



Leaves OF Change



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In this Issue

- 1 *Introduction: Ecological, Sociocultural, and Economic Effects of Urbanization*
- 1 *Research: Tracking the Effects of Development and Urbanization on "Forgotten Coast"*
- 2 *Partnership Highlight: Center for Forest Sustainability*
- 3 *Training Activities*
- 4 *Upcoming Events*

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Introduction

Ecological, Sociocultural, and Economic Effects of Urbanization

WAYNE ZIPPERER, a research forester within SRS-4952: Integrating Human and Natural Systems, is working with colleagues from the Center for Forest Sustainability at Auburn University to study how urban development drives change. The team is looking at a set of questions, which include the following: How has urbanization altered forested landscapes? What are the effects of urban development on water quality and aquatic resources? How does urbanization affect the culture or sense of place of a community? In this issue we focus on some of the key findings from this collaborative study.

Research

Tracking the Effects of Development and Urbanization on Florida's "Forgotten Coast"

"We don't want high-rises. We don't want congestion. We don't want the big box stores . . . Do me a favor and don't use the name of the county. Don't tell anybody how cool it is. We want it all to ourselves."

THAT WAS the response of one participant in a focus group looking at human-landscape relationships and sense of place on "the Forgotten Coast," an area in northwestern Florida that has remained relatively unchanged by the urbanization and development that have transformed other parts of the coastal South. The focus groups were part of a larger multidisciplinary research project investigating the ecological effects, economic considerations, and sociocultural implications that accompany coastal development.

"Often studies of the effect of urbanization on natural systems occur after development has occurred," says Zipperer. "We have the unique opportunity to establish baseline data before major development occurs and compare that data to the post-developed state."

The research team decided to focus on a stretch of coastline around the town of Apalachicola since the area remains relatively rural but is likely to experience considerable development over the coming decades. For generations, the local economy has relied on timber and seafood—90 percent of the Florida oyster harvest comes from Apalachicola Bay. However, the St. Joe Company, the area's largest landowner (and the largest landowner in Florida overall), is shifting interests from being a local timber owner and paper producer to being a major real estate developer. With thousands of acres of land coming into the market, the area is primed to experience dramatic development

continued on page 2



Apalachicola Bay's local economy has relied on seafood for generations.

Photo courtesy of: Wayne Morse

Research: Tracking the Effects of Development and Urbanization on Florida's "Forgotten Coast"

continued from page 1

over the coming decades. While development could bring needed jobs, expanded social and health care services, and educational opportunities to the area, there is concern that rapid development could adversely affect natural systems, particularly water quality and forest ecosystems.

The project is using an integrated approach to develop specific land-use and cover data and to describe the influence of urban development, primarily through vegetation analysis, water and soil sampling, and socioeconomic studies across the region. Graeme Lockaby, the director for the Center for Forest Sustainability at Auburn University, explains the study's anticipated far-reaching effects. "We will be able to monitor changes as development occurs, determine which are positive or negative, and provide guidance on making development more compatible with the remaining forests."

Coastal Watersheds

Another key component of the study involves examining how urbanization affects water resources in the area. Water quality and stream flow can be altered by coastal development, particularly when the development involves conversion of forest to urban land cover. Urban land cover is normally associated with the expansion of impervious surfaces (parking lots, streets, buildings, etc.), which reduce infiltration and increase runoff velocity. Studies of the effects of expanded areas of impervious surface in other parts of the country found higher and more frequent flood pulses and lower baseflows in streams and rivers. In addition, growing populations, land conversion, and expansion of impervious surfaces also often lead to increased nutrients, sediment, bacteria, and metals in watersheds, all of which could threaten downstream recreational and commercial resources. The flat terrain and sandy soils of the coastal watersheds reduced some of the impacts of runoff and sedimentation

even in urbanized watersheds; however, even small increases in impervious surfaces in watersheds led to increased levels of nutrients and bacteria.

The increase in bacteria is of most concern. Fecal coliform contamination (from human and non-human origins) is a serious threat to the seafood industry and the local economy. High coliform counts can result in the temporary closure of oyster harvesting and the loss of local income. The study found a strong relationship between coliform counts and impervious surfaces, which indicates that as urban development continues near Apalachicola, increased problems with bacteria are possible.

Biodiversity Hotspot

While the sandy lowlands of the Florida panhandle may have little or no topographic relief, slight changes in elevation, water availability, and salinity result in widely different ecological community types, including dunes, sand pine scrub, sandhills, pine flatwoods, cypress swamps, bay swamps, marshes, coastal hammocks, and coastal swales. This rich diversity of coastal terrestrial habitats has made the Apalachicola region of the panhandle of Florida one of the six biodiversity hotspots in the United States. The Apalachicola River basin is home to approximately 60 tree species, 1,300 plant species, 308 bird species, and 57 mammal species.

Project researchers have established long-term monitoring plots to evaluate the effects of future growth and development on the composition of species and the structure of plant communities. "Habitat loss and fragmentation can have dramatic effects on the unique biodiversity of this region," says Zipperer. Through monitoring, we can identify how biodiversity may be changing and the factors leading to that change."

The researchers estimate that nearly 21 percent of the natural habitats on private lands along the Forgotten Coast will be converted to urban uses within

the next 50 years. Without proper planning, this growth can reduce habitat availability and further imperil threatened and endangered species.

Carbon and nitrogen storage are also important considerations when looking at land-use and land-cover changes. The research team found that carbon and nitrogen storage in soils and vegetation differs among land uses near Apalachicola. Forested wetlands had the greatest soil carbon and nitrogen storage due to the organic nature of wetland soils, while natural pine forests and pine plantations had the least. Surprisingly, urban lawns had significantly greater mineral soil nitrogen content than urban forests, natural pine forests, and pine plantations, possibly because of the lack of fire.

The research findings suggest that increases in carbon storage are possible with continued urbanization along the Gulf Coast if forest cover and lawns are maintained within urban areas. However, this study does not account for carbon emissions during land conversion, or the energy costs

Partnership Highlight: Center for Forest Sustainability

Auburn University's Center for Forest Sustainability in Alabama seeks to enhance and facilitate



linkages among research and education activities that focus on comparability between natural resources and urban expansion at regional, national, or international scales. The Center fosters interdisciplinary efforts that integrate biological and socioeconomic issues and functions as a primary interface between society and natural resources issues which directly influence our quality of life. For more information visit: <https://fp.auburn.edu/cfs/>



Photo courtesy of: Wayde Morse

Damon Lowery helped to describe the sense of place held by coastal residents near Apalachicola, FL.

associated with maintaining built-up and residential spaces in urban areas.

Sense of Place

Another aspect of the project was an effort to describe the “sense of place” held by local residents and what this means for future change and development. Wayde Morse and Damon Lowery of Auburn University held 20 focus groups and spatial mapping exercises with a variety of local interest groups, including realtors, seafood workers, residents, small business owners, retirees, hunters, biologists, and foresters. The focus groups centered on mapping natural areas that were considered important for ecological, economic, and cultural reasons, and discussed preferences for conservation and development.

“Most participants were hesitant at first to talk and share information,” says Lowery. “But once we got them going, we found a surprising amount of agreement about the need for conservation and limited development.”

The places identified for conservation were mostly located on the water—fishing spots, camping spots, and places that were important for fishing livelihoods. The exercise helped to identify hotspots for conservation (from economic and cultural perspectives) and also served to generate discussions about the importance of conservation. Discussions within the focus groups revealed tension among different groups that disagree about the need for economic growth and jobs and the desire for the area to remain unchanged. Many focus group participants worried that the area would lose its uniqueness and potentially become a “tourist trap” town like those found elsewhere along the coast. Despite the need

for more economic opportunity, there was wide agreement that the area was too important ecologically to threaten with more development.

To help with the conservation and sustainability of the region, project researchers will provide natural resource managers and urban planners with the study’s findings. This information will allow important ecological and cultural areas to be identified and conserved and will provide guidance for future development.

Challenging Assumptions

Another component of the project is an economic analysis of how changing water quality may affect the area’s economy. Led by David Laband, an economist with Auburn University, the team is taking a different approach by looking at economic effects of increasing impervious surfaces in watersheds. “We are trying to determine if impervious surface is a variable of convenience,” says Laband. “Not all impervious surfaces are created equal—where they are located is critical.”

Laband and his colleagues are trying to determine if patterns of residential development and urbanization can influence water quality characteristics. They are also looking at socioeconomic aspects of development, such as appraised value, length of residence, and household composition, to see if any other variables can predict changes in water quality. The study should further refine the understanding of the relationship between urban development and the quality of the water.

As communities work to balance conservation and economic growth, it is essential that they maintain a comprehensive perspective on the connections between ecosystems, the services they provide, and the social and economic health of communities. In the case of the Apalachicola River and the surrounding area, the economy and social fabric has for generations relied on the land and the sea. As coastal development increases in the area, community leaders will need to make decisions that conserve important resources while providing for opportunities for economic development. As those decisions arise, the Florida panhandle research project will provide the baseline information needed to ensure that the region’s uniqueness will be enjoyed by future generations.

Training Activities

Urban Forest Strike Teams Update

URBAN FORESTRY South’s Dudley Hartel and Eric Kuehler are working with the Georgia Forestry Commission and the Urban Forest Strike Team (UFST) Advisory Committee to conduct a training workshop for UFST team leaders and task specialists in Forsyth, Georgia. These workshops will be held during the week of May 7th, 2012; contact your state Urban & Community Forestry Coordinator for details. For more information about the urban forest strike teams visit www.ufst.org/ or contact Dudley Hartel at 706-559-4236, dhartel@fs.fed.us.

In Our Next Issue

We will focus on a collaborative project that is creating a scientific framework for the ecological assessment and sustainable management of the Tampa Bay watershed’s trees and forested ecosystems along the urban-wildland continuum.

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Issue 11, March 2012

Upcoming Events

| Date | Description | Location | Contact |
|-------------------|---|---------------------|---|
| March 17-20, 2012 | 2012 Southern Chapter ISA Conference | Birmingham, Alabama | www.isasouthern.org/annualconference.htm |
| March 24, 2012 | Texas Wildlife and Woodland Expo | Conroe, Texas | http://expo.tamu.edu |
| April 17-19, 2012 | 3rd Human Dimensions of Wildland Fire Conference | Seattle, Washington | www.iawfonline.org/HD_Seattle_2012 |
| May 22-24, 2012 | IUFRO Forests for People Conference | Alpach, Austria | http://ffp2012.boku.ac.at/index.php?L1=left_home.php&L2=body_home.php |



This issue and past issues can be found online at: www.interfacesouth.org/products/leaves

InterfaceSouth and Urban Forestry South are the technology transfer centers of the USFS Southern Research Station work unit, SRS-4952: *Integrating Human and Natural Systems in Urban and Urbanizing Environments* (www.humanandnaturalsystems.org) and are collectively called the Centers for Urban and Interface Forestry. InterfaceSouth focuses on interface forestry issues while Urban Forestry South focuses on urban forestry issues.