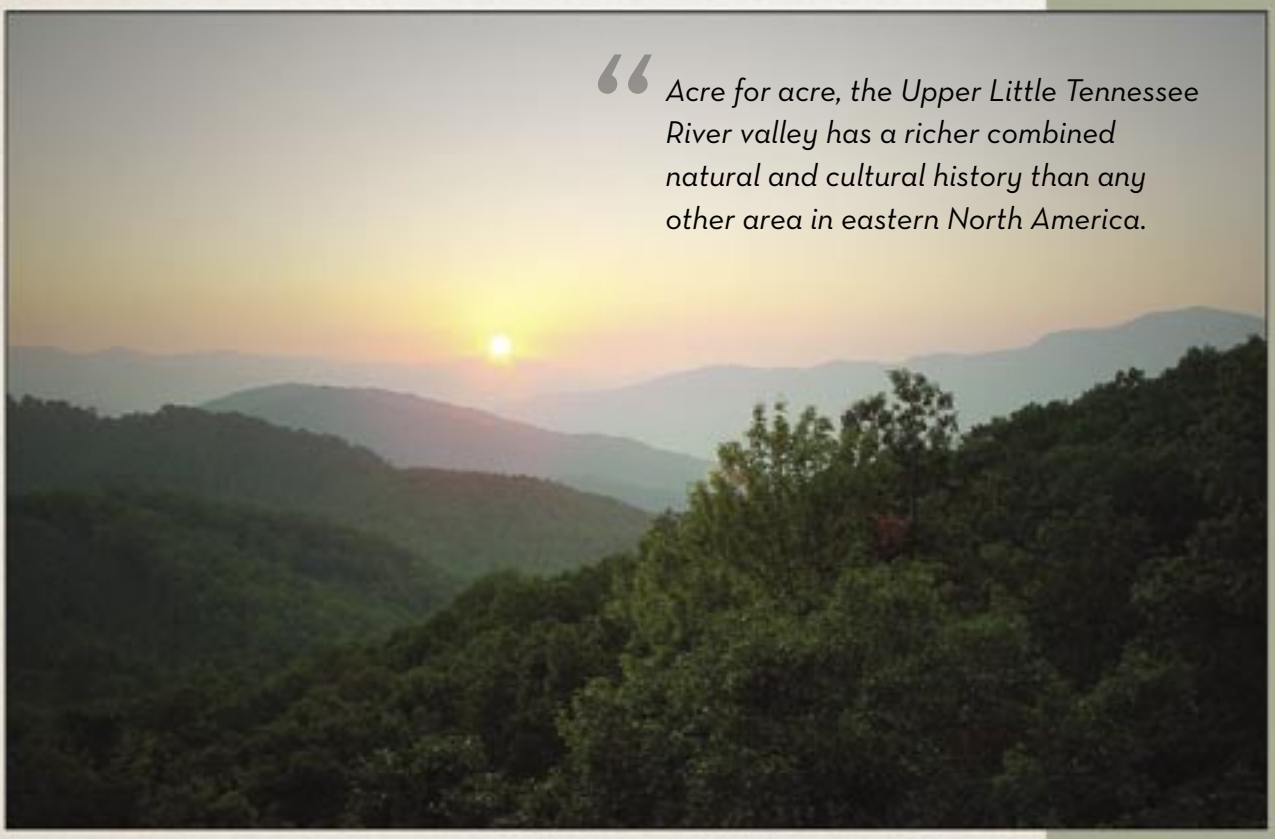
PART ONE
INTRODUCTION

Nestled within some of the oldest mountains on earth, the upper Little Tennessee River basin, comprised of the Little Tennessee, Nantahala, and Tuckasegee watersheds and their surrounding mountain ranges, possesses a unique – yet threatened – natural and cultural heritage. This document provides an assessment of the current status of and threats to this heritage, and some strategies for its conservation.

Our Vision
Our vision of the upper Little Tennessee River basin is one of a healthy rural landscape and vibrant, sustainable economy situated within a well functioning ecosystem.

This vision recognizes the connectivity of:

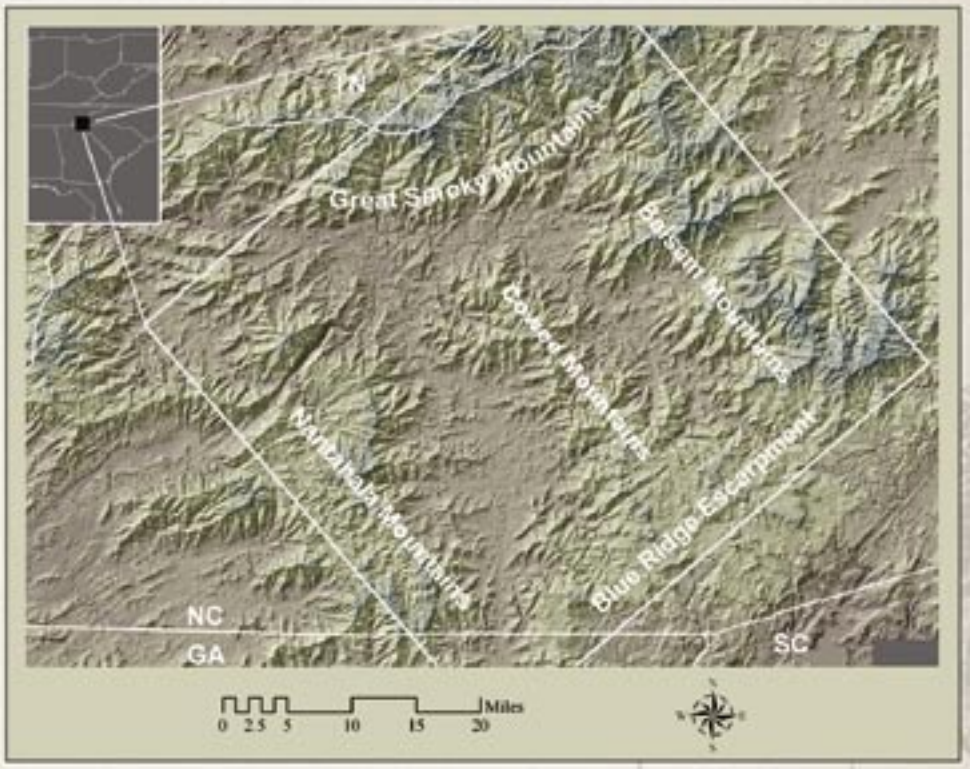
- Past land use by Native Americans and European settlers with the current ecological and cultural landscape;
- Patterns of current land use and management with the quality of water in the streams and rivers;
- Maintaining the native biological diversity with the integrity and functioning of the ecosystem across the landscape;
- Ecological health with sustainable economic and social development; and
- A healthy environment with the quality of life of its people and rural communities.



A westward view of the upper Little Tennessee River basin from the Balsam Mountains across the Cowee to the Nantahala Mountain ranges.
Photo courtesy Balsam Mountain Preserve

Introduction, continued

The upper Little Tennessee River basin lies in the heart of the Southern Blue Ridge, and is comprised of three North Carolina counties (Jackson, Macon and Swain) and part of one north Georgia county (Rabun). The Southern Blue Ridge is one of the three main ecological regions that make up the Southern Appalachian mountains, and one of the most biologically significant regions in the United States (TNC/SAFC, 2002). With nearly 3,000 species of plant life alone, there are more species of trees native to the Southern Blue Ridge than any other temperate region on earth. With habitats ranging from warm sheltered valleys to the highest mountain ranges of the eastern U.S., the landscape is home to creatures of both tropical and boreal origins. Its streams and rivers are world renowned for their aquatic diversity, supporting vast numbers of fish, mussels, snails and crayfish. Much of this diversity depends on the high quality of water that flows out of the mountains (Irwin, et al., 2002).



Digital elevation model of the Upper Little Tennessee River Basin showing major mountain ranges.

"In May 1775, the Philadelphia-born naturalist William Bartram, following a Cherokee trading path from the coast, found paradise along the Little Tennessee. From the river's headwaters down to the Cherokee town of Cowee, not far from present-day Franklin, Bartram rode his horse through "expansive, lucid, green, flowery fields ... Magnificent high forests ... meadows and lawns ... one of the most charming natural mountain landscapes perhaps anywhere to be seen." (Kornegay, 1999).

The role of the Southern Blue Ridge as a biological refuge throughout much of the Earth's history is the cause for these vast natural riches. Our mountains are some of the oldest on earth, formed more than 260 million years ago, and have been sculpted by repeated cycles of continental collision and separation, uplift and erosion. They have been continuously vegetated since at least the Cretaceous extinction 65 million years ago. This prolonged history, combined with favorable climatic conditions, has allowed the region to play a primary role as a refuge for species during past periods of global climate change.

This history also helps explain the southern mountains' richness in endemic species — plants and animals that are native to only a limited geographic area, and are found nowhere else in the world. The south to north orientation of the main stem Little Tennessee River valley has served as a corridor for plant and animal migration and is a regionally significant bird flyway. Few regions on Earth outside the tropics comprise such a "Noah's Ark" of biological diversity.

PART TWO
NATURAL AND BIOLOGICAL HERITAGE

MOUNTAIN RANGES AND FORESTS OF THE UPPER LITTLE TENNESSEE BASIN

Daybreak in the Balsams Jon Bowman photo

Five great mountain ranges dominate the horizons of the upper Little Tennessee River basin (ULTRB), towering from two to four thousand feet above the intermountain valleys. The Smokies, Balsams, Nantahalas and Blue Ridge Escarpment surround the ULTRB and the Cowee Mountain Range bisects the basin. From Cowee Bald sitting at its center, one can behold the entire landscape of the Little Tennessee and Tuckasegee Valleys.

The Smokies lie within the Great Smoky Mountains National Park, which comprises the largest contiguous block of public land in the basin. The park is the most visited National Park in the nation, hosting approximately 10 million visitors annually.

The Balsams are the highest elevation spur of the Great Smoky Mountains, with peaks that reach more than 6,000 feet in elevation. The southern spur of the Blue Ridge Parkway follows the crest of the Balsam ridge. The crest of the Balsams harbors the southern-most native spruce stands in the East.

The Cowee Mountains bisect the basin and feature a unique mineralogy with old ruby and emerald mines.

The Nantahala Mountain Range is the southern-most extent of the massive mountain ranges that make up the Blue Ridge and is cloaked with vast acreages of National Forest.

The Blue Ridge Escarpment has some of the most dramatic scenery in eastern North America. Its shear rock cliffs and waterfalls are the tallest in the East.

> *The Little Tennessee River valley is globally significant because, outside of the tropics, it is where the most species-rich river system (the Tennessee) intertwines with the richest deciduous forests on earth.*

The Flora and Fauna of the Little Tennessee

Plants

A large diversity of rare plants are found in the basin. The survival of many of these depends upon the conservation of rare ecological community types. There are 27 species of vascular plants within the three-county area that are on the North Carolina Natural Heritage element occurrence list. The native botanical diversity is reflected in the vast Cherokee traditional knowledge of medicinal plant use — perhaps the richest in North America.

Mammals

From hoofed-species such as the white-tailed deer to the tiny Star nosed mole, the mountainous region surrounding the Little Tennessee basin is home to 66 of North Carolina's 82 indigenous terrestrial mammals. As with most species, degradation and loss of habitat is the biggest threat to mammals in the region.

Within the three-county region of the upper Little Tennessee River basin there are 11 species of mammals that are on the North Carolina Natural Heritage element occurrence list. Five of these are listed as federally endangered — Carolina northern flying squirrel, Indiana bat, gray bat, Virginia big-eared bat and Eastern cougar.

Black bear
Bill Lea photo

Fraser's loosestrife
Jason Love photo

"Cowee Bald stands in the geographic center of the Upper Little Tennessee River Basin, and may have been the most sacred mountain for native peoples in the basin.

Birds

The north-south orientation of the upper Little Tennessee River valley provides a spring and fall migratory corridor for numerous bird species. In addition to being a natural flyway, the valley provides all of the requirements necessary for these birds in regard to food and stopover habitat: woodlands for warblers and other passerines; and pools, sandbars, mud flats, and wetlands for waders, shorebirds, and waterfowl. The Tessentee Farm Preserve on the Little Tennessee River south of Franklin has a bird list of 102 species and local birders, John & Cathryn Sill have compiled a list of over 170 species of birds they have observed over the years within three miles of the Little Tennessee River. Osprey are increasingly common on the basin's rivers, and in the spring of 2004, a flock of whooping cranes migrated through the valley.

Reptiles and Amphibians

The Southern Blue Ridge is the center of the world's salamander diversity. There are at least 3 species of reptiles and 6 species of amphibians within the three-county area that are on the NC Natural Heritage element occurrence list. Of these, the Bog Turtle is listed as federally threatened.

Aquatic Species

The upper Little Tennessee River is widely recognized as having one of the most significant assemblages of aquatic species in the Southeast. The basin provides habitat for a large diversity of aquatic life, including a number of rare fish, mussels and insects — several of which are endemic. Over the past 15 years, the Little Tennessee River has consistently ranked as one of the most intact aquatic ecosystems in the entire Tennessee River system. Scientists, such as local aquatic biologist Dr. William O. McLarney, believe that the river continues to support the full assemblage of native aquatic animal life, something that no other warm-water river in the Blue Ridge can boast. Many species that have disappeared from other river basins continue to thrive in the Little Tennessee. Perhaps one of the most important reasons why this basin's aquatic communities are intact is the predominately forested watersheds on the publicly owned lands of its tributary streams. Another key factor is that, unlike other Blue Ridge rivers, it remains free flowing for much of its length and has not experienced large-scale industrial or urban pollution.

Tangerine darter, Percina aurantiaca

The "Red Eft" is the immature land phase of the Eastern newt, Notophthalmus viridescens

Bill Lea photo

The upper Little Tennessee River is home to 67 species of fish – fully one-quarter of the freshwater fish species native to the entire Tennessee Valley system, while representing just 2% of the entire drainage area (McLarney, 2001). The southern Blue Ridge is considered the center of salamander evolution on Earth.

Aquatic species, continued

As of November 2000, 8 species of fish, 7 species of mollusk (mussels and snails), one amphibian species , 2 crayfish, 2 plant species and 17 species of invertebrates (insects) were listed as rare in the Little Tennessee River basin (NCDWQ, 2002). The river is home to the most diverse assemblage of mussel species in North Carolina and harbors at least three federally listed species — two endangered mussels and one threatened fish. The river otter was reintroduced in the Needmore area in the early 1980s and is now found throughout the main stem of the Little Tennessee River.

Rivers & Water Quality in the Basin

The Little Tennessee River

The main stem Little Tennessee River rises in the mountains of Rabun County in northeastern Georgia. In North Carolina, the river flows north and then northwest before being impounded behind Fontana Dam, the tallest in the East. Downstream of Fontana, the river is a series of impoundments into the state of Tennessee, where it meets the Tennessee River. The main stem upper Little Tennessee River flows 55 river miles and drains 450 square miles in Rabun, Macon and Swain counties. Unlike other Blue Ridge rivers, it remains free flowing for most of its length except for the run-of-the-river Lake Emory Dam in the town of Franklin, NC. The Little Tennessee River's watershed drains the highest-rainfall area in the eastern United States. As such, the upper Little Tennessee River before entering Fontana Reservoir is the largest river flowing from the smallest watershed in eastern North America.

"The Little Tennessee River's watershed drains the highest rainfall area in the East, making it the largest river flowing from the smallest watershed in eastern North America.

The main stem Little Tennessee is actually two rivers of very different characters. The river upstream of Franklin, NC, meanders northward across an ancient, low-gradient valley. This reach of river is heavily sedimented, but is bordered by regionally-significant wetland habitats. Near Franklin, the river doubles in size with the confluence of the Cullasaja River and Cartoogechaye Creek. Downstream of Franklin, the much larger river increases in gradient as it cuts to the northwest, creating the most ecologically-intact warm-water river system in the Southern Blue Ridge.

The Tuckasegee River

The Tuckasegee River is the largest tributary to the upper Little Tennessee. It originates on the western slopes of the Blue Ridge Escarpment and flows northwest between the Balsam and the Cowee mountain ranges, then turning west passing between the Great Smoky Mountains and the Cowee Mountains before being impounded by Fontana Resevoir.

The Fish Hawk Mountains tower over the Little Tennessee Valley near the Georgia state line.
LTLT photo

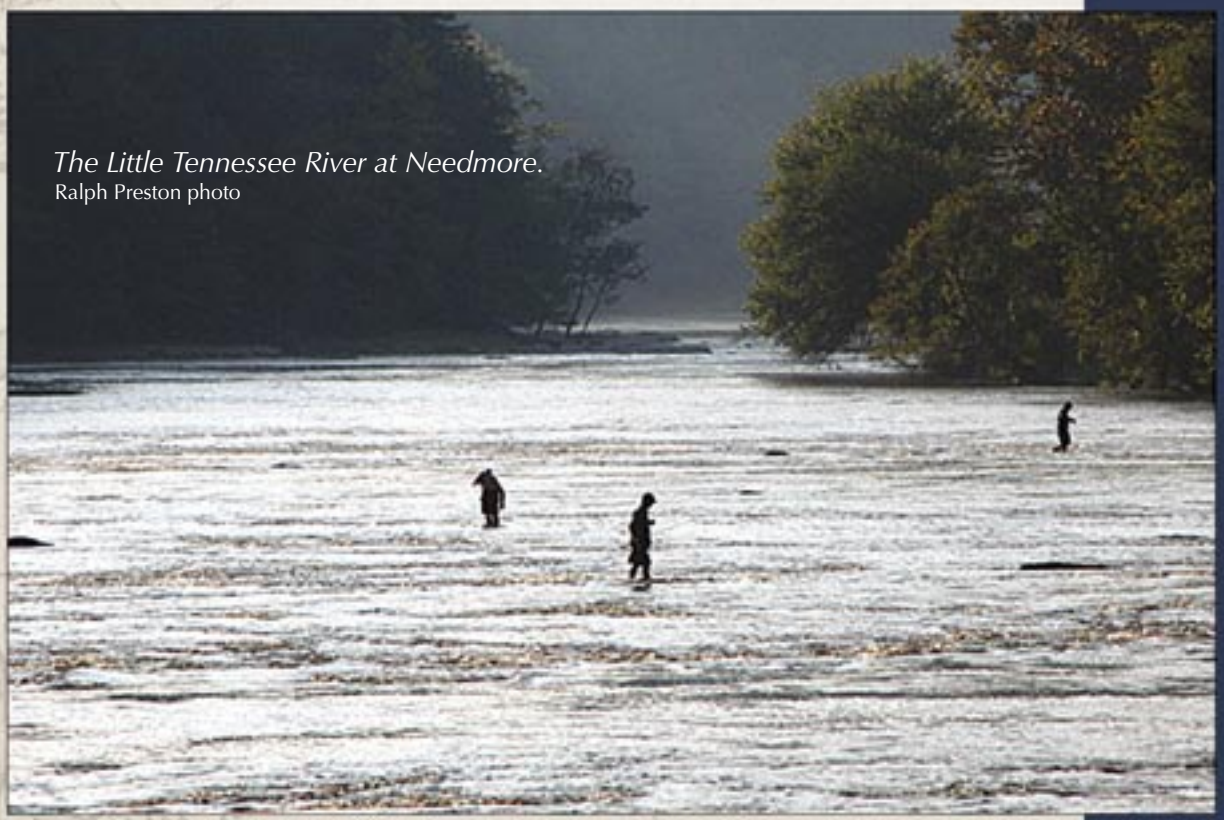
The Tuckasegee has endured more local extinctions of freshwater fauna than the Little Tennessee, due to past industrial pollution. The Tuckasegee is a regulated river as its daily flow regime is altered by four large hydroelectric dams in its headwaters. The river's flow is further interrupted by the run-of-the-river Dillsboro Dam. Many biologists believe that the Tuckasegee holds great potential for recovery of much of its former species assembleges that are still found in the neighboring mainstem Little Tennessee River. Management of Duke Power's dams on the Tuckasegee and Nantahala rivers is currently evaluated as part of the federal relicensing process.

The Nantahala River

One of the Little Tennessee River's most visited tributaries is the Nantahala River; in Cherokee, "land of the noonday sun." A cold-water trout stream throughout its length, the Nantahala arises from the shadow of Standing Indian and Albert Mountains, yielding native brook trout in the headwaters and providing a popular brown trout fishery further downstream. While watershed ownership is largely in the Nantahala National Forest, the Nature Conservancy holds a conservation easement on more than 1,800 acres in the Rainbow Springs area. Roughly midway in its length, the Nantahala River is impounded by a hydroelectric dam forming Nantahala Lake. The private land portions of the watershed are small, fragmented inholdings under intensive residential and summer home development pressures.

The river has become a nationally recognized whitewater recreation destination making it an economic engine for Swain County with myriad rafting businesses along its banks. Nantahala Gorge is the most extensive formation in southwestern North Carolina of limestone and Murphy marble, and is home to a number of rare or endemic Southern Appalachian plant species.

Together with the southern Blue Ridge Escarpment, the Nantahala Mountains receive the highest annual precipitation in the east. Rockhouse Knob, in southern Macon County near the Georgia state line, receives the highest rainfall in eastern North America, sometimes exceeding 140 inches per year.



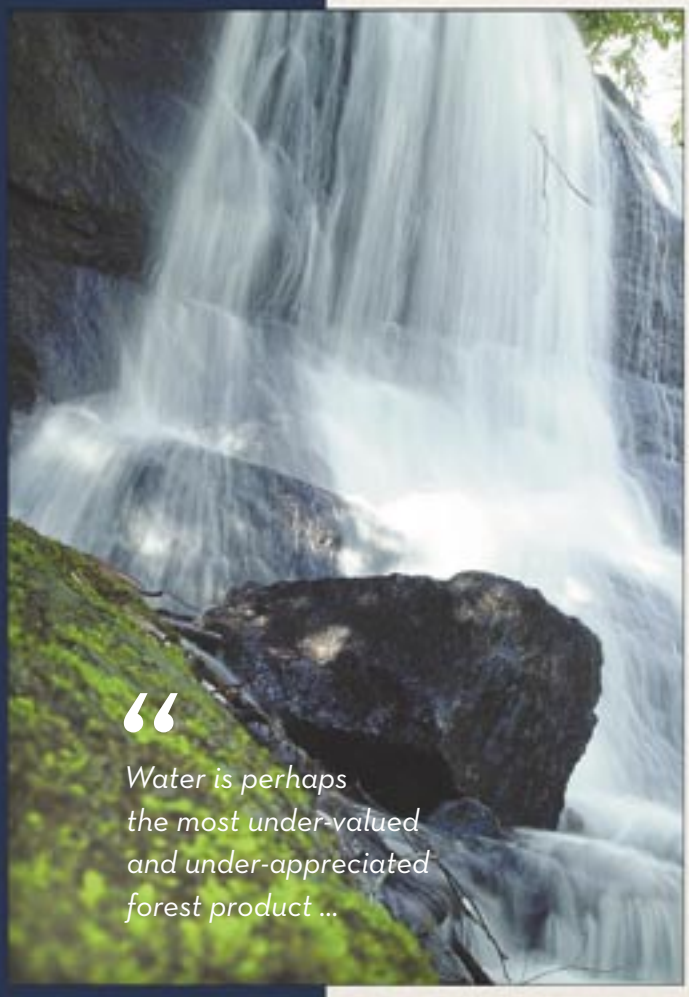
The Little Tennessee River at Needmore.
Ralph Preston photo

Land Use and Water Quality

Conventional wisdom suggests that the mainstem of the Little Tennessee River cannot be conserved without a conservation strategy for its entire watershed and its tributaries. This point of view has been reinforced recently with the discovery of a massive fall migration of the threatened spotfin chub and its common congener the whitetail shiner up Little Tennessee River tributaries. This observation represents a biotic interchange of unsuspected magnitude and unknown significance between the river mainstem and its tributaries. The more recent discovery of the first record of any of the Little Tennessee mussel fauna in a tributary stream is also significant. One recognized value of the larger tributaries is as nursery habitat and refugia for river fishes, such as the smallmouth bass (McLarney, 2002).

Water is perhaps the most under-valued and under-appreciated forest product. Interactions among soil, water and forests play an important role in the quality of aquatic ecosystems within streams and rivers.

Land use is clearly one of the most important factors determining water quality. Inversely, water quality is an important indicator of how well land is managed. Forested watersheds, for example, have consistently been shown to have lower sediment and nutrient yields and better aquatic biological conditions than nonforested watersheds. Forests increase the resilience of watersheds through water storage, soil protection, nutrient buffering and filtering of sediment and other pollutants.



Since 1988, a locally-led biomonitoring program based upon fish community sampling to establish indices of biological integrity (IBI) has helped to map the water quality trends in the watershed of the Little Tennessee River upstream of Fontana Reservoir and to identify key aquatic diversity areas. This information is summarized in the recently published “State of the Streams” report produced by the Little Tennessee Watershed Association (LTWA, 2003). A riparian land use survey and mapping of the Little Tennessee River and its two principal tributaries, the Cullasaja River and Cartoogechaye Creek, was conducted by the LTLT between 1997 and 1999 (McLarney, 1999).

Waterways with notable water quality concerns in the basin include Crawford Branch, in the Upper Little Tennessee watershed, Scotts Creek and Savannah Creek in the Tuckasegee watershed, and Silvermine Creek and Wine Spring Creek in the Nantahala watershed (NCDWQ, 2002).

Sugarloaf Creek, in the Scotts Creek watershed
Bill Graham photo

Measuring the Health of the Little Tennessee

The Little Tennessee Watershed Association's Biomonitoring Program uses an Index of Biotic Integrity (IBI) to calculate a quantitative measure of river or tributary stream health. The IBI system gives a score for each of 12 criteria, based on the number and distribution of fish identified in a sample. The sampling process uses fish shockers, seines, and dip nets to catch fish, which are evaluated and released. Since the mid-1980s, the Little Tennessee River at Needmore has consistently scored as the healthiest reach of warm water river in the entire five-state Tennessee River Valley (LTWA, 2003).

Corridors, Elevational Gradients and Connectivity within the Basin

Maintaining connectivity among different habitats along streams and rivers, as well as from mountain tops to valley bottoms, is considered an important factor in conserving the biological diversity found in the Little Tennessee landscape. Due to the potential effects of future climate change, maintaining habitat corridors across elevational gradients may become increasingly important. The landscape of the Little Tennessee River basin is woven together by three types of corridors:

A. Riverine and Riparian Corridors

Restoring and maintaining native aquatic species along major stream channels requires an unimpeded flow of water.

- The Lake Emory dam along the Little Tennessee River & the Dillsboro dam along the Tuckasegee River may be having important adverse consequences in this regard. Some other species, such as the river otter, can overcome such obstacles.
- There is also an important biotic exchange of aquatic species between tributary streams & main river channels. The extent of such exchange is just beginning to be understood along the Little Tennessee downstream of Franklin (McLarney, 2002).
- Given its north-south orientation, the Little Tennessee River valley has been recognized as an important regional flyway for birds. The maintenance of wetland habitats along this corridor is considered important to support the rich diversity of bird life that moves through the valley.

Four-lane highways such as US 23/74 in the Balsams are a barrier to movement of wildlife and dispersal of plants at several key points in the Little Tennessee River basin.
Bill Graham photo

B. Forested Ridgetop Corridors

Ridgetops have traditionally served as important migration corridors for many mammal species, with black bear being one of the most important. While much of our forested uplands lie within National Forest system lands, there are some important ridgetop areas where public holdings are fragmented. Private forestland conservation can help fill these gaps. Principal among these ridgetop areas in need of private, forestland conservation are along the Cowee and Fishhawk mountains and the Plott Balsams/Balsam Gap region.

C. Forested Elevational Gradients & Corridors Between Mountain Ranges

The passage ways between the ridgetops and valley bottoms and between mountain ranges are becoming increasingly fragmented by residential development and roads. Major highways such as the four-laned US 23 and US 74 serve as serious barriers for movement of wildlife, large and small, and dispersal of plants across the landscape.

Examples of key forested elevational gradients where there is potential to maintain connection between mountain ranges in the upper Little Tennessee River basin:

- The Nantahala to the Cowee at Needmore *(see below)*
- The Southern Nantahala to the Blue Ridge Escarpment
- Little Canada to Cullowhee Mountain
- Cowee Bald to the Plott Balsams

"Remnant old growth forests are found mostly on public land. Most of the river basin is cloaked in second or third-growth forests with dominant trees often exceeding 100 feet in height at 50 years of age.

The Little Tennessee River at Needmore
Ralph Preston photo

The Nantahala to the Cowee Across Needmore

Beginning at Cowee Bald at 4,944 ft. in elevation, dropping to the Little Tennessee River's confluence with Tellico Creek in Needmore at 1,880 ft. and climbing back to Wesser Bald on the Appalachian Trail on the Nantahala at 4,627 ft., there is more than 5,800 ft. of elevational change in 14 horizontal miles. Traveling this transect, one can stay under continuous forest canopy except to cross the wide river at Needmore, while passing every major forest type in the Southern Blue Ridge. The tawny crescent butterfly and the raven are two examples of high-elevation species that surprisingly can been found below 1,900 feet on the Needmore tract. It is assumed that they follow the intact forested gradient down from mountaintop to the river. This transect is crossed by two state roads, a two-laned paved road (NC 28) and a gravel road (the Needmore Road), and a U.S. Forest Service gravel road (Leatherman Gap Road).

With the Needmore Tract now being state-owned conservation land, this forested elevation connector has a good chance of being kept relatively intact. National Forest lands extend from the crest of the Nantahala to the Needmore Tract to the west. To the east, National Forest land covers about 70% of the spine of the main ridge connector. The LTLT holds a conservation easement on 206 acres on upper Tellico Creek and is nurturing easement projects in other portions of this corridor. The Nature Conservancy also holds an easement on a 37-acre tract on Shepherd Creek.

The Little Tennessee River corridor and the pastoral landscape of northern Macon County. In the distance is the Nantahala to Cowee forested corridor that crosses the river at Needmore.

Ralph Preston photo

PART THREE
THE HUMAN ELEMENT

THE CULTURAL HERITAGE OF THE UPPER LITTLE TENNESSEE RIVER BASIN

Cultural elements are intricately interwoven in the natural history of the landscape of the Little Tennessee River basin.

• Until relatively recently, Native Americans had continuously cultivated crops for 4,000 years along the river in the vicinity of Cowee. Over the past five generations, European descendants, as well as African Americans, have left their signature on the land.

• For millennia, this valley has served as a crossroads for trade and cultural contact. Still today, Mississippian mounds of the Cherokees' ancestors are found on the banks of the Little Tennessee, and the Cowee/West Mill National Register Historic District encompasses a 1,400 year breadth of man made historic structures, unequaled in North Carolina.

• The valley is significant as a remarkable turning point in early U.S. history. In September 1776, the largest army ever assembled on the continent, to that time, marched on Cowee in a campaign that served as the "Lexington and Concord" of the Revolutionary era in the South.

"The September 1776 colonial campaign against Cowee on the banks of the Little Tennessee River was the "Lexington and Concord" of the Revolutionary era in the South.

Effects of Historical Human Interactions with the Environment

The basin has been a heavily worked landscape for centuries. Its forests are, for the most part, the result of multiple disturbances and land use changes. Prior to European settlement, Native Americans modified the composition and structure of significant portions of the forests, primarily in the river valleys, with fire and crop cultivation. Once trade with Europe was established, Cherokee and Euro-American hunters took a severe toll on native wildlife populations, extirpating some species and greatly diminishing others.

Barbara McRae & Elayne Sears Illustration

For millennia, the Little Tennessee River valley has served as a crossroads for trade and cultural contact. Mississippian mounds of the Cherokees' ancestors are still found on the river's banks.

Beginning with European settlement, three historical epochs in land use and resource extraction further shaped the region's landscape. The first was the land clearing for agriculture and livestock rearing, and the forest grazing of livestock. The second involved widespread commercial timber exploitation in the late 19th and early 20th century, and subsequent wildfires. By the beginning of the Great Depression much of the region's forest-resource was depleted and its soil greatly degraded. Also during this period, many of the richest bottom lands and rural communities were buried under large reservoir lakes created as part of hydroelectric projects. Wholesale land abandonment followed the Great Depression and set the stage for the third epoch, a 60 to 70 year period of forest regrowth. Starting in the 1930s, many forested areas were permanently transformed by the chestnut blight, which eliminated American chestnut from its dominant role in the mountain forests.

Legacies of these massive alterations still influence forest composition, structure, and functions, and can also be found in aquatic systems. For example, severe soil erosion and sedimentation of waterways strongly altered and continue to influence aquatic habitat and species. Various terrestrial wildlife species have been displaced or are extirpated.

Logging and Subsequent Forest Conservation

The timber industry migrated to the region in the late 1800s after timber stocks were depleted in the Northeast and the Lake States.

- Commercial attempts at large-scale timber operations began in the late 1800s.
- The Tallulah Falls Railway reached Tallulah Falls, GA in 1882, and extended north to Franklin by 1907.
- The railroad arrived in Jackson County, from the north in 1884, and the extension of the Western North Carolina Railroad to Murphy in 1890.
- In 1899, a diverse group of local people met in Asheville to chart a course for the protection and restoration of the Southern Appalachian Forests. Soon thereafter, President Theodore Roosevelt's "A Message from the President" (Wilson, 1902), gave official voice to the leading conservationists of the day.
- The Weeks Act of 1911 was passed, ultimately bringing some 24 million acres of Eastern forestlands into the National Forest system to be held for watershed protection and timber production. Western North Carolina was one of the first areas to be targeted, with a National Forest that encompassed several counties in Western North Carolina, upstate South Carolina and Georgia established with its first headquarters in Franklin.
- In the late 1930s, the boundaries were changed and the portion of this reserved land located in western North Carolina became known as the Nantahala and Pisgah National Forests.

As railroads and timber operations worked their way through the upper Little Tennessee River basin, the mountainsides were being cleared of

their biggest and most valuable trees, wildfires were consuming what was left, and rich topsoil was being washed downstream by flash floods. The land was being devastated.

Post-Timber Boom

Beginning in the 1930s, there were further changes in the basin's mountain landscape.

- The 1930s, 1940s, and 1950s brought TVA and Alcoa dam system construction when lakes were created to harness flood waters and produce electrical power. Fontana Dam and the Nantahala Hydroelectric Project were built in the 1940s.
- In 1960, the advent of the federal highway program brought outsiders in, allowing tourism and summer residences to grow.
- From 1970 to 1980, the three-county population increased 24%. The profile of landowners began to change and the price of land began to rise. This trend has not abated.
- Meanwhile, the forests, rivers and scenic views continue to draw tourism, seasonal-residency and retirement. Due to development pressures, forest loss in the basin today rivals that of the 1930s.

"Today, we are in the midst of yet another epoch. Farms and forests are being overrun by a surge of subdivisions and residential development.

"We examined all major forces of change, from timber and land markets to socio-economic factors, insects and disease changes, and other potential threats. It appears that population growth and urbanization are the most significant challenge we face in sustaining forests.

—Dr. David Wear, Co-Leader of the Southern Forest Resource Assessment.

Ancient fish traps dot the Little Tennessee River downstream of Franklin, NC. While rural people have lived and worked the land along the river for millennia, it remains the most ecologically intact river in the Southern Blue Ridge.
LTLT Photo

Modern Population, Economic Condition & Housing

I. Population

Nationwide, population change in rural counties since 1970 has been strongly related to their natural amenities, such as mild climate, varied topography, and proximity to surface water (McGranahan, 1999). This relationship explains much of the recent dramatic growth for population of our region, which is rich in these amenities. Since 1960, population has increased 77% in the three-county area, from 41,102 persons to 75,900 persons. Growth was especially dramatic in the decade 1970-1980, increasing by 24%, and in the last decade, 1990-2000, increasing by 23%. Macon County had the highest growth rate for the period 1990-2000 at 27%. If the current growth rates continue, the three-county area's population will exceed 100,000 by 2013 (USCB, 2002).

Unlike other areas of Appalachia, the Basin is not seeing a net out migration of youth and working-age residents although it is a popular destination for retirees. Overall, the local population is older than the state and national averages.

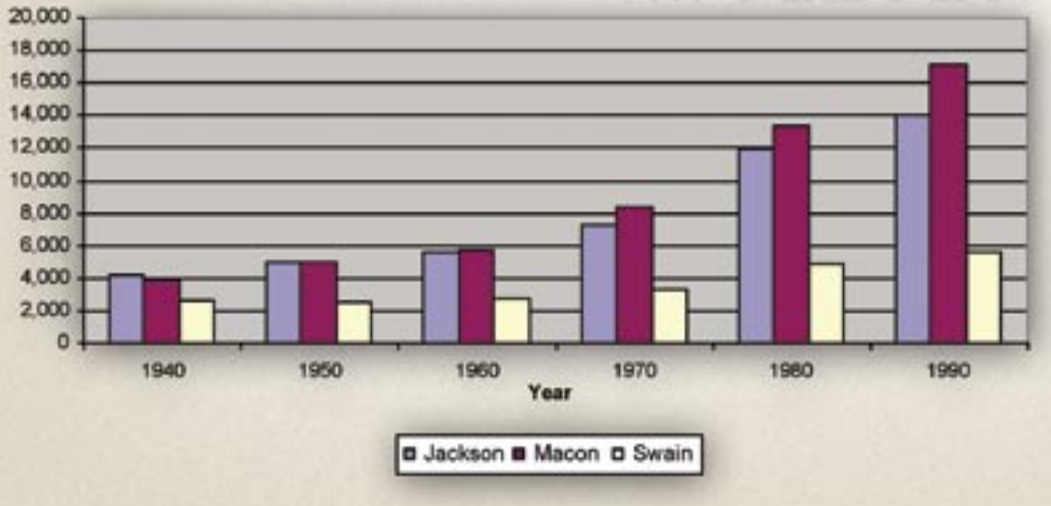
II. Employment, Income and Poverty Rates

The basin attracts tourists, seasonal-homeowners and retirees whose expenditures increasingly support an economy based on services, retail trade, healthcare and construction industries. The region has been hard hit by a downturn in its two main traditional industries: textiles and tobacco. From 1969 to 2002, manufacturing as a share of employment, dropped from 23% to 6%. While average local income falls below state and national averages, quality of life arguably is above average. Poverty rates, which in 1990 were more than double the national average, by 2000 had fallen by half in Macon and Jackson Counties, and by a third in Swain County (USCB, 2002). Meanwhile, an abundant forest resource has helped keep the forestry and wood products sector a stable, albeit decreasing, part of the local economy.

III. Housing and Real Estate

Housing units have grown even faster than population. In the three-county area, from 1960 to 2000, while population increased 77%, housing units increased 335%, from 14,090 units to 47,142 units. In Jackson County alone, the number of housing units increased 37% from 1990 to 2000 (USCB, 2002).

Housing Unit Growth in Jackson, Macon and Swain Counties, 1940-2000



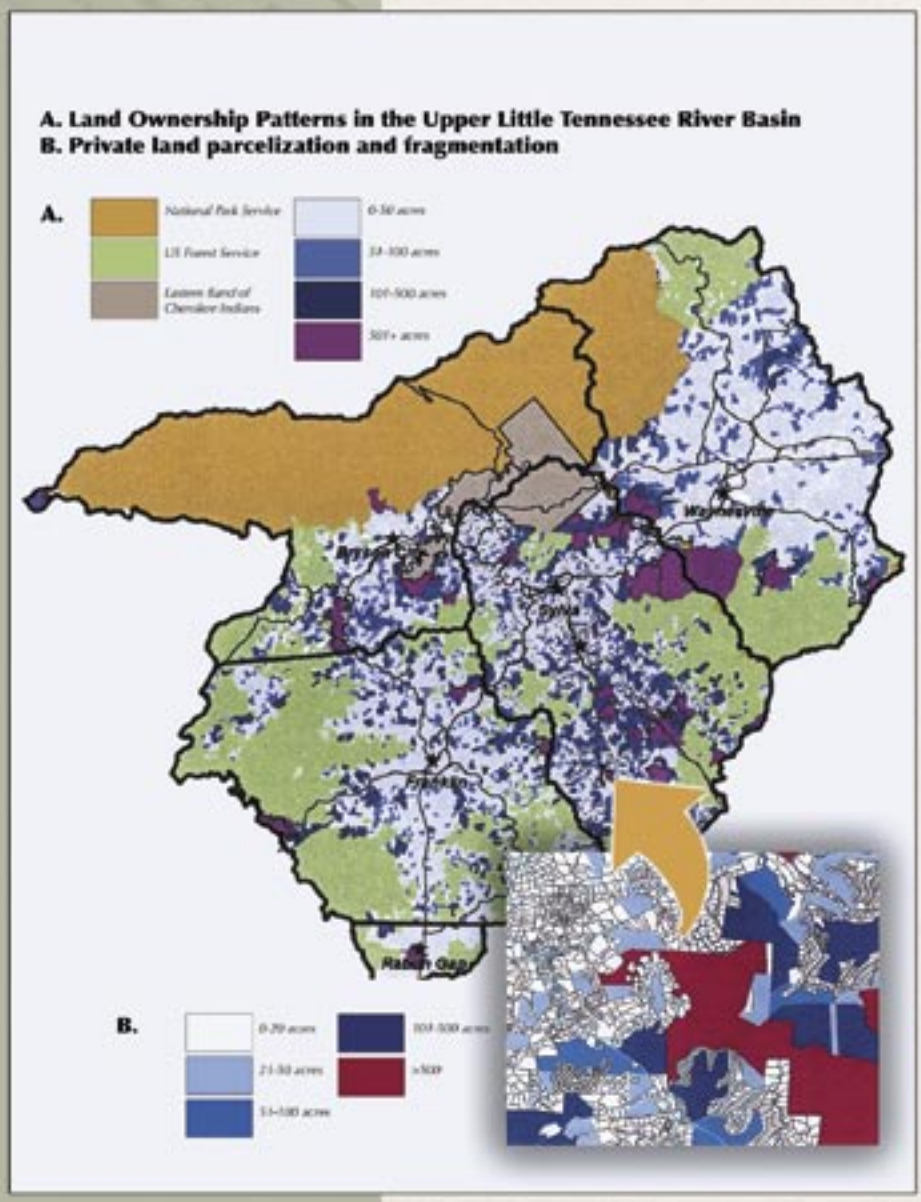
In the three-county area, from 1960 to 2000, while population increased 77%, housing units increased 335%.

Affordable housing is a serious issue for working class people in the Little Tennessee basin. This is particularly ironic given the large stock of second homes in the area.

More than 50% of housing units built in Macon County in 2002 were seasonal units (Seay, 2003), while 48% of Macon County property tax bills in 2002 went to owners outside the county (Niedenthal, 2003A). This same trend holds for the neighboring counties.

Land in the mountains has become particularly expensive. In Macon County, property values increased nearly 40% in four years, from $3.5 billion in 1999 to $4.9 billion in 2003 (Niedenthal, 2003B). While average building costs in the county have gone from less than $75 per square foot of finished living area to more than $100 per square foot.

Because of the rapid inflation of property values and building costs, affordable housing is a serious issue for working class people in the Little Tennessee basin. This is particularly ironic given the large stock of second homes in the area.



Land ownership and degree of private land fragmentation in the upper Little Tennessee River Basin

Land Ownership & Use

Over one half of the land in the basin is part of the "green infrastructure" of publicly owned land, divided almost equally between National Forest and National Park lands. In addition, about 5% of the area lies in the Qualla Boundary of the Eastern Band of the Cherokee Indians. Swain County has the highest amount of public land, over 80%.

One of the most dramatic changes accompanying population growth in the Basin over the past 45 years is the change in private land ownership and use. Outside of the Balsam Mountains, few private tracts exceed 500 acres in size, and much of the land has been divided into parcels 1 to 20 acres in size.

A. Agriculture

Farmland (crop and pasture) decreased 28% in the three-county region from 1982 to 1997. While the 1997 NRI (Natural Resources Inventory) data listed 110 full-time farms in Macon County, Kenneth McCaskill, director of Macon County Cooperative Extension Service, indicates that only about 25 families still farm full time in Macon County (Franklin Press, 2002). Acreage in corn and tobacco has dropped substantially, while hay acreage and cattle inventory remained fairly steady from 1987 to 1997. Hay, pasture, and corn are still major crops, yet generally, the full-time

farms are now small and specialized, with the most successful operations growing high-value fruit and vegetable crops, such as cabbage, tomatoes, and strawberries. Greenhouse and nursery production has also grown rapidly in recent years.

B. Forest and Timber Land
In 1990, USDA Forest Service data showed forestland covering 88% of the three county area at 869,000 acres, and forest cover remained highly contiguous. However, recently released Forest Service data shows this area as having lost 5.8% of its forestland since 1990, leaving forestland at its lowest level since inventories began in 1938. About two-thirds of forest is potential timberland (outside of National Parks and designated wilderness areas). The majority of timberland in the three-county area is under private ownership, with most located in Jackson County.

While the mountain forests and farms fall to second homes, the owners of these homes tend to hold different values about nature and land than did the traditional rural people. This has resulted in a dramatic decline in working forests and farms.

C. Urban Development
Meanwhile, urban areas more than doubled in size in the river basin, increasing from 28.2 sq mi in 1982 to 57.8 sq mi in 1997. There is now nearly half again more urban land than farmland in the upper Little Tennessee basin.

Farmland (crop and pasture) decreased 28% in the three-county region from 1982 to 1997. The land is growing houses.

The Local Forest Based Economy

Photo courtesy Smoky Mountain News

Land Ownership & Use, continued

Recreation & Tourism
The streams, lakes, forests, and farmlands of the Little Tennessee river basin are the main reason for the popularity of our mountain region for recreation, tourism, seasonal-residency, and retirement, which are important components of our economy. Conservation and stewardship of these open space resources is critical as the pressures on these resources increase.

With close to 50% of the national population living within a half-day drive, the National forests in the Southern Region are the second most heavily used of the nine USDA Forest Service regions (Wear and Greis, 2002).

The economic impact of outdoor recreation and tourism in the Southern Appalachians is substantial. In 1996, hunters were in Southern Appalachian national forests for almost 4 million days spending more than $77 per person per day (MTSU, 1998, cited in Barnhill, 1998). Between 1991 and 1996, the amount spent by anglers in the Southern Appalachians increased 39%, to $173 million in retail sales — or $51 per person per fishing day (Vishwanie, 1998, cited in Barnhill, 1998).

"The Little Tennessee has the highest number of trout streams (102) and of native brook trout populations (65) of any other basin in North Carolina (WINC, 2000). Coldwater brook trout streams are especially vulnerable to increases in water temperature due to "daylighting" of stream banks and rainwater runoff from heated impervious surfaces such as driveways and rooftops.

Timberland ownership in Jackson, Macon and Swain Counties, NC, 1990

The Little Tennessee is home to two of the most visited national parks in the U.S., the Great Smoky Mountains National Park and the Blue Ridge Parkway, along with the Nantahala National Forest, which provide a huge base for outdoor recreation. The whitewater industry around the Nantahala River has been recognized as one of the main employment engines of Swain County.

Timber Resources

The story of our forests over the last seventy years has been mainly one of growth and restoration. Timber volumes over the past two decades in Jackson, Macon and Swain Counties have continued to increase, with an average net annual ingrowth of sawtimber of over 124 million board feet (mbf) in 1990. Net annual growth exceeded removals by a wide margin (3.6 to 1), although annual sawtimber removals were increasing, from 21 mbf in 1984 to 35 mbf in 1990. The majority (86%) of the year 1990s sawtimber harvest was in hardwoods (Johnson, 1991).

However, marketable timber is increasingly a by-product of development. Developers log and sell timber before subdividing land, and there is great concern that the future supply of timber will drop as the forest land base is lost to development.

Non-timber Forest Products

Non-timber forest products (NTFPs), which include hundreds of species, provide significant social, ecological, and economic benefits to the people and forests of the Southern Blue Ridge. NTFPs include hundreds of species collected for medicinal purposes; dozens of species harvested for the floral and landscape industry; numerous edible plants; as well as an assortment of plants and plant parts for crafts, especially Christmas greens. There is growing concern that uncontrolled and non-managed harvesting of these products threatens their viability. For example, serious consideration is being given to terminating the export of ginseng roots, which would fundamentally shut down the digging of the species. These actions, although they may be necessary to preserve the species, would have significant social and economic impact at the local level.

Perhaps the most promising approach to continued survival and use of these products is through intentional propagation and cultivation of these species in woodland ("wild crafting") or artificial settings. Indeed this is occurring for a few of the most valued species, such as ginseng, goldenseal and black cohosh. Research is currently underway for refining techniques for these and other plants, such as bloodroot.

Annually, 2 billion leaves of Galax are harvested from the Nantahala and Pisgah National Forests in Western North Carolina.

PART FOUR
PRIORITIES & THREATS
CONSERVATION PRIORITIES AND THREATS TO THOSE PRIORITIES

Headwater trout stream in the Great Balsams

Historic structure at Needmore

The upper Little Tennessee River basin encompasses an extraordinarily unique natural and cultural landscape. In the face of the numerous and powerful forces of change acting on this landscape, its conservation and sustainable management is a daunting challenge. Understanding that change is inevitable, and indeed often desirable, LTLT recognizes the need to focus on certain conservation priorities in order to maintain the underlying integrity of the Little Tennessee's biological and cultural legacies. ***In its assessment, the Land Trust for the Little Tennessee has identified the following five key landscape elements as conservation priorities for the 21st century:***

Rivers, Floodplains and Tributary Streams

In order to maintain good water quality we will need to treat our rivers and streams, as well as their shorelines, with special care. Water quality will best be conserved by maintaining wooded strips along all waterways, minimizing impermeable surfaces near waterways and controlling stormwater runoff.

By conserving water quality we will conserve the dozens of warm-water aquatic species found in the Little Tennessee and Tuckasegee Rivers, many of which are very rare, and we will also conserve the headwater trout streams that are naturally kept cool by forested buffer. Conserving floodplains from being converted into commercial and residential subdivisions will protect montane alluvial forests (the most species rich in Appalachia), canebrakes, wetlands and much of our best farmland.

Historic & Archaeological Sites

The Little Tennessee valley remains the most intact archeological landscape of the 18th century Cherokee. The 1776 military campaign on Cowee served as the "Lexington and Concord" of the American Revolution in the South. The Foxfire books that cataloged the local Appalachian culture were developed at the head of the Little Tennessee in Rabun Gap. The richest National Register Historic District in the state is found on the banks of the Little Tennessee at Cowee/West's Mill, and throughout the landscape, one can still admire historic churches, barns and farmsteads.

The conservation of such heritage sites and values not only will remind present and future generations of the rich cultural heritage available locally, but also can form the basis of a vibrant economic development opportunity based upon heritage tourism.

Rare Natural Communities & Imperiled Species

The upper Little Tennessee River basin is exceptionally rich in its diversity of unique habitats which often are home to imperiled species. The diverse warm-water habitats in our rivers have been mentioned, yet there are many terrestrial habitats that are rare, including bogs, serpentine barrens, cedar/hardwood cliffs, waterfall spray zones and high elevation spruce stands, among others that merit special conservation efforts.

Imperiled firs in the Richland Balsams

Working Farms & Forests

A rural landscape ultimately can only be maintained in the Little Tennessee if there continues a rural economy based upon farm and forest management. Farmers are the keepers of our rural communities as they maintain the open space of pastures and fields that give our valleys their extraordinary beauty. Clean water, open space, wildlife habitat and stunning views should be considered as primary farm products, and we need to find ways to support farmers who chose to conserve their land rather than to convert to residential subdivision. LTLT is working to build conservation capital for farmland preservation through the purchase of working farm conservation easements. Similarly, managed private forestland, including prudent timber harvest, should be viewed as a land conservation strategy in this region under such high pressures for land subdivision.

A working farm along the Little Tennessee

Intact Forested Corridors for Wildlife Migration

From the Nantahala to the Cowee Mountains across Needmore, from the Plott Balsams to Richland Balsam, from the southern Nantahala Wilderness to the Blue Ridge at Rabun Bald, among others, the river basin has many dramatic corridors which connect one mountain range to another. These forested corridors are utilized as pathways for wildlife migration such as black bear, and may become even more important in the future as the climate continues to warm and forest communities change in composition. Until now, most of the corridors have remained forested and rural. However, as poorly planned growth continues to fragment the basin in the 21st century, there will be more conflicts between homeowners and "wilderness." Smart conservation will seek to maintain areas of lower development intensity where habitat connectivity can continue across the landscape.

Forested corridor connecting the Nantahala and Cowee mountain ranges

Threats to the Landscape of the Upper Little Tennessee River Basin

The Southern Forest Resource Assessment completed in 2002 identified the Southern Appalachians as an area that "will be influenced by a combination of human, biological and physical factors over the next two decades. Population growth and land-use changes will increase the human presence in many forests ... Also a complex of forest health issues is affecting all forest types in this region and has the potential to restructure forest ecosystems." The report concluded that the mountains of North Carolina are one area in the South where forest loss will likely be concentrated (Wear and Greis, 2002).

"Four of the five most rapidly "sprawling" metropolitan areas in the U.S. are within a five-hour drive of the upper Little Tennessee River.

Based upon various studies and its own assessment, LTLT has identified the most critical "threats" or "sources of stress" to the future integrity of the landscape of the upper Little Tennessee as being:
- Incompatible Development
- Non-native Invasive Species (insects, diseases, plants and animals)
- Air pollution and potential climate change

And to a lesser extent:
- Poor Forestry Practices
- Substandard Farming Practices

Incompatible Development

The upper Little Tennessee River basin is facing unprecedented population growth with rural land prices and property taxes rising rapidly, creating an incentive for the sale and subdivision of land. As residential development sprawls across the landscape, there is increased demand for commercial development and associated infrastructure (e.g., roads, power lines, etc.) all of which is occurring in a generally unplanned fashion with impacts across the landscape.

Ecological impacts and "stresses" of incompatible development include:
- Degradation of water quality and riparian habitats
- Fragmentation, alteration and degradation of forest ecosystems
- Loss of farms and working forests

In addition, socio-economic impacts include:
- Increasing risks from natural hazards (e.g., fire, flooding)
- Increasing costs of community infrastructure and services
- Increasing housing costs and lack of affordable housing
- Loss of rural community and the connection to the land

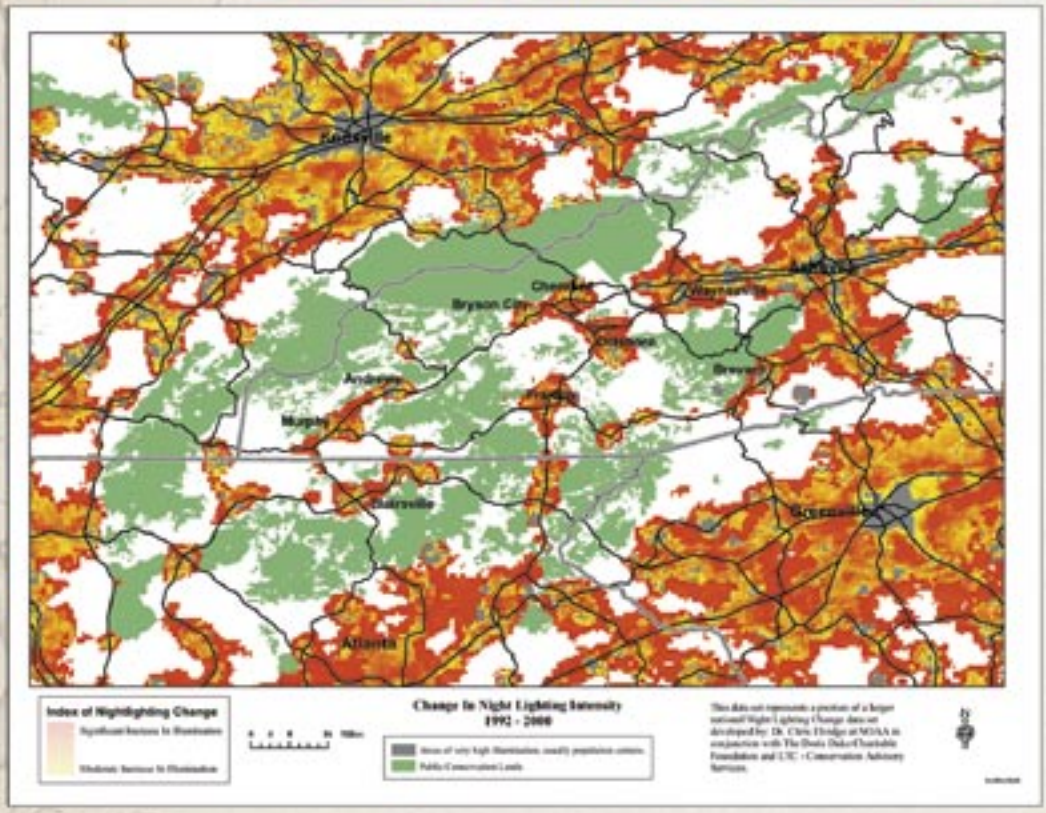
Unplanned Growth Threatens to Overwhelm the upper Little Tennessee

Four of the five most rapidly "sprawling" metropolitan areas in the U.S. are within a five-hour drive of the upper Little Tennessee River. The northwestern edge of the Atlanta metro area has reached within two counties south of the head of our valley in Rabun County, Georgia.

The Financial Cost of Residential and Commercial "Sprawl"

A recent analysis of the fiscal impact of different land uses in Macon County, N.C. (Jones and Kask, 2001) demonstrates the cost-saving benefits to the county of conserving farmland and open space. The study indicates that the typical residential properties cost the county budget by demanding more in tax-supported services such as water and sewer, fire and police protection, schools and roads, than they pay in county taxes. On the other hand, the typical farmland/open space parcel contributes more in property tax to the county budget than is demanded in expenditures for county services. The study did not include the additional environmental costs of residential development, such as degradation of water and air quality.

Over the decade of the 1990s, Macon County had a 27% population growth



Sprawling residential and commercial development, and the resulting increase in night lighting, has overwhelmed rural landscapes surrounding the Southern Blue Ridge and has seriously impacted about half the private lands in the upper Little Tennessee over the past decade.

Two-thirds of Americans live where they can never see the night sky (The Christian Science Monitor, Dec. 11, 2001). Over the past few years, residents of Franklin and Sylva have joined this group as increased night lighting has made it impossible to view the Milky Way. What does it mean to mankind when future generations will be unable to sense the wonder and perspective that can be gained from viewing the heavens?

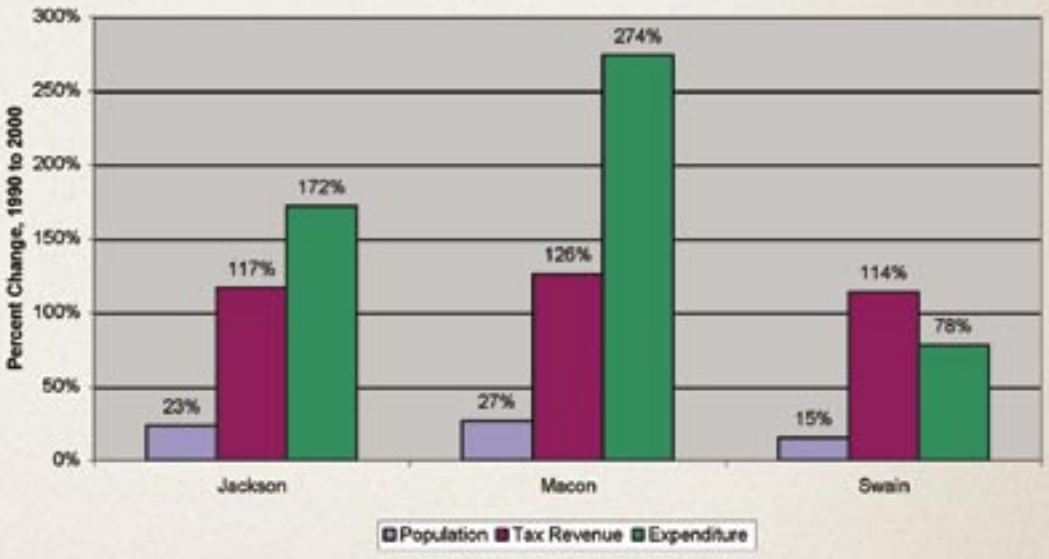
rate and the fastest rate of conversion of rural lands to residential-suburban in the upper Little Tennessee River basin. During the same period, the county appeared to be headed toward a red ink budget as county expenditures for services increased more than twice as fast as the increase in county tax revenue. On the other hand, Swain County grew by a robust 15% in population, but had much less residential "sprawl" given that over 80% of the county's lands are off-limits to residential development. Here, the county appeared on a fiscally sound path as tax revenues grew half again faster than did county expenditures for services.

Increasing Risks from Natural Hazards (fire and flooding)

Developments both on floodplains and on mountaintops increase the risk of natural hazards. Residential development on the floodplain of the Little Tennessee and Tuckasegee Rivers over the past few years have created public emergencies such as the flooding that occurred in September 2004 in the wake of Hurricanes Frances and Ivan.

As residential development sprawls across forested ridgetops in search of grand mountain views, the "wildland-urban" interface increases, which eventually will lead to extensive loss of property values from forest fires. In Jackson County, emergency service personnel, such as fire and medical, are increasingly constrained in their work due to substandard roads that are being built to access increasingly remote homesites on steep terrain. The director of emergency services for the county stated that in about one-third of their calls, there is some problem getting to the person in need due to improper road design (Jones, et al., 2002). In case of future forest fires, this condition will put emergency workers at great risk.

Loss of Rural Community and Connection to the Land



Relative growth of population, county tax revenue & county expenditure for services in Jackson, Macon and Swain counties, 1990-2000. Swain County, which experienced the least suburban "sprawl," also had the best ratio of increasing public revenue to expenditure.
(Source: U.S. Census Bureau and N.C. Department of State Treasurer)

"All about him, slash, crash go the devastating forces. His old neighbors vanish. New and unwelcome ones swarm in."

– Horace Kephart (1915) writing of the plight of the mountaineer in the upper Little Tennessee a century ago.

Steep slope development, scarring a mountainside and creating an untenable situation for emergency and medical services
LTLT Photo

Rural communities are strongly organized around traditions and relationships that have developed over multiple generations of living close to the land in a given geography. Rural communities harbor the "skill sets" required to maintain sustainable agriculture and forestry – the knowledge and skills, for example, to grow sorghum and make molasses; to log and hunt the forest; to manage livestock, pastures and hayfields. These and other traditions help maintain both the rural landscape and the rural culture.

It is not easy to define at what point scattered residential development turns an area from a rural community into disconnected suburbia, but with recent changes in demographics and land ownership and use, that point has clearly been passed in many parts of the upper Little Tennessee River basin over the past decade. During this same period, rural community has been extinguished in many North Georgia counties within 75 miles of the basin.

While not normally associated with environmental movements, rural people are the most key constituents for land conservation. The preservation of the Needmore Tract, for example, is a story of a powerful local political movement to save a landscape that came out of the rural communities of Swain and Macon counties. The extent to which poorly planned growth shreds the rural fabric of the basin in the coming decades will ultimately determine the potential to conserve the rich diversity of natural and cultural history that still exists in the upper Little Tennessee.

Non-Native Invasive Species

Emergency service personnel, such as fire and medical, are increasingly constrained in their work due to substandard roads that are being built to access increasingly remote homesites on steep terrain.

Non-native invasive species are considered to be the second greatest threat to biodiversity on earth, after habitat loss and degradation.

Non-native invasive species are considered to be the second greatest threat to biodiversity on earth, after habitat loss and degradation. Non-native (or exotic) plant, animal, insect, and disease species were and continue to be introduced into this country either intentionally or accidentally. Many are already prevalent in the Southern Blue Ridge, while others are or have the potential to move into the region. Approximately 42% of species that are listed in the U.S. as federally threatened or endangered are at risk because of competition with or predation by non-native species.

The exotic pests of Chestnut blight, Dogwood anthracnose, Butternut canker and Balsam woolly adelgid have dramatically altered our forest ecosystems over the past decades. Several exotic pests that recently have been found in the Little Tennessee, such as the Beech bark disease, Gypsy moth and Hemlock woolly adelgid, promise to have huge impacts on our forests. Many experts fear that in the near future, we may lose most of our large hemlock trees that shade the mountain streams. Such a catastrophe could devastate the native brook trout population, among other impacts.

An estimated 400 of 1,500 vascular plants species in the Great Smoky Mountains National Park are exotic, and 10 of these are currently displacing and threatening other species. In response, over the past decade, the Park Service has initiated a concerted effort toward invasive plant control. Several non-native invasive plants, such as Chinese privet and Oriental bittersweet, once established are capable of invading relatively dense forests. These are perhaps the most critical to control. Other sun-loving species such as multiflora rose and Japanese honeysuckle can quickly dominate abandoned farmland.

The exotic hemlock woolly adelgid, with a white cotton-like appearance as shown here, is a recent threat to all hemlock trees in the region. As hemlocks die along streams, water temperature will increase threatening trout fisheries.
Richie Cunningham Photo

Air Pollution

Regional air pollutants that result in acid deposition, ground-level ozone, fine particulates and haze are an increasing issue to human and ecosystem health. In 2002, the Smoky Mountains experienced one of its worst ozone seasons, with 43 days of unhealthy air (Ayers & Oakes, 2002). An American Lung Association report on ozone levels gave Jackson and neighboring Haywood counties (with high-elevation monitor sites) failing grades for air quality (ALA, 2003).

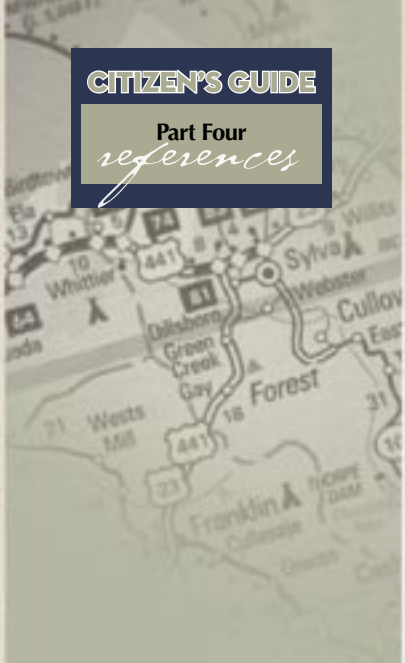
Pollution induced haze on the horizon is an increasingly common backdrop for mountain views

Photo courtesy Balsam Mountain Preserve

Pollutants also seriously affect mountain views. The National Park Service suggests that the "natural" condition of the Great Smoky Mountains National Park is a visibility of 113 miles, while average visibility is currently only 25 miles. Over the past two decades, residents of the upper Little Tennessee have come to accept that from late June through late September, spectacular mountain views are lost behind an omnipresent, milky haze.

While much of the mountain air pollution is imported from neighboring regions, the effects of population growth and increasing per capita consumption, waste generation and pollution within the upper Little Tennessee is degrading local air and water quality. Per capita solid waste generation within the three-county area of Jackson, Macon and Swain increased by nearly 50% from 1992 to 2001 (from 0.70 to 1.03 tons per person) (NCDENR). Over the same period, the average daily automobile use increased 26% per local resident (NCDOT & USCB).

The "natural" condition of the Great Smoky Mountains National Park is a visibility of 113 miles, while average visibility is currently only 25 miles.



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