

Mountains

[This Section Adopted by the Board of Supervisors August 5, 1998]

GOAL: Recognize the value of Albemarle's mountains, including protecting water quality and drinking water reservoir capacity, soil conservation, forest resources, plant and animal habitat, scenic values, tourism, and the economic impact of these resources.

Introduction

Albemarle's mountains have been and continue to be a source of income, natural resources, scenic beauty, and recreation. Mountains may be said to define much of the character of Albemarle County. Directly and indirectly, the County's mountainous areas provide economic benefits to the local community in employment, tourism, and agricultural and forest products. Beyond the economic benefits, the mountains provide important natural functions, such as provision of clean water, contributions to healthy air, and habitats for many of the County's plant and animal species. And, to many residents, the blue backdrop of the mountains gives Albemarle County in large measure its "sense of place," that quality which makes this area a special place to its residents and visitors and one which is consistently ranked among the top places to live in the United States.

Mountains are a source of concern when inappropriate development creates unwanted impacts to environmental and aesthetic resources and public safety. Environmental concerns include soil erosion, surface water runoff, septic system contamination, fragmentation of forests, and destruction of habitat. Aesthetic concerns center on disruption of the relatively pristine wooded character which provides a sense of continuity, natural beauty, and wilderness, and the resultant impact on tourism. Public safety concerns include difficult access for emergency vehicles, and the potential for debris flows.

OBJECTIVE: Pursue additional protection measures to protect mountain resources and to promote public safety in these areas of exceptional critical slopes and higher elevations.

Strategy: Develop a mountain protection district to protect and promote mountain resources and to protect public safety in mountain areas.

Strategy: Develop an educational brochure with recommended design standards for mountain areas to encourage sensitive site design which is considerate of safety, environmental and aesthetic concerns.

- Strategy:** Encourage voluntary measures which protect mountain resources, such as conservation easements, agricultural and forestal districts, and use value taxation.
- Strategy:** Encourage the use of the Rural Preservation Development (RPD) option to protect mountain resources.
- Strategy:** Utilize an acquisition program, such as purchase of development rights (PDR), to protect mountains.
- Strategy:** When enabling legislation allows, evaluate a density transfer or transfer of development rights (TDR) program to protect mountains.
- Strategy:** Develop County planning tools and educational materials that address hazard avoidance with regard to areas that are prone to debris flows. In conjunction with appropriate resource agencies, develop a debris flow hazard map for Albemarle County.

Albemarle's Mountain Resources

Albemarle's mountains are unique areas of the County which are distinguished by the natural resources and physical conditions listed below. Such resources and conditions are found in other areas of the County, but only in the mountains do they occur in such combination, as extensively, and to such extremes.

Critical Slopes

Mountain areas are unique and distinct from the lower elevations of the County that also may contain critical slopes because mountains, by their nature, are a system of slopes that extend for greater distances than critical slopes at lower elevations and which may be considerably steeper. In Albemarle's mountains continuous critical slopes in excess of 50% can be found for distances of up to one mile, and in some cases, longer. Concerns regarding disturbance of steep land become pronounced in mountain areas due to generally shallow soils and length of grade on side slopes. Soil erosion, surface water runoff, and septic system contamination are amplified in these areas.

Soil

Forest cover is the optimum land use for minimizing soil erosion and maximizing water quality. Soils on steep slopes are typically more erodible than in other areas. Inaccessibility and isolated location of development sites in mountain areas necessitate longer driveways and access roads over more highly erodible soils than in other areas of the County. Such driveways and access roads may disturb many times more land area than a dwelling itself. Improper attention to soils

may result in accelerated soil erosion and sedimentation, ground or surface water pollution, landslides, flooding, drainage problems, failed septic systems, construction problems, and unproductive agricultural and forestal lands.

Water Quality and Quantity

Sedimentation of Albemarle's public drinking water reservoirs in addition to increased demand may necessitate the building of an additional raw water source prior to 2015 to meet the average daily demands of the Urban Service Area. The South Rivanna Reservoir loses 13 million gallons of storage capacity annually as a result of sedimentation. By contrast, the Ragged Mountain Reservoir, whose watershed is almost entirely forested, loses no appreciable capacity. Protection of water resources is of vital importance to Albemarle County and Virginia in general. Albemarle's location adjacent to the Blue Ridge Mountains provides both the advantage of clean headwaters, and a responsibility to protect them. (See Water Resources, on page **Error! Bookmark not defined.**).

Forest and Agricultural Resources

The mountains of the County are almost entirely in forest cover, with the remaining acreage in orchards and pasture. A viable forest industry is an essential economic incentive to maintenance of forest land. The principal threat to the County's mountain forests and farms has now become fragmentation and conversion to residential land use. The County's Agricultural and Forestal Industries Support Committee report states, "Continued forest fragmentation is probably the biggest threat to the future viability of the forest industry in Albemarle County. As parcel size declines, operability for timber harvesting decreases. Forest sizes below 40 acres are difficult to manage economically. The proximity of houses and other structures escalates the problem."

The Growth Management Goal of Albemarle County places highest priority on the protection of agricultural and forestry resources in the Rural Area. The Mountain areas are zoned almost exclusively Rural Areas.

The Rabun-Myersville-Catoctin soil association on the Southwest-Carters Mountain chain is among the most productive hardwood forest soils in the Commonwealth.

Debris Flows

Some types of landslides take place very gradually, and while they can cause property damage, the landslide can be tracked and mitigation planned. Others types of landslides move very rapidly and have to potential to inflict massive damage to natural landscapes and human settlements. Debris flows (also called mudslides, mudflows, or debris avalanches) are fast-moving landslides that occur during periods of intense rainfall.

The U.S. Geological Survey (USGS) describes debris flows as follows:

Fast moving flows of mud and rock, called debris flows, are among the most destructive types of landslides and are responsible for substantial damage and loss of life worldwide...Their consistency ranges from watery mud to stiff, rocky mud similar to wet concrete and dense enough

to carry boulders, trees and cars. Debris flows are triggered predominantly by adding moisture to soil on steep slopes faster than the moisture can drain away leading to a temporary condition of perched water in the soil. They commonly start on steep hillsides as shallow soil slides that liquefy, accelerate to speeds of 35 miles per hour or more, and flow down hill slopes and channels until slowing on more gentle ground.

The following debris flow events have occurred in recent times in our particular region of the Appalachian Mountain chain:

- In 1969, during Hurricane Camille, Nelson County (and a small part of Southern Albemarle) experienced debris flows that caused 150 deaths and \$100 million in property damage.
- In November 1985, widespread debris flows in Virginia and West Virginia in the Potomac and Cheat River basins led to 70 deaths and \$1.3 billion in property damage.
- In June 1995, a storm cell in Madison County caused by 30 inches of rain during a 16 hour period resulted in debris flows that caused one fatality and \$100 million in property damage.

During the same period as the Madison County events, at least 100 debris flows occurred along the North Fork Moorman's River in Albemarle County and Shenandoah National Park. It is estimated that at least 11.5 inches of rain fell during a two-hour period. Were it not for the Sugar Hollow Reservoir, which acted as a trap for the debris flow flood surge from the North Fork Moorman's, eight or more downstream residences would almost certainly have been destroyed.

In addition, scientists have documented 51 historical debris flow events between 1844 and 1985 in the Appalachians. Studies of debris flow sites have revealed old, prehistoric debris flows beneath deposits of modern debris flows, meaning that, in geologic time, debris flows are recurring events in the Appalachian region. While a debris flow may not return to the exact same geographic area (e.g., the North Fork Moorman's) for thousands of years, it is known that conditions promoting debris flows occur somewhere in the Appalachian region every two to three years, and, accordingly, somewhere along Virginia's Blue Ridge front approximately once every decade.

Compared to other areas of the country, Central Virginia is not known as a region that is particularly vulnerable to natural hazards (e.g., earthquakes, volcanoes, etc.). However, floods and debris flows are certainly natural hazards that are known to occur in Central Virginia, and for which the population should be prepared.

With regard to typical flooding, the County maintains a flood plain program in accordance with the National Flood Insurance Program, and regulates activities within flood plains through the zoning ordinance. Debris flows, however, are not associated with a typical flood event, and until the events of June 1995 (and Hurricane Camille for some) brought these realities to our doorstep, the community has remained largely unaware of this natural hazard.

It is important for the County and the residents of mountainside communities to realize that there are measures that can be taken to avoid debris flow hazards and to be prepared. The U.S. Geological Survey recommends the following general measures:

1. Become familiar with the land around you. Learn whether debris flows have occurred in your area by contacting local officials, State geological surveys or departments of natural resources, and university departments of geology. Slopes where debris flows have occurred in the past are likely to experience them in the future.
2. Support your local government in efforts to develop and enforce land-use and building ordinances that regulate construction in areas susceptible to landslides and debris flows. Buildings should be located away from steep slopes, streams and rivers, intermittent-stream channels, and the mouths of mountain channels.
3. Watch the patterns of storm-water drainage on slopes near your home, and note especially the places where runoff water converges, increasing flow over soil-covered slopes. Watch the hillsides around your home for any signs of land movement, such as small landslides or debris flows or progressively tilting trees.
4. Contact your local authorities to learn about the emergency response and evacuation plans for your area, and develop your own emergency plans for your family and business.

In accordance with these recommendations, the County should enhance its planning and informational resources to direct and advise that development avoid debris flow-prone areas. In this regard, recent USGS studies have identified the following predictive criteria for potential future debris flows:

- Storms with very intensive rainfall -- the 1995 storms had periods with rainfall intensities of 5 inches per hour that were sustained for 2 hours or more.
- Areas underlain by prehistoric debris flow deposits.
- Areas underlain by slopes greater than 26 degrees (approximately 47 percent slope).
- Natural drainage channels and streams that originate on slopes greater than 26 degrees and delineated with a buffer 10 feet in elevation above the channel.

The USGS has used these and other criteria to produce a hazard map for part of Madison County based on studies of the 1995 debris flows. Albemarle County should work with the appropriate agencies to produce a similar map for the County's mountain areas.

The information in this section was derived from the following reports:

Debris-Flow Hazards in Areas Affected by the June 27, 1995, Storm in Madison County, Virginia
Morgan, B.A., Wieczorek, R.H., Campbell, and Gori, P.L., USGS Open-File Report

97-438, 1997.

Debris Flows and Landslides Resulting From The June 27, 1995, Storm on the North Fork of the Moormons River, Shenandoah National Park, Virginia, Morgan, B.A. and Wieczorek, G.F., USGS Open-File Report 96-503, August, 1996.

Debris-Flow Hazards in the Blue Ridge of Virginia, U.S. Geological Survey Fact Sheet - 159-96, 1996.

Landslide and Debris-Flow Hazards Caused by the June 27, 1995, Storm in Madison County, Virginia, Wieczorek, G.F., Gori, P.L., Campbell, R.H., and Morgan, B.A., USGS Open-File Report 95-822, October, 1995.

Plant and Animal Habitat

Losses of native biological diversity (plant and animal species diversity, genetic diversity and ecosystem diversity) are a significant concern. Those declines are caused by several factors, most importantly, fragmentation of habitat - the dividing of large areas into smaller parcels, and the resulting disruption of forest cover. (See Biodiversity **Error! Bookmark not defined.** and Forest Fragmentation **Error! Bookmark not defined.**).

Scenic Resources and Their Economic Impact

Albemarle County is well known for its scenic character. Maintaining this character is important to current residents and to prospective residents and tourists. A number of highly visible structures constructed recently have occasioned public concern about the continued scenic quality of the mountain landscape. Public expression of concern suggests that the scenic quality of the mountains is important to County residents. An issue that is of importance to visual impact is the horizon. In a county with as much varied topography as Albemarle, the natural horizon becomes very prominent. Any serious modification of the natural ridge lines in the County will modify the visual character of an entire area. (See Scenic Resources on page 126).

Dark Sky

Excessive outdoor lighting in the urban and developed areas of the County is increasing. The natural resource of dark night sky and its importance to the University's Observatories has been insufficiently considered in planning processes in the County. Energy wasted nationally from poorly designed outdoor lighting amounts to more than a billion dollars a year (International Dark Sky Association, 1990). Poorly designed outdoor lighting creates glare, which compromises safety especially for drivers, degrades the quality of the entrance corridors leading to the City, and degrades the quality of the built environment. (See The Dark Sky **Error! Bookmark not defined.**).

Tourism

Tourism and associated economic benefits related to the mountains continue to grow in the County. Travel sales in 1994 accounted for 17% of total sales or \$109,139,211 in the County. Each year approximately 1,985,000 people visit Shenandoah National Park. Direct economic

benefit to counties adjoining the Park is approximately 85 million dollars per year. In 1990 there were 550,183 visitors to Monticello, which translates into over 159 million dollars in revenue to the County.

History of Mountain Protection

Mountain resource protection efforts began in 1971 with the adoption of the County's first Comprehensive Plan, which delineated the mountains as "conservation areas." The 1977 Comprehensive Plan contained a map of conservation areas that included hilltops, major ridge lines, and slopes over 15%. Hillside development standards were proposed on slopes exceeding 15%, which included road construction, grading and drainage standards.

In 1980 a new zoning ordinance was adopted, which included the Rural Areas zoning district to restrict rural development rights, and the critical slopes provisions. All the mountains except two small peaks in the Urban Development Area are currently zoned Rural Areas. The critical slopes provisions require a "building site," a contiguous area of land in slopes of less than 25%. The regulation is intended to implement the Comprehensive Plan by protecting and conserving steep hillsides together with public drinking water supplies and flood plain areas and in recognition of increased potential for soil erosion, sedimentation, water pollution and septic disposal problems associated with the development of those areas described in the Comprehensive Plan as critical slopes. The 1980 critical slopes provisions did not address driveway construction.

The 1982 Comprehensive Plan included environmental standards to protect and conserve natural resources. The Plan states: "Clearing, grading, building, cropping or overgrazing of critical slopes can result in extensive erosion and landslides or sloughing of soil and rock; excessive storm water runoff; increased siltation and sedimentation of natural and man-made bodies of water; loss of aesthetic resource and in the event of septic system failure, a greater travel distance of septic effluent."

The 1989 Comprehensive Plan states that, "Natural, scenic, and historic resources are essential to Albemarle County's rural character, economic vitality and quality of life." The Plan notes the strong relationship between these environmental resources, water supply protection, and agricultural/ forestry preservation, which are the major reasons for protecting the Rural Area. The Plan also notes the interdependency of environmental resources. "For example, the maintenance of forested areas protects surface water quality, wildlife habitat, critical slopes, groundwater recharge areas, and air quality." The 1989 Plan also discusses design standards for scenic resources. "In a county with as much varied topography as Albemarle, the natural horizon becomes very prominent. Any serious modification of the natural ridge lines in the County will modify the visual character of an entire area." The Plan recommended adoption of an Open Space and Critical Resources Plan, to identify and to develop protection measures for significant natural and scenic resources, including critical slopes, important wildlife habitat, wooded areas of environmental importance, and hilltops and ridges.

The Open Space Plan, adopted July 15, 1992 as an amendment to the Comprehensive Plan, identifies Mountains as one of four major open space systems which are the most important open space lands to protect. It lists resources associated with mountains: critical slopes, scenic views, wildlife habitat, extensive forests, unique soils for orchards, natural areas (including geologic

features and habitats for rare and endangered plants and animals), and headwaters. The Open Space Plan defines mountains by a designated elevation contour line, based generally on location of critical slopes and areas of visual impact. (See Map 2 – 8: Recommended Mountain Protection Areas). The Open Space Plan includes the following strategy which was also added to the Comprehensive Plan action agenda: “Develop a mountain protection district to protect the scenic and aesthetic values associated with mountains, and to further protect their environmental characteristics.”

The Open Space Plan states: “Visual concerns related to mountains center on disruption of the relatively pristine wooded character which provides a sense of continuity, natural beauty, and wilderness. Extensive critical slopes, combined with high elevations, result in a prominent display of changes to the mountain landscape. Activities that alter the continuity of the ridgeline or result in excessive tree removal should be discouraged.”

Environmental concerns include (1) the loss to development of a unique and beneficial natural environment and (2) disruption of the natural balance of soils, slope and vegetation. While detailed studies have not been undertaken at this time, it is anticipated that due to the location of generally unspoiled and extensive forests, together with a relatively small human and domestic animal population, mountains may be areas of comparative significance as "natural areas" and "wildlife habitats." Mountains also provide areas of unique soils suitable for orchards and vineyards between elevations of 800 - 1800 feet. Environmental benefits of undisturbed forests often associated with mountains include increased groundwater recharge, surface water quality, and climate modulation. In addition, concerns regarding disturbance of steep land become pronounced in mountainous regions due to generally shallow soils and length of grade on side slopes. Issues related to soil erosion, surface water runoff, and septic system contamination are amplified in these areas.”

Mountain Protection Plan

The Mountain Protection Committee consisting of 12 citizens appointed by the Board of Supervisors met from June 1995 through July 1996. They prepared a report, the *Proposed Mountain Protection Plan* (Appendix B) dated August 1, 1996, which was presented to the Board of Supervisors September 4, 1996. The plan contained three major recommendations:

- (1) Delineation of a **Mountain Overlay District** describing the area containing the critical resources of the mountains, and recommendations which ensure health and safety of the mountain areas' residents and which control possible degradation of the County's resources from activities within the District.

The intent of an ordinance would be to protect resources characteristic of or dependent on the mountainous regions of the County: public safety, water quality, public drinking water reservoir capacity, soil conservation, forest resources, plant and animal habitat, scenic values associated with the mountains and their economic impact, and tourism.

Specific recommendations for a **Mountain Overlay District** addressed soil erosion plans, driveway requirements, protection of ridge areas, and building and subdivision

requirements to use building sites located outside the mountain district if they are available.

- (2) Recommendation of Countywide application: **A Lighting Ordinance** to require shielding of all new exterior lighting fixtures. The Committee also recommended a future study to determine maximum foot candles for categories of uses, and recommended that the Board of Supervisors ask power companies to cease promoting unshielded and inefficient lighting. (See The Dark Sky **Error! Bookmark not defined.**).
- (3) **Additional Planning Tools:** Though the Mountain Protection Committee's task was to develop recommendations for the protection of the mountains of the County, the Committee noted that planning for the protection of discrete areas or resources, such as the mountains, the urban areas, or the watershed must be integrated with a more systematic approach which provides for the protection of resource systems, such as drinking water, economic viability of urban areas, or transportation networks. The mountainous areas of Albemarle County are not only prominent physical features possessing critical natural resources, but they are also important parts of many human and natural systems in the County and region. Like other County human, cultural and natural resources, they therefore require consideration as components of larger planning issues.

Some of the County's land use regulations developed with a compartmentalized approach to land planning may have unintended consequences for protection of its natural resources and other comprehensive planning goals of the County. Rural residential parcels (5-20 ac.) too small to farm or timber or serve as habitat, increase sprawl, put unintended pressure on mountain and agricultural lands. Areas of the County possessing critical resources may require different types of land use restrictions to protect the resource. Segregated land uses may unintentionally increase housing costs, and increase pressure on transportation systems and on agricultural lands in the path of proposed new roads. Discussion of natural resource protection may not be broad enough in scope to suggest effective or equitable solutions. The Committee recommended several planning tools to achieve a more systematic approach to resource protection for Albemarle County.

Mountain Design Standards

The following **GENERAL STANDARDS** should be applied to protect Mountain resources:

- Minimize clearing. Consider the impact of your clearing on others' vistas of the unspoiled natural terrain.
- Locate driveways to minimize grading, length, and impact on critical slopes and trees. Driveways should disturb no more than 65 feet in cross section.
- Consider "peek holes" in the vegetation and winter views rather than clearing for year-round views.
- Maintain the natural tree canopy.
- Replant the forest edge with local indigenous species to discourage growth of undesirable edge vegetation (poison ivy, greenbriers).

- Locate the house and structures to make them unobtrusive in the landscape.
- Do not build structures taller than the natural tree canopy.
- Do not locate the house and structures where they will be “skylighted” against the horizon.
- Do not alter the continuity of the ridgeline.

- Locate the house and structures to make them safe.
- Do not build in swales or other areas where a debris flow may occur.
- Minimize disturbances to critical slopes.
- Locate the septic system downslope of the dwelling to make use of the clearing as a fire buffer area.

- Design private driveways to permit fire and rescue emergency vehicle access:
 - Longitudinal gradient should not exceed 16%.
 - Minimum allowable radius for horizontal curvature should be 40 feet.
 - Avoid north slopes where snow and ice may accumulate.

- Design the house and structures to blend in with the terrain surrounding the building site.
 - Choose non-reflective colors and materials.
 - Choose earth tone colors rather than stark white.
 - Choose underground rather than overhead electrical service.
 - Choose local indigenous landscape materials.
 - Consider an alternative to growing a lawn.

- Consider your impact on plant and animal habitat.
 - Maintain the natural landscape in large contiguous areas.
 - Clearing for a dwelling creates edge habitat. Be prepared to coexist with deer and other wildlife.

- Locate and shield exterior lighting to minimize its obtrusiveness on neighbors and the natural environment.
 - Use full cutoff fixtures that are aimed downward.
 - Use lighting that is adequate but not excessive for the proposed use.

Mountain Contour List

The following named mountains and other unnamed mountains are included on the Concept Map (USGS quad sheet locations are noted if names are duplicated). They are defined by a designated elevation contour line, based generally on location of critical slopes and areas of visual impact.

700 Foot Contour

Stillhouse
Lewis
Mt. Jefferson
Southwest Mountains
Trevillian
Wolfpit
Long
Sugarloaf
Lonesome
Broadhead
Hightop (Keswick Quad)
Walnut
Dowell
Peters
Goodlow
Carters
Monticello
Patterson
Round Top (Alberene Quad)

800 Foot Contour

Piney (Earlsville Quad)
Dudley Mountain
Britts
Piney (Alberene Quad)
Ragged Mountains
Round Top (Charlottesville West Quad)
Bear Den (Charlottesville West Quad)
Newcomb
Woodson
Gibson (Alberene Quad)
Gillums

900 Foot Contour

Buck
Taylor's
Martin's (Crozet Quad)
Sprouse
Israel

Tom
Gay
Ammonett
Cook
Persimmon
Fan
Mount Oliver
Appleberry
Shiloh
Brush
Yellow
Harris
Green (Free Union Quad)
Cherry Mountain

1000 Foot Contour

Boaz Mountains
Walnut Top
Heard
Mill
Chalk
Castle Rock
Moses
Massies
Long Arm
High Top (Covesville Quad)
Burnt
Sharp Top
Ennis
Round Top (Waynesboro E. Quad)
Turks
Lick
Currant
Pigeon

1200 Foot Contour

Blue Ridge Mountains

Scott

Bear Den (Waynesboro E. Quad)

Calf

Bucks Elbow

Little Yellow

Beaver Creek

Middle

Pasture Fence

Pinestand

Cedar

Big Flat

Little Flat

Loft

County Line

Fox

Gibson (Brown's Cove Quad)

Martins (Brown's Cove Quad)

High Top (Brown's Cove Quad)

Map 2 – 8: Mountain Overlay District Elevation Map