



Leaves OF Change



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Research

Double Jeopardy: Mapping Social Vulnerability and Climate Change in Georgia



Photo courtesy of: Thinkstock Photos

Metro Atlanta has experienced a notable increase in extreme events, such as floods, droughts, and heat waves.

CLIMATE CHANGE is often discussed abstractly in terms of computer models and global weather patterns that may not seem relevant to specific locations or communities. However, as the effects of climate change become more apparent in the South, two questions are raised that directly address the real-world effects of climate change: Will the physical effects of climate change be more apparent in some areas? Will certain populations and communities be affected more than others?

A recent study in Georgia dealt with these very questions. **Binita KC**, a doctoral student in the Geography Department of the University of Georgia who conducted the research, found that in the state of Georgia the effects of climate change will be felt most strongly in metro Atlanta and counties along the coast. Working with **Marshall Shepherd**, an atmospheric scientist at the University of Georgia, and **Cassandra Johnson Gaither**, a sociologist with SRS-4952, KC mapped climate variables county by county in Georgia using data going back to 1975. She mapped gradual changes in climate variables that showed clear warming and drying trends along with changes in the frequency of extreme weather events such as floods, droughts, and heat waves.

The study results show that the climate in Georgia is indeed becoming warmer and drier, and that heat waves and drought are increasing across the state. However, Shepherd found the changes occurring in Atlanta most surprising. “I had a hunch we were seeing an uptick in floods and droughts across the state, but there has been a striking increase in extreme events in Atlanta,” says Shepherd.

Because these climate changes do not exist in isolation, KC’s study also analyzed climate change in terms of its effects on populations and communities, especially the socially vulnerable. “Social vulnerability refers to the capacity of an individual or community to access resources and information that would help them adapt to and

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mitigate the effects of climate change,” says KC. In her study, KC included measures of social vulnerability for each county, using census data variables such as poverty, race, age (under the age of 5 and over the age of 65), occupation (percentage of low-wage service-sector workers), and home ownership. The results of her study indicate that populations in metro Atlanta and the coast contain higher than average percentages of socially vulnerable groups—the young and the elderly, the poor, immigrants, Latinos, and African Americans. Furthermore, the study found that the effects of climate and climate change, particularly events like heat waves, floods, and droughts, can be exacerbated for such populations, who must contend with higher than average climate risks and social risks.

For example, KC found that lower-income groups are more vulnerable to extremes of cold and heat; such populations may lack air-conditioned homes that could act as buffers against heat waves or adequate heat to deal with cold temperatures.

The study found that social vulnerability in urban areas is strongly influenced by the density of the population and structures. Increased temperatures and heat waves, the urban heat island effect (a phenomenon in which built-up areas are significantly warmer than nearby rural areas), the prevalence of impervious surfaces (roads, sidewalks, parking lots, and so forth that are covered by materials such

as concrete or asphalt, which increase the likelihood of flooding), poor air quality, and possible increases in diseases, such as food- and water-borne diseases due to warming, can have significant human health effects in urban areas. Environmental changes and hazards in urban areas also have the potential to affect large numbers of people and cause extensive economic damage due to the concentration of people, buildings, and economic activity.

Socially vulnerable groups living in rural areas are susceptible to many of the same impacts from climate change, but they are also subject to the negative economic effects of droughts, to which the agricultural and forestry sectors are particularly vulnerable. Coastal areas are at increased risk from tropical storms, particularly those people living in areas that have lost protective mangroves and wetlands.

“There are segments of the population that are more vulnerable to natural hazards,” says Shepherd. “They do not have the resilience or adaptive capacity to overcome events. Take a hurricane, for example—some groups affected by a hurricane can bounce back quicker than others.”

KC notes that vulnerability has increased in every part of the state since 1975—including urban, rural, coastal, and inland areas. She relates this to changing demographics in rural Georgia, especially the large increases in Hispanic workers in those areas.

The researchers say that the study points to the need for local governments to prepare for the coming effects of climate change, paying particular attention to vulnerable populations. In urban areas, this may involve designing new stormwater systems to handle extreme weather events that will increase in frequency and intensity. Planning for the distribution of cooling stations in urban areas during hotter and more frequent heat waves may also be necessary.

In rural areas, increasing drought will dramatically affect counties that are dependent on agriculture and forestry. The researchers in this study suggest that agencies and officials charged with natural resource outreach and education begin promoting drought-resistant crops, species, and seeds. “This research suggests areas where local government might concentrate energies to manage awareness of climate change and its potential impacts,” says Shepherd.

As climate change moves from abstract academic modeling to real-world effects, the need for practical and effective responses is becoming more significant. This social vulnerability and climate change study highlights the necessity of recognizing that not all individuals, groups, and communities will be affected equally.

To learn more about this project visit: <http://www.srs.fs.usda.gov/compass/2013/06/13/hot-time-in-the-city/>.

Recommended Resource

CompassLive

CompassLive is the online science magazine of the USDA Forest Service Southern Research Station. CompassLive includes news about Station scientists, spotlights

about new and archived publications, and much more.

Visit the CompassLive at: <http://www.srs.fs.usda.gov/compass/>.

In Our Next Issue

We will feature our Kids in the Woods project at Westwood Middle School in Gainesville, Florida.

Training and Outreach Activities

Kids in the Woods in Gainesville, Florida

InterfaceSouth's **Annie Hermansen-Báez** has partnered with Alachua County School District's Westwood Middle School and Camp Crystal Lake, the University of Florida's School of Forest Resources and Conservation, the City of Gainesville's Parks, Recreation



Photo courtesy of: USDA Forest Service

and Cultural Affairs, and Alachua County Environmental Protection Department to develop a More Kids in the Woods Program at Westwood. In October, over 300 sixth grade science students studied local birds and their feeding behavior at nearby Loblolly Woods to determine how factors such as location, time of day, and predators might affect how birds feed. Through this study program partners are reinforcing what the students are learning about the scientific method in the classroom. Additionally, they are getting outside and being physically active.

Throughout the 2013-2014 school year, students will also study erosion, sedimentation and forest structure in Loblolly Woods Nature Park. The project team will also be doing additional studies with the students throughout seventh grade.

Westwood's Kids in the Woods project is part of a larger initiative on the part of the U.S. Forest Service to get kids outdoors due to concern about the growing disconnect between children and nature. Hermansen-Báez partnered with **Dr. Michael Andreu** from the University of Florida's School of Forest Resources and Conservation to develop the project concept and apply for a national grant from the More Kids in the Woods program. Some of the main objectives of this project are for students to become more aware and connected to their local environment and exposed to careers in science and natural resources, as well as increased teacher participation in providing outdoor learning experiences for students. For more information contact Annie Hermansen-Báez, ahermansen@fs.fed.us.

To learn more about the More Kids in the Woods initiative visit: <http://www.fs.fed.us/news/2013/releases/05/more-kids-outdoors.shtml>.

Updates about the Westwood Middle School "Kids in the Woods" project will be posted at: www.interfacesouth.org/projects/kids-in-the-woods.



Photo courtesy of: Eric Kuehler

Participants in the UFST workshop in Raleigh get some hands-on training.

i-Tree Workshops

Urban Forestry South's **Eric Kuehler** led two i-Tree workshops this past summer. In June, Eric led a two-day workshop in Long Leaf, Louisiana, at the Southern Forest Heritage Museum. Participants learned about proper data collection protocol for i-Tree Eco, including how to collect tree data for a complete inventory. In August, Eric led a pre-conference workshop about i-Tree Eco and Canopy at the North Carolina Urban Forestry Conference held in Wilmington, North Carolina. Participants learned how to use the i-Tree Eco graphic user interface, collect Eco data, and to generate reports for a complete inventory. They also learned how to estimate tree canopy and other land cover percentages using the on-line tool, i-Tree Canopy.

Urban Forest Strike Team Workshop in Raleigh, North Carolina

The North Carolina Forest Service sponsored an Urban Forest Strike Team (UFST) workshop in Raleigh in June 2013. The UFST program functions throughout the eastern United States and trains state forestry agency certified arborists and urban foresters, municipal and consulting arborists, extension foresters, and tree wardens to assess tree damage using FEMA and tree risk management standards following major natural disasters (e.g. ice storms, hurricanes).

The first day of the workshop included a Team Leader refresher course, which focused on the UFST Level 1 risk assessment. During the following two days, 25 new task specialists and guests (non-arborists) participated in the UFST training. Northeastern Area representatives from Nassau County (NY) Extension and Washington DC Department of Transportation Urban Forestry attended, as well as guests representing the North Carolina Department of Agriculture Emergency Programs. Alan Moore (NC), Mickey Merritt (TX), Chris Frey (NC), Paul Revell (VA), Jim McClone (VA), and Doug White (NC) served as instructors and field "crew leaders" for the workshop. For more information contact **Dudley Hartel**, dhartel@fs.fed.us.

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Upcoming Events

Date	Description	Location	Contact
January 14-16, 2014	2014 Green Infrastructure and Water Management in Growing Metropolitan Areas	Tampa, Florida	http://psgs.usf.edu/patel-center/2014-green-infrastructure-conference/
March 27-29, 2014	National Green Schools Conference	Sacramento, California	http://greenschoolsnationalnetwork.org/conference/
March 17-19, 2014	Wildland Urban Interface 2014	Reno, Nevada	http://www.iafc.org/WUI



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

InterfaceSouth and Urban Forestry South are the science delivery centers associated with the USFS Southern Research Station work unit, SRS-4952: Integrating Human and Natural Systems in Urban and Urbanizing Environments (<http://www.humanandnaturalsystems.org>), and the USFS Southern Region. They 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.