



Leaves OF Change



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Introduction

Ecosystem Services

FOREST ECOSYSTEM services (benefits provided by forests to people and other living organisms) result from a variety of ecosystem processes and functions. Yet, the availability and the potential to provide these services do not depend on forest processes and functions alone. They also depend on policies, regulations, decisions, and actions people make regarding the use and management of forests and the services forests provide. In this issue we highlight a collaborative research project that integrated different stakeholders that use and affect El Yunque National Forest in Puerto Rico and its ecosystem services. The techniques and products developed from this study can be used by natural resource managers, specialists, and researchers of other national and state forests to better understand peoples' knowledge and awareness of ecosystem services and the factors affecting these services.

Research

Stakeholders and Ecosystem Services in El Yunque National Forest, Puerto Rico

EL YUNQUE National Forest in Puerto Rico is unique among forests in the national forest system. It is the smallest national forest at 28,000 acres, and it is the only tropical rain forest in the system. El Yunque also has the greatest biodiversity among national forests, including more than 100 types of ferns, 50 native orchids, and 13 species of *coquí*, a tree frog that plays a rich role in Puerto Rican cultural heritage.

However, the northern boundary of El Yunque is only a 45-minute drive from the sprawling metropolis of Puerto Rico's capital city, San Juan, and urban expansion in the eight municipalities surrounding El Yunque increased by 21 percent from 1998 to 2010. Consequently, the forest faces many of the same problems faced by other natural areas in the national forest system—increased urbanization around its boundaries, overuse from tourism, and threats to water resources. In an effort to minimize the negative effects of urban expansion on the forest, several conservation initiatives have been introduced over the past few decades. These include a regional zoning plan that established a “non-urban” buffer zone around the forest and collaborations with local non-governmental organizations to purchase lands for conservation. However, due to poor enforcement of and the lack of financial resources for these initiatives, development has continued around El Yunque and land acquisition efforts have progressed slowly.

Forest managers from El Yunque approached InterfaceSouth with concerns about how the landscape was changing outside of the forest. They wanted to understand better the potential effects of this change on the ecosystem services provided by the forest and on their ability to manage the forest. They also wanted to incorporate the views and perspectives of different stakeholders regarding the ecosystem services provided

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by El Yunque. **Ed Macie**, the USDA Forest Service Region 8 regional urban forester and science delivery team leader for the Centers for Urban and Interface Forestry, commented, “We have long recognized the need to relate local planning and land-use issues to forest conservation and management activities. We saw this project as an opportunity to build a better understanding of local values and perceptions toward forests and the ecosystem services provided by them, and to explore tools and methods to help resource managers better engage in the planning process.”

Participatory Stakeholder Research

“Conservation efforts in and around El Yunque have traditionally followed ‘top-down’ approaches that have not included the perspectives of the different stakeholder groups around the forest,” says **Tania López-Marrero**, a Puerto Rican geographer formerly associated with the University of Puerto Rico’s Institute of Caribbean Studies but now a faculty member at Rutgers University. “For conservation to be more successful, further dialogue is needed between civil society, scientists, and land managers.”

To address this need, López-Marrero designed a study in collaboration with InterfaceSouth, El Yunque National Forest, and the International Institute of Tropical Forestry. The main goal of the study was to understand stakeholders’ knowledge about the services provided by El Yunque and the factors affecting these services so as to identify better ways to conserve both the forest and the services. There were four main objectives: (1) to assess stakeholders’ knowledge of El Yunque’s ecosystem services and the factors influencing the availability of these services; (2) to document the geographic distribution of land covers around El Yunque, with special emphasis on the distribution and expansion of urban land cover as a potential factor affecting El Yunque and its ecosystem services; (3) to develop geographic data and a resulting map that can assist in land-use planning efforts that support El Yunque and its ecosystem services; and (4) to explore the potential role of landowner-incentive conservation programs for forest conservation around El Yunque, including conservation easements, land donations, and land purchases.

López-Marrero used a variety of participatory methods, which were carried out with the different groups of stakeholders. The stakeholders participating in the project included 1) scientists working in El Yunque, 2) El Yunque forest managers, 3) municipal planners from the surrounding municipalities, and 4) community leaders and residents from communities near El Yunque.

The project began with participatory listing, ranking,

and scoring exercises designed to document and compare the knowledge and perceptions of different stakeholders regarding ecosystem services and drivers of change. After being provided with a common definition and explanation of the concept of ecosystem services, the different stakeholder groups developed lists of known ecosystem services provided by the forest. The stakeholder groups also listed the drivers of change that influence (positively or negatively) the continued delivery of ecosystem services. The top three ecosystem services were then ranked and the drivers of change were scored on a scale of one (least effect) to six (most effect).

“The goal of these exercises was to identify the areas of common knowledge and perception among the stakeholder groups and also to identify the gaps in knowledge among the different groups,” says López-Marrero. “But, this was more than a simple information collection project. The process also generated reflection and discussion of the issues—allowing people to see the situation in ways that they would not otherwise.”



Photo Credit: Tania López-Marrero

As part of the participatory listing process, participants generated individual lists of El Yunque’s ecosystem services.

The technique revealed varying degrees of knowledge regarding ecosystem services and the drivers of change affecting El Yunque. For example, water was ranked by all stakeholder groups as the most important ecosystem service provided by El Yunque; however, carbon sequestration was only listed by scientists and forest managers. Not surprisingly, urbanization was scored by all groups as one of the factors having the most negative effect on ecosystem services.

Next, the participants were given a base map that indicated familiar reference points in the forest and surrounding communities. The participants were asked to sketch in the areas where they perceived urban expansion to be occurring. The perceptions of the different stakeholder groups were then compared to actual urban land cover change using aerial photography interpretation and Geographic Information Systems (GIS) in order to see actual changes versus perceived ones. Most stakeholder groups correctly identified the northern areas of the forest that were being affected by urban growth, but they did not identify as often the areas south of El Yunque that are also being affected by urban development.

After looking at the final sketch map, one of the scientists commented, “There is more development occurring than we are even aware of. With this mapping exercise, I realize that there is a lack of knowledge about certain geographic areas around El Yunque, particularly in the southern portion of the forest. We need to know more about what is going on there.”

To increase knowledge about land cover and change, land

cover data around El Yunque was summarized and trends in urban expansion in the study area were presented. Additionally, a methodology was developed that allowed the identification of lands around El Yunque where it is most critical to plan for land uses that can help ensure the continued provision of El Yunque's ecosystem services.

In collaboration with InterfaceSouth's **Annie Hermansen-Báez**, a series of fact sheets and guides, in both English and Spanish, have been developed and are available on the InterfaceSouth website. The fact sheets provide information that can assist land-use planning, decision making, and management around El Yunque, while the guides provide the main findings of the different components of the study. The guides also describe the techniques that were used in the study and provide step-by-step instructions in their use. A general technical report that includes all the project information and major findings is under development and will be released in 2013.

Next Steps

López-Marrero noted that the findings from this project are a useful starting point for designing educational efforts that target certain stakeholder groups. In addition, the findings can be used to identify topics for dialogue among stakeholders and to identify collaborative projects, such as actions to promote sustainable use and minimize negative effects on water resources.

Some of the most important aspects of the research, according to López-Marrero, are the potential discussions and actions within and among the stakeholder groups that the findings and recommendations from this study can generate. She hopes that these exercises may prompt the stakeholders to explore creative collaborations and ideas for conserving ecosystem services that have not been discussed previously.

To access the El Yunque Ecosystem Services publications in English and Spanish visit www.interfacesouth.org/projects/el-yunque.



Photo Credit: Tania Lopez Marrero

Participants drew the boundaries of where they perceived that urban expansion is occurring around El Yunque.



Training Activities

Recent Changing Roles Training in Virginia

InterfaceSouth's **Nicole Wulff** helped organize and presented at a one-day Changing Roles training titled "Incorporating Natural Resources into Land-use Decision Making" that was offered as part of the "Forest, Farms, and Community Lands for Tomorrow Conference", June 27-30, 2011, in Farmville, Virginia. The conference was led by representatives from the VA Department of Forestry and the Natural Resources Conservation Service with assistance from Virginia Tech, VA Cooperative Extension, and VA's Soil and Water Conservation Districts. The training's goal was to help resource professionals understand the land-use planning process and their role in the process, as well as identify policy and conservation tools for incorporating natural resources into planning. For more information about Changing Roles visit www.interfacesouth.org/products/changing-roles.

Partnership Highlight: Tania Lopez-Marrero

Tania is an Assistant Professor at Rutgers University with a joint position in the Departments of Latino and Hispanic Caribbean Studies and Geography. Her research focuses on the relationships between humans and the environment, including ecosystem services and drivers of ecosystem change; land use and land-cover change; and vulnerability, adaptive capacity, and resilience to natural hazards. Based on the belief that there are multiple ways of learning and means of conducting research, she employs a variety of approaches, methods and techniques, as demonstrated through her work on the El Yunque Ecosystem Services research project. To learn more about Tania and her work visit: <http://geography.rutgers.edu/faculty/faculty-core> or <http://latcar.rutgers.edu/Lopez%20Marrero/index.htm>



In Our Next Issue

We will focus on a multidisciplinary research project conducted in Florida's Panhandle that is investigating the ecological effects, economic considerations, and sociocultural implications that accompany coastal development.

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Upcoming Events			
Date	Description	Location	Contact
September – December 2011	Southern Fire Exchange Fall Webinar Series	Online	www.southernfireexchange.org/ProDev/Webinars.html
October – November 2011	Changing Roles 4-Part Webinar Series	Online	www.interfacesouth.org/products/changing-roles/webinars Nicole Wulff, 352-378-2451, nmwulff@fs.fed.us
November 30 - December 4, 2011	American Society of Consulting Arborists Annual Conference	Incline Village, Nevada	asca-consultants.org/edprograms/conference.cfm



This issue 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.