



Case Study 1

The Challenge of Controversial Resource Issues: Southern Pine Beetle

The southern pine beetle (*Dendroctonus frontalis*) (SPB) is a bark beetle native to the southeastern United States. The SPB disperses widely and can attack multiple host trees in a beetle's lifetime. An infested spot can spread 50 to 70 feet per day, allowing unmanaged infestations to lead quickly to an outbreak. Adult females bore through the tree's inner bark (phloem), lay eggs, and release pheromones that, in combination with chemicals from the damaged tree, attract more beetles. The adult females then resurface and go on to infest new trees. They leave behind larvae that feed on the phloem for about two weeks, pupate in the outer bark, and emerge after another two weeks, often flying several miles before infesting a new tree. Stressed, dying, or recently dead pines are most vulnerable to SPB infestation. A mass attack of SPB can kill a tree in less than three days.

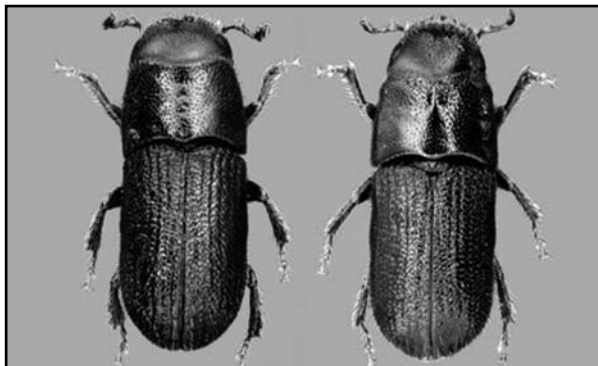


Photo by: David T. Almquist

Southern pine beetles, native to the southern United States, can cause great damage to pine forests in a short time.

Pine beetle outbreaks are natural occurrences that can drastically alter forest composition, increase risk of wildfire, and destroy habitat for some types of wildlife. Socio-economic impacts can include: the disruption of forest management plans, property damage and safety risks

from falling trees, law suits in response to the spread of SPB from one property to another, changes in property use and value, and loss of potential timber. Pine beetle outbreaks in urban and interface areas are also problematic because they can create hazards and result in damage to infrastructure. Therefore most local governments and natural resource agencies feel they must take measures to suppress them.

In the spring of 1994 the city of Gainesville, Florida, and surrounding areas experienced an unprecedented outbreak of SPB. It had been nearly 50 years since there had been any sign of the beetles in the area. The conditions were ideal for an outbreak: dense stands of mature loblolly pines and a severe drought followed by a warm winter. Generally, stands with a basal area above 120 ft have increased susceptibility to SPB. The Gainesville area was struck again in 2001 by another outbreak, this time more severe and widespread.

Recognizing and quickly responding to signs of infestation are essential for controlling beetle populations and minimizing damage.

Management strategies to control SPB infestations include (1) cutting, removing, and processing infested trees (2) cutting and spraying infested trees with insecticides (Lindane and Chlorpyrifos were used in the 1994 and 2001 but are now largely unavailable), (3) cutting trees and burning the debris, and (4) using a cut-and-leave technique that may disrupt expansion of infestations in forest stands when tree removal is not feasible.

In response to the 1994 pine beetle outbreak, Gainesville's local government implemented an aggressive suppression program. The program

goal was to rapidly and thoroughly treat all infested trees to reduce the subsequent infestation and tree mortality. Containing the outbreak largely depended on how quickly and effectively private landowners and managers of public lands responded to infestations. The Florida Division of Forestry (DOF), with federal support, worked with the City of Gainesville and Alachua County to contact landowners and manage infestations. One of the program's strengths was the collaboration of multiple agencies and experts on a Technical Advisory Committee (TAC). TAC members included arborists, entomologists, tree physiologists, and other specialists.

The suppression program used several approaches for detecting infestations: aerial surveys, a telephone hotline for reporting suspected infestations, and ground checks by DOF with follow-up visits. Public education efforts about beetle detection and management included radio, television, and print media releases and interviews; expert lectures; and workshops. TAC members met regularly to review assessments and make recommendations. The city and county offered cost-share programs to help landowners remove infested trees. They cut and sprayed trees for a reduced fee, but landowners were responsible for debris removal. Cost-share programs encouraged prompt responses to infestations and reduced the financial burden to individual property owners.

Key elements that helped the program achieve its goals included interagency cooperation, commitment, USDA Forest Service-funded cost-share components, and the timber industry's cooperation in responding quickly to infestations. The city government's willingness to search for and assist with solutions was also an essential element of the program.

The program encountered several challenges, such as poor access to remote areas, price-gouging by some tree surgeons, slow response from some natural resource agencies, and con-

flicts with reluctant landowners. Illegal dumping of infested wood debris threatened to spread beetles and dumping of insecticide-treated logs jeopardized water quality. In addition, there was a shortage of people to respond to the barrage of phone calls and requests the hotline received during the outbreak.

During the 2001 outbreak most of the same techniques were used to alert residents, coordinate agency efforts, and respond to requests. In addition, some experts encouraged the state's agricultural commissioner to declare a state of emergency. While most area residents cooperated with the voluntary suppression program, some opposed the suppression strategies, suggesting that the beetle infestations occur naturally and should therefore be allowed to run their course. Absentee landowners also contributed to management issues by not being nearby to check and manage their property.

A declaration of emergency would have allowed authorities to enter properties where infestations were not being managed properly and, after a review process, allow them to treat or remove trees at the landowner's expense. This proposal outraged some community members who argued that such actions would be unreasonable and even illegal. They advocated public education about SPB and the availability of voluntary management programs for residents with severe infestations. Although a state of emergency was never declared, the suggestion generated divisive debate within the community, exemplifying some of the complex challenges that can emerge from such an issue.

Police arrested one Gainesville man for attempting to disrupt beetle management on city property. The man argued that the process was natural and provided woodpecker habitat; he said that "poisoning" and cutting the trees was wrong. Foresters maintained that the outbreak threatened natural resources, public safety, and infrastructure. Another resident commented on the city's efforts to suppress the

beetles in an editorial for the local newspaper. She said, “It looks like a frenzy to me. We’re cutting down all the pines (and every other tree that’s in the way) so the borers won’t have any trees left to infest, is that it? I’m just glad these forestry people aren’t doctors.”

Conflicts also arose from neighbors of a local preserve who thought preserve managers allowed an infestation to spread onto private property. Some experts agree that the preserve’s response was delayed and ineffective. Some residents even sued the preserve, claiming that its negligence led to infestations within the nearby residential development. The 6,000-acre preserve lost 15,000 trees to SPB, and although it may have played a role in the spread of infestations to the private development, this claim is difficult to prove. Suppression program organizers suggest that an inflexible management philosophy, poor accessibility, and bureaucratic obstacles contributed to the agency’s ineffective response.

Before the 1994 outbreak there was no protocol for dealing with SPB outbreaks in the Gainesville area. During the 1994 outbreak, public lands within Alachua County lost an estimated 29,000 trees and private residents lost more than 8,000 trees and spent a total of about \$1.4 million for removal, even with the cost-share program. Despite the severity of beetle-related damage, the organizers of the suppression program consider it a success. They claim it helped preserve thousands of trees in the area’s urban forest and minimized economic and ecological effects, while avoiding water contamination. The program’s educational efforts not only helped mitigate the problem at the time, but prepared residents to be able to recognize infestations in the future.

In response to the SPB epidemics in Alachua County (and northern Florida) in 1994 and 2001, statewide prevention and education efforts have been implemented, including a billboard campaign, state-wide landowner

workshops, and brochures distributed to non-industrial private forest (NIPF) landowners of ten acres or more in several high-risk counties. These efforts emphasize that pine forests should be managed to promote forest health and decrease susceptibility to SPB attack. State cost-share programs that provide partial reimbursement to NIPF landowners for preventative management practices (such as pre-commercial thinning and prescribed burning) have also been implemented. Members of the TAC suggest that further action be taken to prevent future SPB outbreaks. They recommend preventative resource management, continued education efforts, incentives, and possibly mandates requiring beetle management in the event of an outbreak.



Photo courtesy of www.forestryimages.org

The Florida Division of Forestry used these billboards to raise awareness about SPB prevention activities.

Source

This case study was written with the help of Bud Mayfield, Ph.D., DOF Forest Entomologist; Edward L. Barnard, Ph.D., DOF Forest Pathologist and Supervisor of the Forest Health Program; John Foltz, Ph.D., Associate Professor of Entomology and Nematology at the University of Florida; and Dr. Carol L. Lippincott.



Case Study 2

Conservation Development in South Carolina

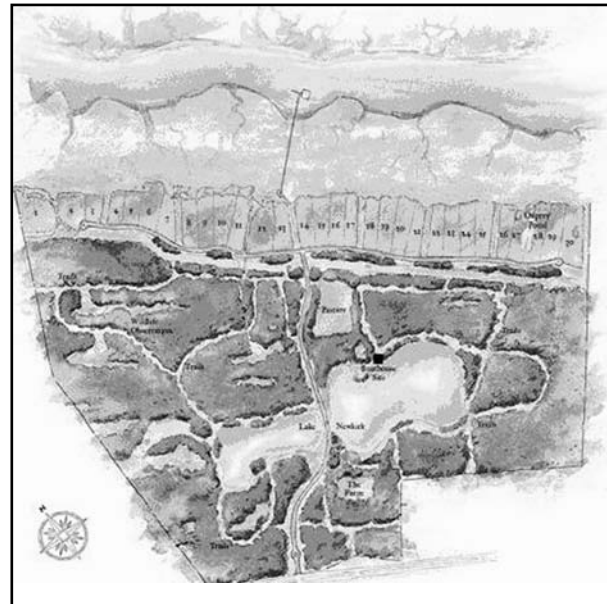
South Carolina's coastline is a maze of tidal flats, marshes, islands, and uplands. Most of the highland areas have been planted in corn, cotton, potatoes, or pine at some point during the last two centuries. Overgrown hardwood hammocks, the lack of road access, and the barrage of sporadic hurricanes make development and resource management challenging. Areas that people have managed to develop, however, are rapidly expanding. New subdivisions and golf course communities are cropping up near Hilton Head Island and Charleston.

Advertisements draw people from across the nation to come take advantage of the 'last homesites now being sold' because 'people need refuge too.' Typical developments provide large homes on mid-sized lots and community designs that isolate residents from nature and require them to drive to enjoy recreational activities.

Some developers are beginning to offer alternatives to typical development, creating designs that aim to create balance between people's desire to live in beautiful, natural places and the protection of those natural places. One such project is the Sewee Preserve, which is about 25 minutes from downtown Charleston.

Once completed, Sewee will include 30 houses on a 90-acre parcel with more than 400 acres left undeveloped. All of the homes will be built along the bay, conserving the remaining land for wildlife observation and seven miles of trails for hiking, biking, and horseback riding. The development also includes a 45-acre stocked lake for fishing and boating. There is also an on-site working farm, managed by a local farmer, providing property owners with access to freshly-grown vegetables like squash,

sweet corn, potatoes, tomatoes, and beans through their farmer's market.



Conservation subdivisions generally cluster home lots in one area and leave a portion of natural area undeveloped.

In this example, wealth acquires access to nature and simultaneously aims to protect it; lots in the preserve start at \$625,000. The Wetlands America Trust retains a land preservation agreement for the 400-plus acres of undeveloped land. This easement provides a key link in the Santee Corridor, which runs from Mount Pleasant to the Santee River delta, connecting the Cape Romain National Wildlife Refuge and Francis Marion National Forest. The preserve has also established guidelines for environmentally-sensitive homebuilding and lighting technologies and encourages homeowners to use native plants for landscaping.

The preserve provides habitat for a variety of wildlife species, including many birds. The preserve developed the Sewee Partnership for

Birds of Prey in cooperation with the South Carolina Center for Birds of Prey. This partnership works to enhance habitat in the area for species such as hawks, osprey, owls, and eagles. Sewee property owners are offered honorary memberships to the center, which rehabilitates and releases hundreds of birds every year.



Photo courtesy of Sewee Preserve

The Sewee Preserve offers beautiful scenery and recreational opportunities to its residents.

The Sewee Preserve is one model for alternative residential development. While the cost to live there makes it an inaccessible option for most people, it fills a niche that might otherwise be comprised of pavement and golf courses. It sets an example and provides ideas for future development that might meet the needs of middle and lower-middle class home buyers.

Developments like Sewee also provide opportunities for natural resource professionals to perform outreach activities and, in some cases, provide management for commonly-owned natural areas.

Source

Sewee Preserve website,
www.seweepreserve.com (accessed October 5, 2005).



Case Study 3

Cooperation is the Key: Blue Ridge Forest Landowner Cooperative

Forest Cooperatives (co-ops) are an increasingly popular means for family forest owners to reap the benefits of pooling resources and experience. Co-ops are generally created to increase the financial return to producers of forest products by marketing products and/or reducing the cost of supplies. Co-ops can, however, serve other functions such as working toward common environmental, ecological, and social objectives. Some co-ops are created specifically to enable private landowners to engage in sustainable timber production. Co-ops can increase the value of landowners' raw materials, helping forest stewardship activities pay for themselves. Although forest landowner cooperatives are more prevalent in the upper Midwest and Northeast, they are beginning to appear in the South.



Photo by: Harry Groot

Forest cooperatives can help members effectively market their forest products and reduce production and management costs while achieving other objectives, such as sustainability.

In southwestern Virginia, the Blue Ridge Forest Landowner Cooperative (BRFC) is working to provide similar benefits for its members. The BRFC's mission is to, help forest landowners practice profitable, sustainable forestry. The co-op provides forest management assistance and other services to its members and pools

resources to enable the production of value-added products such as molding and flooring. Members of the co-op help determine what assistance and services the co-op needs to provide. The BRFC also works to protect ecosystems on a regional scale while improving the public's access to sustainable forestry products. The group has adopted the standards of the Forest Stewardship Council (FSC), an organization that analyzes and provides guidelines concerning the economic, social, and environmental aspects of forestry. The BRFC's goal is to assist all of its members in becoming certified by the council. "We see our forests as a major asset of our personal wealth, but not only as an economic asset. We desire to manage our forests for multiple purposes including aesthetics, wildlife habitat, peaceful refuge, big old trees, wealth creation, a legacy for our children and grandchildren, or just an attractive place to live," say the founders of the cooperative.

The idea for the BRFC started in 2003 at a meeting about sustainable forestry in Mountain Lake, Virginia. In October of 2004 the co-op became officially incorporated. Five board members and a chief executive officer were appointed and the group began soliciting members. The co-op has approximately 900 acres but expects to grow to approximately 10,000 acres. Membership in the cooperative requires the purchase of one share of common stock. Currently, a share costs about \$500. To be eligible for membership, landowners must also be Virginia residents who own at least 20 acres of woodland, and they must agree to abide by the guiding documents of the co-op.



Photo by: Harry Groot

The Blue Ridge Forest Co-op is using newsletters, informational meetings, and word-of-mouth to raise awareness and recruit new members.

To gather support and enlist new members, the BRFC produces a newsletter providing information about the benefits of forest cooperatives and mails it to interested families and members. Other marketing and recruitment activities have included word-of-mouth, sponsorship of workshops on sustainable forest management practices, and informational meetings. Meetings generally attract middle to upper-middle class forest landowners; however, the board is working to increase accessibility for lower income families by adopting the most affordable certification process possible.

To get started, the cooperatives need technical, educational, and financial resources. Foresters, Incorporated, a local forestry company specializing in sustainable forestry, and Next Generation Woods, Incorporated, a local wood products distributor, provided much of the technical assistance for the co-op. The co-op's founders also attended workshops hosted by the Community Forestry Resource Center, Cooperative Development Services, and Rapid Improvement Associates, LLC. The Southern States Co-op Foundation, the Community Forestry Resource Center, and the Appalachian Forest Resource Center have provided grants to help the co-op get started.

The BRFC's biggest challenge has been a lack of capital. Start-up costs for a forest landowner cooperative that is FSC certified and produces value-added products are high. It costs money

to become legally incorporated, to purchase harvesting and processing equipment, to certify land, and to hire staff. The BRFC is dedicated to taking things slowly and seeking grants to assist its start-up and for special projects.



Photo by: Jim Berkenmeter

Co-ops can make it financially and technically feasible for members to produce value-added products, such as wood flooring.

In the wildland-urban interface, where small-acreage, family forest landowners are becoming more common, forest landowner cooperatives, like the BRFC, are especially relevant. Well-operated cooperatives can help reduce many interface issues in several ways. Co-ops enable participating landowners to manage their forests effectively for multiple objectives and help keep land in forestry by making it profitable, and in this case, sustainable.

Cooperatives can also provide an opportunity for natural resource professionals to work with landowners to promote forest health. Resource professionals can be a valuable resource for landowners interested in starting a cooperative, by providing information about co-op formation, technical assistance, and by helping network interested landowners. One challenge is that cooperatives must be initiated by a group of very motivated landowners and resource professionals cannot force the concept on landowners, no matter how advantageous they consider them to be. Cooperatives will not meet the needs of every landowner in rural areas or the interface, but they are a growing phenomenon. Resource professionals must be prepared to provide information about co-ops and

should take advantage of opportunities to provide landowner assistance.

Written by Sarah Ashton, Virginia Polytechnic Institute and State University.

Sources

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Case Study 4

Deer Debate in Hilton Head, South Carolina

People often move to the wildland-urban interface to enjoy the peace and beauty of neighboring natural areas. Those same people may be surprised and upset by the annoyance, destruction, and danger that local wildlife present to their neighborhoods. Human-wildlife conflict can be challenging on an individual scale but when it begins to affect entire communities, it can become very complex.

One example of this complexity is the overabundance of deer in the community of Sea Pines Plantation on Hilton Head Island, South Carolina. Designated by the South Carolina legislature as a state wildlife sanctuary in 1971, Sea Pines Plantation is now scattered with homes, resorts, restaurants, and shops. Abundant white-tailed deer in Sea Pines, a wealthy 2,137-hectare residential/resort development in southern Hilton Head, have contributed to increasing numbers of deer-vehicle collisions, landscape plant damage, fears of Lyme disease, and other concerns. The number of deer-vehicle collisions increased from 18 in 1993 to 61 in 1999. Deer were sleeping on people's patios and walking through parking lots. The same people who moved to the community to be close to wildlife were upset by the problems the deer were creating. Ironically, those very residents helped create conditions that led to the herd's successful reproduction and their preference for the Sea Pines Plantation landscaping.

In May 1998, the University of Georgia (UGA) and the South Carolina Department of Natural Resources (SCDNR) concluded a three-year research project on the Sea Pines deer herd and found that the population in the Sea Pines area was approximately four times larger than that of most undeveloped barrier islands. Researchers

suggested that lush landscape plants throughout the community were providing a plentiful buffet for the deer, keeping them in prime condition for rapid reproduction. Based on their findings, the researchers recommended the population be managed by a combination of experimental fertility control and sharpshooting. Without first reducing the herd by 100-150 deer, the logistics and cost (\$800 to \$1,100 per deer annually) of delivering contraceptives to stabilize the population were simply not feasible and even then, could take five to 10 years before the population declined. This conclusion was not exactly what local natural resource managers wanted to hear. Not only would administering the fertility control be extremely costly, the sharpshooting element was sure to trigger controversy.



Photo by: Lynda Lester, National Center for Atmospheric Research

Many Sea Pines Plantation residents were frustrated with deer grazing on their landscaping plants.

While the majority of Sea Pines residents expressed their approval of the management recommendations in a mail survey, local, state, and federal animal rights groups bitterly protested. They argued that killing the deer was unethical and that nature should be allowed to run its course. They insisted that people should

accept the deer as part of living in a natural area and adapt by driving slower and using deer-resistant landscape plants. The groups printed bumper stickers, wrote local and state politicians, and threatened to protest at the two nationally televised sporting tournaments held annually in Sea Pines. Community leaders held public meetings and education seminars to demonstrate to the public the complicated and difficult decisions facing them. Eventually, five local, state, and national animal rights organizations (the plaintiffs) filed a lawsuit against UGA, SCDNR, and the Sea Pines Community Services Association (the defendants). They won a temporary restraining order which prevented SCDNR from issuing scientific collecting permits to kill deer in the Sea Pines area.



Photo by: Carolyne Butler

The number of deer-vehicle collisions increased dramatically between 1993 and 1999 in Sea Pines Plantation.

Two lower-level courts ruled in favor of the defendants; the case was appealed and went to the South Carolina Supreme Court. In July 2001 the Supreme Court upheld the lower court's rulings. After three years and more than \$200,000 in litigation expenses, the Sea Pines Community Services Association implemented a deer-management program. Sharpshooters reduced the herd by 500 deer over the course of three years. Deer densities dropped from seven acres/deer to 40 acres/deer. Deer-vehicle collisions were reduced from over 60 per year to less than 10. A wildlife manager was hired for Sea Pines to manage the deer and other wildlife. Following the Court's ruling there has been little opposition to the program.

The Hilton Head deer controversy attracted national and international media attention, including coverage from National Public Radio, Fox News, *The Economist*, and NBC News. Several other coastal communities with deer population problems contacted the UGA researchers for guidance, hoping to avoid a similar controversy. The challenges experienced by these researchers, wildlife managers, and local government leaders illustrate the complexity of interface issues. As development continues to encroach on natural areas, human-wildlife conflicts are likely to increase. Natural resource professionals may be responsible for responding to these conflicts, either through management, research, or educational programs. Juggling public opinion, public safety, and natural resource objectives can be extremely challenging.

Sources

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Case Study 5

The Domain: Managing Interface Forests in Tennessee

The University of the South in Sewanee, Tennessee, is located on 11,000 acres, 40 miles north of Chattanooga. The central campus area, student housing, and 8,000 acres of forested land, referred to as the Domain sit on the southern Cumberland Plateau in Franklin and Marion counties. The forested land is mostly oak with some hickory, yellow poplar, and other eastern hardwood species. In 1898, Gifford Pinchot, the head of the burgeoning U.S. Division of Forestry (currently called the USDA Forest Service), helped create the Domain's first management plan. Since then, the plan has been rewritten and revised many times to respond to changing conditions, needs, and objectives.

The Domain has more plant diversity than almost any region in the continental United States. It is home to more than 700 species of native and naturalized plants including more than 70 tree species as well as a variety of vertebrate and invertebrate species that have yet to be cataloged. It is also home to more than 275 historical sites including prehistoric Native American settlements, European settlements, Civil War sites, and sites of historical significance to the university. Almost 500 acres of forest in the Domain have been set aside for preservation without any forest management. Over 36 miles of mostly private residential property surrounds the Domain. Many students, faculty, staff, and local residents use the Domain for recreation. Multiple users and stakeholders influence the Domain, creating complexities that cross residential and university-owned land. Consequently there is a host of wildland-urban interface issues found here.



Photo courtesy of University of the South

Students can observe and participate in sustainable timber harvesting on part of the Domain.

The university has designated about 350 acres to be harvested using ecologically responsible logging techniques. Loggers leave enough native hardwoods to ensure regeneration and are not allowed to construct new roads. In addition to income, the sustainable logging provides a unique opportunity for university classes to help with the planning process and study regeneration. Income generated from timber sales covers the costs of obtaining a third-party sustainable forest practices certification.

Natural resource managers working in the Domain face many resource and human-related challenges. Recreational pressures represent one of those challenges. Many people use the Domain for hiking, biking, caving, horseback riding, picnicking, climbing, and camping. Heavy recreational use requires increased maintenance of trails, overlooks, climbing areas, and fire lanes. Overuse in popular areas results in litter, soil compaction, vegetative damage, and soil erosion, particularly in more fragile areas such as stream banks and bluff edges. The affects of recreation are consistently monitored and the management plan calls for

managers to regulate, prohibit, and segregate certain activities as necessary to protect the integrity of the ecosystems.

The Domain's accessibility to the public makes it vulnerable to illegal and destructive activities. All-terrain vehicles and other four-wheel drive vehicles tear up vegetation and damage soil and stream banks. Dumping, land theft, and arson, while less problematic than in the past, remain concerns. More recent problems include marijuana cultivation and theft of historical artifacts. Managers are also concerned about methamphetamine labs, which have become a problem in other remote areas of the state. These labs use dangerous, explosive chemicals to produce a highly addictive narcotic and could pose a threat to the ecological health of the area and the safety of students and recreators. The harvest of various non-timber forest products such as mushrooms, seeds, and plants has been increasing and managers are concerned about the resulting impacts of potential overharvesting on forest ecosystems. Wildflower and ginseng collection have been particularly problematic and while plant removal is prohibited, enforcement is difficult to implement.

Poaching has been a long-standing problem in the Domain. Hunting pressure during the late 1800s and early 1900s nearly wiped out local deer and turkey populations. Hunting has been prohibited for many years and reestablishment programs for deer and turkey have been successful. In fact there is an overpopulation of deer on the Domain and an annual controlled hunt is conducted every winter. Poaching remains a concern because of visitor safety. To increase security and reduce illegal activity, the management plan recommends that specific roads and fire lanes that serve as entry points into the Domain be patrolled. The plan recommends that people found trespassing with motor vehicles, poaching wildlife and plants, or stealing artifacts be prosecuted. The local sheriff patrols the Domain for illegal activity, on a part-time basis.

Another issue in the Domain is water quality. To supply water for the increasing populations of the university and the Sewanee Utility District, three reservoirs were created in the Domain: Lake O'Donnell, Lake Jackson, and Lake Dimmick. Lake Dimmick has only been pumped once in 1987 during a severe drought, and Lake Jackson is pumped only three or four times a year. The university owns the entire, mostly forested watershed around Lake O'Donnell, but water quality must be closely monitored because underground storage tanks from a neighboring airport and a close-by landfill are potential sources of contamination. The university owns 303 of the 493 acres comprising Lake Jackson's watershed, while the remaining acreage is mostly residential neighborhoods. Domain managers are concerned about potential pollution from septic tanks, agricultural fields, or land-use changes in these areas. Recognizing that undeveloped, forested watersheds provide the highest water quality, the management plan calls for the protection of the reservoirs and their watersheds from housing development and activities that may jeopardize water quality.

Insect pests present the greatest threat to forest health in the Domain. Managers are most concerned about the gypsy moth and Asian long-horned beetle. Managers work to protect the forest from these pests by careful monitoring and keeping forests healthy, vigorous, and diverse. This strategy helps forests resist and recover from potential infestations. Southern pine bark beetle, a native insect to the region, has also infested some areas in the Domain. Trees that have been killed by pine beetle and removed for control purposes have been reforested with pine and hardwood seedlings and the Office of Domain Management carefully monitors and records seedling and sapling mortality as well as natural regeneration.



Photo courtesy of University of Missouri

Multiflora rose is one of several invasive species that the Domain management plan addresses.

A member of the Tennessee Exotic Pest Plant Council helped management identify the 13 most problematic non-native invasive plants in the Domain. These include tree of heaven, mimosa, Nepal grass, privet, kudzu, multiflora rose, and others. Invasives typically proliferate in recently cut or cleared areas such as roads, yards, and trails. Managers carefully monitor invasives and use manual clearing tools such as chainsaws, brush hooks, and axes along with herbicides to control them.

The Natural Resource Advisory Committee (NRAC) controls land-use decisions outside of the campus area. NRAC is made up of the provost, university treasurer, domain manager, forestry and geology chair, university forester, a representative from the biology department, and a community member with land-management experience. The committee realizes how integral the Domain is to the surrounding community and values public support for its management activities. Community council meetings, university-wide e-mails, and announcements in the local newspaper are used to inform the public about major projects such as harvesting or intense clearing.

Although the Domain's main purpose remains providing teaching and research opportunities, the current management plan recognizes that there are a variety of stakeholder interests, needs, and objectives required of the Domain. Issues in the Domain, like in other wildland-

urban interface areas, tend to be interconnected. For instance, pest and invasive plant problems may threaten forest health, wildlife habitat or food sources, and forest aesthetics. Poaching and other illegal activities create safety hazards for recreational visitors, students, and researchers, while also impacting wildlife and ecosystem health. Setting aside forested areas that are protected from harvesting and development also helps ensure clean drinking water, wildlife habitat, attractive recreation areas, and healthy forest systems. Balancing the needs and objectives of multiple users is always challenging and the Domain management plan clearly outlines management priorities and strategies for meeting multiple goals. Efforts to preserve specific lands not only conserve the aesthetics and ecological health of the Domain, but also protect cultural heritage, and increase the forest's capacity as a research and educational facility. The management plan also recognizes the increasing need for additional university housing and the importance of placing new development in areas of the Domain that will not jeopardize forest health, recreation, educational and research value, and water quality. Recreational amenities in the Domain will continue to be managed by protecting and maintaining areas and trails used by visitors.



Photo courtesy of University of the South

The Domain is a valuable educational resource for the University of the South.

The Domain provides a lot of value to the university and local community and its managers are faced with a variety of changing issues that

impact its beauty, health, and functionality. Like other interface areas, many of the potential threats exist on private property that is beyond manager control. Developing a management plan that carefully identifies and prioritizes issues and defines strategies for monitoring and mitigating problems, while adjusting to changing needs and issues, is essential. While managers may not be able to regulate what goes on beyond their jurisdiction, effective monitoring and on-site management are helpful tools in facing these challenges.

Source

Smith, K, Domain Forest Manager, University of the South. Personal interview, January 2005.



Case Study 6

Improving the Urban Forest in Roanoke, Virginia

Located between the Blue Ridge and the Virginia Allegheny Highlands, Roanoke has become a center for industry, finance, education, travel, and entertainment in western Virginia. A result of this popularity has been a rapid increase in population and development, which has affected the health of Roanoke's urban forest.

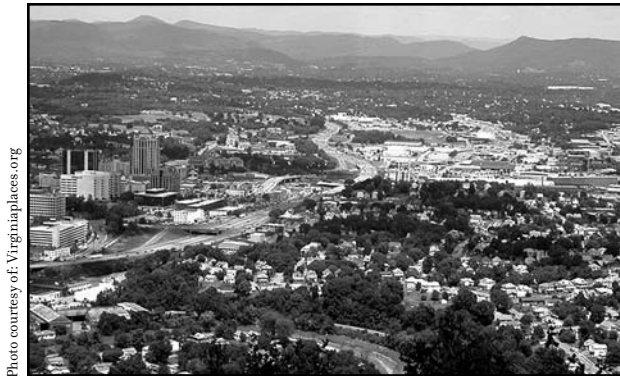


Photo courtesy of VirginiaPlaces.org

The health of Roanoke's urban forest was at risk due to rapid urban development.

To help protect the urban forest, the state Urban Forestry Council collaborated with the Valley Beautiful Foundation (a nonprofit organization) and Roanoke city staff to obtain funding for a study of the city's tree canopy loss. The funds were awarded by the USDA Forest Service and administered through the Virginia Department of Forestry. The group contracted with American Forests (a nonprofit organization in Washington, DC) to prepare an Urban Ecosystem Analysis for the Roanoke Valley. The study measured changes in tree cover, identified ecological services such as storm-water control and air filtration provided by tree cover, and calculated what it would cost to build the infrastructure needed to provide equivalent services. The results revealed a 25 percent loss in tree cover in the region between 1973 and 1997.

Roanoke's urban forester and members of the Roanoke Valley Urban Forestry Council reported to the city council on the Urban Ecosystem Analysis findings. They stressed that urban tree loss affects the city's air quality, storm-water management, economy through tourism, and quality of life. The city council responded by appointing an Urban Forestry Task Force to create an Urban Forestry Plan for the city.

Members of the task force membership included local business owners, neighborhood representatives, parks and recreation staff, and a city council liaison. With the Urban Ecosystem Analysis as background information, the task force prepared an Urban Forestry Plan with an overall goal of increasing the city's tree canopy from 32 percent to 40 percent within 10 years. The 40 percent goal was recommended by American Forests' as the minimum amount of tree cover necessary for a healthy urban community.

The Urban Forestry Plan recommended a combination of strategies including launching educational programs for children and adults, designating funds for planting public trees places, encouraging tree planting on private land, and updating local landscaping and zoning ordinances. Draft plans were mailed out to a variety of individuals and organizations including state and federal agencies located in Roanoke, city departments, and environmental groups. A letter signed by the city manager that encouraged comments on the plan was included. A briefing was held to notify the public about the plan. Two public hearing were conducted: one with the Planning Commission and one with the City Council. Most of the feedback about the plan came from the mailings. At the public hearings,

all of the suggestions were discussed one-by-one and if possible, incorporated into the plan. Although the two public hearings did not draw large crowds, those who attended were supportive of the plan. The city council adopted the Urban Forestry Plan as part of the city's comprehensive plan in April 2003.

While the process of developing a plan to restore and enhance Roanoke's urban forest was not without challenges, everything flowed well due to proper preparation and execution. In forming the task force, the city council selected members that had demonstrated an ability to work closely with government staff to resolve problems. A good working relationship between staff and professional experts from beginning to end was also critical. It is easy for a diverse group to lose sight of the project goal. Task force co-chairs were selected from among the citizen members, but staff added expertise and guidance at every meeting. The real key was the balance of support for the initiative from citizens, community organizations, staff, city administration, and the city council.



Photo by: Helen Smythers

A commemorative tree planting celebrates the new Urban Forestry Plan.

The urban forest planner for Roanoke summed up the value of their urban forest, "Trees and other vegetation represent both an environ-

mental resource and an important landscape feature in the quality of life in the city. Maintaining and increasing the city's tree canopy will have a beneficial impact on air quality, storm-water control, noise levels, temperature, and visual appearance."

Since the plan has been adopted, urban forestry staff has assisted city planning staff in drafting new landscaping and tree canopy minimums for an upcoming zoning ordinance revision. During the public review of the first zoning draft, some local developers and homebuilders noted that there would be an increased cost from additional planting. The staff was able to counter this concern by noting that studies indicate that the presence of healthy trees around a building increase its value. An additional study is underway to identify and evaluate forest fragments within the city. Strategies to preserve forested areas and their associate benefits will be developed using information from this study.

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Case Study 7

Interface Issues in the Georgia Mountains

According to its local chamber of commerce, White County, Georgia, is ‘where the good life is even better.’ White County is located in the beautiful Blue Ridge Mountains at the base of the Appalachian range in northern Georgia. It is 80 miles from Atlanta and is home to the city of Helen, a popular tourist destination that resembles a modern alpine village. Helen hosts several festivals every year including an Annual Trout Tournament, Oktoberfest, and a Hot Air Balloon Race. The Chattahoochee National Forest comprises 27 percent of White County, which helps protect the county’s famous natural beauty. White County’s natural features offer recreation and nature-based tourism such as fishing, hiking, rafting, tubing, and camping. Beautiful fall foliage draws leaf lookers from all over the country.



Photo by: Brett Billings, U.S. Fish and Wildlife Service

Helen, Georgia, a modern-day alpine village, is a popular tourist destination.

White County’s population has almost doubled since 1990, expanding from 13,000 residents to almost 23,000 in 2003. Many people move to White County to enjoy its mountain beauty and relaxed pace. While most past development occurred on flatter lands that were suitable for agriculture, new construction is creeping into the mountain ridges as developers strive to

provide home buyers with a desirable view. Unfortunately, this type of development can degrade the resource, blocking or altering vistas so that others’ views are no longer available or attractive.

With development encroaching on forested ridges, natural resource managers and emergency personnel are facing new challenges. For instance, managing wildfire outbreaks in White County’s forests used to be a less complicated task for firefighters and forest rangers than it is today. Although fighting wildfire is always a dangerous undertaking, the difficulty of the task increased vastly when homes became common in remote areas, particularly on steep terrain. Now when wildfire occurs in White County and firefighters ask, “Are there any houses nearby?” the answer is almost always “yes.” This makes containing the fire more urgent and increases risks to residents, wildlife, and forests. It also often requires structural firefighters to team up with forest rangers to prioritize what needs to be saved.

Rapid population growth and sprawling development are also affecting water quantity and quality in White County. White County shares its water, the Chattahoochee River, with the Metropolitan Atlanta region. As populations in both areas continue to grow, concerns over water shortages and pollution are rising. When new homes are built in the mountain ridges of White County, more roads are developed and nonpoint source pollution increases. The ecosystem services that help protect water resources, such as nutrient cycling and infiltration, will decline as forested land is cleared for development.

White County has also experienced challenges with southern pine beetle (*Dendroctonus frontalis*) infestations. Extended drought conditions resulted in a three-year infestation that was difficult to control. Large tracts of forest are often divided into one- to three-acre home-steads in White County. This means there are many landowners to educate about appropriate beetle control measures and they must work collectively to contain infestations. Even if most landowners properly manage pine beetles on their property, it only takes a few who don't to enable the insect population to get out of control. The increasing number of private lands that border the Chattahoochee National Forest make coordinating pine beetle control efforts a challenge for resource professionals.

The Georgia Forestry Commission began a Wildland-Urban Interface Project in 2000 to address wildland-urban interface concerns in White County. Although the project focuses on wildfire and forest stewardship, the project coordinator would also like to see it address other issues that arise from rapid interface development in White County. "I think one of the most important ways that resource managers can improve conditions in the interface is to learn about and get involved in the community-planning process," the coordinator says. Although every county in Georgia is required to have a comprehensive plan, counties are not required to follow their plans, and many counties lack the initiative, resources, and knowledge to effectively implement their plans.

Natural resource professionals have valuable experience and expertise to bring to planning decisions and can help shape future development by incorporating natural resource information. They can offer compelling reasons to protect forest connectivity, wildlife habitat, watersheds, and other significant ecological features. The traditional role of the resource manager is expanding in Georgia to include public educator, issues mediator, and community-planning advisor. The WUI Project

Coordinator in White County says, "As land ownership patterns change in the WUI, foresters and the agencies they work for may have to be willing to change their approach to resource management in order to help landowners meet their objectives. Foresters have skills that can be useful in long-range land-use planning, protecting homes from wildfire, preserving tree cover and biodiversity during development and maintaining water quality."



The Georgia Forestry Commission's Wildland-Urban Interface Project was designed to respond to wildland-urban interface concerns in White County.

Recognizing the increasing number of difficult issues in White County, the Georgia Department of Community Affairs hired a planning director and invited about 30 consultants to visit and evaluate the county's growth patterns. The team held a stakeholder meeting to gather public input for improved community development and is in the process of determining the best course of action. In response to mountain-ridge development problems, ordinances are being implemented that regulate lot sizes and the areas and altitudes that will be available for development. Such ordinances have been successful in protecting the public safety, ecological conditions, and scenic value of other mountainous regions.

The Wildland/Urban Interface Project offers the community a Firewise wildfire preparedness program and the Arbor Day "Building with Trees" program to help protect the health of people and forests in the interface. The project

coordinator has found residents and builders to be very receptive to these programs. He says that many new landowners are politically active, helping stir community support for positive changes. Many have moved to White County to enjoy the unique 'good life' it has to offer and are personally invested in protecting the beauty and health of the area.

White County's story is a prime example of the variety of issues that can arise from wildland-urban interface development and how several agencies and the community can begin to address these issues. Rapid land development and the fragmentation of the forest in White County are creating challenges for natural resource professionals including increased risk of wildfire, water quality and quantity concerns, and southern pine beetle infestations. The Georgia Forestry Commission is beginning to respond to these and other related challenges by developing its programs through the Wildland/Urban Interface Project. Programs aim to identify important interface issues, improve awareness, facilitate action in the interface, and expand the roles of natural resource professionals to address a variety of problems. With a broad foundation in agency assistance and expertise, White County is identifying and addressing interface problems and taking preventative measures to protect the health, safety, and beauty of the community.

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Case Study 8

Island Interface Issues: Puerto Rico and the Virgin Islands

Wildland-urban interface issues create unique challenges on islands because there may be fewer feasible solutions and a greater sense of urgency than in areas with more available land and resources. In addition, islands often grapple with problems created by rapid and poorly-planned development. Because space is limited on islands, prudent planning and wise use of space is imperative. Natural resource professionals, residents, and government officials on islands like Puerto Rico and the Virgin Islands must work together to prevent and mitigate interface issues quickly and effectively.

Photo courtesy of: Caribbean National Forest



Because space and resources are limited on islands, interface issues can be more urgent and complicated than on the mainland.

Puerto Rico is approximately 100 miles by 35 miles and is home to nearly 4 million people. It depends heavily on its natural beauty and resources to sustain its primary industries: agriculture, tourism, and pharmaceutical plants. The island is home to the Caribbean National Forest, also known as *El Yunque*. The forest's name comes from the Taino Indian word, *yuke*, which means *white lands*, referring to its cloud-covered mountains. The Taino Indians, a subgroup of the Arawakan Indians, considered the mountain range within the forest to be the sacred home of their supreme god.

El Yunque was set aside as a reserve by Spain in 1876. With about 28,000 acres, it is one of the smallest forests in the National Forest System. However, it has the greatest biodiversity and is the only tropical rainforest in the National Forest System, receiving 160 to 200 inches of annual rainfall. It has more tree species (about 250) than all the 192 million acres of the other national forests combined. It contains more than 1,000 plant species, including more than 100 types of ferns and 50 native orchids. It has 79 different birds (including the endangered Puerto Rican parrot), 11 different bat species, and 13 species of coquí, a tree frog that is a well-known part of Puerto Rican heritage.

Photo courtesy of: USDA Forest Service



El Yunque is the only tropical rainforest in the National Forest System.

Many of Puerto Rico's urban areas show evidence of urban sprawl. Development is chiseling away at forest boundaries, recreational pressures are increasing, non-native invasive species are flourishing, water resources are at risk, and wildfire is a growing concern on some parts of the island. These interface issues are complex and require swift and innovative responses that can be adaptable and can evolve as conditions continue to change.

Almost 30 years ago, a 9,300-acre greenbelt of agricultural lands was established by Puerto Rican legislature to create a buffer around *El Yunque*. Since then nearly 18 percent of the buffer zone has been depleted both by clandestine development and zoning exceptions made by the government. A report from the USDA Forest Service states that *El Yunque's* forest ecosystem is being seriously damaged by urban development. The erosion of the greenbelt is reducing *El Yunque's* ability to support wildlife populations and is affecting forest temperatures and rainfall.

Forest ecosystems in Puerto Rico are also threatened by non-native invasives, often introduced by urbanization. Cats, dogs, iguanas, mongooses, and rats prey on native birds, amphibians, and reptiles and may out-compete native species for food or habitat.

The forest is also experiencing recreational pressures. With nearly 900,000 visitors every year, *El Yunque* is a popular destination for tourists and recreationalists. About half of the visitors come from all over the world, the other half live on the island. The forest offers hiking, swimming, picnicking, and interpretive and ecotourism tours.

In addition to providing recreation, *El Yunque* supplies 20 percent of the water used in Puerto Rico (about 50 million gallons per day). With rapid population growth and the cost of water climbing, protecting water resources is an important priority for resource professionals and governmental officials. In April 2005 officials announced that a Comprehensive River Management Plan (CRMP) would be developed to protect and enhance the water quality and free-flowing conditions of the *Rio Mameyes*, *Rio de La Mina*, and *Rio Icacos*. These three rivers were designated part of the National Wild and Scenic River System by the Caribbean National Forest Wild and Scenic Rivers Act of 2002 and were identified as providing remarkable scenic, biological, hydrological, and historic and cultural values. Together these three rivers' watersheds cover nearly 20 percent of the forest and contribute significantly

to Puerto Rico's water supply.

Because *El Yunque* receives ample rainfall, it has little risk of fire. However other parts of Puerto Rico are not immune to fire risk. During the three-month dry season in 2004, Puerto Rico experienced almost 1,500 fires and during the same time period in 2005, there were more than 5,000 fires. Most fires are caused by brush burning or outdoor cooking and quickly get out of control. The Maricao Forest Reserve on the western side of the island has been damaged by several brush fires. Much drier than *El Yunque* (3 to 4 inches of rain per month in the dry season), the Reserve is more vulnerable to fires that spread from urban areas. During the 2005 dry season, hundreds of acres were burned and several thousand trees were lost from multiple brush fires. Unlike other interface areas where wildfires in forests threaten the safety of people and property, these fires usually start in urban settings and move out into neighboring forests.

Puerto Rico is no stranger to interface issues. Like much of the southern United States, it is experiencing rapid population growth and subsequent development pressures. Urbanization contributes to many issues in *El Yunque* and other forests on the island. Natural resource professionals and government officials are faced with balancing urban development, a growing population's need for resources, and the need to protect the health of the island's forest ecosystems.

The U.S. Virgin Islands deal with issues similar to Puerto Rico. While rapid urbanization is not as prevalent in the Virgin Islands, unmanaged growth and urban sprawl are beginning to create problems. Sprawl is contributing to issues such as nonpoint source pollution, run-off, erosion, and loss of forest canopy. The Virgin Island Cooperative Extension Service is working to reduce problems by promoting Smart Growth principles and encouraging low-impact development through public outreach efforts. High levels of tourism are also affecting the natural resources of the Virgin Islands. The islands are heavily

dependent on fishing and tourism, both of which add to the depletion of resources and threaten to endanger both of these economically viable activities.



Photo by: Anand Ranganathan

Land-use planning is especially important on islands, where land and resources are limited.

Water quantity is also a major concern in the Virgin Islands. Because the Virgin Islands are at a lower elevation and are smaller, they tend to receive less rainfall and retain less fresh water than Puerto Rico. There are no year-round streams and ground water supplies are limited. Population growth and the conversion of forests for other land uses are negatively affecting the natural water cycles and water supply. Reservoirs are filling with sediments due to erosion, groundwater is being contaminated, and water supplies are being overexploited. Leaky septic tanks and inadequate sewage-treatment facilities also threaten groundwater quality. An increase in impervious surfaces from development and pavement impedes storm-water absorption, leading to runoff and increasing flood risks. Thirteen percent of the drinking water in the Virgin Islands comes from rooftop catchments, 22 percent from groundwater supplies, and 65 percent from salt water desalination. Due to frequent and severe drought conditions and the costly desalination process, the Virgin Islands have the most expensive publicly supplied water in the United States.

Islands experience similar interface issues as mainland areas but the intensity and urgency of problems are often much greater. Natural

resource professionals who work on islands must be equipped with cutting-edge strategies for addressing and preventing interface problems. They must be able to implement effective management strategies, provide public outreach, and work with local leaders and decision makers to reduce issues.

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Case Study 9

Karst Habitat Restoration in Arkansas

The Ozarks region of Arkansas, Oklahoma, and Missouri is well-known for cold-water springs, sinkholes, caves, and forested hills. These features are made possible by the limestone and dolomite that underpins this region, known as karst geology. Like other valuable natural resources, this water-rich system is threatened by human activity, but the damage is not so obvious. The bellwether of change, like the canary in the coalmine, is the rich variety of underground species (e.g., crayfish, bats, and cavefish) that reside in the caves and underground streams.

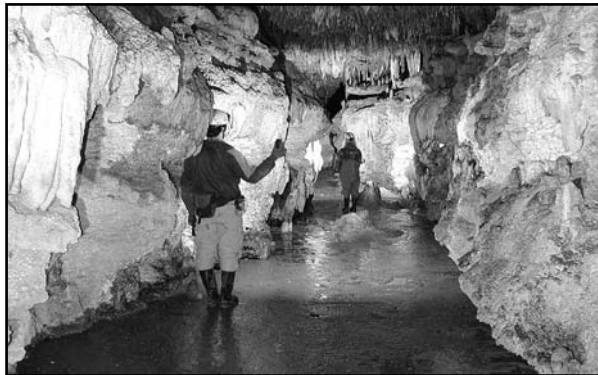


Photo courtesy of, U.S. Fish and Wildlife Service

The Ozarks feature unique karst topography with caves, sinkholes, and springs.

These underground aquatic habitats are threatened by a host of above-ground activities. Nutrients from chicken farms and septic tanks, pollutants from chemical spills, and volatile organics from leaking gas tanks can travel through the fissures in the bedrock and contaminate underground streams within hours of their release. As communities around Fayetteville expand, the effects could be devastating.

The U.S. Fish and Wildlife Service's Arkansas Field Office (FWS) began working on restoring the karst habitat in the northern third of the

state through an outreach campaign that linked citizen health and welfare, groundwater quality, and karst resources. They began by identifying the stakeholders who should be a part of the campaign: private landowners of property containing karst resources, citizens who use karst landscapes, federal and state agencies with karst-related responsibilities, karst geologists elected officials, industry, agriculture, and caving clubs. They also developed a vision for the outreach program, aiming to achieve conservation goals without regulations. Their mission: work cooperatively with others to plan, implement, and monitor karst conservation in the Ozark Plateau.

The FWS team created a name for their effort, aiming for simplicity, memorability, and unique identity: Karst Resources Support Team (KaRST). Their next step was to win administrative support within the FWS at the local, regional, and national levels. A series of presentations, fact sheets, and a bumper sticker were delivered to each participant.

After gaining internal FWS support, project coordinators began talking to other agencies, conservation groups, universities, caving clubs, and private landowners. The basic presentation was modified for each group, emphasizing the ways they could be involved in the program. University scientists learned about funding opportunities for research, biological surveys, and recharge area delineations. When presented to caving clubs, the presentation highlighted how the participants could help with mapping projects. At each presentation participants were asked to join the effort and become a member of the Karst Resources Support Team.

Photo by: David Kampwerth



A number of stakeholders have been organized to help restore and monitor the karst habitat.

Team members were eligible to attend meetings, held throughout the three-state region. Information on karst issues was presented at meetings and groups were encouraged to discuss conservation strategies that could be employed locally. Some teams planned and implemented cave gates, sinkhole cleanup, and habitat restoration on private land. Ideas moved from teams to agencies in proposals for funding. More landowners were invited to participate and provide input. Once funding was available for assistance, the word spread.

Today the program has broadened to include more partners at the state and federal level, including U.S. Forest Service, National Park Service, Missouri Department of Conservation, Arkansas Game and Fish Commission, Oklahoma Department of Wildlife Conservation, Neosho National Fish Hatchery, Speleological Society, The Nature Conservancy, University of Arkansas, Arkansas State University, Arkansas State Parks, Ozark-St. Francis National Forest, and others.

Like most programs, this one was not without its share of challenges. Efforts to compile a regional database to designate high-priority conservation areas were squelched by data-sharing issues. Some partners were reluctant to share data and were uncomfortable with a perceived loss of control. Lack of trust led to the

abandonment of certain projects and reduced the program's overall ability to fulfill its original objectives. Despite these challenges, KaRST continues to serve as an informal, technical-information exchange network.

Adapted from Public Outreach and Education: Overview and Planning, April 2004, Division of Education Outreach, National Conservation Training Center, U.S. Fish and Wildlife Service, with help from Dr. David Kampwerth, U.S. Fish & Wildlife Service Arkansas Field Office.



Case Study 10

Land Conservation along the Suwannee River

Different agencies have different tools to address problems in the wildland-urban interface. For example, some agencies are in the position to acquire or facilitate the acquisition of conservation easements (or land-preservation agreements). Conservation easements (voluntary donations or purchases of property rights for the purpose of restricting development) can be a powerful tool for conserving natural resources, improving management opportunities, and protecting connectivity in interface areas. The Suwannee River Water Management District (SRWMD) is one agency that is using this tool with great success. The district is one of five regional water management districts in Florida. It was created by the Florida legislature through the Water Resources Act of 1972. The objectives of this agency are to manage water and related natural resources in north central Florida by providing water quality and quantity monitoring, research, regulation, land acquisition and management, and flood protection. The SRWMD aims to balance public access, recreational use, and restoration and protection of natural lands when making management decisions.



Photo courtesy of Florida DEP

Conservation easements allow resource agencies to create buffers around management areas and conserve resources without the high cost of purchasing land outright.

In 1999 the Florida Forever land acquisition program was founded. This program aims to conserve and protect natural resources by acquiring and protecting land on behalf of the citizens of Florida. Under the sponsorship of the Florida Forever program, SRWMD promotes conservation easements as a cost-effective means to protect natural resources and provide buffers for their management areas. A conservation easement enables a landowner to retain the title to his or her property but transfers subdivision and development rights to the district, and restricts certain land uses. In most cases, landowners can still manage their lands for products and services, such as timber production and wildlife habitat enhancement, but they must agree to develop annual management plans in cooperation with the district. According to the projects coordinator at for the SRWMD, Acquisition and Management Program, conservation easements are an attractive mechanism for both landowners and the agency. Landowners are able to preserve their property by selling the development rights and continuing to own it and the agency is not saddled with a purchase of the entire property.

Conservation easements have many advantages. One advantage is that the landowner is still responsible for managing the land, as opposed to the fee simple purchase of land in which the district then becomes responsible for land management. Another advantage is that conservation easements serve as buffers for the lands the district has conserved by outright purchase. Purchasing development rights is also significantly less expensive than purchasing land outright, enabling the district to conserve more land with its funds.

Photo courtesy of Florida DEP



Suwannee River Water Management District website. http://flwaterpermits.com/home/srwmd_inside.jsp (accessed September 2004).

The Suwannee River Water Management District's Acquisition and Management Program has successfully protected over 150,000 acres of land from development.

The SRWMD conservation easement program has contributed to many ecological improvements in a short time, including the hydrological restoration of Mallory Swamp, the conservation of the floodplain of the Suwannee River in the Suwannee Swamp and Oak Hammock, and the creation of a greenway linking Manatee Springs State Park and the Lower Suwannee National Wildlife Refuge that serves as a wildlife corridor. The district relies primarily on word-of-mouth to promote this program but also distributes brochures and speaks to civic organizations. As of early 2005, the district had successfully purchased the development rights of over 154,000 acres of conservation easements.

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Case Study 11

Life on the Edge: Interface Issues in Bastrop, Texas

Tucked along the edge of the Colorado River, the small town of Bastrop, Texas struggles to balance historic preservation and development pressures. While the city (pop. 5,340) has retained a small-town feel with features such as quaint shops, a riverfront park, and old homes, the surrounding county (pop. 63,934) is growing by leaps and bounds. Bastrop is in the Lost Pines, an isolated, timbered region of loblolly pines and hardwoods. At only 30 miles from Austin, Bastrop is a reasonable commute for an increasing number of people in search of the benefits of a small town. Bastrop County's growing population has put it among the fastest growing counties in the nation, growing 51 percent between 1990 and 2000.



Photo by: Martha C. Monroe

Downtown Bastrop has a small town feel with features such as quaint shops and old homes.

There are several interconnected wildland-urban interface issues in the Bastrop area. Predominant issues include fire, land-use planning and subdivision design, endangered species, recreation, water quantity, and private property rights. Fire is a particularly important issue and one that relates to all of the others. The flammable cedars, loblollies, and yaupon holly in the Lost Pines make the area prone to wildfire. However, the increasing developments and forested homesites have led to increased

fuel loads since wildfires have been necessarily suppressed. The reduction of fuel loads by using prescribed fire is difficult due to the increased number of people in the surrounding area. In 1998 a severe drought and observations of Florida's extensive fire season prompted the Texas Forest Service (TFS) to preemptively station a team of Hot Shot firefighters in Bastrop. While they waited to pounce on a fire, they conducted hazard assessments. These eventually grew into a significant educational effort when coupled with follow-up neighborhood meetings, which were carried out by the TFS and volunteer fire departments (VFD). TFS and VFD crews have successfully conducted prescribed burns on large ranches and camps in recent years.

The design of several subdivisions in the county also increases residents' risk in the event of fire. Blind hills, complicated street names, and short radius turns make it a challenge for firefighters to get to fires. Limited entrances and narrow feeder roads make evacuations difficult as well. To reduce the risk of fire spreading through a community, residents have been encouraged to create defensible space and conduct structural improvements. Through field days and demonstration areas, residents have begun to work on selected properties and to show others what can be done.

The historical lack of zoning in Bastrop has led to many of the area's existing fire problems. One positive step, however, is that the city of Bastrop has a large "extra-territorial jurisdiction," which allows the city to zone areas outside its limits in order to plan for future growth. This has enabled the city to look at wildland fire design issues before the building begins at the subdivision review stage. Housing

developments that are located in fire-prone areas have mitigation requirements built into the planning stages of subdivisions.



Photo by: Martha C. Monroe

Blind hills are one challenge that firefighters face in Bastrop.

Water supply issues are also of concern in Bastrop. Water rights do not automatically come with property and most developments purchase water from one of several water companies. These companies rarely use water mains that are large enough or produce enough pressure to provide water to hydrants for fire fighting.

Recreation is a major business for Bastrop since Bastrop State Park is one of the most visited parks in the state park system and stays busy year-round. This means that there is a large population of recreation enthusiasts in this highly flammable environment, creating a high potential for ignitions from sources such as campfires and cigarettes. To add to the complexity, there are several large subdivisions adjacent to the park, which pose a risk to both life and property. In response, the park has initiated an aggressive prescribed burning program to reduce risks to neighboring communities. The park has hosted several interactive public education programs addressing both fire safety and fire ecology to help increase awareness of the benefits of the prescribed burning program.

Bastrop State Park and nearby forests are home to the Houston toad (*Bufo houstonensis*), a designated endangered species. On the one hand, the use of prescribed burning or vegetation removal for the reduction of wildfire risk can

disturb the breeding habitat of these toads or result in toad mortality. On the other hand, increased fuel loads due to prolonged periods of fire suppression can result in very hot fires that are even more detrimental to this species. Prescribed fire also helps maintain the herbaceous vegetation layer that the Houston toad needs for cover and foraging habitat. Additional research is needed to determine the effects of prescribed burning programs on toad populations. Sharp toad population declines are attributed to development, drought, soil erosion, cattle grazing, and pesticide runoff, all of which limit the suitability of breeding ponds. Research sponsored by the University of Texas indicates that the toad population fluctuates with drought. If habitat can be protected or created on private property, the population may stabilize and rise.

A culture of independence pervades the Texan legal system, fostering strong support of individuals' right to do what they want on their own land. This means that any educational programs about how to reduce wildfire risk and protect endangered species on private property or how to better design new developments or retrofit existing developments must proceed with care: building knowledge, engaging citizens, and helping them realize what they might do to improve their quality of life.

Bastrop is a good example of a community, like others across the South, that is experiencing rapid population growth and increased land development. Several steps are being taken to address the natural resource issues that exist in the interface, but there are still many issues left unresolved.

Adapted from "Bastrop, Texas: Steps to improve community preparedness for wildfire" Case Study #12 in the Community Preparedness Case Study Series, published by the USDA Forest Service, North Central Research Station, St. Paul MN, <http://www.ncrs.fs.fed.us/4803/Highlights.htm> (accessed August 31, 2005).



Case Study 12

Mediating for Change in Martin County, Florida

For decades, the residents of Martin County, Florida, have worked to control the growth in their county. Martin County lies on the south-east coast of Florida, just north of Palm Beach County (900,000 people), Broward County (1,300,000 people), and Miami-Dade County (2,000,000 people). To help manage growth and reduce anticipated interface problems, the county developed a comprehensive plan in the early 1980s, long before most Florida counties. The plan established guidelines for environmental protection, a height limit for buildings, and an urban service district boundary. In 1990, even stricter policies were introduced.



Photo courtesy of: Everglades National Park

Protecting the Everglades is a priority in South Florida. The Everglades Restoration Project identified rapid, poorly planned growth as a problem and spurred the visioning process in Martin County.

In 1997 Martin County became one of five counties designated as a Florida Sustainable Community by the Department of Community Affairs (DCA). The program was developed from a recommendation by the Sustainable South Florida Study Commission to help test models of sustainability that could help restore the Everglades. As part of the project, Martin County residents and officials conducted a community visioning process to create a plan

for their community. They also generated a hazard-mitigation strategy and developed plans for a sustainable community resource center. The county was encouraged by the DCA to use the visioning process to build consensus within the community on growth and development issues. This process engaged a wide range of business, civic, educational, environmental, and neighborhood representatives, along with interested residents to determine what a sustainable Martin County would look like.

Throughout the county in 1998, community workshops were held to develop and refine a vision for a sustainable Martin County, focusing on environmental, land-use, and transportation issues. Workshop participants also articulated the vision's guiding principles and identified 52 indicators of sustainability. The Martin County Commission formally adopted the vision as part of its comprehensive plan in July 1999. The project won the 2000 National Association of Counties Achievement Award and the 2000 International City, County Communications and Marketing Association Savvy Award.

The County partnered with the Florida House Institute for Sustainable Development to design the Sustainable Communities Resource Center within the county's new Indian Riverside Park. While the plan for this center was to serve as energy and water-efficient demonstration building, as well as a neutral forum for citizen-based planning, conflict-resolution, and community development meetings, a shortfall of funding has prevented the resource center from being constructed as of this writing.

The Sustainable Communities pilot project led to the creation of the Sustainable Martin Alliance. This nonprofit group assisted in developing plans for the resource center, helped with a project to determine indicators of sustainability, and promoted public education on concepts of sustainability. The group also helped develop “Martin 101: It’s Different Here,” an educational program that provides new and long-term residents with an overview of the natural and built characteristics, as well as economic, environmental, and social issues in the county.

A member of the Sustainable Martin Alliance and former county commissioner founded a nonprofit organization called Friends of Martin County in 2004. The organization aims to offer community members a nonpartisan, nonpolitical forum for discussing the county’s growth-management issues and options, assuming that a desirable future requires broad, active participation from the public. The organization’s objectives include creating grassroots support to implement a county land acquisition program. The group’s steering committee includes the founder, an officer of the local Audubon Society Chapter, a hospital executive, and a developer. After struggling with conflicting perspectives, the group asked a professional mediator from the University of Florida to facilitate its meetings. During the first facilitated meeting between the steering committee and local stakeholders, the group discussed each participant’s interests and concerns related to land use in the county; defined and discussed the ground rules and characteristics of the group; and decided to include expert presentations by the county planner, tax assessor, and water manager in future meetings. Once the ground rules became habit, everyone was able to listen and work together. Each stakeholder was given a chance to speak and all participants vowed to listen.

Through this process the group learned that steering committees must be representative of the stakeholders, the facilitator must be neutral

and enforce group ground rules, and the process must reveal all views of the group members. Expectations of the group grew more reasonable as they gained more knowledge about land-use issues. Involving stakeholders in the visioning and decision-making process was a strategy that served everyone and encouraged group cooperation. The Friends group continues to guide growth in Martin County and protect natural resources through collaborative and cooperative community effort. They have also assisted the development of the “Martin 101: It’s Different Here” program.



Photo by: Larry Kohmak

Unplanned growth can contribute to a number of natural resource challenges.

Martin County has been pro-active in managing its growth issues and is committed to involving as many stakeholder perspectives as possible in discussions and decisions. They have made a variety of efforts to promote sustainable development within their community.

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Case Study 13

A Multi-Agency Initiative: Water Education in Kentucky

The State of Kentucky is initiating a Commonwealth Water Education Project to teach Kentucky residents about nonpoint source water pollution. Like in most places, water is an important resource in Kentucky. Ninety percent of its rural population relies on groundwater for their water supply. With nearly 90,000 miles on rivers and streams, more than 630,000 acres of wetlands, and 55 percent of its land underlain by karst topography, Kentucky has reasons to be concerned about protecting its water quality.

In 2004 a statewide survey of environmental knowledge and attitudes in adults identified water quality as the number one concern. The same survey revealed that only 17 percent of respondents could identify the major source of water pollution. The Commonwealth Water Education Program is designed to engender in the public a desire to know more about how they influence water quality. It aims to help fulfill the Kentucky Environmental Education Council's 1999 master plan recommendation that state agencies collaborate on improving adult environmental literacy.



Photo by: Larry Korhnik

Like most states, Kentucky's water supply is vital to the well-being of its residents.

The degree of multi-agency collaboration makes this program unique. The project development team of more than 20 agencies, led by the Kentucky Environmental Education Council includes state universities, the Division of Water, Kentucky Education Television, League of Cities, the Association of Counties, and the Transportation Cabinet. Several partners are developing products such as a logo, workshop materials for local officials, workshop materials on watersheds for high school teachers, and a virtual watershed field trip. A documentary about water issues in Kentucky is being made and radio, newspaper, and television advertisements will promote the program messages. While challenging at times, involving so many partners in the project has provided many advantages. It helped project developers identify and understand audience characteristics and needs, it increased the capacity for dissemination, and helped establish credibility.

The five-year program will concentrate on two major state watersheds each year. Dissemination efforts will target area churches, Lions' Clubs, Kiwanas, and other groups. Special outreach efforts will be made to bring the documentary and other materials to residents living in interface and rural areas. Although the program is still in its developmental stages, Jane Eller of the Kentucky Environmental Education Council said, "Organizing such a far-reaching program involving so many groups can be challenging. With multiple partners, moving through the development process can be cumbersome and sometimes slower than expected. Having clearly defined objectives and good communication are essential when working with so many agencies

and organizations and that has often been difficult.” One problem is the long turn-around time between when the proposal is submitted and MOA’s are actually written to each partner. A significant delay could result in changes in personnel or organizational agendas, making it difficult to maintain clear goals.

Developing a program with multiple target audiences is also challenging. The project aims to reach the general adult population, local officials, and teachers. Project designers talked to partner agencies that work with these groups to get ideas on the best ways to reach them. The project’s general messages are consistent among all audiences: that Kentucky’s water is becoming polluted, an explanation of the causes of pollution, and why people should care. However, messages concerning what people can do about water pollution is different for the different groups. For instance, teachers learn how to teach about it, local officials learn how to make educated policy decisions concerning water, and the general population learns about simple actions they can take and best management practices (BMPs) they can follow to protect water quality.



Photo by: Larry Korhnik

The Commonwealth Water Education Program is designed to increase people’s awareness about water quality and teach them how they can protect and improve it.

The project’s messages are pro-active and positive. According to the project director most Kentuckians appreciate water as a resource and know that it is polluted. The project elicits a sense of pride in Kentucky’s beauty and helps

people to understand how the water gets polluted and what they can do to improve it.

In order to be effective, an education program’s message must be clear and consistent and multiple communication channels must be used. The Commonwealth Water Education Project uses video, television and radio, workshops, community presentations, an electronic field trip, and a website to present accurate and consistent information. The project addresses common misconceptions about water, for instance that factories are the only source of water pollution, or that water cleans itself.

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Case Study 14

New Urbanism in South Carolina

Duany Plater-Zyberk & Co., the planners for the Habersham Land Company in South Carolina, boast that the town was built ‘in the tradition of beautiful coastal towns.’ Habersham is located off coastal marshes, one hour south of Charleston, South Carolina, and one hour north of Savannah, Georgia. The development’s design aims to blend community goals and public spaces to create, according to their website, “a place of sustainable character and charm, a place that protects the present while preserving the values for future generations to come.” Before designing Habersham, planners toured historic southern towns to study the details that make up their aesthetic and functional character and incorporated these details into the development’s new-urbanism concept. The result is a town with a traditional feel, an awareness of natural resources, and a tight-knit sense of community.



Photo by: Martha C. Monroe

Homes in Habersham are designed to capture the feel of older southern communities.

Following the “new-urbanism concept” Habersham was designed with Smart Growth principles. Habersham developers worked with great conscience to preserve the natural environment while still meeting the needs of homeowners. Clustered housing intermixed with urban parks and trails allows for condensed development while preserving the estuaries and buffer areas creating open space and recreational opportunities. Lots are priced from \$75,000 to \$500,000, providing prospective homebuilders with a wide range of opportunities.

Prior to the development plan, natural resource professionals helped perform a survey of 35,000 trees and developed topographical, aerial, and archeological maps of the area. Numerous parks and walking paths along the marsh increase access to the natural landscape. Bob Turner, one of the town’s founders has been featured in *Coastal Living*, *Southern Living*, *Southern Accents*, and *The Wall Street Journal*. In 1996, Habersham was recognized by the Congress for New Urbanism as one of the top Ten Traditional Neighborhood designs in the country.

Design codes foster distinctive, attractive homes with a strong sense of place. Codes also encourage materials and finishes that withstand the salt marsh environment, look good for years to come, and require minimal maintenance. With this mix of quality design, proportion, and indigenous materials, the homes of Habersham embrace a sense of southern elegance typical of the older communities in the low country.

With urban sprawl increasing traffic and loss of natural areas, the Habersham design incorpo-

rated a different street plan and opportunities for alternate transportation. Habersham features a gently curving grid of tree-lined, narrow streets that slows traffic and invites walking or biking. Building setbacks, street widths, curb radii, sidewalk widths, and other features were designed to optimize traffic flow and walkability. With the community-oriented design, homes are within walking distance of a traditional town center, multiple forested areas, waterfront parks, and an activity center including a pool, river pavilion, a dock, a bed and breakfast inn, and rental cottages. The community also features a post office, fitness facilities, and restaurants. Of the 283 total acres in the project, nearly 75 acres are dedicated to shared, public space.



Photo by: Martha C. Monroe

Front porches for relaxing and sidewalks for strolling foster a friendly, tight-knit community.

Habersham is zoned for 700 single-family and 300 multi-family units. Compact building designs and a range of housing opportunities are incorporated in the downtown area. The town center is zoned to allow loft apartments above commercial spaces to enable people to live close to work and shopping. This design helps decrease traffic and the need for parking lot space, while contributing to the vibrancy of the town center.

A sense of community is the core characteristic of the Habersham design. Neighborhoods are designed with central gathering places and parks are scattered throughout the town to serve as social gathering spaces. Every home in Habersham is required to have a front porch

and be sited close to the street, creating opportunities for people to interact, get to know their neighbors, and walk throughout their community. The continuous presence of people throughout neighborhoods and parks helps create an inherent sense of security.



Photo by: Martha C. Monroe

Environmentally sensitive shorelines are protected as parks and public areas.

Habersham's design provides one possible model for conserving natural areas, providing a sense of community, encouraging pedestrian activity and reducing urban sprawl. Natural resource professionals helped Habersham's planners create a design that would meet these objectives. The result is a pleasant community that connects people to their neighbors and their environment.



Photo by: Martha C. Monroe

Residents are encouraged to enjoy the natural beauty of the coastal marsh.

Source

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Case Study 15

Outdoor Environmental Classrooms in Oklahoma

Animal tracks in the sidewalk. Classes in the gazebo. Mallards and lizards at the wetland. All on school grounds!

The idea for these outdoor environmental classrooms began in 1993 when staff in the U.S. Fish and Wildlife Service's Partners for Fish and Wildlife Program discussed declining public awareness and support for natural resources. They decided to turn the tide by working with schools, enabling youth to learn about natural resources, conservation, and current issues, and to develop an environmental ethic. The goal was to help develop outdoor classrooms on school properties that provide high quality, interactive, structured opportunities for experiential learning about wildlife, wetlands, and other interesting topics.

The majority of these classrooms are located on elementary school grounds in the interface. As is typical in many suburban areas, youth have few opportunities to explore natural landscapes and wetland habitat is disappearing.



Photo courtesy of U.S. Fish and Wildlife Service

Outdoor classrooms provide access to natural areas that students might not otherwise have.

Although there are outdoor classrooms in every state, the program has been amazingly success-

ful in Oklahoma. The Partners for Fish and Wildlife Program, a program to improve wildlife habitat on private lands, makes seed grants of \$5000 available and technical assistance for wetlands construction. Schools and institutions sign 12-year contracts to manage and maintain the wetland habitats. In the first 15 years of the program nearly 100 outdoor facilities were constructed and the interest has not slowed. Program staff members estimate that the classrooms will provide two million students and adults with outdoor learning adventures over 15 years.

Teachers are encouraged to use the wetlands for science, language arts, math, and art activities. Nest boxes for birds and bats are often installed, as well as butterfly gardens and bird feeders.

In addition to the services provided by the U.S. Fish and Wildlife Service, many of the outdoor classrooms receive assistance from county conservation districts, Natural Resource Conservation Service, Oklahoma Conservation Commission, Oklahoma Department of Wildlife Conservation, community businesses, local governments, parents, and teachers. As a result, this project builds good will for the agencies and enables everyone to benefit from positive media and increased public awareness for natural resources. The staff members recognize that increased public trust in the agencies is a good investment for the future.

The process for developing an outdoor classroom usually begins with a conversation with Partners staff and school administrators, teachers, and maintenance personnel. Program staff meet at the school and give a presentation on

the potential uses of outdoor classrooms. They encourage teachers to visit nearby sites to better understand how to develop and maintain their site. When there is agreement and support for the concept, school officials sign a private lands agreement stipulating the wetland will be maintained for wildlife for 12 years.

community support and recognition for our agencies.”

Adapted from Public Outreach and Education: Overview and Planning, April 2004, Division of Education Outreach, National Conservation Training Center, U.S. Fish and Wildlife Service.

Photo courtesy of U.S. Fish and Wildlife Service



Community volunteers and agency staff work with school personnel to create a wetland habitat on school grounds.

Teachers, parents, and administrators develop a budget for their site and leverage the seed grant into \$20,000 to \$25,000 in donations and in-kind services. USFWS provides blueprints for construction, labor and materials are often donated. State agencies provide teacher training and lesson plans for the outdoor classrooms, and project partners are tapped to give presentations to students and attend special events.

The opportunity for positive media attention is well-utilized in many communities. Newspaper articles and TV stories cover the fund-raising activities and grand opening events. State and federal legislators are aware of the program's success and local officials are pleased to be involved.

The Oklahoma coordinators are strong believers in the concept of outdoor environmental classrooms as a public education tool for both youth and adults. Jontie Aldrich, the Private Lands Coordinator with the USFWS, comments, “It is a great way to help students learn about the environment and at the same time build



Case Study 16

Restoring Coastal Wetlands in Louisiana

Development in coastal areas can create a wild-land-urban interface that is unique in many ways, while sharing similar challenges with other types of interface. Like many states with coastline, Louisiana is experiencing rapid growth that is encroaching on coastal wetlands and forests. Wetlands are important to Louisiana's ecology, economy, infrastructure, and safety. Ambitious restoration efforts and effective land-use planning are essential to their protection.



Photo courtesy of NOAA

Louisiana's coastal wetlands support its booming fishing and shrimping industries and provide a variety of other benefits.

Coastal wetlands and wetland forests also provide numerous environmental benefits. They improve water quality, provide critical wildlife habitat, store carbon, and stabilize soil. They also provide economically valuable resources. Much of Louisiana's economy is based on commercial fishing, shrimping, wild fur trade, and recreation. Coastal wetlands contain a rich diversity of vegetation, wildlife, and fisheries that support vital commercial markets and tourism. The National Marine Fisheries Service found that from 1984 to 1991, commercial fishing in coastal Louisiana made up about 20 per-

cent of the national harvest. In addition, Louisiana's wetlands support the largest wild fur and hide industry in the nation, generating nearly \$20 million annually.

Perhaps the most important function of Louisiana's coastal wetlands is their ability to buffer inland areas from hurricanes and flooding. Coastal wetlands and barrier islands have historically provided Louisiana's coastal cities with hurricane protection. Researchers discovered that every mile of wetland and barrier island that lies between a hurricane and inland development before landfall results in proportional decreases of wind speed and storm surge. Every continuous mile of wetland can reduce storm surges by three to eight inches, helping reduce the overall severity of hurricane impact.

Because of these numerous benefits, Louisiana's wetland coastal areas are of immense regional and national importance. The destruction of wetlands by rapid and unplanned coastal development threatens people's property, sustenance, culture, and way of life. Activities that are affected include fishing, wildlife, shrimping, and oyster industries; oil, gas, and chemical industries; recreation, hunting, and tourism. The greatest threat to coastal wetlands is urbanization. Wetland loss has also been the result of storms; canals created for navigation and oil and gas drilling and transport; and nutria, an invasive marsh rat that overgrazes on marsh-stabilizing grasses. All of these factors can also contribute to salt water intrusion, further weakening the wetlands and marsh stability.

The potential effects of wetland destruction are many. The U.S. Army Corps of Engineers esti-

mates that commercial fish and shellfish harvests will decline by 30 percent by the year 2040 if nothing is done to protect coastal wetlands. Louisiana is losing coastal wetlands at nearly 25 square miles per year. During the past 40 years, at least 600,000 acres are estimated to have been lost. Between 50 and 75 percent of state residents live within 50 miles of the coast, making urban and industrial expansion into wetland areas inevitable. Loss of wetlands also increases catastrophic effects of storms and flooding such as those that ravaged New Orleans and other near-coastal development during the summer of 2005.

In 1989, the Louisiana legislature established funding for wetlands restoration, and citizens approved a constitutional amendment to help ensure funding for wetland restoration and protection. The Coastal Wetlands Planning, Protection, and Restoration Act was created, empowering various government and scientific agencies, private industry, and concerned citizens to preserve the coastal wetlands. Since 1991, more than 50,000 acres of wetlands have been protected or restored and \$33 million to \$62 million a year in federal funding has been given to coastal projects. Regular public meetings held by the Army Corps of Engineers and the Louisiana Department of Natural Resources help ensure that citizens play a key role in the restoration effort.



The Coastal Wetlands Planning, Protection, and Restoration Act was designed to foster wetlands restoration and protection in Louisiana.

Without proper land-use planning, development will continue to chip away at coastal wetlands. Natural resource professionals who study and manage wetlands, wetland forests, and related systems can provide local leaders and planners with information about the role of wetlands in storm and flood mitigation, ecosystem services they provide, and their current conditions. Resource professionals can help decision makers prioritize areas for protection and articulate possible consequences of wetlands destruction. Strategically-planned development decisions are essential to protecting coastal interface and the many benefits these areas provide.

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Case Study 17

Smart Growth Blossoms in Flower Mound, Texas

Just north of the Dallas-Fort Worth International Airport and just beyond the miles of shopping plazas that characterize the Dallas suburbs, lies the town of Flower Mound. Despite the recent population growth (226 percent from 1990 to 2000) and the steady stream of new building permits (nearly 1,200 per year), the community has been able to retain rural views, natural areas for recreation, and an urban tree canopy. Their story may help other communities recognize opportunities and work toward a vision that reflects their values.

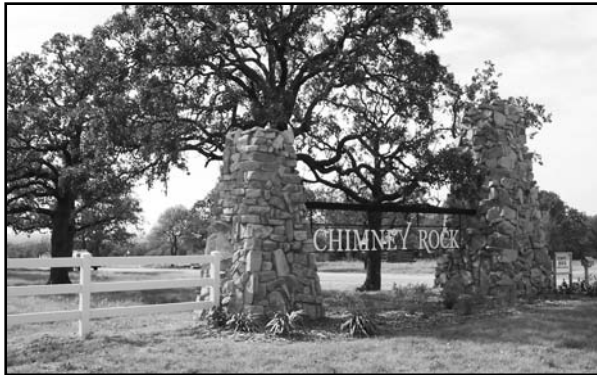


Photo courtesy of Town of Flower Mound

Chimney Rock is one of Flower Mound's premiere conservation developments.

Flower Mound's town manager admits that their current success did not happen overnight, nor could it have been possible ten years ago. A big part of their ability to control and steer development was the process they used to engage the public; listen to the community vision; and establish a comprehensive, community-based growth management strategy. The town's growing population required strategic development planning while also providing a larger tax base.

In January 1999, the community officially adopted a set of Smart Growth principles and started the visioning process with a series of public meetings. Hundreds of residents voiced

their opinions and helped community leaders recognize exactly what residents value. This process resulted in a set of goals that are used to make decisions and develop policies.

Flower Mound Smart Growth Goals – January 1999

- Mitigate the effects of rapid and intense urbanization
- Ensure growth is served with adequate public infrastructure
- Ensure growth contributes to the attainment of the community character and quality of life objectives established in the master plan
- Preserve open lands, natural landscapes, farmland, sensitive ecological resources, and scenic vistas
- Integrate the built and natural environments and contribute to a sense of place
- Ensure growth does not occur at the expense of environmental quality, community character, or quality of life

The land development code is closely linked with the town's comprehensive growth-management plan and includes zones for urban, industrial, and rural development. When plans are proposed, an interdisciplinary team reviews them together. Staff with expertise in urban forestry, engineering, landscape architecture, and transportation meet with the developers to hammer out agreements and negotiate conces-

sions before the permits are granted. They use a variety of tools and policies to achieve the town's Smart Growth goals:

Conservation development – In land zoned Agricultural, the net density is one home per two acres. Developers receive significant incentives, however, if their plan conserves green space by reducing lot size. They can maintain the same number of homes and conserve 40 to 50 percent of the land area within the development. This gives the developers and planners flexibility in applying the conservation goals to each individual parcel.

Floodplain preservation – Developers carve the floodplain out of land available for sale and use these corridors for recreation and wildlife. The area of floodplain is not included in a plat- ted lot or in the density calculations.

Tree preservation – Trees larger than 6 inches in diameter at breast height (DBH) on building sites are measured and recorded; the public is notified if these trees are to be removed. Developers may be required to replace trees of similar size and species.

Topographic slope protection – Development is not permitted on slopes greater than 12 percent. Slopes from 5 to 12 percent cannot be altered beyond five feet from the building footprint. This preserves riparian corridors, habitat, natural vegetation, and greenways.

Urban design plan – Integrates business, technology, and the environment to harmonize the natural and built environment. The plan has resulted in hidden parking facilities, trees in parking lots, vegetated water retention areas, and a more desirable community.

Viewshed protection – To retain the appearance of a rural landscape and reduce erosion, developers are encouraged with incentives to not build on areas near public roads. Scenic roads have been established where views are protected.



Photo courtesy of Town of Flower Mound

Shared areas for recreation and relaxation enhance quality of life in Flower Mound.

While many communities might have these policies available to them, Flower Mound is able to use them successfully because the political leadership is aware of the public's desire for a reasonable blend of conservation and development. Their experience suggests that it is not enough to have an urban forester, he or she must also have a place at the table when developments are discussed and must have the political power to negotiate for conservation.

All of this is made easier in a town with a fairly homogeneous, passionate, and engaged community. Their commitment to environmental protection to enhance the quality of their lives and their community demonstrates that such goals can be met while still encouraging and accepting development. The developers who are willing to find strategies that work in Flower Mound are the ones that Flower Mound residents wish to encourage. To date there has been no shortage of developers.

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Case Study 18

Stakeholders in the Planning and Zoning Process in Georgia

Discussions occurring today at county and city levels in west Georgia are focused on land-use changes, zoning, and urban growth management. This is especially true in rural Harris County, the ‘moving front’ of the wildland-urban interface in Georgia, where residents face rapid population growth rates and rapid development. Interest in zoning and land-use regulation has been at the center of discussions and debates among residents, landowners, developers, planners, and policy makers.

Land-use changes in Muscogee and Harris counties center around conversion of forest, agricultural, and older industrial and urban zones into residential subdivisions and multi-zoned commercial centers. Zoning debates occurring at regular public planning hearings in both counties reveal residents’ concerns, developers’ interests, patterns of land-use change, and political strategies used by all interested groups.

This case study focuses on how the process of citizen-government debate occurs in west Georgia and examines the juncture points around which interested parties come together. Rezoning requests and the debates that they spur represent the primary juncture points, shedding light on how developers, citizens, and policy makers interact to influence land-use policy.

Thus far, Harris County residents have strongly supported minimum lot size policies as a key growth-management strategy. While this has been met with resistance from some developers, other more established developers have used the policies to their advantage, marketing their developments as conservation develop-

ments, maintaining greenspace and the rural character of the area. This case study gives an introduction to how various stakeholders in west Georgia contest, cooperate on, and ultimately decide land-use policy, and in the process guide and shape urbanization and growth.

Study Area

Columbus, Georgia, is the third largest city in the state and the largest urban center in the region of west-central Georgia. During the past decade, its metropolitan area has steadily expanded northward. Columbus is located in Muscogee County, a predominantly urban county in contrast to the more sparsely populated, rural counties of Harris and Meriwether. However, the rural landscapes of Harris County, in particular, are being rapidly transformed by the growth of subdivisions and other residential facilities, driven by a population growth rate of 33 percent between 1990 and 2000. Harris County’s growth is a direct result of its proximity to north Columbus. This rapid growth is not, at the moment, occurring in Meriwether County, but it will likely spread there if current trends continue.

Since 1960, insurance, banking, and digital technology firms have taken the lead role in the local economy. Also located partially in Muscogee County is the Fort Benning Military Reservation, which employs a large civilian workforce. In the surrounding areas, timber production dominates and some areas are becoming retirement centers that boast proximity to the military base and the health and social services of the city. Callaway Gardens,

one of the largest tourist and recreation attractions in the state of Georgia, is located in Harris County, and development is rapidly expanding in its vicinity.

Land-Use Planning and Zoning

Zoning ordinances produce, over time, a series of categories that set out permitted, restricted, and conditional land uses. Zoning determines the types of activities that can occur on the land, regulating, for example, the density of housing or timber harvesting activities. While an area may be zoned for a particular land use, some or all of that area may not be used the same (an example would be an area zoned for residential use that is still partially in agricultural use). As such, zoning designations reflect both current and anticipated conditions.

In looking at zoning regulations for a particular area and their impact on natural resource management, the following relevant questions should be asked: What are the zones used most often in these counties or municipalities today? What are the accompanying restrictions and allowances for each zoning designation? How do residents and developers attempt to work around particular restrictions and allowances while remaining in one zone or attempting to switch to another? Are variances to these restrictions and allowances obtainable and how? How are requests for rezoning debated and decided?

Zoning ordinances are relatively new in the rapidly developing, rural Harris County, while they are older in the more urban Muscogee County, where the first ordinances passed in 1972. Before 1980, there were no regulations on land use and residents had a strong distrust for land-use regulations in Harris County. However in the mid-1980s, as county residents began to encounter interests from residents and non-residents to develop the county landbase, Harris County was mapped and zoned.

In both counties, zoning decisions go through a process involving citizen and city staff review and a final vote by the city council or board of commissioners. At the center of the planning advisory commission hearings in Muscogee County and Harris County is the comprehensive plan, the county-wide planning document on existing and projected future uses for all land in the county. But zoning decisions are not based solely on these plans, nor are these plans binding in any concrete way.

Depending on location, the planning advisory commission hearings and the city council meetings in Muscogee County, and the planning commission and board of commissioners meetings in Harris County represent the platforms in which interests collide and decisions are made regarding land use in the two counties. The decisions occur mainly in piecemeal fashion, based on decisions pertaining to individual properties. However, these small changes accrue over time, and can lead to dramatic shifts in land use over a period of years. In most cases, land-use conflicts are between individuals or concern primarily one neighborhood and a small group of citizens with little community-wide interest. However, there are occasions when larger interests are at stake, and different groups align according to economic and political stakes.

In Harris County, quality of life issues are in the forefront of public debates concerning urbanization and development. Interestingly, the concern for maintenance of “rural character” in the county has resulted in strong efforts to maintain relatively high minimum lot sizes for new developments, and a strong resistance to high density developments.

Stakeholders and Conflicts in Development and Urbanization

In rapidly growing Harris County, there is citizen debate over requests to rezone large tracts

of land for residential subdivision development. By and large, requests to rezone tracts of land under 100 acres are approved while all but two requests for plots over 100 acres, have been declined in the last three years. Many fear the domino effect of rezoning, but precedent plays a large role, and commissioners are reluctant to turn down a request if other similar requests have been approved.

There were a considerable number of approved requests that involved converting timber, pasture, and agricultural land to residential subdivisions. As subdivisions become more concentrated, residents and county commissioners are talking more concertedly about the advantages and disadvantages of this kind of development. Many residents complain that subdivisions do not provide enough revenue in property taxes if plots are too small. They argue that residential growth of this kind creates significant costs for the county for services such as schools, roads, and water. Decision makers and stakeholders are discussing options for controlling growth such as limits on lot size and the number of lots allowed in subdivision plans.

The “Community-Minded” Developer

T. R. Milton, a pseudonym for a Muscogee County based company, owns many businesses in the area, but is primarily known for its real estate development projects. They have a large presence in Muscogee County and in the surrounding counties. A representative characterizes the company as a private “community-minded” organization. The company argues that they are on the forefront of “environmental-friendly” development, going beyond the current requirements to ensure better control of soil erosion and other environmental impacts during construction. They have developed green spaces in their commercial complexes in Columbus, and have several residential subdivisions under construction in Muscogee County that are based on single fami-

ly housing around green and surface water spaces. The plots sell for \$70,000–\$210,000, with lot sizes of 3–8 acres, placing them at the highest end of the residential real estate market in the county.

Representatives of T. R. Milton use a strategy of talking to neighbors, church groups, business leaders, and other stakeholders in the area before attempting to rezone a property that they plan to develop. Company representatives said that they want to go into the zoning hearing knowing the outcome, and according to many involved in the process, they are fairly successful at their preliminary networking with residents and business owners in their target project areas. The company also comments on existing ordinances and plays a role in encouraging and advocating change of existing policies and laws. For instance, they have been instrumental in maintaining minimum lot sizes at one acre and have resisted efforts by other developers to reduce the minimum lot size to half and quarter acre-lots. They want to maintain their hold on the market for large lot size homesites, and they couch this fight in terms of maintaining rural character and preserving the environment. All stakeholders interviewed for the case study expressed admiration for the company’s ability to influence public opinion and policy in specific cases related to their projects.

The Tree Ordinance

In 2000, the city manager’s office in Muscogee County chose representatives from an identified set of stakeholder groups to constitute a 27-member Tree Ordinance Committee. Members represented commercial and residential developers, foresters, landscape architects, engineers, citizens, Georgia Power, the tree service industry, and planners. At the time, political will for a tree ordinance was fairly well developed. The citizen’s movement to save existing trees in urban Columbus began well

before this in Lake Bottom Park. In a well-publicized event, residents tied crime-scene tape around existing trees that were slated for removal in order to build a larger parking lot. The event sparked a city-wide debate, primarily played out in the local newspaper, on the disappearing urban tree cover.

The Tree Ordinance Committee worked with Trees Columbus, a citizens' organization established to address the problem of loss of urban forest and green space, as well as four "green" developers to draw up a draft ordinance, guided by ordinances they had collected from other U.S. cities. In general, participants cited the good working relationship between stakeholders during this process for constructing an ordinance that satisfied all major stakeholders. The committee then put a draft of the ordinance online on the city's website and advertised a public meeting to discuss it.

Suggestions during these meetings were used to modify the draft before a final version was submitted to the city council. The city council then deliberated and held a public hearing. Reporters were very interested in these events and followed the story closely in the local press. A final ordinance was passed and went into effect in October 2002.

The discussions surrounding the tree ordinance provoked the realization that zoning, in many cases, promotes urban sprawl and that planners need to be more specific about zoning categories. At present, however, the tree ordinance stands alone in Muscogee County as one of several policy statements to which a zoning request should comply.

But the tree ordinance resulted in large measure out of the interaction between citizen groups, developers, and county government employees.

Conclusion

Residents' individual land uses and interests in land-use change drive the bulk of the land-use rezoning requests in Muscogee and Harris counties through incremental changes. Though smaller in number, the requests of developers and industries to rezone and redesign larger tracts of land also drive rezoning and sometimes lead to substantial discussion on policy changes. Maintenance of minimum lot sizes is viewed by many residents of Harris County as a key to controlling development and growth. While the county is under tremendous pressure from some developers and business leaders to loosen those restrictions, the residents of the county have demonstrated the political will to keep current restrictions in place. The requests in Muscogee County, in contrast, are concerned with smaller plots and less ambitious landscape change plans, reflecting the fact that there is less of what is called "raw land" in Muscogee County. The case study presents examples of how different developers have confronted this political reality with varying degrees of success. The key lesson from the case study is that land-use policy is determined in the points of interaction among stakeholders, and that each stakeholder group has particular strategies for approaching the policy process. Understanding how key stakeholders engage decision makers and influence their decisions is fundamental to understanding points of entry for influencing policy.

Written by Josh McDaniel, School of Forestry and Wildlife Sciences and Kelly Alley, Department of Anthropology, both of Auburn University.



Case Study 19

Treasuring Forests in Alabama

Alabama has more than 23 million acres of forestland that provides ecosystem services that directly and indirectly contribute to the quality of life of its residents. Forests support the production of forest products, the state's number one manufacturing industry, and also sustain wildlife, purify the air and water, protect topsoil, and provide recreational opportunities. Approximately 95 percent of Alabama's forests are privately owned and landowners often need assistance in making effective management decisions.



Photo by: Alabama Forestry Commission

In a state where 95 percent of forestland is privately owned, it is essential that natural resource agencies engage in outreach education and provide incentives to landowners for appropriate management.

To help protect these forestlands and the benefits they provide, the Alabama Forestry Planning Committee developed the TREASURE Forest Program in 1974. It was considered a model program for the National Stewardship Program. TREASURE is an acronym for Timber, Recreation, Environment, Aesthetics, for a Sustained Usable Resource. Through the program, natural resource agencies help conserve natural resources and reduce problems in the wildland-urban interface by providing forest management guidance to landowners. The

program, similar to other state forest stewardship programs, is designed to promote forest stewardship by private forest landowners. The program provides voluntary guidelines for responsible forest management and formally recognizes qualifying forest landowners who practice active stewardship on their land. In addition, the program provides important opportunities for landowners and natural resource professionals to work together to address forest management and interface challenges. More than 2,000 landowners have been certified through the TREASURE Forest Program and 1.89 million acres are being managed according to its guidelines.

Since its implementation, air and water quality in the state have improved, forest regeneration has increased, and the state's general environmental and economic well-being has improved.

The forestry commission provides incentives for responsible forest management through the Certified TREASURE Award Program.

Landowners must own at least 10 acres of forestland to qualify, and winners are selected from nominations sent in by individuals, county forestry planning committees or government agencies. Landowners must identify a primary, and at least one secondary management objective for their land from the following list: timber production, environmental education, recreational opportunities, wildlife, and aesthetics. A written multiple-use management plan for the property is also required (resource professionals from the Alabama Forestry Commission provide assistance when needed). Finally, there must be evidence of active, multiple-use management on the property.

Landowners can get more information about active management requirements from the local forestry commission office. A registered forester or wildlife biologist must inspect the land to verify that it complies with program requirements. The TREASURE Forest Subcommittee of the Alabama Forestry Planning Committee reviews and approves all nominations.

The Alabama TREASURE Forest Association (AFTA) is a related nonprofit association dedicated to promoting responsible forest management and stewardship values. AFTA promotes the Alabama Forestry Commission's Certified TREASURE Award Program. In addition to its other activities, ATFA also holds special events just for women, such as *A Woman's Story of the Land: Tour and Workshop for Women Forest Landowners*. These functions provide information, encouragement, and hands-on instruction to assist women forest landowners with land management. Events are open to females 18 years or older and teach about tree farms, hurricane recovery, wetlands, invasive exotic plants, and prescribed burning. Participants often tour local TREASURE forests owned by women. Some workshops also teach outdoor skills such as hunting, fishing, archery, shooting, and plant identification.

Photo by: Alabama Forestry Commission



The Alabama TREASURE Forest Association holds events to encourage women to engage in outdoor skill-building and forest stewardship.

The Alabama TREASURE Forest Program and ATFA help respond to challenges in the wildland-urban interface by providing guidance to landowners who want to know more about active forest management and promoting stewardship ethics. Participants in the TREASURE Forest Program and in AFTA influence the development of natural resource programs, policies, regulations, and incentives.

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Case Study 20

Where Rural Reigns: Purchase of Development Rights Program in Kentucky

Each year nearly two million acres of American farmland are lost to sprawling urban development. Nowhere in Kentucky is the threat of urban sprawl more real than in the Bluegrass Region—world famous for its natural beauty, horse farms, southern hospitality, and living history. This region is home to Fayette County and Lexington, the state’s second largest city with more than 260,000 people.

Called the “Horse Capital of the World,” Lexington depends heavily on agriculture for its revenue. Agriculture generates \$260 million annually to the economy and also creates jobs, stimulates farm-related industry, and provides the vistas that create opportunities for tourism (horse farms, tobacco farms, and the Bluegrass region). The people and government officials of the Lexington-Fayette area wanted to maintain a sense of place; use existing infrastructure efficiently; protect cultural, environmental, and historical resources; and maintain thriving agricultural and tourism industries. To achieve these objectives, the city government in 1958 created the first urban service boundary in the United States.



Photo courtesy of Kentucky Department of Agriculture

The Bluegrass Region is famous for its horse farms and rural beauty.

Originally the urban service boundary was used as a tool to limit development to urban areas served by sanitary sewers. This boundary created an urban service area of 85 square miles (30 percent of the county) and a rural service area of 200 square miles (70 percent of the county). Despite these efforts, urban expansion continued to consume rural lands. Over 4,700 acres of land within the rural service area was lost to urbanization between 1990 and 1998.

The Lexington-Fayette Urban County Government (the city and county governments were combined in 1974) is implementing new strategies to protect farmland from urbanization. The community adopted a Rural Service Area Land Management Plan in 1999 and added an ordinance in 2000 that created the Purchase of Development Rights Program (PDR) and the Rural Land Management Board. Fayette County’s PDR Program is the first Agricultural Conservation Easement program implemented by a local government in Kentucky. The PDR Program aims to help the region sustain its rural agricultural heritage while working to build a strong and diverse economy. The PDR program provides financial incentives to farmers who agree to permanently protect their land from development and to keep it as farmland.

The PDR program supports the reduction of expensive expansions of infrastructure and public services, such as water treatment facilities and emergency services; the concentration of development within urban areas; the protection of the agricultural and tourism industries; and the conservation of historic, agricultural, scenic, and natural resources. The county’s goal is to protect

50,000 acres of land in the rural service area during the next 20 years with the use of conservation easements.



Photo courtesy of Kentucky Division of Conservation

Fayette County's PDR program protects rural land from urban development, preserving the region's sense of place and conserving natural resources.

Principles of the PDR Program

The PDR Program is based on the following guidelines.

- Voluntary program that helps protect land from development and preserve it for farming.
- Funds may help farmers meet financial needs, pay off debts, expand operations, or purchase equipment.
- Land is prioritized based on an objective point ranking system.
- Farmers retain the ownership of land.
- Land preserved in perpetuity (rare exceptions permitted).
- Program is not anti-growth—rather it is pro-infill, pro-agriculture, pro-rural, and pro-downtown redevelopment.

The PDR program is funded by \$15 million in state grant matching funds, more than \$4 million in federal grant matching funds, and \$2 million annually from the Lexington-Fayette Urban County Government. These funds are

used to purchase the development rights of interested rural landowners and to create conservation easements. Payment to a participant in the program is based on the estimated value of the property's development rights. The Rural Land Board retains an independent certified real estate appraiser to complete an appraisal of the development rights for the land. Landowners retain all other rights to the property. The land may be farmed, rented, sold, or passed on to heirs, and any agricultural buildings may be built on the land.

In order to be eligible, parcels must be more than 40 acres and development rights for at least two 10-acre pieces must be available for purchase by the program. Lands are ranked according to a point system, based on characteristics such as soil quality, length of ownership, potential for enhancing other preservation efforts, environmental sensitivity, and historic or scenic qualities. A rural land management board evaluates and nominates specific lands for purchase. The board includes members of the local chamber of commerce, historical preservation group, natural resource agents, and farming and thoroughbred groups. The program has conserved more than 10,000 acres on more than 80 farms, varying from general agriculture, to horse farms, to grass and tree farms.

The Lexington-Fayette PDR program helps maintain urban-rural distinctions, enhances rural economies, protects environmentally-sensitive areas, and preserves unique rural and historical qualities of the area. The program also helps preserve the historic resources and rural character of the area. Programs such as these provide important incentives for land conservation in the wildland-urban interface.

Written by Terri Mashour, School of Forest Resources and Conservation, University of Florida.

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Case Study 21

Wildfire Preparedness in Mississippi

The pine savanna ecosystem in southern Mississippi is home to the Mississippi Sandhill Crane National Wildlife Refuge and about 135,000 people living in the surrounding communities, according to 2004 census data. Located between Biloxi and Mobile, the area is anticipating growth and hoping to accommodate the region's natural resource heritage.

Photo courtesy of U.S. Fish and Wildlife Service



When residents live next to public lands, resource agencies must make special efforts to educate them about interface issues and develop working relationships with them.

Wildland fire is an important element in this pine savanna and wildfires have occurred at regular intervals in recent years. Thus far, most fires have been small and no lives have been lost, but resource professionals are well aware of the potential for a disastrous fire during drought years. The understory has become overgrown in places. Refuge staff are committed to restoring the longleaf pine savanna by reducing fuel loads. They are working with The Nature Conservancy (TNC), the Mississippi Forestry Commission (MFC), the U.S. Department of Agriculture Forest Service, local fire departments, and the Mississippi State University Extension Service to conduct both mitigation and education projects.

Several inter agency strategies have been successful in Jackson County. Fuel reduction activities on the Refuge have included both prescribed burns and mechanical techniques, with assistance from MFC and TNC. Refuge and TNC crews routinely help MFC with wildfire suppression. Both planned and unplanned fires are used as training for volunteer fire fighters from the nearby communities. Grants from federal agencies are also used to send volunteer fire fighters to wildfire training programs and to purchase protective gear. The Gulf Coast Wildfire Academy was recently established to provide training for volunteer and fire personnel in wildfire suppression and the Incident Command System, the management system for the command, control, and coordination of emergency scenes.

Cooperation and communication between agencies and organizations are maintained by strong networks operating in the region. The South Mississippi Environmental and Agricultural Coordination Organization (SMEACO) meets four times a year to share resources, update others on activities, and promote environmental education. The Tri-County Cooperative is organized by MFC to promote prescribed burns in wildland-urban interface areas on public and private lands.

Public education is a high priority for these agencies. They work to help communities understand their risk of wildfire in areas near the Refuge. Wildfire issues have been incorporated into existing programs and promoted with short-term awareness cam-

paings. Extension programs such as the Mississippi Master Naturalist program, Teachers' Coastal Wetland Diversity Workshop, the annual Earth Science Day, and NatureWise, an educational summer program for adults, include information about the role of fire in maintaining forest ecosystems. The Refuge conducts programs on fire, and TNC holds prescribed burn workshops for landowners. Extension and MFC have jointly conducted field days for landowners covering fire management. Prior to prescribed burns, TNC and Refuge staff distribute flyers to neighbors by going door-to-door.

Education efforts that direct homeowners to reduce their risk of wildfire are planned jointly by community leaders, civic organizations, and land management agencies. Additional fuel reduction activities such as prescribed burning are planned for private lands, where fuel loads are significant. On-going training and increased funding for fire-fighting equipment are also on the horizon. Through partnerships and public education, natural resource agencies in southern Mississippi are working to reduce wildfire risk, conserve natural resources, and establish relationships with residents.

Adapted from "Communities Near the Sandhill Crane National Wildlife Refuge" Case Study #10 in the Community Preparedness Case Study Series, published by the USDA Forest Service, North Central Research Station, St. Paul MN, <http://ncrs.fs.fed.us/pubs/bro/sandhill.pdf>. (accessed August 10, 2005).



Case Study 22

Working with Diverse Stakeholders in Newbirth, South Carolina

The town of Newbirth, South Carolina, was incorporated in 1992 in response to the urban expansion that was making its way northward from metropolitan Charleston, South Carolina into the rural counties. Rural residents in the then unincorporated rural area believed their community would be consumed by the upscale development that had transformed nearby rural areas into a suburban bedroom city of Charleston.

Newbirth is contained within 8.6 square miles (about 5,500 acres) along a major U.S. highway. It lies approximately 5 miles inland from the Atlantic Ocean and the barrier islands off the South Carolina coast. The town consists of three residential and commercial pods. The town is surrounded by the 250,000-acre Francis Marion National Forest. Small parcels of forest land are actually located in the town. Immediately adjacent to Newbirth are a national wildlife refuge, a coastal reserve, and a state park. Newbirth has approximately 1,200 residents, the majority of whom are African American (65 percent); the remaining third are White. The town is rural according to census definitions and place characteristics.

Several years ago, Newbirth residents passed a referendum for municipally supplied water. The town's mostly black town council and mayor pointed to the fact that many of the town's residents (particularly African Americans) lived in substandard housing with unsafe drinking water and sanitation. Town leaders argued that a municipal water system would deliver safe, reliable drinking water to residents.

There were concerns, however, from some residents that public water would encourage subur-

ban and urban-style development. These oppositions came mainly from white residents, some of whom were newcomers to the area. These residents moved to Newbirth because they wanted to live in a rural environment where they would not have to contend with the possibility of nearby development. Those opposing the water system cited examples of other local areas that had been consumed by development when the towns' infrastructures changed to include public water and sewer lines.

System proponents (mostly African American), on the other hand, have said opponents to the system exaggerate the extent of development that a water line might promote. Proponents also concede that a limited amount of development would be good for Newbirth because of the very limited job opportunities in the town and surrounding areas. They observe that Newbirth is in a position to gain economically from the demand for resort-style development in the Charleston area.

Newbirth has two options for a municipal water system. The town can construct its own system or pipe water in from a town approximately five miles to the south. The least expensive option would be to import the water; however, the town would need to obtain a right of way from the U.S. Forest Service to do this. The most direct route from the town south of Newbirth would be directly through 1.5 miles of the forest. Newbirth administrators have petitioned the Forest Service to allow Newbirth to construct a water line on the forest lands. Town leaders maintain that the forest has an obligation to aid small, economically struggling communities in their development. Opponents, again, argue that if the agency allows the water

line to be run through federal property, the agency would contribute indirectly to urban sprawl. Opponents feel strongly that such added infrastructure is but the beginnings of development in Newbirth. When asked about the Forest Service's position on this issue, public affairs officers are directed to explain that there are increasing demands on the Francis Marion stemming from an expanding human population in counties in and neighboring the forest. The Forest Service's goal is to be sensitive to the role the forest plays in addressing the needs of local communities by 1) contributing to the social, economic, and environmental well-being of local communities; 2) contributing to the long-term economic stability of local communities through conservation and use of forest resources; and 3) cooperating in the urban/rural development of the area.

Town residents were not satisfied with this response and have requested that the forest supervisor and district ranger attend a citizen's meeting at the town hall to discuss this issue publicly.

Written by Cassandra Johnson, USDA Forest Service, Southern Research Station.



Case Study 23

Zoning to Conserve Greenspace in Davidson, North Carolina

Smart Growth is an increasingly popular approach for responding to a range of community problems such as urban sprawl, traffic congestion, and loss of greenspace. A Smart Growth America poll conducted in September 2000 revealed that 78 percent of Americans favor both the concept of Smart Growth and the strategies necessary to implement it. The poll explained that “the term Smart Growth refers to giving priority to improving services, such as schools, roads, affordable housing, and public transportation in existing communities rather than encouraging new housing and commercial development and new highways in the countryside (Smart Growth America 2005).” In the 2000 elections, 83 percent of the 209 ballot initiatives nationwide to protect greenspace, control development, and otherwise implement Smart Growth policies were approved. Real estate trends also reveal a preference for Smart Growth. According to leading real estate analysts, home buyers increasingly favor living in neighborhoods that are convenient and have a strong sense of community.

Smart Growth is a powerful tool for conserving natural resources, improving quality of life, and creating affordable housing. Davidson, North Carolina, is just one community in the South where Smart Growth is taking off. Davidson was the 2004 winner of the U.S. Environmental Protection Agency’s Overall Excellence in Smart Growth Award. Just north of metropolitan Charlotte, Davidson and neighboring communities are under significant development pressures. While many of these communities advocate Smart Growth principles, local zoning ordinances often fail to protect significant open space. Even with well-funded land acquisition

programs, contiguous tracts of greenspace are becoming scarcer. The people of Davidson decided that protecting greenspace was important to maintain the town’s sense of place and the rural character of the countryside. In 1999 the town put a moratorium on growth and increased the zoning requirement for open space from 10 percent to 50 percent. Initially the ordinance upset developers, but some are realizing the benefits of including large greenspace in their designs. Developer Frank Jacobus had a 50-acre site under contract when the ordinance was passed. “I was disappointed and concerned because we had a lot at stake financially. But I’m very excited about the project. It is a beautiful project, a great design. People will enjoy living there,” Jacobus said.

Many new developments in Davidson promote open space as their prime amenity, which illustrates how important home buyers consider it. New neighborhoods are made up a variety of lot sizes and are required to include 12.5 percent affordable housing (new homes start at \$100,000). Many new subdivisions in the area have a neighborhood park within a five-minute walk and all new developments are required to include plans for pedestrian, bicycle, and street circulation.

Tree-lined streets, sidewalks on both sides of the street, narrow travel lanes, and on-street parking are also required to encourage walking and biking. The following advertisement for the Bradford neighborhood, one of Davidson’s Smart Growth subdivisions, illustrates how important these amenities are to builders, real estate professionals, and prospective buyers.

Parks and Trails Weave into Davidson's Open Space.

Step out your door and find fresh air, trees, and room to roam. Almost half of the Bradford neighborhood is set aside as open space— one of the themes in the Davidson, NC Town Vision Plan. Follow the path of serene stream through a four-acre park that has been described as a “cathedral of trees” — with sycamores, poplars, huge oaks, persimmons, and other native species... Stroll or pedal on Bradford's winding sidewalks and bike trails, then continue downtown or to school on Davidson's pedestrian-friendly walks and trails... If you could choose your dream home and place it in the ideal town, Bradford is that place.

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