

Hugh Irwin
Susan Andrew

Conservation Area Network in the Southern Appalachians

Introduction

The Southern Appalachian Forest Coalition (SAFC) is currently developing a proposal for a regionally integrated conservation plan for the Southern Appalachian region. This region, which covers the highlands of Virginia, Tennessee, North Carolina, South Carolina, Georgia, and Alabama, is an area of high biological diversity, rich cultural heritage, and fast population growth and development. A core of public lands exists in the area that could be the basis for long-term regional biodiversity protection. SAFC is developing conservation plans centered on these public lands. However, addressing just these lands would leave significant gaps in conservation and biodiversity protection. SAFC is addressing other conservation and management ideas to fill in these gaps.

Biological Diversity of the Southern Appalachians

Forests of the Southern Appalachian Region are among the most diverse temperate forests in the world. At least 2,391 species and varieties of flowering plants are found in the high mountains (the Blue Ridge Province) of the Southern Appalachians alone. Approximately 2,816 species of plants are found in Great Smoky Mountains National Park; 130 are tree species. Also found in the park are 450 species of vertebrates, 4,280 of invertebrates, 2,250 of fungi, 330 of mosses and liverworts, and 230 of lichens. These are conservative estimates, and these numbers are expected to increase as new species are discovered. An All-Taxa Biodiversity In-

ventory recently begun in the park expects to increase these numbers to 5,400 plants, 475 vertebrates, 76,000 invertebrates, and 20,000 fungi. Numbers of species in Great Smoky Mountains National Park, which has received considerable study, are only an indication of the number of species in the entire region, which in general has received much less study.

The major reason for the biological diversity of the Southern Appalachians is the relatively long stability of the region's climate and geology. Mountains have been present in what is now eastern North America for about 230 million years, going through several stages of uplift and

erosion. Because of a combination of geographical and climatic protection, the southern portion of these mountains has been continuously vegetated for this whole period. The Southern Appalachians have thus played a crucial role in the vegetation history and evolution of North America and the world. While other areas have been submerged under seas, covered by glaciers, and otherwise subjected to catastrophic changes, the Southern Appalachians have remained a biological refuge.

During this same period, the Americas, Europe, and Asia were connected as a single supercontinent. Flowering plants evolved while this connection between the great land masses of the earth existed. As the continents separated, an immense forest of broad-leaved trees with a rich understory developed that stretched over the entire northern section of the landmass from Asia to the Americas.

This primordial forest, which has been called the Arcto-Tertiary Forest, is thought to be ancestral to the present forests of both the Southern Appalachians and Southeast Asia. This ancient forest is thought to closely resemble the Cove Hardwood Forests of the Southern Appalachian Mountains and the Mixed Mesophytic Forests of the Cumberland Mountains. Most of the plants in our Southern Appalachian forests had their origin in the Arcto-Tertiary Forest. The separation of North America and Eurasia as the conti-

nents continued to drift apart isolated the forests, but the large number of plant genera that the Southern Appalachians have in common with areas of Southeast Asia illustrates the common ancestry of forests in these widely separated regions.

This ancestral forest expanded to cover most of North America as the climate warmed about 30 million years ago. Although changes occurred in this forest, the major events that profoundly changed the ecology of the entire northern hemisphere were the ice ages that occurred during the last 3 million years. The majority of this period was characterized by periods of cold, lasting about 100,000 years, during which glaciers moved south. These periods were interrupted by periods of relative warmth, lasting 10,000 to 30,000 years, during which the glaciers receded. From four to ten such periods occurred. The Southern Appalachians were south of the ice sheets, but were nevertheless greatly affected by them. Periods of cooling were associated with southward migrations of plant species; interglacial warming was associated with northward migrations as the ice sheet receded. Because of the lack of glaciation in the region and the multitude of microclimates found around the low mountains and stream valleys, much of the biological diversity of the region was able to find suitable microclimates to survive during the ice ages.

The Conservation Challenge for the Southern Appalachians

The rich biological heritage of the region that has survived time and ice ages is currently threatened by a variety of forces. Extirpation of large mammals during European settlement and destructive logging at the turn of the century damaged many ecosystem functions and eliminated or marginalized many species. Establishment of public lands early in the century and a wide variety of conservation efforts have resulted in a base of ecological recovery for the region. However, new threats place this recovery in jeopardy. One of the highest growth rates in the nation is converting unfragmented forest into sprawl. An aggressive regional road-building policy is further fragmenting the landscape. Timber and pulp companies are increasingly focussing their activities in the region. If the legacy of biological diversity in the Southern Appalachians is to be saved, disparate conservation efforts throughout the region must be unified to provide a coordinated and comprehensive conservation strategy. SAFC is seeking to provide this strategy by working with a wide variety of conservation groups in the region. SAFC's GIS program provides the analysis, persuasive mapping, and other tools to develop and implement a conservation vision for SAFC and other conservation associates in the region.

Conservation Elements for Landscape and Regional Planning

A number of conservation ele-

ments are available for large-scale planning in the region. The region has a complex mix of ownerships and a long history of human influence, both from European settlement and from pre-Columbian habitation. However, within this complex cultural context are a rich heritage and potential for conservation protection. Elements on the landscape available for a regional conservation plan include:

- **Protected wildlands.** Existing wilderness areas and national park lands, including the world-class bioserves Great Smoky Mountains and Shenandoah national parks, are central to any regional conservation strategy.
- **Currently unprotected wildlands.** U.S. Forest Service areas inventoried as roadless, as well as other areas that may not satisfy strict roadless criteria but nevertheless have wildland characteristics, are habitat to species dependent on an unfragmented landscape.
- **Old-growth forest.** Destructive logging at the beginning of the century destroyed much of the original forest in the region. However, significant tracts, particularly in remote areas, survived. These areas are being re-discovered, and their extent is sometimes surprising. These areas of old growth serve as a reservoir of diversity and a reference for the recovery of the extensive second-growth forests that are just reaching maturity in the re-

gion.

- **Biological hotspots.** Species diversity is not spread uniformly across the landscape. There are areas of the region that harbor much more than their share of rare species and species richness. These areas, many of them on the public lands, are key areas to protect as reservoirs of community and species diversity. SAFC is working with The Nature Conservancy and state and federal natural heritage programs to identify and protect these biological hotspots.
- **Aquatic diversity area watersheds.** Just as there are terrestrial hotspots of diversity, there are rivers and streams that are particularly diverse in aquatic species and which retain much of this diversity despite widespread impoundment of waters and degradation of water quality in the region. SAFC has conducted a rapid assessment of the regions' watersheds to identify priority aquatic diversity areas for special protection by public agencies and for landowner outreach programs for riparian protection. In addition, these watersheds and riparian areas can play a key role in providing movement corridors for terrestrial species.
- **High-priority areas for public acquisition.** Public lands were established in the Southern Appalachians early in the century primarily for watershed protec-

tion. The passing of years has also highlighted the importance of the region for biological diversity. However, there still remain many gaps in the fragmented public ownership in the region. Much of the land in the region remains in large blocks owned by utility and timber companies. Currently much of this land is being sold. It is an excellent opportunity to fill in the gaps in public ownership and add key lands for habitat and aquatic protection.

- **Private conservation management.** Many landowners are open to managing their lands for long-term habitat and open-space preservation. Particularly when economic incentives are put in place, key tracts can be managed with conservation easements to supplement habitat on adjacent and nearby public lands. SAFC is working with conservancy groups to encourage this movement and to envision these areas in their relationships to the landscape and the regional context.
- **Regional sustainable development.** To prevent conservation lands from becoming islands in a sea of development, there is a great need for local, state, and regional efforts to put development and economic trends into a planning context that protects important biological processes while encouraging compatible

economic development. Road planning that provides for wildlife movement could mitigate the high biological impacts. Residential clustering and land-use planning could provide for both economic development and habitat protection.

Conclusion

The Southern Appalachian region is one of the fastest growing in the USA. If the region's rich biological heritage is to be saved for the future, planning a conservation network is essential. SAFC is beginning this process with a proposal for a conservation network centered on public lands and building on other initiatives in the region.

Hugh Irwin, Southern Appalachian Forest Coalition, 46 Haywood Street, Suite 323, Asheville, North Carolina 28801-2838; hugh@safc.org

Susan Andrew, Southern Appalachian Forest Coalition, 46 Haywood Street, Suite 323, Asheville, North Carolina 28801-2838; susan@safc.org

