trees to mature. In sustainable forest management, we are managing the forest to provide products while maintaining its natural character and value. Our management activities should not significantly change the forest from a natural state.

One of the most important opportunities we have to influence the life cycle of the forest exists when the forest is starting as seedlings and saplings. Our management activities influence what types of trees will grow in the new forest and can make it healthier and more productive. Management activities you can perform in your forest include preparing the forest to grow new trees, encouraging the establishment of desirable trees, and protecting the new forest from damage by wildlife.

Management Activity: Prepare the Site for your New Forest

Site preparation is a term foresters use to describe the management activities that prepare the forest to grow new trees. These activities provide an environment that helps a desired tree species to grow. For example, consider that you want to grow oak timber in your recently harvested forest, but the understory is made up of red maple saplings. Because oak trees cannot survive in the shade, you need to get sunlight to the forest floor so the oak seedlings will have a chance to grow. You could cut down the understory so the oak seedlings can get enough sunlight to compete. This management practice would be considered site preparation.

Extensive site preparation is common in eastern Virginia, but more basic techniques are used in our region.

There are three primary types of site preparation treatments: mechanical treatments, chemical treatments, and prescribed burning. Mechanical treatments involve the use of heavy equipment to clean logging slash, knock down large trees that were not harvested, and even cultivate the soil. Mechanical treatments can sometimes damage the forest by causing compaction and erosion. Chemical treatments involve using herbicides to control vegetation so new trees will have more sunlight and less competition. Prescribed burning is generally used to control understory vegetation before planting

and to kill large trees that were not removed during harvesting. The treatments used to prepare a site will depend on the types of trees that will be in the new forest, the qualities of the site, the amount of vegetation, and the amount of slash that was left after a timber harvest. It is vital to consider the impact of your site preparation activities on the future forest. The minimal application of these techniques will help to ensure that the natural character of the forest is maintained.

Landowners who decide to establish hardwood forests have one very important site preparation alternative. They can cut down or apply herbicides to understory trees to allow sunlight to reach seedlings on the forest floor. This management activity is very important in stands where the understory is composed of undesirable trees, but where the landowner wants to have a forest with trees that are not shade-tolerant. These stands have usually been harvested, but not all the trees in the forest were removed. Therefore, site preparation is necessary to allow seedlings of desirable trees to survive. If you have recently harvested timber, it is a very good idea to talk with your county forester or a consulting forester about what types of trees will be in your new forest. The forester can recommend site preparation activities that will allow you to create a sustainable forest that meets your needs.

Intensive site preparation is more common in pine plantations than in hardwood forests. Pine trees are not shade-tolerant and they are usually planted, so they have more specific site requirements than hardwood trees. Site preparation is not very common in western Virginia because there are relatively few pine plantations. Intensive site preparation techniques that change the character and features of the natural forest are non-sustainable practices.

Management Activity: Establish a Stand of Desirable New Trees

Forest regeneration is the process of reproducing a forest after a timber harvest or natural catastrophe. Regeneration will occur naturally as the forest changes stages in the natural life cycle. However, this is a good time for us to use forest management activities to influence which tree species will grow in the new forest.

Two methods for establishing a new forest are artificial regeneration and natural regeneration.

The two types of forest regeneration are natural regeneration and artificial regeneration. Natural regeneration occurs when new trees grow from the seeds, sprouts, and root suckers of trees in the stand. This type of regeneration is very common in the forests of western Virginia. Artificial regeneration occurs when humans bring seedlings or seeds into the forest with the intent to establish a new forest with those trees. Examples of artificial regeneration would be planting pine or walnut trees.

Artificial Regeneration

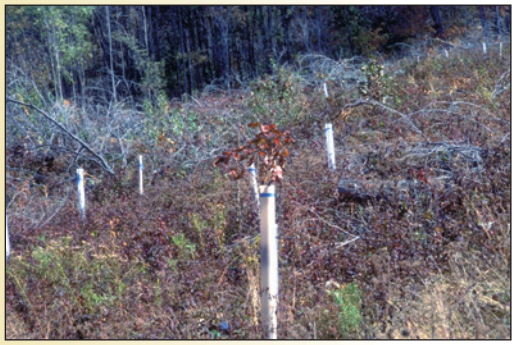
Artificial regeneration is used to establish tree species that would not become established in the forest naturally. There are several reasons why we might want to establish these species. It might be a valuable timber species such as oak, walnut, or cherry. It might produce food for desirable wildlife species. Trees that are artificially regenerated might grow naturally in a later life cycle of the forest, but you might want to grow them immediately. Perhaps you are interested in establishing these trees while site characteristics are optimal for growth. Species that are sometimes artificially regenerated in western Virginia include white pine, red oak, and black walnut.

Artificial regeneration is used to establish forests with a particular tree species. This landowner is planting a grove of black walnut trees.

Two techniques for artificially regenerating a forest are planting and seeding. Planting is certainly more common in

The best time to plant trees is from February to April.

western Virginia, because seeding requires the establishment of a good seedbed consisting of moist, exposed soil. Creating a seedbed is usually more expensive than planting, but in special cases direct seeding may be a feasible alternative. For example, if a wildfire in your forest burns leaves and exposes the soil, then conditions would be favorable for seeding some tree species. Your forester can give you more information about sources of seed, techniques for seeding, and site preparation activities that will help the seeds grow into trees.



This timber harvest has been artificially regenerated with red oak seedlings. They are protected from wildlife by tree shelters.

There are several ways to plant trees in our forests. The most obvious method is using a shovel, hoe, or some other tool to plant the seedlings by hand. Seedlings can also be planted with a planting machine, which can plant trees very quickly, but requires relatively flat and open ground to operate. Steep slopes and logging slash usually prevent mechanical tree planting in western Virginia.

The traditional tree-planting season in western Virginia is February to early April. Trees are dormant during this period - they have no leaves and are not growing. The soil should be moist and firm when the seedlings are planted. When possible, avoid planting trees when the ground is frozen, dry, or very wet. Planting under these conditions is more difficult and the seedlings will not grow very well. If soil conditions are severe, many of your seedlings could die.

When you decide to plant trees in your forest, you will need to determine if you can do the planting yourself or if you need to hire a tree planter. For many landowners, planting trees themselves is not an option because their forest is simply too large. An average person can plant approximately one acre of trees per day. If you were planting a 50-acre field with white pine seedlings, it would probably take you at least 50 days. Therefore, most landowners contract with tree planting crews. You can talk with foresters, other landowners, and the Virginia Department of Forestry to obtain a list of tree planters. The best planting contractors will have a good reputation and experience in planting the types of trees you desire.

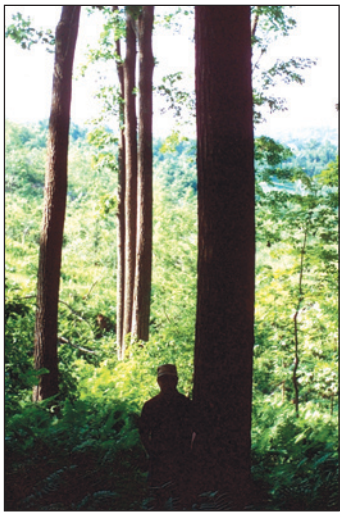
There are several things to watch for in your newly planted forest. First, look for tree seedlings that die. Seedlings can die because they have been improperly planted, the weather has been severe, or wildlife has browsed on them. If a large number of your seedlings die, you might consider planting more in the bare spots. The second thing to watch for is competition from grasses, bushes, and other seedlings. If there is heavy competition, you will need to use herbicides or mow around the seedlings to help them survive. Without weed control, tree planting is generally a waste of time and money. Good site preparation is also important in preventing these problems with your new seedlings.

Many forests in western Virginia are naturally regenerated with seed or stump sprouts.

Planting is used prudently in a sustainable forest. It is primarily employed as a restoration tool in abandoned farmland. Perhaps the most important consideration in artificial regeneration of sustainable forests is that the species being planted or seeded are native. Exotic species must be avoided in sustainable forest management.

Natural Regeneration

Natural regeneration is ideal when natural forest conditions are favorable to growing desirable trees. Natural regeneration is very common in hardwood forests. Many hardwood trees regenerate naturally from both seeds and sprouts. In the mountains, pine trees usually naturally regenerate only on poorer sites, where they can compete with hardwoods.



The amount of light available to seedlings is an important factor in determining which tree species will grow in a harvested forest.

The transformation from a seed to a seedling is a very complex process. First, seed trees must produce a good crop of fruit or seeds. These seeds can come from trees that are left after the timber harvest or may have come from trees before they were harvested. After a seed falls on the forest floor, it must be distributed to a site where it can germinate. The seed could fall directly from the tree onto an ideal germination site, but wind, water, or wildlife can carry it to a better site. Only a small percentage of the seeds that a tree produces will actually germinate.

When a seed has germinated, it requires very specific site conditions to become established. The site must be moist and the seed must be able to grow roots into the soil. Furthermore, the temperature must be within a particular range. If these conditions are not just right, the germinated seed will not survive.

The established seedling will also require special conditions. The amount of sunlight available for the seedling is a very important factor at this stage. Seedlings that are not shade-tolerant will not survive if they do not receive direct sunlight. Many seedlings do not grow into trees simply because there are not enough resources such as sunlight, water, and nutrients for all to survive.

It is apparent that natural regeneration from seedlings is dependent on many factors. If these factors are not ideal, then seeds will not be successful in becoming seedlings. The seed crop for the year could have been poor because of dry weather conditions. A heavy deer and squirrel population might have eaten the majority of the seeds that were produced. Perhaps a fire killed all the seedlings on the site, or an insect rendered the seeds infertile. There are many things that can cause problems with natural regeneration from seeds.

Many of the tree species found in western Virginia will sprout if they are cut, burned, or otherwise damaged. These trees sprout when the sugar stored in the roots is transferred to buds located in the stump or roots. These buds then grow similarly to the buds that are located on the end of a tree branch. Often, several buds on the same stump will grow in a clump of sprouts. Sprouting is most prolific from smaller stumps. You may have noticed trees in your forest that grow in a clump from the same stump. These trees probably grew from that stump when an old tree died. Stump sprouts were the primary form of regeneration of many of today's forests. Tree species that commonly sprout include oak, yellow poplar, maple, beech, and black locust.

If you are considering natural regeneration in your forest, it is a good idea to perform a regeneration survey. A regeneration survey involves looking at trees and shrubs in your forest to determine what types of trees will grow in the new forest. In particular, you are looking at the trees that are located in the understory and the trees that might provide a source of seeds or sprouts. If you have a good number of desirable tree species in the understory and those trees receive enough light to survive, then your new forest will probably have a good number of these trees. Although they may be trampled during a logging job, these young trees will grow back vigorously. Furthermore, if you have a large number of sprouting species such as oak and poplar, then there is a good chance that these species could grow back into the new stand. Your forester can help you with a regeneration survey and make recommendations about which species to expect in the new forest.

The timing of a timber harvest can have a very significant impact on the success of natural regeneration in your forest. For example, if you harvest timber in the fall or winter, then you can expect to have a large amount of sprouting in your new forest. Trees have been storing sugars in their roots all summer and there is a large

Even-aged forests contain many trees of the same age.

Uneven-aged forests contain trees of many ages.

supply for the sprouts. On the other hand, if you harvest your forest in the spring or early summer, there will be much less sprouting. The trees have used the sugars stored in the roots to survive through the winter and the sprouts will not be very aggressive. In general, harvesting in the spring or summer favors seed regeneration and harvesting in the fall or winter favors sprouting.

The type of harvest can also have an important impact on the success of natural regeneration in your forest, particularly for tree species that are not shade-tolerant. If you harvest all the trees from your forest, then there will be plenty of sunlight for seedlings and sprouts. However, if you only harvest a few trees, then the only seeds and sprouts that will survive are those that are shade-tolerant. Light is probably the most important factor in deciding which tree species will grow in your new forest.

The type of timber harvest is so influential on regeneration that different harvesting methods are sometimes called regeneration systems. Different regeneration systems have been developed in the past to meet the increasing needs of forest landowners. However, regeneration systems can be divided into two categories: even-aged and uneven-aged. The distinction between these two categories of regeneration systems is the age structure of the forest.

It is important to distinguish between clearcutting and deforestation.

Forests that are managed with even-aged regeneration systems contain trees of approximately the same age. The trees and shrubs in the understory may be younger, but the dominant trees in the overstory are the same age. Even-aged timber harvests are commonly used to regenerate shade-intolerant species because they allow sunlight to reach seedlings and sprouts when a timber harvest is completed. Examples of even-aged regeneration harvests include clearcutting, seed-tree harvesting, and shelterwood harvesting.

Uneven-aged forests contain trees of many different ages. For example, five trees from an uneven-aged forest might be 90, 65, 40, 30, and 11 years old. Uneven-aged harvesting methods include single-tree selection, group selection, and two-aged cutting. Uneven-aged management is becoming more popular as more emphasis is placed on non-timber values of the forest.

Clearcutting is a common type of regeneration harvest where shade intolerant trees are desired.

Regeneration Systems

Clearcutting is a common harvesting technique for regenerating shade-intolerant species. Clearcutting involves cutting down all the timber in the stand and either cutting or deadening understory trees that could shade the new forest. Clearcutting is simply a way of harvesting your forest so that new seedlings and sprouts can receive enough sunlight to survive.

There are several guidelines to follow when clearcutting your forest. It is a good idea to limit the size of clearcuts. Smaller harvests reduce the aesthetic impact on the forest. Where possible, create irregular edges around your clearcut so that it blends in with the landscape. You can leave a few trees in the clearcut to provide shelter and food for wildlife. Finally, it is wise to consider aesthetics and soil disturbance before deciding to clearcut. Properly conducted clearcutting is certainly a sustainable forest management practice.

Shelterwood and seed tree regeneration systems are even-aged systems where some trees are not harvested.

The seed-tree regeneration system is an even-aged system that is similar to a clearcut, but leaves a few mature trees as a source of seed. Seed trees may be harvested after the new forest is established or may simply be left in the forest indefinitely. There should be enough trees to provide sufficient seed to

regenerate the forest, but there should not be so many that they shade the new seedlings. Regardless of how many trees you decide to leave, you should only pick trees that are strong enough to withstand heavy winds and that have large crowns capable of producing good crops of seeds. Promote good genetics by selecting well-formed, desirable, and dominant trees in the stand.

Shelterwood regeneration involves a series of small timber harvests that prepare the forest for regeneration, encourage new seedlings, and remove the mature stand. The first harvest in a shelterwood system will remove some of the mature trees so that there is enough space and sunlight on the forest floor for the new seedlings and sprouts to grow. There should also be enough sunlight for shelter tree crowns to expand and produce heavier seed crops. During this harvest, some mature trees are left as a source of seed and to create site conditions preferable for regeneration of a desired species. When the new forest is established, the second shelterwood harvest removes the remaining mature trees. The primary distinction between seed-tree harvests and shelterwood harvests is that more trees are left in a shelterwood system. Because there are always trees in the forest, some landowners think seed-tree and shelterwood harvests look better than a clearcut.

Single tree selection involves periodic harvests of mature and undesirable trees. Single tree selection will regenerate only shade tolerant species.

It is a good idea to carefully consider which even-aged regeneration system to implement on your property. Seed-tree systems are uncommon in western Virginia because most of our desirable species can grow from sprouts and previously distributed seeds. Shelterwood harvests are becoming more popular because they protect the beauty of the forest during a timber harvest. The most common even-aged regeneration system, however, is still clearcutting.

Single-tree selection regeneration systems are uneven-aged systems in which light cuttings of mature trees occur every 10 to 25 years. Single-tree selection systems favor shade-tolerant tree species because large trees are always shading the forest floor. Therefore, there is not sufficient sunlight to regenerate seedlings that require a large quantity of sunlight.

Single-tree selection systems are not very common in western Virginia because we usually want to regenerate trees that are shade-intolerant. Furthermore, logging costs are increased and a good road system through your forest is necessary. However, single-tree selection can improve the aesthetics of timber harvests and can provide a steady source of income for the owner of the forest if shade-tolerant species are desired.

Some landowners confuse single-tree selection regeneration systems with "high-grading." Other names for high-grading include "diameter-limit" cutting, "select" cutting, and "logger's choice" cutting. There is a very important distinction between single-tree selection and high-grading. Single-tree selection harvests are conducted with consideration of regeneration. Trees that are poorly formed and some trees of undesirable species are harvested to make room for better trees. Only trees that are of good form are left in the forest. In a high-grading harvest, however, only the best trees are harvested. Poor-quality trees are left in the forest, even if they are mature. "High-grading" is inconsistent with sustainable forest management.

Group selection regeneration systems can be successful in regenerating shade intolerant trees.

The group selection regeneration system consists of periodically harvesting small patches of timber throughout your forest. These small patches are essentially small clearcuts that are usually smaller than five acres, but must be big enough to allow

sunlight to reach seedlings and sprouts that are not shade-tolerant. If these pockets are large enough, shade-intolerant species can be regenerated with some success. Group selection is particularly successful in regenerating shade-intolerant trees in the centers of the openings. Edges are generally lost to shade-tolerant species.

Group selection systems are expensive to implement because logging costs are higher and you need good forest roads. However, properly executed group selection can increase long-term income by allowing trees to grow into higher-quality classes rather than cutting them prior to financial maturity. This is particularly important with high-value species on good-quality sites. Furthermore, group selection may be a viable regeneration system if aesthetics is a major concern and you are interested in regenerating shade-intolerant species. Finally, group selection is a good regeneration system when edge and habitat diversity are desired to meet wildlife management objectives.

Two-aged regeneration systems are a compromise between even-aged management and uneven-aged management. Two-aged harvests are similar to shelterwood or seed-tree harvests, but trees that are not harvested will be left in the stand until the new forest is mature. Two-aged regeneration systems are becoming common where aesthetics is an important management objective.

There are several concerns in two-aged forest management. You will need to remove enough trees from the forest to allow sunlight to reach new seedlings and sprouts. Furthermore, only good trees should be left in the stand. These trees should be healthy, able to live a long time, and well-formed. Two-aged regeneration systems can be a good way to regenerate your forest while maintaining its beauty.

There are many considerations when choosing a regeneration system for your forest. You must determine your ownership objectives, inventory the trees and understory in your forest, and estimate the productivity of the land. These items should be outlined in your forest management plan along with recommendations about which regeneration system is best suited for your forest. If you don't have a management plan, it is a good idea to contact a forester and inquire about one. When you have determined your ownership objectives, your forester will be able to look at your forest and make a recommendation about regeneration systems.

Management Activity: Minimize Wildlife Damage to Regeneration in your Forest

Wildlife can cause serious problems for landowners who want to regenerate a forest. The most common damage is caused by deer, which browse on seedlings and sprouts. Deer browse is sometimes so severe that the forest cannot regenerate according to plans. The deer population may be so high that the deer have browsed the entire understory in your mature forest. If you decide to harvest timber in this forest, it can be difficult to regenerate new trees. Deer can also hinder regeneration in planted forests. Deer prefer to eat planted seedlings because these seedlings are often more nutritious than natural seedlings.

Although wildlife damage to regeneration is not widespread in western Virginia, there are several techniques for managing wildlife damage in your forest if it is severe. The best way to manage deer damage is to control the population of deer in your forest. A normal deer population will not usually cause problems in a regenerating forest, but if the deer are overpopulated they will browse on every small tree they can reach. Hunting is a common technique for controlling deer populations. Harvesting female deer maintains control of the expected annual population growth of deer herds living in the absence of natural predators. If you do not hunt, then your game warden can recommend a hunt club or group of hunters that are responsible and ethical.

There are other management techniques for controlling wildlife damage where populations are not excessive. These

techniques usually involve shielding seedlings from wildlife or making the seedlings less appealing. You can shield trees with a tree shelter made of plastic tubing that is placed around the tree. The seedling grows inside the shelter so that it is out of the reach of deer. Similar shelters can be constructed from wire. Tree shelters are expensive and are usually implemented only in special cases. There are also chemical compounds that can be sprayed onto your seedlings to give them an offensive odor or taste. However, chemical treatments are only marginally successful, because the deer will still browse on the nutritious seedlings.

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CHAPTER 4

Protecting Special And Unique Areas

Special and unique areas are those with certain characteristics that make them different from the rest of your forest. Special and unique areas might be rare habitats, fragile areas, important cultural or historical sites, and similar places in the forest. These areas are more than just land that grows trees. They have special characteristics that we should try to preserve. Protecting these areas for future generations is an important component of sustainable forestry. Protecting special and unique areas on your property involves identifying those areas and managing the impacts of forest management activities on the special characteristics of the sites.

Special areas in our forests might have historical, social, ecological, or sentimental value that requires special consideration.

You can protect special and unique areas by:

1. *Identifying special areas*
2. *Managing the impacts of management activities on special characteristics*

Strategy #1: Identify Special and Unique Areas

Identifying special areas is the first step in managing them. These areas are sometimes apparent from a distance, but other times they are only revealed after a close inspection. A thorough knowledge of where these areas are located and information about the current status of each special area are valuable because they help you to make better forest management decisions. Management activities for identifying special and unique areas are conducting an inventory of areas and monitoring areas to note natural changes that might occur.

Management Activity: Inventory Special and Unique Areas

Your forester, while performing an inspection of your property for a forest management plan, will probably notice special and unique areas. However, it is a good idea for you to point out areas that you have already identified. These locations can then be mapped and described in your management plan. Special and unique areas that you might find in your forest include those with rare plants and animals, historical sites, unique habitats or forest types, old-growth forests, or other special land features.

Rare plants and animals are those not commonly found in a geographic area. If the habitat in your forest is unique, you may find that plants or animals living there are not common in your county. If this habitat is unique, then that plant or animal species may be very uncommon. There are even species found in western Virginia that cannot be found anywhere else in the world. These rare plants and animals are an important component of your forest.

The federal government keeps a list of very rare animals. This list is called the Endangered Species List, and federal law protects the included animals. You could be subject to prosecution under this law if you disturb the habitat of an endangered animal. If you know that an endangered animal is living in your forest, it is wise to contact the U.S. Fish and Wildlife Service to assist you in developing your management plan. A list of potential endangered species found in your area is available from the U.S. Fish and Wildlife Service, the Virginia Department of Game and Inland Fisheries, and the Department of Conservation and Recreation.

Historical sites in the forest are important because they give insights about life in the past. These special areas may have historical, cultural, and personal value. You might find Native American relics in your forest that reveal important information about native culture and lifestyle. You could discover an abandoned farmstead in your forest. Frontier farmsteads are common in western Virginia because

many were abandoned and forests developed around them. Some of these homesteads have been restored and have become important historical sites. A homestead on your property might have even belonged to one of your ancestors. Perhaps you will find Civil War memorabilia in your forest. Several Civil War campaigns occurred in western Virginia, and sites with war memorabilia are fairly common. Another common historical site that you might find in your forest is a cemetery. There are important laws regarding cemeteries, and if one exists in your forest you should be sure that it is addressed in your management plan. Many types of historical sites are located in forests, and although you may not think your forest contains one of these sites, it is still a wise idea to look for them.

Old iron furnaces are common in some parts of western Virginia.

Unique habitats and forest types are those that are rare or are very fragile. These areas should be protected because they may contain combinations or communities of rare plants and animals. Furthermore, they will become more valuable as they become more rare. There are two very good examples of unique habitats and forest types found in western Virginia. Some streams in our region contain very fragile habitats that are ideal for

On A Side Note ...

Freshwater Mussels: Unique Animals in our Streams and Rivers

Freshwater mussels are soft-bodied animals enclosed in two shells that live on the bottoms of streams, rivers, and other bodies of water. Mussels are often associated with their saltwater counterparts, oysters and clams. They are long-lived creatures that can have a lifespan of more than 60 years. They often bury themselves in the sand or gravel at the bottom of streams and move only short distances during their entire lives.

The rivers and streams of Virginia contain a diverse collection of mussels - more than 70 species have been identified in our waters. However, the abundance of many of these species has declined in the last century. Some species have even become extinct. The most important factors contributing to the decline of mussels have been the creation of dams and other impoundments, channeling and dredging of rivers, water pollution, and sedimentation. Fish kills and the introduction of non-native mussel species have also contributed to their decline.

Freshwater mussels are valuable for a number of reasons. They are an important source of food for some wildlife species, including muskrats, otters, and raccoons. They also filter water through their gills and remove pollutants and suspended particles. In this respect, mussels are an important component of the natural purification system for water. They are often used as an indicator of water quality because they point out the level of toxic contamination in rivers and streams. There is even some evidence that certain types of mussels are resistant to cancer and may contain drugs that could be used to cure some cancers. Because mussels are such a valuable component of our river environments, they should be protected before they become extinct. The rarest species have been placed on the endangered species list and are protected by federal law.

Management activities in your forest can harm mussels if the water from your property flows into a tributary of a river containing mussels. The most important action you can take is to follow the Best Management Practices for preventing erosion from your forest. You should also avoid polluting local waters with pesticides or fertilizer runoff from your forest. Finally, if you live along a stream or river containing mussels, you should maintain a large buffer of unmanaged forest. A buffer of at least 100 feet would be desirable, but a larger buffer would be more effective in protecting the unique habitat of freshwater mussels. A minimal effort by every landowner would provide a great deal of protection for these valuable creatures.

several species of endangered fish and mussels. Small changes in stream conditions could destroy these unique habitats. Likewise, there are high-elevation forests in southwest Virginia that are unique. These forests are located on very tall mountains and are composed primarily of red spruce and Fraser fir. If these special areas were disturbed, they probably would not return to their original state.

Old-growth forests are those that have not been impacted by humans for many years. It seems that every person has a different idea of how old a forest must be before it is considered old-growth. However, there are several characteristics that are present in most old-growth forests. They usually contain old trees that are sometimes unhealthy. Tree mortality is common in an old-growth forest, and there is an abundance of standing and fallen dead trees. There are usually multiple levels of vegetation in an old-growth forest - very large trees in the canopy, smaller trees in the understory, and herbaceous growth on the forest floor. The soils in an old-growth forest usually contain a thick layer of humus that has not been disturbed. Finally, an old-growth forest will probably not have indications of human disturbance.

Most of Virginia's old growth forests were harvested early in the twentieth century.

Old-growth forests are very rare in western Virginia, but they do exist in small patches. These patches are usually found in areas that have not been disturbed by humans, have been protected from wildfire, and have not succumbed to recent natural disasters. Old-growth forests have important social and ecological value.

Unique land features that you might find on your property include seeps, vernal pools, and caves. Seeps are small areas where groundwater rises and forms wetlands during part of the year. Vernal pools are small depressions in the ground that fill with rainwater or groundwater during wet weather. Seeps and vernal pools are very important land features for some species of wildlife. Mast-producing trees and browse plants usually grow well around seeps because the ground is very moist. Vernal pools provide critical feeding and breeding habitat for many types of amphibians.

Caves are often found in forests located in limestone regions. Some caves in western Virginia are open to the public, but many are either unknown or left in a natural state. These caves are very important land features because they provide unique habitats that are necessary for wildlife species such as rare bats and certain amphibians. Caves are often difficult to locate because their openings are not apparent. Therefore, you may have a cave on your property and not know its location. If you live in a limestone region and think that you may have caves in your forest, your Soil and Water District, the Virginia Department of Game and Inland Fisheries, and the Virginia Department of Environmental Quality can provide you with more information about local caves and their management on your property.

The Department of Environmental Quality has regional offices in Abingdon, Roanoke, and Harrisonburg.

Management Activity: Monitor the Status of Special and Unique Areas

Monitoring special and unique areas in your forest is an important step in managing them. Changing conditions in these areas may drive you to make changes in your plans for managing them. Up-to-date information is vital to deciding how to change your management plan to protect special and unique areas. This information may simply be the knowledge that a rare animal is still living in your forest. However, the information may also be complex. For example, you may need to know what effect a recent ice storm had on a unique habitat in your forest.

Monitoring the special areas in your forest can be relatively simple. It might simply involve walking through the area every year to observe any changes. There may even be some type of measurement you can take during this inspection. For example, you may wish to count the rare plants growing in your unique habitat.

You might want to measure the water level of a vernal pool in your forest. These types of activities will allow you to keep track of changes in your special areas. Your forest management plan should recommend activities for monitoring the special areas in your forest.

Strategy #2: Manage the Impact of Forest Management Activities on Special and Unique Areas

If you have identified special and unique areas in your forest, it is a good idea to consider how your forest management activities might affect those areas. It is sometimes best to minimize the impact of management activities and leave the special area in an undisturbed, natural state. Other times, you may want to improve an area using certain management activities. Sustaining these special areas involves consulting with experts about the specific needs of an area and choosing management activities that complement these needs.

Management Activity: Consult with Experts

In order to manage special and unique areas, you need to have complete information about their unique features and needs. Because these areas are rare and unusual, many people may not fully understand them. It is a good idea to consult with an expert to obtain the best and most correct information. For example, you might contact the Virginia Department of Historical Resources to get more information about an old homesite that

On A Side Note ...

Unique and Special Areas: Several Examples from Western Virginia

High-Elevation Boreal Forests

High-elevation boreal forests are special areas isolated on Virginia's highest mountain peaks. These forests are unique because they contain plant and animal species normally found in the colder climates of Canada and New England. The most noted of these forests are located in Grayson, Smyth, and Carroll Counties in southwest Virginia. Additional boreal forests have been found on high mountains in other counties.

Most of the boreal forests in western Virginia are composed of red spruce and a variety of other northern species. Red spruce is the dominant tree on the highest mountains, but at lower elevations it is typically found in mixed forests with American beech, yellow birch, sugar maple, and other hardwood trees. The understory is composed of a variety of tree and shrub species.

The snowshoe hare and northern flying squirrel are rare animals that are found in boreal forests. The snowshoe hare is very rare in Virginia and is found only in boreal forests with adequate understory cover. The northern flying squirrel is also very rare and inhabits only mature boreal forests at high elevations. Both of these species are threatened by habitat loss. Careful management of boreal forests will be necessary to sustain populations of these rare animals.

High-Elevation Bogs

High-elevation bogs are cool, acidic, and extremely small wetlands that are found in poorly drained areas at high elevations. High-elevation bogs are special environments that contain species normally found in boreal and subarctic areas. Bogs have been found primarily in Grayson, Carroll, and Floyd Counties and on Massanutten, Clinch, and Salt Pond Mountains. Additional high-elevation bogs may exist in other areas.

High-elevation bogs are generally vegetated with a variety of unique herbaceous species. Sphagnum moss is a primary component of these bogs, which also contain various rushes, sedges, grasses, and forbs normally found in Canada. The bog turtle is an extremely rare species found in mountain bogs in Grayson, Floyd, and Carroll Counties. The main threat to this animal is the destruction of habitat, namely the drainage of wetlands that are an important

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you have found. It is also a good idea to contact the U.S. Fish and Wildlife Service or Virginia Department of Game and Inland Fisheries if you discover an endangered animal in your forest. Sometimes, the agency or group you contact may even be interested in visiting your property and helping you manage the unique area.

Your county forester or consulting forester can help you find experts on special and unique areas that you might find in your forest. Your forester may have even worked with an expert on another property. You can also locate experts by contacting government agencies listed in your phonebook and by calling your county Extension agent.

Management Activity: Choose Management Activities that Complement your Special or Unique Areas

Special areas usually make up only a small portion of your forest. There are almost always ways to manage the remainder of your forest to meet your ownership objectives and still protect special and unique areas. The management activities that you plan for the surrounding forest should correspond to the needs of the special area. Planning these activities can be a very complex process because many special areas are fragile and have specific needs.

A buffer around a special area can protect it from damage during logging. This spring was protected by a relatively wide buffer.

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component of its habitat.

Sinkhole Ponds

Sinkhole ponds are found in karst areas of the Shenandoah Valley. They are rare features of the landscape and support a unique habitat similar to that of high-elevation bogs. Seasonal sinkhole ponds retain rainwater during the spring and early summer, but are dry during other seasons. Permanent ponds are fed by springs or seeps and hold water throughout the year.

The edges of a sinkhole pond are composed of northern and coastal plant species, including several sedges, rushes, and forbs that are extremely rare in Virginia. Virginia sneezeweed is a rare wildflower found only along the edges of these ponds. Other notable plants found in sinkhole ponds are northern bulrush, swamp pink, and bog rose. The rare tiger salamander breeds in sinkhole ponds in early spring. The main threat to these rare species is drainage of the ponds that provide their unique habitat.

Shale Barrens

Shale barrens are hot, dry shale exposures that occur on steep slopes in the ridges of western Virginia. A very thin layer of shale flakes covering the ground causes rapid runoff of rainwater and prevents the infiltration of water into the ground. Trees are sparse because the flakes of shale are continuously washed downhill by rain. Only scrubby pines and oaks are able to become established around these harsh sites.

Several rare plant species are found on shale barrens. The hot and dry conditions discourage the growth of other plants. The Millboro leatherflower, shale barren rockcress, and Kate's Mountain clover are three extremely rare plants that grow on shale barrens. Some primary threats to these species are wildfire, browsing by wildlife, landfill bulldozing, and railroad construction.

Limestone Glades

Limestone glades are unique areas where a large slab of limestone forms the surface or is located beneath a thin layer of soil. The shallow and dry soils in limestone glades greatly influence the vegetation that can grow in these special sites. Drought-resistant trees, such as Eastern redcedar and chinquapin oak, are the primary forest species. The understory is composed of several rare plants, such as the running glade clover. A large and colorful millipede that inhabits some limestone glades is very rare and is found nowhere else in the world. Land clearing appears to be the primary threat to this millipede.

There are some management activities that would be relevant to almost all special areas. For example, it is usually a good idea to leave a buffer of unmanaged forest between a special area and the remainder of your forest. The width of this buffer depends on the type of special area. Sensitive areas will require a large buffer to maintain specific site conditions. Other areas might only need a few trees to block sunlight. Your forester will be able to recommend these types of management activities.

Select forest management practices that correspond with the special needs of special areas.

Many management recommendations for special areas are very specific and are intended to have an impact on the forest in a particular way. For example, a salamander may lay eggs on small branches and twigs that are submerged in a vernal pool. However, large debris, such as logs, would prevent the salamander from moving around in the pool. If this pool was located in your forest, you might want to place some small branches in the water for nesting sites, but keep large trees from falling into the pool. These types of management recommendations are very site-specific and require a thorough knowledge of the needs of the special area. It is a good idea to contact experts to assist you in making these specific management recommendations.

Some special areas may require very active management to preserve a special characteristic. For example, grasslands may require periodic burning to prevent the establishment of woody vegetation. Rivers inhabited with endangered mussels may need to be monitored for zebra mussels. Zebra mussels are an exotic species that should be controlled to protect native mussel populations. Other special areas may require active management under a similar approach.

Forests are very adaptable and can evolve to meet changing site conditions that might be caused by poor management decisions. However, special and unique sites in your forest are often fragile and need special attention. It is wise to gather as much information as possible about the special needs of these areas. This information will help you to make the best management decisions for your forest.

For More Information

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CHAPTER 5

Provide Wildlife Habitat

You can improve wildlife habitat in your forest by:

1. *Understanding the species that you want to manage*
2. *Providing basic habitat requirements*
3. *Working with neighbors to manage the area wildlife*

Wildlife resources are very important components of a sustainable forest. They improve the aesthetics of the forest, provide hunting and observation opportunities, and increase property value. Wildlife may not have monetary value, but it certainly has aesthetic, recreational, and scientific value. There are also important interactions between plants and animals of the forest. For example, trees provide food for birds and small animals that, in turn, transport tree seeds to new sites. The wildlife in your forest is an important asset.

Habitat consists of the physical and biological surroundings of an animal. Climate, soil, topography, and aspect all can influence the plants that grow in a forest. The plants, in turn, influence which animals will live in the area. Because plants are an important component of wildlife habitat, any management activities you plan for your forest should take into account your wildlife management goals.

All wild animals cannot live in the same type of habitat. Some species have very specific habitat requirements. For example, some bats roost in caves, rock outcrops, and old buildings. If you do not have these features in your forest, then you will have difficulty managing for these bats that depend on these resources. Furthermore, animals cannot survive in open habitats unprotected from predators. Foxes and owls will be successful in preying on rabbits where brushy cover does not exist.

The first step in managing wildlife habitat is determining which species you want to emphasize. You may have specified certain species in your ownership objectives. If your ownership objectives do not specify which wildlife species, or group of species, you desire, then you should create a list of those you enjoy. Write these down in order of importance to you. You can then start at the top of your list and manage for wildlife in order of importance. You may discover that animals on your list can actually live in your forest if it is managed properly.

It is important to achieve a balance in your management objectives - sustainable wildlife management is not trying to maximize the numbers of a single game species. Instead, sustainable management is the encouragement of desired species in natural habitat that contains all the normal forest animals.

When you have determined which species, or group of species, you want to encourage in your forest, there are several management strategies you can pursue. It is a good idea to understand the wildlife you want to manage, provide the basic habitat requirements for these animals in your forest, and work with neighbors to manage wildlife in the local area.

When you have selected the wildlife species that you want to encourage, you can develop management practices applicable to that species.

Strategy #1: Understand the Wildlife Species you Want to Manage

You should develop a good working knowledge of the wildlife species you want to manage before you devise a plan to improve habitat in your forest. This knowledge will help you make better decisions, communicate with professional wildlife managers, and understand the wildlife in your forest. You can learn about the wildlife in your forest by researching their biological needs and by talking with wildlife biologists.

Management Activity: Research the Biological Needs of the Desired Species

As you research the needs of the wildlife species you want to manage, you should look for information that will help you understand the annual lifestyle of the species. You should learn about the foods they eat, the places they live, how they reproduce, their life cycle, seasonal patterns in behavior, and similar information. You may want to keep notes on the information you find and keep these notes with your forest management plan. You may even find that this information will help you to better enjoy and appreciate the wildlife in your forest.

There are a variety of sources of information about wildlife. A good place to start your search is your local library, which will likely have books about wildlife. You may also find information about wildlife in publications from the Virginia Department of Game and Inland Fisheries, the Virginia Department of Forestry, Virginia Cooperative Extension, or other government agencies. These agencies often offer educational programs at little or no charge. Additional information may be obtained by contacting wildlife conservation groups such as the Wild Turkey Federation or Ducks Unlimited. Finally, you could search for information on the internet if you have access to a linked computer. However, you should carefully consider the quality of the information that you receive. The validity and accuracy of most web sites is not checked.

A variety of wildlife publications are available from the Virginia Department of Game and Inland Fisheries and from Virginia Cooperative Extension.

Management Activity: Talk With a Wildlife Biologist

A professional wildlife biologist is a valuable resource for specific information about wildlife. The biologist can give you information about preferred foods and habitats of local wildlife. The biologist may come to your forest and suggest management activities to improve wildlife habitat.

Wildlife biologists can assist you with making wildlife management decisions.

Before you contact a wildlife biologist, read several books and publications on wildlife to help you understand the technical terms used in wildlife management. Reading background information will also give you ideas about the management activities that might work well in your forest. Finally, this re-search will help you develop specific questions about the management activities you are planning for your property.

You may find that you have access to both public and private wildlife biologists. The biologists with the Virginia Department of Game and Inland Fisheries (VDGIF) are an example of public biologists. Private biologists are consultants who charge a fee to help landowners with wildlife management. The VDGIF offers wildlife management services at no charge, but their time and availability are limited. Conversely, a private wildlife consultant will help you with every detail in your wildlife plan, but will charge you for this service. You will need to decide how much input you need from a wildlife biologist and choose one accordingly.

The Virginia Department of Game and Inland Fisheries has regional offices in Marion, Blacksburg, Vinton, and Verona.

Strategy #2: Provide Basic Habitat Requirements for Desired Wildlife

All wildlife need food, water, cover, and space in order to survive. These basic biological needs are the most important components of the wildlife habitat in your forest. When one of these needs is not satisfied, it limits the number of animals that can live in your forest. For example, if you do not have any trees that produce nuts and acorns, it is unlikely that

The basic needs of wildlife are food, water, and cover.

Ideal rabbit and quail habitat contains cover to hide from predators.

you will have many squirrels. In this example, availability of food will limit the number of squirrels in your forest. The maximum number of healthy animals that can be sustained in your forest is called the biological carrying capacity, and it can be influenced greatly by the quality of wildlife habitat.

By determining which basic need is limiting the carrying capacity of your forest, you may be able to improve habitat by augmenting that limiting component. For example, if there is no source of water in your forest, then increasing the amount of food may have no significant impact on wildlife utilization. Likewise, if there is no protection from predators, then you are unlikely to successfully attract quail or grouse to your forest. Therefore, you should inventory the food, the cover, and the water resources in your forest. When this inventory is complete, you will have a better understanding of whether to improve the food supply, offer permanent water, or enhance cover needed by individual species.

There are numerous techniques available to favorably manipulate habitat. The techniques utilized should be determined on the basis of cost, extent of treatment, landowner skill, available tools, and timing. Plans should incorporate these concerns and prioritize the most valuable habitat management techniques. Cost share assistance is sometimes available from the USDA Natural Resources Conservation Service for techniques that are particularly advantageous in the region.

Management Activity: Improve the Supply of Wildlife Food in your Forest

Animals can be divided into three distinct groups based on the types of foods that they eat. Herbivores are animals that eat primarily plants and fruits. Examples of herbivores are deer, squirrels, and rabbits. Carnivores are animals that eat meat. Foxes and hawks are carnivores that may hunt prey in your forest. Omnivores, such as bears and raccoons, are animals that regularly eat both meat and

Browse is an important source of food for some wildlife species.

On A Side Note ...

Common Misconceptions about Food Plots

There is a common misconception about the purpose and use of planted wildlife food plots. Single, small, and isolated food plots have little impact on the overall supply of food and typically benefit only a small number of individual animals. Predation can increase in and around the plot if the wildlife population becomes concentrated around the food plot. However, food plots are useful in improving wildlife viewing and hunting opportunities. Therefore, you should carefully consider your options before planting food plots in your forest.

The best place to plant wildlife food plots is in the current openings in your forest. Log landings, skid trails, and similar openings are the most common. The best food plots are planted on sites where the food plant would grow naturally. Food plots along streams can be very productive, but it can be difficult to control undesirable vegetation in these good sites. Your forester or a wildlife biologist can help you to determine where to establish food plots and which native plants to grow. You should also be prepared to maintain the food plots in your forest. Maintenance can be time-consuming and expensive because land clearing, burning, herbicide application, mowing, cultivating, and replanting may be necessary. If you are interested in more information about food plots, you might contact a biologist at the local office of the Virginia Department of Game and Inland Fisheries.

plants or fruits. The food management activities you perform in your forest will usually focus on herbivores. Even if you have interest in managing a carnivore, an effective way to manage its food supply is through manipulation of the plants in your forest. By improving the habitat quality for herbivores, their numbers may increase, thus improving the food supply for carnivores in your forest. The regular presence of carnivores is a good indication of successful management for prey species.

Quality and availability are important attributes of a food supply.

Two important characteristics of herbivore foods are quality and availability. Quality is a measure of nutrition and palatability. Wildlife will usually eat the most nutritious and palatable foods that are available in their habitat. Food quality can be divided into four categories. Preferred foods are those that have very high nutritional value and are most palatable, but are often uncommon. Staple foods are abundant and satisfy an animal's nutritional needs, but may be less palatable than preferred foods. Staple foods are the "meat and potatoes" of animal life. Emergency foods have lower nutritional value and are eaten to sustain an animal through temporary periods of nutritional need. Emergency foods will not support an animal in good health over a sustained period of time. Stuffers are those foods that an animal eats when no other food is available. Stuffers have no nutritional value; they simply fill the gut. Management should be targeted at providing staple foods for your wildlife.

Food availability refers to the amount of food that is available and how accessible that food is to wildlife. Both of these attributes are important. An abundant supply of food is useless if it is not accessible to the animals. For example, many states now have very large deer populations. In some forests, deer have browsed the entire understory as high as they can reach. There may be ample nutritious browse left up in the canopy, but deer cannot reach it.

It is also important to consider the seasonal nature of the food supply in your forest. Foods that are abundant in summer are likely to disappear by fall. Furthermore, foods that are still available may have deteriorated to the point that they have low nutritional value. Some species of wildlife deal with these seasonal food shortages by storing food when it is available. For example, squirrels store acorns and nuts in the fall and save them for winter, when the supply of nuts diminishes. Bears eat extra food in the summer and fall so they can hibernate in the winter. However, most wildlife in your forest will need food throughout the year. Managing these species will involve increasing the supply of food in seasons when the supply is low or improving food quality.

It is important for wildlife to have food in every season.

The first step in providing food for wildlife in your forest is to inventory the different types of food that are available. You will need to determine which foods you have for each species, where it is located, and when these foods are available. When your inventory of wildlife food is complete, you can determine whether there are seasonal shortages in the food supply or if there are problems with geographic distribution of the food. If there are seasonal shortages, you can attempt to increase the supply of food during these periods by manipulating the vegetation in a favorable manner to enhance food production. If the food is clustered in one area, plans to better distribute the resources may be needed.

There may be many different types of food (e.g., buds, nuts, berries, etc.) that you can encourage in each season that will provide ample supply for your wildlife population. You should encourage staple foods for the species that you are managing. The best foods are those that naturally occur in your forest. For example, you might be able to enhance the browse that is already established, or you may consider encouraging a small patch of plants that is already present in your forest.

The specific approach you take regarding food resources will depend on the species you have identified as your main objective. For example, the best way to increase food supply may simply be to let the forest mature. Older trees and plants typically produce more nuts, have more branches and twigs, and can be more productive than younger plants. Some wildlife species, such as tree squirrels, simply must live near mature trees because they depend heavily on the foods that they provide. In other cases, you may want to remove the tree cover to promote a younger habitat that certain species are dependent upon. The information you learn about the species you want to manage will dictate the necessary components of wildlife habitat you should strive to provide.

Harvesting timber can significantly increase the amount and quality of browse in your forest. When you harvest timber, you increase the amount of sunlight that reaches the forest floor. This increased sunlight stimulates the growth of herbaceous and small woody plants, which are beneficial for browsing species such as deer. However, it is a good idea to leave groups of mast trees. Mast trees produce fruits or nuts that are important foods for some wildlife species. These trees help to diversify the types of food available in your forest. Good mast trees include oak, hickory, cherry, blackgum, dogwood, and beech.

A clump of mast trees diversifies the food supply in this harvested area.

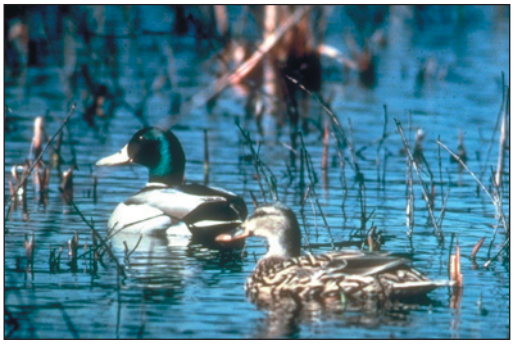
Thinning your forest can also have a notable impact on the amount of food in your forest. Thinning allows sunlight to reach plants in the understory and focuses the forest's resources on trees that produce important wildlife food. For example, if you thin around groups of mature oaks in your forest, these trees often will produce more acorns.

Prescribed burning is a very valuable wildlife management tool. Use of controlled fire in the understory of your forest will stimulate the growth of herbaceous and woody plants. A properly conducted burn will not harm the mast-producing trees in the overstory. A prescribed burn also improves the quality of herbaceous plants in small grassy openings within your forest. Small grassy openings attract insects, which are an important source of food for birds. Vigorous weeds, forbs, and grasses will contain many more insects. You should seek assistance from the Virginia Department of Forestry if you are interested in a prescribed burn. Fires can be dangerous and difficult to manage without the proper equipment used in accordance with a good fire plan.

Prescribed burning is becoming a valuable wildlife management tool.

Management Activity: Offer Permanent Water for Wildlife

Water is an important component of wildlife habitat, but it is not generally considered to be a limiting habitat factor for upland wildlife in Virginia. All species of wildlife need water and some even live in it. Therefore, water must be available year-round in or near your forest.



A pond can greatly enhance the wildlife habitat in your forest.

Wildlife can get water from several places in your forest. An obvious source of water is a stream or pond, but many forest properties do not contain such a body of water. In these forests, animals might get water from puddles that form during wet weather. They may also get water from rain, snow, or dew on plants they can reach. Finally, there is water available in the food eaten by wildlife.

An effective way to increase the availability of water in your forest is to build a small pond. A pond provides drinking water for wildlife and adds diversity to

The Natural Resources Conservation Service can help you build a pond in your forest. NRCS offices are located in most counties.

the wildlife habitat in your forest. Ponds located in sites that have level topography, an ample supply of water, and enough clay to hold water in the pond are best. Ponds should have escape cover nearby so that animals using the pond can escape from predators. The Virginia Department of Game and Inland Fisheries and the Natural Resources Conservation Service can assist you in planning and constructing a wildlife pond in your forest.

Management Activity: Enhance Wildlife Cover

Cover is the component of habitat that provides shelter, protection, and concealment. Examples of cover that you may find in your forest include thick vegetation, caves, rocky outcrops, old buildings, and other features. Every animal has specific cover requirements. You can improve wildlife abundance in your forest by enhancing cover.

Good cover offers shelter, protection, and concealment.

There are many different types of wildlife cover. For example, hiding cover is used as protection from predators. Thermal cover protects animals from severe weather such as rain and snow and from extreme temperatures. Reproductive cover is a place for wildlife to raise young and usually contains the nest or den site. Additional types of cover are used for escape, roosting, brood-rearing, and bugging. Many of the wildlife species found in your forest have very specific cover needs during their lifetime. Also, an animal's cover needs change with the season. For example, a deer uses hiding cover to hide from predators, including deer hunters. In winter, deer may spend more time in thick stands of pine trees, seeking thermal cover. Therefore, it is a good idea to create diversity in the wildlife habitat of your forest.

There are many management activities that you can perform to enhance cover in your forest. Improvements can be targeted at enhancing cover for smaller animals, including such activities as creating wildlife trees, brush piles, or nesting boxes. Habitat improvement for larger animals usually involves long-term planning and more intense activities. Examples of more intensive management activities include creating shrubby edges between plant communities, forming corridors between major habitat features, and encouraging a thicker understory.

The three primary types of cover are hiding cover, thermal cover, and reproductive cover.

Wildlife trees are standing dead or live trees that provide cover for wildlife. Snags are upright dead trees that often contain insects and provide potential sites for cavities. Cavity trees are usually live trees with internal cavities that can provide nesting and denning cover. Large-diameter trees are the best wildlife trees because they provide more nesting areas. A good mix of hardwood and softwood wildlife trees is desirable because these trees will decompose at different rates. Different animals will use a tree at different stages of decomposition. For example, a squirrel might build a nest in the cavity of an old oak tree. The squirrel will leave this tree if it dies and falls down, but a fallen tree provides excellent cover for reptiles such as snakes and lizards.

Large trees with cavities offer nesting cover for small animals and birds.

Nesting boxes can serve the same purpose as a cavity tree or snag and can be used to temporarily supplement or replace wildlife trees where they are limited. Boxes are particularly useful in managing wild birds. Nesting boxes should be carefully maintained, including cleaning the box after each nesting season. If the box is not cleaned, birds may not use the box in the future. Nesting boxes should be placed in locations that the bird would normally use as a nesting site. For example, barn

Nesting boxes can serve as a substitute for nesting trees.

owl boxes should be placed near a barn, old building, or open field. Likewise, a nesting box for wood ducks should be placed in the forest near a wet area rather than on posts in open water.

Brush piles are an easy cover feature to create and are valuable for small mammals, birds, and insects. Simply piling small branches and downed trees can form brush piles, but the size and shape of the pile are important considerations for some wildlife species. The period following a timber harvest is the ideal time to create brush piles because there is a large supply of logging slash and natural cover may be limited. It is a good idea, however, to avoid placing brush piles immediately along streams.

Regular forest management activities can certainly improve the wildlife cover in your forest. Harvesting timber will allow more sunlight to reach the forest floor, thereby encouraging the growth of a thick stand of young trees that can serve as hiding cover for deer and other large wildlife. Unmerchantable tops provide escape and nesting cover until they decay. Thinning and prescribed burning provide similar results by enhancing hiding cover. Planting pine trees will increase the hiding cover in your forest over the short-term, but will also provide thermal cover when the trees are older. Forest management can enhance habitat for some type of wildlife, but may also make habitat conditions unsuitable for other species. Thus, it is important to determine which species you are interested in managing

On A Side Note ...

Cover for Bobwhite Quail

The bobwhite quail is a wildlife species that has very specific cover needs requiring careful planning and management. Bobwhite quail require specific types of cover for hiding, reproducing, thermal protection, nesting, and brood-rearing. Quail use nesting cover for protection from predators and for feeding on insects, seeds, and small sprouts. Ideal nesting cover is found in abandoned agricultural fields, brushy fence rows, cutover timberland, and wide edges between forests and fields. An important characteristic of good quail habitat is that it is open near the ground surface so that quail can move freely beneath overhead cover. Quail also need escape and winter cover, which usually consists of dense, woody areas along a wood's edge, treeline, or fenceline.

Over the last 50 years, many farms were abandoned and provided abundant quail habitat. The combination of fields and brushy areas provided all the cover requirements for quail. However, many of these farms are developing into thick forests, which are not ideal habitat for quail. To manage these properties for quail, management practices that can sustain the necessary types of cover are needed (e.g., periodic plowing, discing, or burning old fields).

Discing, plowing, and burning are useful management practices because they prevent old fields from growing into young forests. Normally, these areas should be burned or cultivated every three to five years, or whenever woody plants are emerging as the dominant cover. After a field has been burned or cultivated, it will grow back in herbaceous cover that is ideal for quail. When you burn or cultivate, some areas of small woody plants and shrubs, such as honeysuckle, blackberry, greenbriar, vines, persimmon, sassafras, and dogwood, should be saved. These plants provide cover sanctuaries for quail.

You can improve quail habitat in your forest by thinning and burning. Thinning your timber allows more sunlight to reach the forest floor and encourages the growth of herbaceous plants. Periodic burning of a thinned forest will prevent woody species from becoming established in the understory. Thinning and burning in your forest will create cover conditions similar to those found in an abandoned field.

Bobwhite quail is a good example of wildlife that requires specific cover conditions. If you are interested in more information about quail, you might want to contact the Virginia Department of Game and Inland Fisheries and ask for the publication "Virginia Bobwhite Quail," which contains an in-depth discussion of habitat management practices for bobwhite quail.

and what implications your management plans are likely to have on them and other species.

Edge is the boundary between two different plant communities, such as a hardwood forest and an open field. Here, the two communities mix and create a transition zone. These edges can be very important habitat components for wildlife that utilize the adjacent plant communities. Edge is particularly important for animals that use a variety of areas to eat, rest, and breed. Soft edges have a blend of vegetation, creating a wider transition zone and supplying more food and cover than hard edges, which have an abrupt transition. An agricultural field with an adjacent hardwood tree border with no understory plants is a good example of a hard edge.

Edge is the boundary formed between two different plant communities.

Managing an edge habitat requires long-term planning and a good knowledge of your forest. Look for naturally occurring edges, which often exist where soils change. Vegetation that grows on one soil type could differ in size and species or may be thicker or thinner than vegetation on adjacent soil types. Changes in moisture also can produce naturally occurring transitions. Artificial edge can be created by management activities. For example, if you are harvesting timber, you can leave some trees around the edges of the harvest to blend in with the neighboring stands. Agricultural practices often offer many potential edge opportunities at the boundary of field and forest.

A timber harvest should be strategically positioned so that a desirable amount of edge is created. A long, thin, and irregularly shaped timber harvest has more edge than a square or circular area. However, it might be a good idea to avoid creating too much edge. Some wildlife species require large, contiguous blocks of forest in their habitat. You can talk with a wildlife biologist and decide how much edge you need for the wildlife you are interested in managing.

Forest fragmentation occurs when large areas of timberland are broken up into smaller, non-contiguous forests by deforestation practices. Fragmentation can have a severe impact on wildlife when there is not enough food, water, and cover remaining in each residual forest block. In these cases, wildlife may need to move from one forest to another. An effective way to help wildlife move between areas is to provide a travel route, or corridor. Corridors connecting forest tracts include field borders, fencerows or hedgerows, buffers between harvest areas, and streamside management zones. Protecting and creating corridors will be an important aspect of wildlife management as forests become more fragmented.

Travel corridors are very important habitat features in areas that have been fragmented by agriculture or residential development.

Ground nesting cover is needed by many wildlife species and can be developed next to mature forests. Nesting cover for turkey and quail might consist of a combination of native grasses along the forest edge. Nesting cover in your forest could also serve as a food resource after the breeding season. Regardless of the type of vegetation that you plant for nesting cover, the area must have dimension and not be a long thin strip. It is more difficult for predators to effectively hunt a large patch of grass than a thin strip.

Strategy #3: Work with Neighbors to Manage Wildlife in the Local Area

Your forest probably contains many different species of wildlife. Some of these animals will live their entire life within your forest. However, unless you have a very large property, many of the animals using your forest will travel onto

neighboring properties. Perhaps these animals can find better food or water on the neighboring property. The adjacent forest may contain better cover or the animals may be looking for a mate. There are many reasons why wildlife will cross property boundaries.

Because the normal home range of many wildlife species in your forest is large, they undoubtedly will cross property boundaries. Thus, management activities on neighboring properties can affect much of the wildlife throughout the area. It is a good idea to work with your neighbors when possible to manage wildlife in the local area. You can talk to your neighbors about wildlife objectives and consider forming a community landowner cooperative to manage wildlife.

Management Activity: Talk with Neighbors about Wildlife Management Objectives

The first step in influencing the management activities in a neighbor's forest is to discuss ownership objectives, particularly those relating to wildlife habitat. It is a good idea for you to know what wildlife species the neighbor wants to encourage. It is also a good idea to know what timber harvests or other forest management activities the neighbor may be planning. You can then begin planning how to compensate for any food, water, or cover that might be affected by changes occurring in adjacent habitat. You may be able to work with your neighbor to coordinate the forestry activities on both properties so that good wildlife habitat is maintained. A good relationship with neighbors is certainly an asset when attempting to manage wildlife outside your property.

Working with your neighbors can improve the wildlife habitat in your area.

Management Activity: Form a Community Landowner Cooperative to Manage Wildlife

The second step in managing local wildlife habitat might be to form a community landowner cooperative. This is a good alternative if all landowners in an area have similar wildlife management objectives and have good working relationships. This cooperative might be an informal group that meets periodically to discuss wildlife objectives and forest management plans. The cooperative could also be a more formal group, based on written agreements that outline how local wildlife habitat will be managed. The type of cooperative you form will depend on the local landowners' feelings about property rights and their commitment to wildlife management.

If you form a cooperative, it should enlist the services of natural resource professionals to help develop management plans for the land in the cooperative. Your cooperative should at least have a forester and a wildlife biologist to provide management advice. If all members of the cooperative use the same forester and biologist to help manage their individual forests, then the advice to your cooperative would be based on a complete knowledge and understanding of the entire land base. The biologist and forester could help schedule and locate timber sales, prescribed burns, and other forest management activities for the cooperative.

Formal cooperatives can be binding and difficult to maintain. Thus, this type of cooperative requires a strong commitment from all members. Members should have good relations and understand and respect the ownership objectives of other members. The cooperative might collect an annual fee to pay for the services of a consulting forester and biologist. Most importantly, however, the members of the cooperative must have faith in the advice of professionals who help to manage the property. There should be no unanswered questions about the intentions of management activities initiated by the cooperative.

For More Information

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CHAPTER 6

Protect Aesthetics And Recreational Values

You can manage aesthetics and recreation in your forest by:

1. *Protecting the aesthetic value of the forest*
2. *Providing recreational opportunities*

Aesthetics and recreation are very important uses of your forest, but their significance is often overlooked. Many landowners do not recognize the value of these forest uses until there is a significant change in their forest. An insect or disease epidemic, severe weather damage, wildfire, or a timber harvest might cause this change. It is very important to understand the impacts of your forest management decisions on aesthetics and recreation. If your ownership objectives include maintaining aesthetics or recreation, then it is also important to implement activities that maintain the forest for these uses.

The most difficult aspect of managing recreation and aesthetics can be identifying the users of the forest. You are a user of your own forest - you might live in it, visit it regularly, or enjoy other benefits of ownership. However, other people use your forest for aesthetics and recreation. For example, if your forest is located along the Appalachian Trail, then it is an important part of the recreational experience for hikers. Likewise, if your forest is visible from the Blue Ridge Parkway, its beauty is important to motorists on the parkway. While these people may not pay to use your property, it is still a good idea to consider the impact of your management activities on their use of your forest. If they become dissatisfied with your forest management, they may pass laws and regulations that can affect your future management decisions.

The aesthetic value of the forest is often overlooked. It is difficult to assign a value to these attractive forests.

Recreational potential and aesthetics are very closely linked forest characteristics. A beautiful forest is an important input to many recreational activities. For example, a campground in an unattractive forest would probably not be visited very frequently. Therefore, managing the beauty of your forest is an important component of managing recreation. You may decide to protect the aesthetic value of your forest and provide recreational opportunities.

Strategy #1: Protect the Aesthetic Value of Your Forest

Appearance is a significant characteristic of the forest. For example, if you live in your forest, then you may be very concerned about the view from your home. Appearance is an important concern for forests located along heavily traveled highways. A beautiful forest usually has higher real estate value than an unattractive property. Finally, appearance is a very important concern for forests located near public areas such as parks, recreation areas, lakes, and rivers.

The owners of these types of forests could manage their forest simply based upon appearance, but this option is usually impractical and financially infeasible. Therefore, we need to consider the impact of our forest management activities on aesthetics. In particular, you can use buffers to protect visually sensitive areas, plan aesthetically acceptable management activities, and schedule forest management activities during the appropriate time of year.

Appearance is an important concern for many landowners that live in their forest.

Management Activity: Use Buffers to Protect Visually Sensitive Areas

Buffers are often recommended in forest management plans because they are effective in softening the transition from intensively managed forest to other land uses. They can be a useful tool in managing the aesthetics of your forest if they block the view of unattractive forest management activities. Although buffers are generally more effective in flat areas than in mountainous terrain, they can certainly be a practical component of any aesthetic management strategy.

The optimal width of aesthetic buffers varies and should be recommended by your forester in the forest management plan. Most buffer decisions are based on common-sense approaches to blocking the view from sensitive areas. Younger forests, evergreen forests, and forests in flat terrain generally have small buffers because they are effective barriers. Old forests with a sparse understory, hardwood forests, and forests on mountains typically require a larger buffer.

Management Activity: Plan Aesthetically Acceptable Forest Management Activities

Many people enjoy the rustic appearance of a horse logger performing a single-tree selection harvest in a mature forest. There are similar management activities that are considered to be attractive. However, most of the activities we implement in our forests do not have this charm or rustic beauty. For example, an extensive clearcut on a ridge along the Holston River would not be considered attractive by most people. In particular, forest harvesting and prescribed burning are often considered to be the most undesirable forest management activities from an aesthetic standpoint. It is a wise practice to carefully think about the aesthetics of management activities and consider alternatives that may be more appealing.

Horse logging may be more nostalgic than mechanized logging systems, but it is much more expensive.

Many complaints about the aesthetics of forest management activities concern timber harvesting. Each regeneration technique is different and has individual aesthetic impacts on the forest. Clearcutting is obviously the most objectionable regeneration system because it results in large areas of logging slash, stumps, and young trees. Group selection, shelterwood, and seed tree systems are more acceptable because they leave trees in the forest. Single-tree selection is the most desirable regeneration technique because it has minimal visual impact on the forest. You may notice that the aesthetically desirable regeneration techniques are the most expensive to implement. They are also the most difficult systems to use for regenerating shade-intolerant trees such as oaks and yellow poplar. Finding a regeneration system that meets aesthetic standards and can be practically implemented can be a very difficult task. Foremost, however, the regeneration system you implement must be conducive to establishing a sustainable forest.

There are several techniques and strategies that you can use to minimize the visual impact of logging.

Regardless of the regeneration system you choose to implement in your forest, there are several techniques and strategies you can use to minimize the visual impact of logging. Careful management of roads, skid trails, and landings is the first step in reducing aesthetic impact. When the forest is being harvested, you can soften the visual impact by cutting up and distributing logging slash and stumps, avoiding damage to residual trees, leaving patches of trees, designing harvest areas in irregular shapes that follow the topography, and hiding entrances to the harvested tract.

Roads

Roads are often the most visible part of a logging job, particularly from the highway. Roads also give a strong first impression to anyone entering the harvest area. However, roads are one of the largest expenses in timber harvesting and often limit the production of a logging crew.

Careful planning and good maintenance will improve the long-term appearance of forest roads.

Therefore, careful planning and construction are needed to build roads that provide good access, are reasonably priced, do not cause water quality problems, and are aesthetically acceptable.

People often complain that forest roads are muddy and eroded. Mud is often dragged onto the highway by log trucks leaving the site. These complaints about forest roads are usually justified, but can be minimized through good road management practices. All forest roads should be located in stable soils that are well drained. When possible, your roads should avoid sensitive areas such as streams, low areas, and steep slopes, and should adhere to Virginia's Best Management Practices. It is a good idea to build roads that are well drained, have sufficient stone to support heavy equipment, and are allowed to settle before heavy use. Perhaps most importantly, a road should not be used if it is wet or easily rutted. Dry roads and frozen roads are most preferable and will receive less damage.

Another common complaint is that there are too many downed and damaged trees along forest roads. These trees may have been pushed over or damaged by the bulldozer when the road was constructed. It is a good idea to harvest any merchantable timber along the path of the road. Stumps and unmerchantable trees can be buried in depressions along the road or dragged into the adjacent forest. Finally, the road should be constructed just wide enough to allow use by large trucks and encourage quick drying of the road.

Skid Trails

Aesthetic problems of skid trails are very similar to those of forest roads. In particular, skid trails are sometimes muddy and eroded and they can cut into the landscape. Careful location and construction of skid trails can minimize these negative impacts on appearance. For example, we can minimize mud and erosion by following BMP's, avoiding streams and steep slopes, and providing good drainage. Your forester can also help you plan harvesting activities that minimize the blading of skid trails. Blading occurs when a bulldozer cuts a skid trail into steep side slopes so that skidders can safely and efficiently operate.

Seeding can significantly improve the appearance of skid trails.

You can improve the appearance of skid trails by seeding them with grass when logging is complete. Sowing wildflowers along portions of the skid trail and creating hiking trails through your forest also improves the appearance. If you do decide to seed skid trails, it is a good idea to plan for maintenance such as mowing, herbicide application, and burning. Good maintenance will allow you to enjoy the hiking trails for many years.

Log Landings

Forest roads may give the first impression of a timber harvest, but the log landing can certainly give the strongest impression. The landing is the location where all harvesting operations come together. This concentration of activity can have a significant impact on the appearance of a forest. For example, a neat and orderly landing that is cleaned and seeded is generally acceptable, but a messy landing that is left as a pile of logs and slash will receive many complaints. Therefore, it is important for your forester and timber buyer to carefully plan the locations for log landings and closely supervise operations on and around the landing.

The log landing should be located away from sensitive areas such as streams,

trails, unstable soils, and residential areas. It is a good idea to place it out of the view from major highways and rivers. Landings need to be large enough for efficient operation, but should not be so large that they are not fully utilized. The landing site must be well drained and very stable, because it will receive heavy use during harvesting operations. Good landings will have few entering skid trails so that disturbance is minimized. Finally, disposal areas for logging debris should be identified.

Supervision of logging activities is vital in maintaining the appearance of a professional and clean job. Logging debris should be removed from the landing frequently, and trash should be taken away daily. Gravel placed where trucks turn around and park will prevent them from getting stuck and will minimize rutting. The landing should be well organized so that operations can flow smoothly and safety is maintained. A well-organized and clean landing has a much more acceptable appearance than one that is sloppy and trashy.

A well-located and properly managed log landing provides a good impression for visitors at the harvest site.

When the logging crew is finished using a landing, it is important to close the landing down from operation. Close-down activities include removing any logging debris and trash from the landing, grading the site so that it drains and is fairly smooth, and seeding the bare areas with grass, legumes, wildflowers, or other herbaceous plants. Closing down a landing can enhance wildlife habitat, improve appearance, and allow the landing to be maintained for future logging use.

Other Logging Appearance Strategies

Logging slash and stumps are unavoidable when harvesting timber, but they can have a significant impact on the appearance of your forest. A forest with large tops on the ground and tall stumps is usually considered unattractive, but removing slash and stumps is very expensive. However, there are several cost-effective practices that can help to minimize this poor appearance. Slash can be removed from within 50 feet of log landings, roads, skid trails, property boundaries, and other important features. Otherwise, slash can be lopped to a height of 4 feet within the harvest area. Lopping is the practice of cutting branches, limbs, and tops into pieces that will lie close to the ground. Finally, stumps can be cut close to the ground. These stumps will often sprout within the next year and may be well hidden. While these few practices will not clear slash and stumps from your forest, they will make the harvest area much more acceptable.

Closing down a log landing should include removal of trash, grading of the landing, and seeding with quick growing native vegetation.

Damage to the residual trees in your forest may occur during felling and skidding operations. In addition to causing stress to the damaged tree, residual damage detracts from the appearance of your new forest. Residual damage from felling usually occurs when a tree falls into another tree or on a small tree in the understory. You can reduce felling damage by choosing a logger who can fell trees away from residuals, but some felling problems are unavoidable. Therefore, you may decide to have the logger cut down any trees that are damaged during felling. The harvested area will have a much better appearance if there are no hung trees, bent saplings, or broken trees.

Skidding damage usually occurs when a log that is being dragged rubs up against the base of a residual tree. The log will often scrape bark from the residual tree, resulting in a wound that detracts from its appearance. Skidding damage in your forest can be avoided by using two precautionary measures. First, you could charge the logger for skidding damage to

residual trees. A logger is much more likely to be conscious of residual damage if there is a fine levied for each tree that is damaged. This fee should be outlined and included in your timber sale contract. Secondly, you should have your forester designate bumper trees. Bumper trees are trees left along the skid trails so that they can keep logs in the trail. Bumper trees are usually low-grade trees and should be harvested when logging is finished.

When identifying the area in your forest that you will harvest, it is a good idea to consider the shape and layout of the harvest area. These two visual characteristics will significantly influence the appearance of your forest from a distance. For example, irregularly shaped areas are much more acceptable than square or rectangular harvests. It is particularly important to avoid using long, straight boundaries in your harvest. These boundaries draw attention when viewed from a distance.

The layout of your timber harvest refers to how the area lies on the terrain. The best harvests are arranged so that harvest boundaries fall along natural lines in the terrain. For example, you might arrange your timber harvest so that its boundaries follow hollows or finger ridges on the side of a mountain. When planning the location of a timber harvest, it is helpful to use aerial photographs or look at your forest from a distance. You will get a much different view of your property from this perspective.

Timber harvests should be arranged so that they conform to natural topographic contours.

Leaving patches of unharvested trees is a good practice in highly visible forests, particularly if they will be clearcut. These patches can break up the continuity of large harvest areas and can decrease the "visual shock" of a timber harvest. The patches of residuals are most effective when they are irregularly shaped and sized. They should also be randomly distributed so that they do not create a pattern. Patches of residual trees can enhance wildlife habitat and help to protect water quality. For example, patches of mast trees would improve wildlife food supply, and long strips of forest could provide travel corridors through your forest. Likewise, trees along small drainages can slow the runoff of water from the forest.

A final practice to improve the appearance of a timber harvest is to screen entrances to the harvest area. This tactic is particularly successful for forests along major highways because it draws less attention to the harvest area. You can conceal entrances by making them as small as possible, leaving a buffer along the highway and entrance area, and seeding the road with a quick-growing grass. Good planning and timely action are the keys to implementing these activities.

Prescribed Burning

There are few complaints about prescribed burning in western Virginia because burning is not very common. However, as fire becomes a more commonly used forest management tool, we should think about techniques we might use to minimize the negative appearance of burning. In particular, we should focus our attention on the appearance of the fire and the appearance of the site after the burn has been completed.

The key to managing the appearance of a prescribed burn is smoke management. The smoke from a well-planned fire will rise quickly and disappear into the sky, but smoke from a poorly-planned fire will stay close to the ground and will move onto neighboring properties and highways. When you plan a fire, it is a very good idea to get assistance from a good burning contractor and well-qualified forester. A contractor certified under the Virginia Certified Prescribed Burn

Prescribed burning can cause aesthetic problems if it is not carefully managed.

Manager Program and a good forester can help you choose a good day to burn.

If you burn a stand in your forest, it could have ashes, black logs and tree trunks, and some bare soil for several years. A forest in this stage is unattractive, but it will soon be full and lush with heavy herbaceous growth. There are several activities you can implement to improve the appearance of your forest during the period between the burn and herbaceous cover. First, you could leave a good buffer around the burn area to block the view as much as possible. You might also consider burning the tract in stages over three to four years so that only a small portion is bare at any given time. Finally, it is a good idea to avoid burning landings and other open areas that have been seeded. Although these activities will not completely eliminate the unsightliness of a prescribed burn, they will help to improve the appearance over the first and most vital years.

Management Activity: Schedule Forest Management Activities During the Appropriate Time of Year

Skidding damage may have a significant impact on the health of a tree, and it is certainly unattractive.

Timing is very important in improving the appearance of management activities in your forest. For example, the bark on trees is very tender during the spring and is easily damaged. Furthermore, the ground is easily rutted and compacted during the winter and spring because it is usually wet and muddy. The hardwood forests in our region provide much better cover during the summer and fall, when deciduous trees have leaves. Finally, many outdoor activities take place during a particular season of the year and attract large crowds to the outdoors.

There are several precautions you can take in scheduling management activities in your forest. Avoid heavy equipment operation in your forest during wet periods unless the soil is very stable. It is also wise to avoid partial harvest and thinning operations during the spring, when bark is soft and vulnerable. You may decide to harvest timber during the summer, when hardwood trees in the buffers have leaves. It is a good idea to avoid operating in forests near residential areas during early morning and evening. Finally, you may want to avoid performing activities during peak recreation seasons if there are recreation areas located near your forest.

Strategy #2: Provide Recreational Opportunities in Your Forest

There are many types of outdoor recreation activities that can be enjoyed in a forest. You may hunt, fish, hike, or camp in your forest. You may even ride mountain bikes, horses, or all-terrain vehicles on the trails in your forest. You might enjoy participating in these activities yourself, or you may lease your forest to other people. For example, some forest owners lease their forest to a club that hunts, camps, fishes, and enjoys other activities.

Regardless of the type of recreational activities enjoyed in your forest, these activities certainly have value. As more forestland becomes fragmented and converted to other land uses, recreational opportunities will become a very important part of sustainable forests. Therefore, you may want to decide which activities to provide in your forest and how to maintain the facilities you develop. In the interest of sustainability, you should also minimize the impacts of recreational activities on the forest.

Recreational facilities increase your enjoyment of the forest and can add significant value to your property.

Management Activity: Decide Which Recreation Activities are Most Important to You

The recreational opportunities that you could offer in your forest are almost unlimited, but it is a good idea to decide

which activities are most important to you. There are often conflicts between different types of recreation, so you may have to choose one activity over another. For example, horseback riders enjoy long and peaceful trails through the forest. All-terrain vehicles may be able to use these same trails, but there is certainly a conflict between horses and ATV's. Therefore, it would be necessary to decide whether ATV or horseback use is most important. This is just one example of a decision you may have to make about recreation.

You will need to decide which recreational activities your forest can support. Streams or ponds may offer good fishing opportunities.

When you have ranked the recreational opportunities of interest, it is a good idea to examine your forest to see if the resources exist to support the preferred activities. For example, if you are interested in trout fishing, you may want to make sure that the stream on your property has sufficient water to support trout. If you are interested in camping, you may want a level spot with access to drinking water.

When you have determined that there are sufficient resources to support the preferred recreational activities, you can begin to identify specific areas in your forest for each activity. You might even map these areas to ensure that they do not overlap into other recreational areas and create conflicts. This map would be a good addition to your forest management plan. You can also use the map to show recreation users where they can enjoy each activity.

Management Activity: Minimize Impact of Recreational Activities

Recreation users often pursue their activities because they enjoy the natural experience received in the forest. Many users, however, are not aware of the impacts they may have on the forest. Heavy recreation use can result in eroded soils, unhealthy trees, and other negative impacts.

Preventing recreational damage to your forest may simply consist of small activities. For example, you may need to encourage hunters to avoid littering. You may need to remind campers to extinguish all campfires before leaving. However, there are some activities that may require a larger investment of time and money. These activities often involve the design and construction of trails and campsites.

Regardless of whether trails are used by foot, bike, ATV, or horse, it is important to avoid erosion by building the trails on suitable grades and stable soils. The ideal grade for a trail is 1-7%. Level areas should be avoided because they will not drain well, and steep areas should be bypassed because they are quickly eroded. You may even want to use water bars and structures to control drainage of trails. You can consult the Soil Survey for your county to identify stable soils in your forest. A good trail will follow natural contours of the land, avoid sharp turns and switchbacks, and provide access during wet soil conditions.

You can reduce erosion and increase safety by discouraging users from wandering off trails. Trails should be designed so that they provide access to interesting places such as scenic vistas, historical areas, unique areas, water bodies, and wildlife observation areas. If the current trails in your forest do not have access to these sites, you might consider adding spur trails that follow a good route to new areas. Otherwise, trail users are likely to form a new trail, which might not be well-located and could cause severe problems in the future.

Damage to the forest at campsites is an important problem in some forests. Poorly designed campsites can result in erosion, compaction, and damage to vegetation. Erosion is a particularly important concern because of its negative impact on water quality. You can prevent erosion by locating campsites on sturdy and well-drained soils, on sites with a good ground cover of leaves and resilient vegetation, and in areas with good drainage. Well-drained campsites usually have a slight slope, southern exposure, and well-drained soil.

A well-located campsite will have minimal impact on the site.

Good campsites will have everything campers need in a convenient location so that improvising is not necessary. Improvising could increase the risk of damaging the forest. Most campers may not understand how they are affecting the ecology of your forest. They will need a site to place a tent, a cooking area, a firepit, and a place for a latrine. Good campsites are also shaded, have a convenient source of water, are relatively private, and are located near important natural attractions. In addition to providing good campsites, avoid campers who do not have an ethical concern for your forest.

Management Activity: Maintain Recreational Facilities

Recreational facilities such as trails, campsites, cabins, and ponds can be expensive to construct. It makes sense to perform good maintenance when you have made an investment in these facilities. A good maintenance schedule will be cheaper in the long run, will increase your enjoyment of the forest, and will increase the value of your property.

Regular maintenance of recreational facilities will increase your enjoyment of the forest.

It may be easy to determine when you need to perform maintenance in one of your recreation areas. For example, you will probably notice if a segment of a trail is eroded and needs to be repaired. Likewise, you would recognize when your cabin needs to be painted or your campsites need to be cleaned. However, if you would like assistance in developing a regular maintenance plan for your recreational facilities, you can ask for help from your forester, the Virginia Department of Forestry, the U.S. Forest Service, or the National Park Service. These agencies have professionals who work daily in public and private recreational areas.

For More Information

- American Pulpwood Association and American Forest and Paper Association. Forestry aesthetics guide - image and opportunity. A guide to the aesthetics of forest operations in the South. American Pulpwood Association, Rockville, MD, and American Forest and Paper Association, Washington, DC. 33 pp.
- Bardon, R. 1998. Woodscaping your Woodlands. North Carolina State University Cooperative Extension Service Publication AG-584. Raleigh, NC. 24 pp.
- Barlow, B. 1998. Practical forestry - aesthetic practices in the South. Alabama's Treasured Forests 17(2): 24-25,31.
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CHAPTER 7

Opportunities And Financial Incentives For Sustainable Forest Management

You can earn money and become involved in sustainable forestry by:

1. *Becoming aware of financial opportunities*
2. *Diversifying your forest income*
3. *Becoming involved in forest management on a large scale.*

One of the most common questions from many forest landowners is how they will pay for sustainable forest management. Increasing regulations and social pressures have dramatically increased the costs of ownership. Therefore, it is very important to recognize cost-efficient opportunities to practice sustainable forest management and to take advantage of financial incentives for implementing sustainable activities. In particular, you can be aware of financial opportunities, diversify the income that you receive from your forest, and become involved in sustainable forest management on a larger scale.

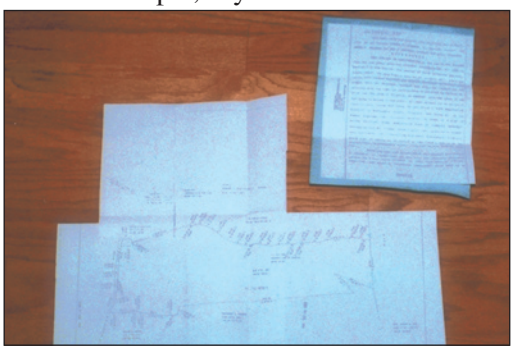
Strategy #1: Be Aware of Financial Opportunities

Traditionally, the most common ways to make money from the forest were to sell timber, lease hunting rights, and lease or sell mineral rights. Many landowners have earned income through these activities. However, the demand for non-timber forest products such as wildlife and recreation is increasing, and new income opportunities are becoming available. Although you may choose not to take advantage of these opportunities, it is still a good idea to be aware of your options in owning forest land. As taxes and the costs of forest management activities increase, it will become increasingly important to recognize every income opportunity that is available. You can learn more about income opportunities by researching different income alternatives, periodically checking on the value of different opportunities, and recognizing non-monetary benefits you receive from the forest.

Management Activity: Research Income Alternatives

There are many different opportunities to get income from the forest, but your particular opportunities depend on the resources you have in your forest. Each income opportunity will require the use of a forest resource such as timber, water, wildlife, non-timber plants, or recreation areas. Therefore, it is important that a complete inventory of your forest resources is included in your forest management plan.

Before you commit to any particular income opportunity, it is a good idea to ensure that you own the rights to the resource in question. For example, if you plan to cut timber, are you sure that you own the timber rights to the property? Likewise, if you plan to lease your forest for hunting access, you must own the hunting rights to the property. If you purchased your property, then the lawyer probably specified whether you owned all property rights. If the property was inherited, it may be wise to have a title search conducted to determine which rights you own. A quick and inexpensive title search may save you the expense of a legal battle and help you avoid fines and penalties.



It is a good idea to examine your deed to determine your specific property rights.

It is also a good idea to check on the tax implications of any income you plan to receive from your forest. Forests are considered a capital asset and are subject to capital gains taxes. Many landowners do not investigate their tax options until they have received income from their forest, and their tax options then become very limited. A complete discussion of tax issues would be very complex and is beyond the scope of this publication. The

best way to investigate your tax options is to formulate a forest management plan that lists the income you plan to receive from the forest. Your accountant or tax advisor can review this plan and make recommendations about adjusting the plan to minimize taxes. Virginia Cooperative Extension is an excellent source of specific information and advice regarding taxes on forestland.

Researching income opportunities will involve talking with foresters, wildlife biologists, and others who work with natural resources. Most forest-related income results from selling resources, leasing resources or access to public resources, or financial incentive programs. You may have opportunities to realize all of these types of income. Therefore, it is a good idea to know about markets for each in your particular area. This information could be developed into a marketing plan and could be included with your forest management plan. Your county Extension agent can help you create a marketing plan for your forest.

Selling Resources

Selling timber is the most common and largest source of income for many forest owners. When you sell timber, it is usually harvested for wood products such as veneer, lumber, pulpwood, or wood chips. Timber is usually sold either to a forest products company or directly to a logger. You will probably only sell timber from your forest once in your lifetime, so it is important to understand the selling process and the pitfalls you should avoid. It is a very good idea to contact a consulting forester or your county forester to obtain assistance in your timber sale. A forester can help you ensure that your objectives are fulfilled by the harvesting operation.

There are two common types of timber sales: lump-sum sales and unit sales. In lump-sum sales, all the timber is sold to the buyer for a single, fixed price. Lump-sum sales are usually better for the landowner because they are easier to administer and they reduce the risk of losing timber to fire or theft. If you decide to have a lump-sum sale, it is important to make sure that you have a good estimate of the timber's value, that you time the sale to get a good price, and that you choose a logger who will not damage your forest.

Unit sales are sold to the buyer for an agreed upon price per unit. The buyer then reports how much of each product is harvested and pays the seller accordingly. Unit sales are less desirable than lump-sum sales because there is an increased risk of timber theft and damage to your forest. Furthermore, the landowner assumes the risk of defective timber in a unit sale; the buyer assumes risk in lump-sum sales. Unit sales are also more difficult to administer. However, a unit sale may be a good alternative if you have a small tract of low-quality timber. If you do choose a unit sale, you should know prior to the sale which trees are being cut and how much volume will be harvested.

Regardless of whether you choose a lump-sum sale or a unit sale, you will need to determine a price for the timber. The most common techniques for determining price are collecting sealed bids and negotiating with individual buyers. Sealed bid sales are conducted by taking bids from several buyers and opening them at a specific time and place. The bids are announced and the highest bidder is offered the timber. In contrast, a negotiated sale involves talking with individual buyers and deciding on a fair price for the timber. Sealed bid, lump-sum timber sales are generally the best option for landowners who have good timber and a competitive timber market.

When you have decided on a buyer and price for your timber, you should develop a written contract that is signed by you and the buyer. A written contract will protect both you and the buyer. It will also clarify the responsibilities of each party involved in the transaction. Good timber sale contracts will address the price, the terms of payment, the amount or legal description of the timber being sold, the duration of the agreement, provisions to

protect your forest, and provisions to release you from liability against workers' compensation claims.

After you have sold the timber and signed the contract, the buyer can begin to harvest the timber from your forest. It is a good idea to inspect the harvest frequently to ensure that the provisions in the contract are being followed. Common problems to watch for include inaccurate reporting of harvest volumes in a unit sale, damage to residual trees, cutting undesignated trees, crossing property boundaries, and damage to soil and water resources. A consulting forester will help you identify these problems.

Although timber sales are the most common income from wood products, there are other products in your forest that you may be able to sell. One of the most common alternative products is firewood. The supply of firewood is high in most of western Virginia, but you might be able to sell firewood from your forest. You might also be able to sell wood poles or fence posts if you have cedar and locust in your forest. These products are usually sold locally and can provide supplemental income to timber sales.

Firewood is an important product for some landowners.

There is increasing interest in the value of non-wood products such as vines, nuts, herbs, and mulch. Traditionally, there have not been markets for these products, but specialty products are becoming more common and demand is gradually growing. Your county forester can give you more information about these markets, which are generally very localized.

On A Side Note ...

The Forest Bank: A New Management Alternative

The Forest Bank is a program of The Nature Conservancy, and is being developed to improve timber management across southwest Virginia. It is a collaboration of landowners who have exhibited their concern for stewardship and sustainability by depositing their timber rights into the bank. The Forest Bank is a private organization that purchases these timber rights and manages forests in a sustainable manner. The forests in the Forest Bank are managed using many of the management practices described in this handbook.

In exchange for timber rights, landowners who participate in the Forest Bank receive an annual payment that is very similar to an annuity. The annuity is based on the initial value of the timber and continues as long as the deposit is in the Forest Bank. In addition to the guaranteed annual payment, landowners benefit by getting an honest appraisal of the value of the timber, access to emergency cash, professional and ecologically sustainable management, and insurance against catastrophic loss of timber.

The Forest Bank accumulates income and guarantees payments to landowners from proceeds of timber sales on forests in the bank. For example, at the appropriate time the bank's forester may designate a timber sale in your forest. The income from that timber sale will in part be used to make payments to all of the Forest Bank's depositors. The bank will be responsible for selling the timber, supervising logging, and establishing a healthy forest. The bank also develops a management plan for your forest that considers your personal ownership objectives. Management activities, such as timber stand improvement and prescribed burning, are also the responsibility of the Forest Bank.

Although the Forest Bank manages the timber on bank properties, the landowner still maintains all other ownership rights that do not affect timber. For example, if you deposited your timber in the bank, you would still be able to hunt, fish, hike, and live in your forest. However, you wouldn't be able to develop the forest into a residential area, which would profoundly affect the timber.

The Forest Bank office is located in Abingdon at 151 West Main Street. You can contact the Forest Bank at (540) 676-2209.

There have always been opportunities to sell rights to a particular resource on your property. The most notable of these are the mineral rights that have been sold in the coalfields. Many of these opportunities still exist, but there is an increasing interest in other types of rights. For example, environmental organizations or agencies may offer to purchase the development rights for properties located near urban areas. The purchaser then holds these rights to prevent the property from being developed in the future. This portion of your rights is called a conservation easement. The sale of conservation easements is most common for landowners who own a large parcel of forest or for owners of unique and fragile resources. The demand for these easements also depends significantly on the location of your property. Most easement sales are found near developed areas.

Some landowners may even sell the timber rights of their forest to a forest products company or a conservation organization. The company or organization will then manage the timber according to their particular objectives. Your consulting forester or county forester can give you more information about companies and organizations that might purchase your timber rights.

If you decide to sell a particular resource from your forest, it is a good idea to consult with a forester and a lawyer. It is usually relatively easy to sell these resources, but their value is often unknown. Furthermore, you could be exposing yourself to liability or exposing your forest to damage. A forester and lawyer can help you to protect your interests in resource transactions.

Leasing Resources

Leasing the forest for recreational and other uses has been popular in other parts of the state for many years, but in western Virginia this practice is relatively new. We have a large amount of public forest, and many citizens either own or have free access to private forests. There has not been a demand for property leases, but leasing will become more popular as the region becomes more populated. The national forests are likely to become crowded and access to private land will become more restricted.

Some landowners receive annual income from hunting leases.

The most common types of leases are those for hunting, fishing, camping, and other recreational uses. The income from leases varies greatly and depends on the quality of the resources in your forest. For example, if you have good road access and quality deer habitat, then you could get a good rate for a hunting lease. In contrast, if your forest is remote and has poor habitat, then your lease would be worth less to potential clients. You can talk with your forester or a game biologist to set the rate for a lease in your forest.

There are several types of leases that you can offer in your forest. Annual leases allow the lessee to use the property for the entire year. Seasonal uses give the lessee access to the forest for a particular season. Short-term leases are usually daily, weekend, or weekly agreements. The type of agreement you decide to use will depend on the demand for leases and the type of resource you are leasing. Short-term leases are usually more profitable in high-demand areas and are appropriate for activities such as camping or fishing at a trout farm. Short-term leases are becoming very popular for natural resource and agriculture tourism, which involves leasing recreational opportunities in your forest to vacationers who are searching for a natural or in-the-country experience. Annual leases are well suited for long-term agreements with parties like

You may be able to lease a group of rights to one group. This camp is leased to the same family for hunting, fishing, and weekend getaways.

hunt clubs, who might use the property for hunting, camping, fishing, and other activities throughout the year.

When you have decided on the type of lease you will offer, you will probably need to advertise the leasing opportunity to potential clients. Word of mouth is a very cost-effective and successful method of advertisement in many cases. You could also place an advertisement in a newspaper or outdoor magazine, display posters at local supermarkets and sporting goods stores, or have special events on your property to attract potential clients. It is also a good idea to contact your county forester, game warden, or county recreational department. These professionals may know of individuals or groups who would be interested in your lease.

It is very important to have a written legal agreement with the leaseholders in your forest. These agreements will reduce your liability, avoid misunderstandings, and protect your forest. A good lease will list the payment amount, terms of payment, expiration date, and mutual agreements of the lease. You and all the leaseholders should sign it. If you are leasing your forest on a short-term agreement, then a permit may be more appropriate than a lease agreement. However, the permit application should release you from liability and include provisions to protect your forest.

Financial incentive programs may reward you for practicing good forestry.

Financial Incentives

The increasing costs of good forest management have caused some landowners to convert their forests to other land uses, such as agricultural fields or residential developments. Governments, private organizations, and some consumers recognize the value of sustainably managed forests and have implemented financial incentive programs to help landowners offset the rising costs of forest management. Specific government incentive programs that you might consider investigating are cost-share programs, land-use tax assessments, and conservation easements. You might also consider pursuing market-based incentives to practice sustainable forestry.

Cost-share programs are financial incentive programs that help landowners pay for forest management activities such as management planning, timber stand improvement, soil and water protection, wildlife habitat improvement, and recreation enhancement. There are approximately ten different programs that reimburse from 20-75% of management costs. These programs are designed to help landowners practice good forest management.

Cost-share programs helped pay for fencing and tree planting along this stream.

There are different qualification criteria and cost-share rates for each incentive program, so it is a good idea to determine which programs are applicable for your forest. The best way to get information about the different programs is to contact your county forester. The VDOF administers several important cost-share programs, and the county forester can recommend agencies to contact regarding other programs. Your county forester will also know about fund limitations and the best time of the year to apply for assistance. Finally, the county forester will need to be involved in planning and implementing the management activities that fall under the cost-share programs.

Some local governments implement land-use tax assessments to encourage landowners to maintain forests and agricultural lands. These assessments are designed to lower taxes on forests and farms so that landowners do not have to sell land to pay high taxes. The county assessor and Commissioner of the Revenue determine a general assessment for forests and farms. All land in the county that meets the qualification criteria for land-use assessment is assessed at this general rate, which is usually much lower than the traditional fair-market value assessment. For example, if your forest is assessed at $350 per acre under fair-market value assessment, the land-use assessment might only be $175

per acre. In this example, you would save approximately 50% on your property taxes each year.

Local governments may offer tax breaks to forest landowners to discourage development of open land. Owners of this Botetourt County land qualify for reduced property taxes.

There are several requirements you must fulfill in order to qualify for a land-use assessment. Counties require that you have a minimum acreage, usually around 20 acres. You must also have a current forest management plan for the property. The county will require an application form and fee when you apply for the assessment. When you have been included in the program, you will be taxed at the land-use assessment until you change the forest to another land use. If you change the land use, you will be required to pay the difference between land-use taxes and regular taxes for the past five years. If you are interested in obtaining a land-use assessment for your forest, you should contact the tax assessor or the Commissioner of the Revenue for your county.

Conservation easements have been discussed as a source of income from your forest. However, you could choose to donate a conservation easement to a government agency or private organization. You would still retain all rights of ownership except the right to develop the property, and you could get significant tax benefits by donating the easement. Property taxes would be lower, estate taxes would be minimized, and you could take an income tax deduction. You can get more information about conservation easements from the Virginia Outdoors Foundation in Richmond. Although you should carefully consider the loss of development rights, donating an easement may be a significant financial incentive.

Market-based incentives are provided by consumers who are willing to pay more for forest products that come from sustainably managed forests. For example, some consumers will pay more for paper or lumber that comes from a well-managed forest. As the environmental movement progresses, there is increasing interest in these types of products.

Most consumers who will pay a premium for wood products from a well-managed forest will seek products with some type of forest management guarantee. The most common type of guarantee of good forest management is forest certification. Private organizations will inspect forests and provide certification of good management. One of the most-recognized forest certification programs is that of the Forest Stewardship Council (FSC). The American Forest and Paper Association and the National Woodland Owners Association have also developed forest certification programs. You could even become a Certified Tree Farmer with the American Tree Farm System. By having your forest certified, you may be able to receive a higher price for your timber. If you are interested in certifying your forest, you might ask your forester about certification programs.

FSC Forest Stewardship Council U.S.

FSC Trademark © 1996 Forest Stewardship Council A.C.

Certified forest products receive a premium in some markets.

Management Activity: Periodically Check the Value of Income Opportunities

It is a good idea to periodically check on the value of different income opportunities so that you know where to best invest the resources in your forest. If you know the value of the timber in your forest, the going rate for recreational leases, the value of conservation easements, the available cost-share programs, and the value of other opportunities, then you can choose the opportunities that meet your objectives and provide the most reasonable income.

The value of some resources will change frequently. For example, the value of your timber will change regularly with

changes in lumber prices, weather, and wood inventory at local mills. Other income opportunities will have a relatively stable value. The land-use assessment of your timber is not likely to change for several years at a time. Therefore, you can investigate the different options on different schedules. You may have a consulting forester send you monthly reports on stumpage prices in your area, but wait for the local newspaper to report information about new tax assessments.

There are many sources of information about the value of income opportunities in your forest. Your consulting forester and the local county forester are good places to start. They should be abreast of the markets for forest products and other income opportunities. You can also talk with other landowners about the income they receive from their forests. Virginia Cooperative Extension and other agencies offer periodic workshops and conferences in which you may find information about marketing the products in your forest. You may even decide to join a landowner association, which may have a newsletter or journal with information about forest income. If you are interested in specific or detailed information, then you can contact a wildlife biologist, the county recreation department, the tax assessor, or your accountant. These professionals and agencies have detailed

On A Side Note ...

Cost-Share Programs: A Reward for Stewardship

Cost-share programs are designed to reward landowners for wise forest management. These government programs provide financial assistance in performing specific management practices. Programs are constantly changing according to available funds, program demand, and specific environmental needs. The programs fall into five general categories: environmental protection, wildlife management, woodland management, protection of water quality, and restoration of wetlands. The following table lists the programs in each of these categories and includes the name of the agency responsible for administering the program. For more information about a specific cost-share program, you can contact the local office of the listed agency.

Program Purpose	Program Title	Agency
Environmental Protection	Conservation Reserve Program (CRP)	FSA
	Environmental Quality Incentive Program (EQIP)	FSA
	Conservation Farm Option (CFO)	NRCS
Wildlife Management	Wildlife Habitat Incentive Program (WHIP)	NRCS
	Partners for Wildlife	USFWS
	Virginia Wildlife BMP Cost-Share Program	SWCD
Woodland Management	Stewardship Incentive Program (SIP)	VDOF
	Reforestation of Timberlands (RT)	VDOF
Water Quality	Virginia Agricultural BMP Cost-Share Program	SWCD
	Virginia BMP Tax Credit Program	SWCD
	Nutrient Management Equipment Tax Credit Program	SWCD
Wetlands Restoration	Wetland Reserve Program (WRP)	NRCS

FSA	Farm Service Agency
NRCS	Natural Resource Conservation Service
USFWS	U.S. Fish and Wildlife Service
SWCD	Soil and Water District, Virginia Department of Conservation and Recreation
VDOF	Virginia Department of Forestry

information about specific programs and opportunities.

Management Activity: Recognize Non-Monetary Benefits

The appearance of the forest is valuable to these homeowners.

Non-monetary benefits are those that you get from owning your forest, but are not in the form of money. If you hunt in your forest, then your hunting experience is a non-monetary benefit. You could sell this opportunity to another person, but you choose to enjoy it yourself. Similar benefits include personal recreation use, aesthetic enjoyment, clean water, and cutting firewood.

It is difficult to place a value on non-monetary benefits because they have different values to different people. However, it is important to recognize the benefits you receive and to consider their value as an income. After all, if you sold your forest, you would have to pay for these benefits. You might also consider what other people are willing to pay for the benefits you are receiving. For example, if the going rate for hunting leases is $4/acre, then you may decide to lease your forest to a hunting club and find another place to do your personal hunting.

When the income that you receive from your forest is diversified, you are not dependent on a single market.

Strategy #2: Diversify the Income You Receive from Your Forest

The value of the resources in your forest is constantly changing, and some values are more volatile than others. Timber prices might change relatively frequently, but hunting leases increase steadily between lease periods. By taking advantage of several income opportunities, you can diversify the income you receive from your forest. When resources are diversified, you are less dependent on the market for a particular forest product. For example, if the only source of income in your forest is timber sales, then the amount of income you get from your forest is very dependent on the markets for lumber, paper, and other forest products. However, if you also had a hunting lease, a land-use tax assessment, and you sold firewood, then you would be much less dependent on timber for income.

Diversifying the income from your forest can be a relatively simple task. Review the income alternatives that are available and select those that correspond with your ownership objectives, do not interfere with each other, and will more fully utilize the resources in your forest.

When you are selecting income opportunities, it is a good idea to maintain flexibility in your management activities. If one particular opportunity will restrict your ability to use other resources for an extended period, you may want to carefully consider the long-term impact of choosing that opportunity. Consider, for example, that you have the opportunity to sell the mineral rights to your forest. It is a good idea to consider how the loss of those rights will affect the other resources in your forest. Perhaps the buyer of the mineral rights plans to strip the forest to mine coal. If this occurs, you will lose the value of timber, wildlife, recreational opportunities, and other resources. It may be a better decision to decline the opportunity to sell mineral rights and to conserve the remainder of your resources.

Strategy #3: Become Involved in Sustainable Forest Management on a Larger Scale

A quick glance at an aerial photograph demonstrates the value of landscape level management.

You may recall that the mission of sustainable forestry is to meet the needs of today without compromising resources to fulfill the needs of future generations. The management activities that you implement in your forest certainly influence the sustainability of

western Virginia's forests. However, there are some components of sustainability that you cannot control inside the boundaries of your forest. For example, in order to be sustainable we need a regular supply of timber from our forests, but your timber is only a small portion of the regional timber supply. How will harvesting the timber on your forest affect regional timber supply? The answer will depend on the harvest schedules of other landowners. Managing the forests across a region is called landscape management.

Another example of landscape management is the management of many migratory neo-tropical birds, which need large, contiguous blocks of mature forests for habitat. It is unlikely that your forest is large enough to manage for these birds. Even if your forest were large enough, it is unlikely that it would be financially feasible to manage for neo-tropical birds. The examples of regional timber supply and migratory neo-tropical birds require management of forests across property boundaries.

In order to manage regional forests, we need to coordinate forest management activities with other landowners. This coordination is a difficult task. Landowners who participate in landscape management could lose some income or property rights from their forest. There are, however, some opportunities for landscape-level management that are acceptable to many landowners. Several organizations are attempting to coordinate forest management efforts regionally. You can participate in landscape-level forest management by considering the programs that coordinate regional forest management and by simply talking with neighbors about forest management objectives and activities.

Management Activity: Consider Programs that Promote Landscape-Level Forest Management

Several organizations and government agencies have developed programs to coordinate the management of private forests in western Virginia. These organizations usually focus their efforts on attacking a specific problem in landscape-level management. Some programs may even provide financial incentives for joining the effort. It is a good idea to research the opportunities for becoming involved in these programs and to consider the benefits you might receive by participating in them.

Landscape-level forest management focuses on the forest across a large area.

One of the most common goals of landscape-level forest managers is to reduce forest fragmentation. Fragmentation often occurs when a large block of forest is divided into smaller properties and a portion of the property is converted to another form of land use. Land development and estate divisions are the most common forms of forest fragmentation. Organizations and agencies have become successful in preventing fragmentation by accepting conservation easements, which usually consist of the development rights to property. Easement donors receive favorable tax treatment and other incentives in exchange for their donation. If you and your heirs have no plans for developing your forest, then you might consider donating a conservation easement.

Reduction of non-point water pollution is a result of landscape level management.

Water quality is another important concern in landscape-level forest management, because non-point source pollution is a large problem in Virginia's waters. Therefore, the Soil and Water Districts of the Virginia Department of Conservation and Recreation will help you to identify problems on your property in an effort to improve the water quality of the entire region. They can even help you to obtain financial assistance through federal and state cost-share programs. The office of your Soil and Water District is located in the local USDA Service Center.

Landowner cooperatives are created by groups of local landowners so that they can share information and manage their forests based upon regional needs and objectives. For example, the cooperative might focus on managing timber for

income while improving wildlife habitat and water quality throughout the land base. Landowners in a cooperative may lose some freedom to make decisions, but gain the opportunity to participate in landscape-level management. Forest owners in the northeastern United States have found this tradeoff to be well worthwhile; landowner cooperatives are popular in that region. Fragmented forests and environmental concerns in the Northeast are factors that contribute to the popularity of cooperatives. Although they are uncommon in western Virginia, landowner cooperatives should gain popularity as our forests become more fragmented and concern over forest management increases.

Landscape-level management is a relatively new concern for private landowners, but it is a very important component of sustainable forest management. The roots are established for programs that coordinate the forest management efforts of local landowners, but the programs are not very popular. As we face more management challenges and landscape-level issues become more important, we will see an increase in the popularity of many of these opportunities.

Management Activity: Talk with Neighbors about Forest Management Objectives and Activities

There are many benefits in talking with your neighbors about forest management objectives and activities. You will probably improve your relationship if both parties can communicate in an open and honest manner. You will also know what activities to expect in adjacent forests. Good communication will also help you and your neighbors to informally plan forest management across the local area.

When you meet with the owners of adjacent forests, one of the most important subjects you might discuss is ownership objectives. It is a good idea to share long-range plans for the forest and point out the most important objectives. You might even ask specific questions about neighbors' objectives. For example, you might ask which timber products they are producing or which species of wildlife they want to encourage.

It is a good idea to talk with your neighbors before you perform management activities in your forest.

Management activities are another important subject in a conversation with neighbors. In particular, you might be interested in their plans for timber harvests, prescribed burns, and other specific activities. Knowledge of neighbors' plans will prevent you from being surprised when log trucks are leaving the neighboring forest or a large column of smoke is coming from the adjacent property. You may even decide to combine efforts in certain management activities. For example, it might be cheaper to perform a prescribed burn on both properties at the same time. Conversations with neighbors can help you save money and headaches.

When you and your neighbors have finished discussing individual objectives and plans, you might begin to think about how you could coordinate your management activities to improve forest management across the area. For example, if you are both planning timber sales, then you may decide to postpone one of the sales so that the view from the highway is more attractive. You may decide to preserve an important wildlife travel corridor that crosses your properties. You can be particularly successful in managing local forests if all of your neighbors have similar ownership objectives. However, if neighbor coordination is not possible, then the management activities on your neighbor's property may at least influence the management practices that you adopt in your forest.

For More Information

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CHAPTER 8

Enhance The Local Economy With Your Forest Management Activities

You can enhance the local economy by:

1. *Dealing with local forest management contractors*
2. *Promoting local markets for forest products.*

Sustainable community development is the development of an area with consideration given to long-term success and prosperity. Forests are an important component of sustainable development in western Virginia. The timber in our forests is one of our most important resources, and it is particularly important because it is a renewable resource. Resources such as coal are also important to the region, but well-managed forests can provide a continuous supply of resources in the future. Therefore, forest management is a very important concern when we plan for long-range growth in our region.

The management activities you perform in your forest have an important impact on the local economy. When it is feasible, it is a good idea to support the local economy with these activities by dealing with local contractors and promoting local markets for forest products.

Strategy #1: Deal with Local Forest Management Contractors

Some forest management activities are specialized and require special technical skills or expensive equipment. Specialized contractors who operate over a large region usually perform these activities. However, most of the forest management activities you will perform in your forest can be performed by local contractors. Some of these activities are labor-intensive and require no special skills or equipment.

When you deal with local forest management contractors, you are adding money to the local economy. The contractor's workers will spend this money on food, housing, and other living expenses. Money spent locally is an important component of a sustainable community. You can increase your business with local contractors by making a list of local contractors when you prepare for management activities, comparing local workers with contractors from outside of the area, and giving local contractors an opportunity to bid on the management activities you undertake in your forest.

Forest management activities can often be performed by local contractors. This tree planter uses relatively simple equipment and operated in a small area.

Management Activity: Make a List of Local Contractors when Preparing for Forest Management Activities

It is a good idea to maintain a good list of forest management contractors so you will have contacts when you need to perform activities in your forest. Contractors you might include on this list are loggers, planting contractors, herbicide applicators, prescribed burn contractors, and firewood cutters. You might add this list as an appendix to your forest management plan.

Your forester can help you find local contractors.

You can work with your consulting forester or the county forester to develop your contractor list. Foresters will know the contractors that operate in the area. Although you may want to keep a current list of contractors, you should certainly update this list at least six months before you plan to start any management activity. You will then have time to choose a local contractor who will do a good job in your forest.

Management Activity: Compare Local Workers with Contractors from Outside the Area

Before you choose a contractor to work in your forest, it is a good idea to compare local workers with contractors from

outside the area. It is wise to compare contractors based on availability, quality of work, and cost. You can contact each contractor on your list to inquire about availability and cost. Your forester and other landowners can probably tell you about the quality of work of prospective contractors. A good contractor will have a good reputation.

When you have investigated each contractor and have developed a list of information about each, you can begin to evaluate each contractor. The most important evaluation criterion is the quality of work. An inexpensive but poorly-conducted job will usually cost more over the long run than a better job that was more expensive. If you are concerned about the timing of an activity, then availability will also be an important evaluation criterion. Regardless of the evaluation criteria you choose, you might give special consideration to local contractors.

Management Activity: Give Local Contractors an Opportunity to Bid on the Management Activities you Undertake in your Forest

When you are ready to choose a management contractor, you may decide to ask interested contractors to submit bids for the job. Your forester can write a description of the tasks to be performed, and each contractor can submit a bid on the complete job as specified. It is a good idea to reserve the right to refuse any or all bids and to encourage local contractors to bid on the job.

When you have collected all of the bids, you can sit down with your forester and evaluate them based on price and the reputation of the bidder. If cost and quality of work are similar, then you might choose to work with a local contractor. You might also consider the flexibility of local contractors when assessing bids. Local contractors are often smaller and can therefore perform the work to your specifications and meet your schedule. However, avoid local contractors who are unavailable or are not capable of performing the work to meet your required standards.

Strategy #2: Promote Local Markets for Forest Products

Value is added to a product when it is changed by further processing or by marketing. For example, a wood moulding plant adds value to lumber by carving it into a product that is useful for homeowners and builders. Likewise, a lumber wholesaler adds value to lumber by collecting quantities of lumber and distributing it to retailers.

One of the best ways to improve a local economy is to increase the value of products that are leaving the region. For example, we could promote the furniture industry so that more lumber is manufactured into furniture in western Virginia. Currently, much of our lumber is shipped to furniture plants in North Carolina. Producing more furniture in our region would create more jobs and increase the need for support businesses. It is obvious that you probably cannot directly start new industries. Encouraging the development of new businesses is the job of economic development officials in the local government. However, you can promote local businesses by recognizing the contribution of your resources to the local economy and identifying markets for special and unique products.

Management Activity: Recognize the Contribution of your Forest to the Local Economy

Your forest resources are an important input to the local economy, both directly and indirectly. The forest is directly related if it provides raw materials to local industries. Your property taxes also provide direct income to the local government. Your forest is indirectly related to the economy because its appearance can influence tourism, recreation, and other activities. Regardless of the activities you perform in your forest, it can be an important local economic input.

Management Activity: Identify Markets for Special and Unique Products

Special and unique products do not fit into traditional categories of forest products. Examples of special and unique products are musical instruments and custom, handmade furniture. Many of these products require special skills to manufacture. Unique and special products have important value within the local economy.

You might identify markets for special products by consulting with your forester or by simply going to local events such as craft shows and flea markets. You are likely to find local artists who use wood products. You might offer materials from your forests in support of these products. Sometimes these materials are of low quality or are cheap. For example, a local craftsman might use sections from stumps to make chairs and tables. You might even get ideas of products you could produce from materials in your forest.

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Government Agency Listings

Virginia Department of Forestry
Fontaine Research Park
900 Natural Resources Drive
P.O. Box 3758
Charlottesville, VA 22903-0758
Phone: 804-977-6555

Virginia Department of Game and Inland Fisheries
4010 West Broad Street
Richmond, VA 23230
Phone: 804-367-1000

Virginia Department of Conservation and Recreation
203 Governor Street, Suite 302
Richmond, VA 23219
Phone: 804-786-1712

Virginia Cooperative Extension
104 Hutcheson Hall
Virginia Tech (0402)
Blacksburg, VA 24061
Phone: 540-231-5299

Virginia Department of Historic Resources
2801 Kensington Ave.
Richmond, VA 23221
Phone: 804-367-2323

Virginia Outdoors Foundation
203 Governor Street, Room 420
Richmond, VA 23219
Phone: 804-225-2147

United States Department of Agriculture Forest Service
George Washington and Jefferson National Forests
5162 Valleypointe Parkway
Roanoke, VA 24019
Phone: 888-265-0019

Notes

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