

## Chapter 5. Environmental Issues and Natural Resources

### 5.1 Environmental and Natural Resource Issues

Madison County is located in the heart of the Appalachian Mountains. The main “floor” of the county is about 2000 feet above sea level, with a number of mountain peaks reaching more than 4000 feet in elevation. In the central part of the county, the French Broad River flows through one of the largest gorges in the eastern U.S. Other streams that flow into the French Broad River form the many coves and valleys that are found throughout the county.

Madison County is rich in natural resources and wildlife. The County is covered with mountains and rivers, as can be seen in the accompanying maps. It also contains lots of good soil, extensive forests and receives adequate rainfall (average annual rainfall is 70 inches). The topography has shaped the settlement patterns and transportation routes over the years. The many rivers and streams (see Map 6 – Water Resources) provide water and habitat for wildlife, offer fishing, boating and other recreational opportunities and add to the scenic beauty of the area. The County contains many streams that are classified as “high quality waters” or “outstanding resource waters” and many with native trout and other fish communities.



#### Public Lands and Recreational Opportunities

National Forest properties make up one-sixth of the land in the County and can be found all along the northern county boundary. These large tracts offer important habitat especially for larger animals and for plants such as ginseng and goldenseal which need larger and less disturbed forest areas to survive. The National Forests also offer a wide range of outdoor recreational activities, including hiking, fishing, hunting, rafting/kayaking, horse-back riding and camping. They contain an interconnected network of trails, including the Appalachian Trail, which runs across the northern part of the county. The Town of Hot Springs has been designated a gateway to the Appalachian Trail and has a long history associated with the AT. See the accompanying Madison County Recreation Maps (Maps 5A and 5B) for locations of the various recreational facilities, hiking trails, bicycling routes and motorcycle routes. The beautiful scenery and windy, mountainous roads draw many motorcyclists to the county for recreational riding.

## Biodiversity and Habitats

Madison County is part of the Southern Blue Ridge Ecoregion, as described in the NC Wildlife Action Plan (NC Wildlife Resources Commission, 2007). Habitats range from high peak spruce-fir forest to low floodplain valleys in the ecoregion. The spatial diversity of the region's topography (slope, aspect, elevation) with its unique geologic history has resulted in a broad array of biodiversity. The ecoregion also contains a wide range of climate types. The combination of these conditions, and that the ecoregion escaped glaciation, has provided specialized habitats for the evolution and survival of a vast number of species, including over 400 endemic species – the most found in any ecoregion in the United States (Ricketts et al., 1999).

Many of the factors affecting species in this region can be traced to larger habitat-level issues. The decline of high elevation forests is one of the most pressing habitat concerns in the ecoregion – the southern Appalachian spruce-fir forest is considered the second most endangered ecosystem in the United States (Noss et al., 1995). Loss of this forest type has limited habitat for many bird species endemic to this region. Other habitat loss issues include succession of high elevation heath and grass balds, homogeneous maturity of forested stands, and habitat fragmentation due to development (NC Wildlife Resources Commission, 2007).

The One North Carolina Naturally program of the NC Department of Environment and Natural Resources has an online mapping tool that shows various habitats and indicators of biodiversity, as well as other natural resources. Users can zoom into any area across the state. It can be accessed at <http://www.onencnaturally.org/pages/ConservationPlanningTool.html>. This tool plus the NC Wildlife Action Plan and its related datasets plus the regional data and tools described in section 5.2 below provide a wealth of data and resources for land owners, developers, planners and others on environmental factors and natural resources.

## Land Cover

The Land Cover Map (Map 7) shows broad categories of the types of vegetation and/or development that cover the landscape of the county. A small amount of land is covered with highly or moderately intense development (roads, buildings, town centers, etc..). The French Broad River shows up as the largest body of open water. Much land along the valley bottoms is

### ***What is the North Carolina Wildlife Action Plan?***

“The Wildlife Action Plan is a comprehensive management tool developed by the N.C. Wildlife Resources Commission to help conserve and enhance the state’s full array of fish and wildlife and their habitats. Crafted by our state leaders in research, conservation and education, the Wildlife Action Plan identifies diverse management strategies, research studies and conservation efforts to ensure that all of our wildlife resources have a healthy place to call home.”

To see the plan:

<http://www.ncwildlife.org/Plan/index.htm>

made up of cropland or pasture; that is where most of the farmland exists in the County. The vast majority of the land in the county is covered with forest.

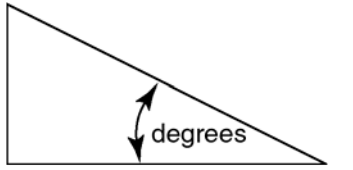
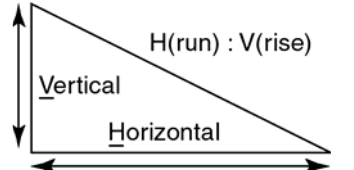
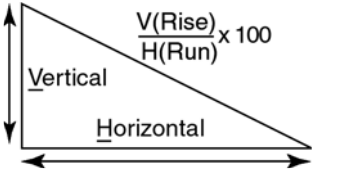
### Topography

The abundance of mountains, rivers and coves provides dramatic scenery and also presents challenges to development. As can be seen on the Topography Map (Map 8), much of the land across the county has some slope to it. Many of the ridges are “protected mountain ridges” designated by the Mountain Ridge Protection Act of 1983, which means that buildings in the protected areas cannot exceed 40 feet in height and must not protrude more than 35 feet above the ridge. The ridge area that is covered in this legislation includes all land that is within 100 feet below the elevation of the crest of the ridge.

Slope varies all over the county and should be examined on a property and case-by-case basis. The largest area of mostly flat and lightly sloped land (much of it with slopes of 10 percent or less) is the area in and around Mars Hill. Other lightly sloped areas are found near the Buncombe County border, south of the Shelton Laurel Creek (NC 212), around US 25-70 and the French Broad River northwest of Hot Springs and along NC 209 through Spring Creek.

Slope is expressed in a couple different ways, depending on its context. The chart below provides a comparison of the different expressions. For example, a 45 degree angle/slope is the same as 1H:1V (rise over run) and 100 percent slope.

**Slope Measurement – Comparison Chart**

Degrees	Ratio	Percent
		
45	1 H : 1 V	100%
27	2 H : 1 V	50%
18	3 H : 1 V	33%
14	4 H : 1 V	25%

### 5.2 Regional Planning Context

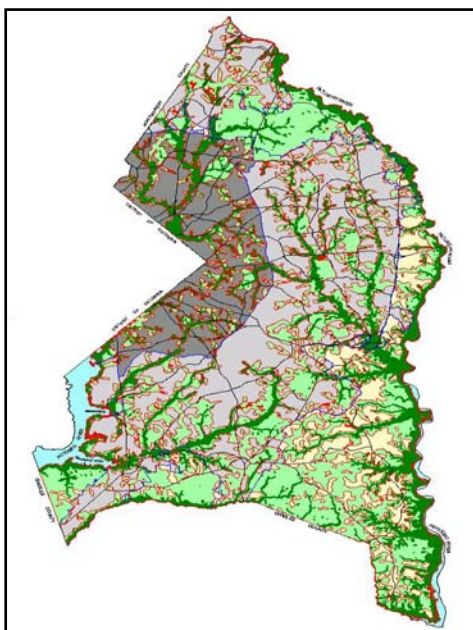
Land-of-Sky Regional Council (LOSRC) is working with a large variety of people and organizations to develop a regional plan to help ensure our natural and cultural resources are conserved and our economy, much of which is derived from these and other resources, remains

healthy. The science-based plan will contain maps showing areas that are valuable for their ecological systems and services – including farmlands, forests, water resources, wildlife habitat, recreation areas – and areas that are most suited for future growth and development. The region covered in this plan includes Madison County and also Buncombe, Henderson and Transylvania counties.

The *Linking Lands and Communities* (LLC) project is bringing together scientists, community and business leaders, farmers, owners of large public and private tracts of land, local government staff and officials, developers and interested citizens to design a regional conservation and development network. Using a highly collaborative approach, the project aims to strengthen and link rural and urban communities and protect the area’s rich natural and cultural heritage.

This regional conservation and development network and accompanying implementation strategies will provide information, maps and GIS data, various tools and inspiration to strategically guide future development in the four-county region. It is being designed to complement current city and county planning efforts and be a resource to local governments, communities, land owners, land trusts and developers. The network will be linked to similar efforts across the Southern Appalachian region and the state. For more information, see <http://www.linkinglands.org>.

Various GIS data layers have been collected and analyzed and have become part of the “assessment” phase of this project. Open house meetings will be held in October and November (2009) to share the assessments and their component maps and to solicit feedback and comments. After this, a “green infrastructure” network will be developed and shared with the public (in January 2010). Then future development scenarios will be considered in an interactive workshop, resulting in a Regional Conservation and Development Network. The Network will be accompanied by a set of implementation tools and strategies as well as documentation on how it was developed and how it can be used.



An example of a green infrastructure network, from Prince Georges County, MD

## 5.3 Strategies for Preserving Natural Resources while Accommodating Growth and Development

### (1) PRE-DEVELOPMENT CONFERENCE AND SITE-SPECIFIC ASSESSMENT

#### 5.3.1 Strengthen pre-development evaluation process for ALL types of development

Madison County Subdivision Control regulations require a pre-development evaluation (Section 7.5.1), where the developer meets with staff and shares a “Sketch Plan” that contains the information outlined in Section 7.6.1. **The County should consider strengthening this requirement by requiring the meeting to occur earlier in the process (i.e., before lots and streets have been laid out) and requiring a pre-development meeting for ALL development projects, not just subdivisions.**

The purpose of this pre-development conference is to create a dialogue, early in the development process, among local government staff, developers and project specialists. It is an opportunity for the developer to obtain advice and technical assistance from county staff and to understand the review process and requirements.

The developer should bring to the meeting:

- Vicinity map showing the location of the property in relation to neighboring tracts, roads, and waterways
- Base map showing property boundaries, total acreage, adjacent property owners, 2’ or 5’ topo, USGS blue-line streams, wetlands and other significant natural resources, zoning
- Aerial photo
- Concept Plan showing:
  - Proposed land uses;
  - Access road alignments and statement of maximum road grades and grading limits;
  - Location of suitable building areas, including proposed “building envelopes”;
  - Summary of infrastructure construction, density and minimum lot size;
  - Preliminary water supply assumptions;
- Preliminary statement regarding proposed water quality protection standards and how they will meet or exceed state/local standards
- Evaluation of water and sewer adequacy for proposed large developments

#### 5.3.2 Request a geotechnical analysis under potentially risky conditions

The County may want to request a geotechnical analysis when development is proposed on properties that contain unstable slopes or less stable soil types. Landslides pose a public safety risk and result from the cumulative effect of many interrelated factors, including geology, soils,

hydrology, slope modifications and deforestation. They can be “triggered” by earthquakes, blasting, freeze-thaw occurrences, with the most common trigger being high levels of precipitation.

## **(2) CONSERVATION-BASED DESIGNS**

### **5.3.3 Encourage designs that leave large, unfragmented natural areas intact.**

The County should encourage designs that leave large, unfragmented natural areas intact – through education, incentives and requirements. Fragmentation of the landscape reduces the diversity of wildlife and contributes to the degradation of water resources. Different species require different habitats and larger animals, like bears, require a large area to survive. A certain level of biological diversity is essential for our environment to function. If too much diversity is lost, the food web breaks down and the ecosystem can no longer renew itself. Also as development occurs, pavement and other impervious surfaces disrupt the water cycle and channel pollutants into waterways.

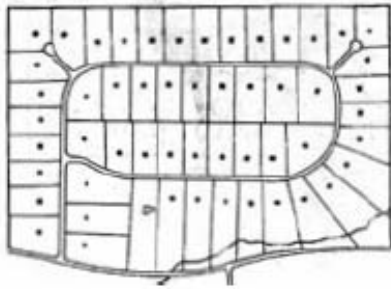
### **5.3.4 Encourage and consider requiring conservation-based design and development plans, for all types of development.**

The County should allow, encourage and consider requiring conservation-based design and development plans, for all types of site development, as well as subdivisions. These practices strive to conserve a site’s natural resources and features while designing the development on the site (see diagrams below). The newly adopted Planned Unit Development regulations encourage the use of conservation subdivision design.

Conservation Subdivisions (also referred to as Open Space Subdivisions and Cluster Subdivisions) typically involve the permanent protection of a large majority of the site (more than 50%). The area selected for protection will generally have valuable environmental or ecological resources such as creeks, wetlands, forests, threatened wildlife habitats, or irregular/extreme topography. Ideally, the conserved areas should be linked to a broader network of conserved lands (e.g. floodplains, forest stands) to preserve the larger ecosystems. The resultant lots are often clustered on a small percentage of the site and can be made up of a variety of lot sizes and densities.

Randall Arendt, a landscape architect from New England, developed the concept of Conservation Design, in his books, *Rural by Design* and *Conservation Design for Subdivisions*, and has authored numerous articles and given presentations on this topic. The main steps for conservation-based design are:

1. Identify all potential conservation areas
2. Identify all potential development areas
3. Locate the house/building sites
4. Design the street alignments and trails (as appropriate to project)
5. Draw in the lot lines (for subdivisions)



**Conventional Subdivision** (above left with 2 acre house lots) vs. **Conservation Subdivision** (above right with just under 3/4 of an acre, 30,000 sq. ft., house lots) with the **SAME** number of home sites (55) on a 130 acre site  
 Diagram above courtesy of LandChoices ([www.landchoices.org](http://www.landchoices.org)) and diagram below courtesy of *Mountain Landscapes Initiative Toolbox* ([www.mountainlandscapesnc.org](http://www.mountainlandscapesnc.org)).



**Conceptual Agriculture-Oriented Neighborhood  
 (Macon County, NC)**

*A conceptual plan for a 100 homes oriented around small subsistence and organic hobby farms one to five+ acres in size to create the ideal arrangement for social and agricultural sustainability.*

**5.3.5 Utilize outside resources to identify areas that are highly rated for biodiversity and wildlife habitat and encourage conservation of these areas.**

Utilize the maps from the Linking Lands and Communities project and maps from other sources to identify areas that are rated highly for biodiversity and wildlife habitat. Encourage conservation of these areas by working with local land trusts (Southern Appalachian Highlands

Conservancy and The Nature Conservancy), the NC Wildlife Resources Commission and land owners.

### **5.3.6 “Steer” development to occur along existing roadways and in/near existing communities.**

To preserve natural areas, minimize fragmentation and to enhance community character, focus new development along existing roadways and in and near existing communities and towns, through implementation of zoning recommendations in this plan (see Chapter 11), and as shown on the Proposed Future Land Use map (Map 16). The main transportation corridors shown on the map are good locations for new commercial and industrial development as well as a mix of other uses.

## **(3) BEST MANAGEMENT PRACTICES**

### **5.3.7 Encourage the use of Best Management Practices (BMPS) for controlling erosion and storm water run-off.**

Encourage the following Best Management Practices (BMPs):

- Encourage the use of Low Impact Development (LID) techniques to minimize stormwater impacts and run-off. The primary goal of LID techniques is to mimic the predevelopment hydrology of the site by using design techniques that store, infiltrate, evaporate and detain run-off. Techniques include reducing imperviousness, maintaining natural drainage courses, minimizing the use of pipes, minimizing clearing and grading and incorporating rain gardens and natural areas to trap and filter rain water.
- Limit land disturbance activities and limit the amount of land disturbed.
- Limit the amount of impervious surfaces — Studies show that watersheds with 10% or more imperviousness show declined biological health; aquatic habitat degradation correlates to increased rate of imperviousness.

## **(4) EDUCATION**

### **5.3.8 Partner with other organizations to provide education and educational materials about the importance of preserving the County’s natural resources and ecosystems.**

Consider partnering with the NC Wildlife Commission to provide a summary of educational resources and an education program showing maps of natural resources and areas of high biodiversity and wildlife habitat with information on why it is important to preserve/conservate these areas and various strategies outlined in this chapter.

### **Selected Resources:**

Arendt, Randall, 1996. *Conservation Design for Subdivisions: A Practical Guide to Creating Open Space Networks*. Island Press, Washington, DC.

Arendt, Randall, 1995. *Rural by Design: A Handbook for Maintaining Small Town Character*. Planners Press, Chicago, IL..

NC Wildlife Resources Commission, 2009. *Green Growth Toolbox* (<http://www.ncwildlife.org/greengrowth/index.htm>).

North Carolina Wildlife Resources Commission, 2007. *North Carolina Wildlife Action Plan*, Raleigh, NC.

Ricketts, T. H., E. Dinerstein, D. M. Olson, C. J. Loucks, W. Eichbaum, D. DellaSala, K. Kavanagh, P. Hedao, P. T. Hurley, K. M. Carney, R. Abell, and S. Walters. 1999. *Terrestrial ecoregions of North America: a conservation assessment*. Island Press, Washington, DC.

Southwestern Planning and Economic Development Commission, the Community Foundation of Western North Carolina and The Lawrence Group Architects of North Carolina, Inc. , 2008. *Mountain Landscapes Initiative* ([www.mountainlandscapesnc.org](http://www.mountainlandscapesnc.org))