

Geographer calls for complexity in sustainability science models

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Tropical deforestation is intimately linked with urban dynamics and needs to be considered along with the role and effect of national and regional policies on land use decisions, and the dynamics of economic globalization in the next generation of sustainability science research, according to an Arizona State University geographer.

"You just can't think of isolated farmers operating out there by themselves. They are linked to whatever are the closest urban areas," noted B.L. Turner II, whose research concentrates on human-environment relationships focusing on land-use change. He addressed change in [tropical forests](#) and the challenges that address its complexity at the annual meeting of the American Association for the Advancement of Science. He was one of the presenters in a Feb. 19 session on the research frontiers in sustainability science.

"Today, there is a lot of work on ecosystem services related to forest change, yet there really is a paucity of work that says how those [ecosystem services](#) come back and affect human outcomes," said Turner, the Gilbert F. White Professor of Environment and Society in the School of Geographical Sciences and Urban Planning at ASU's College of Liberal Arts and Sciences. He also is a professor in the School of Sustainability.

"We have a lot of work informing us about the environmental impacts of deforestation, but it doesn't tell us how people react to it and deal with it. We only now are beginning to ask how those environmental services link

to farm income. How do those factors link to whether people abandon land and go off someplace else or sell their land rights to a cattle farmer. And, how does all this link to changes in rural-urban ties, policy, and global economy changes," he said.

"It's linking the feedback of environmental changes themselves on decisions to cut forest, or not; to expand agricultural land, or not. It isn't just the amount of forests that's cut or the amount of agricultural land lost. It is the spatial and temporal patterns of them," Turner stressed. "It matters whether people are cutting big chunks of land in a uniform pattern or cutting little chunks of land in an ad hoc random pattern."

Turner argued that "all of this matters to biodiversity and rainfall in the tropics. We have the capacity to account for these consequences if we aim our research that way," he said.

What needs to be done now in sustainability science research, according to Turner, is to create models that are fluid and open to the complex changes we observe, full of feedbacks between people and environment.

"Tropical deforestation still remains very high on the sustainability global change/climate change agenda for a variety of reasons that range from it being the lungs of the planet to housing the most terrestrial biodiversity," Turner said. "The new challenge that we face in sustainability science is understanding more fully the ties between the socioeconomic factors affecting forest change and the environmental feedbacks from decisions we make. We can incorporate these types of dynamics directly into how we understand and forecast what's going to fall, where it's going to fall, and what the implications are."

Provided by Arizona State University

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