Managing Your Southwestern Montana Forest

Forest Ecology and Your Management Options for Southwestern Montana

Your forest is a complex ecosystem in which "seeing the forest for the trees" is an important and at times complicated concept. Through reviewing the topics below you will begin to gain an understanding of the complexity of your forest which will help guide your forest management decisions.

Important components to your Montana Forest Ecology:

- Forest Type
- Physical Factors
- Forest Species
- Decomposers
- Biodiversity
- Succession
- Dynamic Ecosystems

Forest Type

Forest types are the suite of species typically found in association. IT might be thought of as "enjoying" each other's company, but really these species interactions can be positive, negative, or neutral. Forest type of any given area can be driven by site specific physical and biological factors. Conversely, forest type can influence and over time change these physical and biological factors. Knowing the forest type of your forest will provide insight as to the potential character of your forest.

Some common forest types in southwestern Montana:

Rocky Mountain Lodgepole Pine Forest

This forested type is widespread in upper montane to subalpine zones (mid to high elevation areas). The dominance of lodgepole pine is related to fire history and topographic conditions. In Montana, this forest type ranges in elevation ranges from 3,200-9000 feet. These forests occur from flat to sloped terrain of all aspects, as well as valley bottoms. Fire is frequent, and stand-replacing (removes all or nearly all trees) fires are common. Following stand-replacing fires, lodgepole pine will rapidly recolonize and develop into dense, even-aged (all within a few years of age) stands. Most of this forest type occurs as early- to mid-successional (see Succession below) forests persisting for 50-200 years on warmer, lower elevation forests, and 150-400 years in subalpine forests. They generally occur on dry to intermediate (intermediary dry) sites with a wide seasonal range of temperatures and long precipitation-free periods in summer. Snowfall is heavy and supplies the major source of soil water used for growth in early summer. Vigorous stands occur where the precipitation exceeds 21 inches.

Rocky Mountain Montane Douglas-fir Forest and Woodland

This forest type is associated with an annual precipitation ranging from 20-40 inches, with a maximum in winter or late spring. Winter snowpacks typically melt off in early spring at lower elevations. Elevations range from valley bottoms to 7500 feet on warm aspects. It occurs on north-facing aspects in most areas, and south-facing aspects at higher elevations. This is a Douglas-fir dominated forest type. Fire disturbance intervals are as infrequent as 500 years, and as a result, individual trees and forests can attain great age on some sites (500 to 1,500 years).

Aspen Forest and Woodland

This widespread forest type occurs in the montane and subalpine zones throughout much of Montana. Distribution of this forest type is primarily limited by adequate soil moisture

required to meet its high evapotranspirative demand, length of growing season, and temperatures. Stands can occur on gentle to moderate slopes, in swales, or on level sites. At lower elevations, occurrences are found on cooler, north aspects and mesic sites. It can be stable and long-lived with little encroachment of coniferous species. Occurrences often originate, and are likely maintained, by stand-replacing disturbances such as crown fire, disease, windthrow, elk and beaver activity.

Physical Factors

Physical factors important to your forest are topography, climate, soil and water, underlying geological material, and human influences. Topography affects the ability of air to carry moisture. Because of this, the lee side of mountain is typically drier than the windward side. This is referred to as a rain shadow (Figure 1). Climate determines the temperature, amount of precipitation, and the annual timing of precipitation for a location. Much of Montana's precipitation comes in the form of snowfall which is an important source of water for the summer growing season. Within the dominate climate of an area, there are local climates which can produce a variety of habitat for plants and animals.

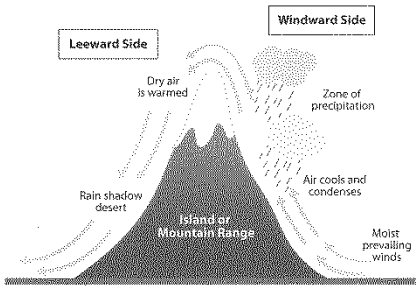

Figure 1. Rain shadow.

Forest Soil

Your forest soil is broken into horizontal layers (Figure 2); each layer plays a role in the productivity of the soil. Your soils provide water and nutrients for your forest. The soil supplies all the nutrients necessary for plant growth except carbon. Carbon is supplied from the atmosphere from carbon dioxide. The three most important macro nutrients (pound per acre per year) provided by your forest soil are nitrogen (N), phosphorous (P), and potassium (K). Forest soils are typically lower in nitrogen than an agricultural soil, but the slow growth of a tree allows the trees to slowly accumulate the needed nitrogen to be healthy. It is difficult and expensive to improve the productivity (plant growth) of forest soils; however, productivity can easily be reduced through poor management. Threats to soil productivity include soil compaction, nutrient depletion, and soil erosion. Good forest management can reduction these threats.

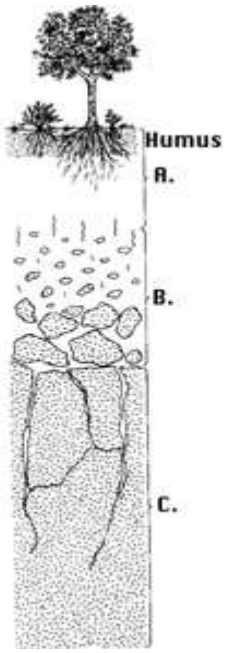

Figure 2. Soil profile. Horizons develop like cake layers. Humus is a layer of organic matter not fully decomposed, the A horizon is the nutrient rich topsoil, the B horizon is the clay-accumulation, moist-holding subsoil, and the C horizon is slightly broken-up bedrock or parent material.

Forest Species

Knowing your forest species will help you decide how to manage your forest. Use "The Basic Guide to Some of Your Southwestern Montana Surroundings" or other keys to identify the tree species within your forest. Once you know your tree species, appendix 1 has a brief guide of the ecology of some common southwestern Montana trees. Additionally, knowing the animals who call your

forest home is an important component of understanding your forest. Most natural forest contain a variety of habitat types such as wetlands, meadows, trees of different ages and sizes, and snags and fallen logs. Having a variety of habitats within your forest and the surround forest provides homes for many different animal species and is essential to having a healthy forest. Some of the services you and forest receive from having a diversity of forest residents include insect control, pollination of plants, checking the populations of herbivores, aeration of the soil, and planting of new trees and other plants.

Decomposers

Bacteria, mold, fungus, insects, and fire all recycle and break down plant and animals into their nutrient elements. Without these decomposers these nutrients would be trapped in the dead plant or animal. Once broken down these nutrient elements can then used by plants.

Biodiversity

Biodiversity is the variety and abundance of life forms, processes, functions, and structure of plants, animals, and other living organisms. Maintaining a high level of biodiversity is a good way to hedge your bets against a disease or insect outbreak from affecting the entirety of your forest. Interesting, a young forest might have a higher level of biodiversity – number of different types of species – than a mature forest; however, the mature forest may support species that the young forest cannot. Across a large forest landscape a mixture of young and mature forest could maximize your forests biodiversity.

Succession

Succession is a somewhat predicable series of changes in which communities of species replaces another (Figure 3). For instance, following a wildfire, the first plant to establish are often grasses. These are often then replaced by shrubs which give way to tree species. However, success is not a well-ordered series of events nor is it unidirectional. The "final" stage for a forest varies widely in part to the components of the forest discussed above such as the physical factors and the available species to recolonize.

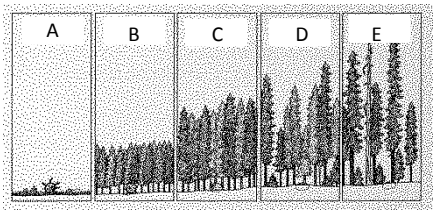

Figure 3. Stages of Forest Succession. A - Grass-Forb/Shrub-Seedling, B – Pole-Sapling, C – Young Forest, D – Mature Forest. E – Old Growth.

Dynamic Ecosystems

It is important to recognize that your forest is constantly changing. Disturbance, such as drought, disease, insects and fire, can be a natural component that shapes your forest both annually or over multiple years, decades, or centuries. Although disturbance is natural, the scale of the disturbance can affect the recovery of your forest. For instance, an intense wildfire (one which burns very hot) may change the soil chemistry. These changes may take many years to recover. Another example is a large wildfire may also kill the seed trees over a large area. With the seed trees removed the forest needs to recolonize from the edges which may result in a longer recovery time for those tree species to recolonize throughout the affected area.

Forest Managing Options and Tools

Now that you have a better understanding of the complexity of your forest you might

consider how you can manage (steward) your forest as forest ecosystem. In managing your forest as an ecosystem, it is helpful to consider a few overarching strategies:

- Reduce soil disturbing in all your activities will help maintain the soil health, forest productivity and reduce invasion from noxious weed species.
- Recruit and retain some logs, snags, and debris in the forest to provide habitat and nutrients to the soil.
- Protect riparian areas by providing functional habitat buffers along streams. This will help maintain water quality and depending on the circumstance might be required by the law.
- Arrange harvest units to provide corridors for animal use and provide a mosaic (variety) of young and old forests conditions.
- Provide structural diversity (trees of different height and density) to help ensure a healthy forest into the future.
- Reintroduction fire where practical.

Management Options

Many options exist in managing your forest. It can be overwhelming when considering each tree and each location in your forest has a different history and potential. To aide in making these decisions it is important to first take time to develop goals for your property. These goals will help you select which management tools and strategies will work best for your needs. Some general goals to consider are if you are managing for:

- Native forest structure and function,
- Wildlife habitat,
- Wildfire safety,
- Aesthetic quality,
- Forest income,
- Forest products.

Often a forest can be managed with multiple goals in mind. With your goals now identified you can develop a management plan for your forest. Your plan will address the needs of your trees, your forest, and your personal needs. Management plan will include four key elements.

- Your goals,
- Your new understanding of your forest (forest resource),
- Steps to implementing your plan, and
- Plans to monitor the results of your management.

Monitoring is an important but oft overlooked step that can help you in your future management of your forest. This is known as adaptive management. In essence adaptive management it is like your gardening journal in which you note “how things did” so you can make changes in the future to achieve a more desired result.

Finally, in developing your plan it is valuable to reach out to your to your neighbors, local foresters, and Extension professionals. These individuals can provide insight into how your management options for your forest fit into the greater landscape.

Sources:
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Montana State University Extension, Trees and Shrubs of Montana 2B0323
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www.msuextension.org/gallatin/naturalresources.html
Prepared: January, 2014

Appendix 1: Select Species Ecology

Rocky Mountain Juniper - Commonly called cedar, this tree varies from a bushy shrub to a 50 feet tall tree. The trunk is short and stout, often divided near the ground. The crown is generally dense, although the branches may become long, slender and drooping. These trees often are infected by a rust fungus that forms galls ½ - 1 inch in diameter. Several related ground varieties are also found throughout the state. Many of the state's older fence posts are cut from Juniper, owing to rot-resistant oils in the wood. The tree offers important habitat for a wide variety of birds and other wildlife.

Lodgepole Pine - Lodgepole Pine is a tall, slender tree, 30 to 100 feet tall, with the trunk 8-18 inches in diameter. It grows fast and often forms dense stands. The young trees do not grow in the shade of other trees, but after a fire they recolonize in high densities and over time natural thin. The common name of this tree is derived from the early use made of it by Native Americans and pioneer white settlers for constructing log frameworks and buildings. Lodgepole Pine has adapted to an environment where fires are common. The cone of the lodgepole may stay unopened on the tree for years, but as soon as exposed to the heat of a fire, will open and spread seeds onto the burned soils. In recent decades, Montana's Lodgepole Pine forests have been significantly affected by pine bark beetle infestations and forest fire events.

Whitebark Pine - Both Whitebark Pine and Limber Pine are usually short and gnarled, with large, edible seeds that are sought after by wildlife. Adapted to a wide variety of sites but usually grows on rocky soils and exposed sites at high elevations. The seed cones produce an important seasonal food source for a variety of wildlife including grizzly bears. The tree had previously been regarded as naturally insulated from pine bark beetle attacks due to its high elevation and cold-weather natural environment; however, researchers are now concerned over recent pine bark beetle infestations in Whitebark Pine stands.

Limber Pine - Like Whitebark Pine, Limber Line is usually a twisted and stunted tree, from 15-30 feet in height. Limber Pine is adapted to a wide variety of sites but usually found on summits, ridge tops and rocky foothills.

Engelmann Spruce - Engelmann Spruce is commonly found in cool mountain canyons along streams and lakesides. At high elevations, it grows in nearly pure stands. This spruce has a straight trunk with spreading and drooping branches in regular whorls forming a narrow spire. The tree is the natural host for the spruce bud worm and moth.

Subalpine Fir - This tree species reaches a height of 80 feet and a diameter of 2 feet but are typically much smaller at high elevations and is often a shrub-like tree at timberline. It usually has a long, dense, narrow, pyramidal, spire-like crown, with short, thick branches. It grows in shaded places where many other trees will not live and, although common at high elevations, it also grows in cool, narrow canyons and north slopes at low elevations.

Douglas Fir – Douglas Fir is really not a fir at all. Most conspicuously its cones are different from the true firs. Although it is a very large tree in coast areas, it seldom gets taller than 130 feet in Montana. Douglas-fir is used extensively for Christmas trees, lumber, and plywood in this state.

Rocky Mountain Maple - This species is a shrub or small tree 20-30 feet tall with a trunk diameter up to 8 inches. It often grows along mountain streams and on sides of canyons. Rocky Mountain Maple, often called dwarf maple, is a striking feature of mountain sides in autumn after the leaves have taken on their varied coloration.

Quaking Aspen - This tree is called Quaking Aspen because its leaves tremble in the slightest breeze. They are easily identified in fall by their golden leaves. It is usually found at high elevations where moisture is available. In exposed places, it is greatly stunted but on favorable sites it grows in pure stands, and the trees have straight trunks clean of branches for two-thirds of their length. The wood is soft and light but will decay quickly unless treated. These trees are important to many kinds of wildlife from birds to elk. Quaking Aspen possibly possesses the most extensive native range of any tree in North America, extending from Alaska to Mexico and throughout Canada from coast to coast. Quaking Aspen can form large clonal colonies with identical characteristics, propagating from common rootstock. Dieback of Quaking Aspen has been noted throughout the West since about 1996, although the reasons remain unclear.