Scientists unravel human-ecosystem interactions

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Whether it is a single rock being overturned or an entire mountaintop being removed, humans play a continuous role in environmental processes, and vice versa. Ecological scientists will discuss findings on human-ecosystem interactions -- from the effects of nanomaterials on plant growth to the diversity of insect species on green roofs, and even communities of airborne microbes in hospital buildings -- at the Ecological Society of America's 95th Annual Meeting in Pittsburgh from August 1-6, 2010. Here is just some of the research on humans and the environment to be presented:

Nanotechnology and the environment

Silver nanoparticles are being increasingly used in consumer and medical products for their antimicrobial properties. However, use of these products results in the release of nanoparticles into the environment through wastewater effluent and biosolids, or treated wastewater byproducts. Benjamin Colman from Duke University and colleagues analyzed the potential effects of exposure to these particles on microbial and plant activity, growth and abundance.

Their findings, to be reviewed in a presentation at ESA's Annual Meeting in Pittsburgh, revealed that silver nanoparticles altered root growth and plant physiology, and the abundance, composition and activity of microbial communities. Specifically in plants, roots near the soil surface were more abundant, though biomass of one of the five

tested plant species decreased by 22 percent. In addition, microbial abundance decreased, the species of bacteria present changed and microbial enzyme activities were reduced by as much as 34 percent.

The contributed oral session "Nanomaterials in the environment: The effect of realistic silver nanoparticle exposures on terrestrial ecosystem dynamics," led by Benjamin Colman, Duke University, will be held Wednesday, August 4, 2010 at 2:50 pm.

Other sessions on technology and ecology include:

The special session "Warfare ecology: A continuing conversation" by Clifford Duke, Ecological Society of America, and the poster session "Potential impact of human transportation on amphibian and reptile populations" led by Christina Soman, Montclair State University.

Insect diversity of green roofs

Green roofs have been gaining popularity due to their natural cooling and storm water management benefits, as well as the opportunity to provide habitat for insects and birds. Researchers Scott MacIvor and Jeremy Lundholm from Saint Mary's University in Halifax, Nova Scotia discovered the biodiversity of green roofs is more abundant than previously thought.

In their upcoming presentation at ESA's Annual Meeting, the scientists will report that insect richness and abundance on a green roof is no different from that of nearby urban habitats. The researchers found that, in addition to large numbers of several unique species on the green roofs, these roofs served as a refuge for a number of uncommon species. MacIvor and Lundholm wrote in their abstract:

"As the rate of green roof installation increases, optimizing these

constructed habitats for long-term support of insect species will not only improve services such as pollination, pest control and decomposition, but also aesthetic and educational opportunities in 'species-poor' cities."

The organized oral session "Reconciliation ecology opportunities reach new heights: Insect species composition and diversity on green roofs and adjacent ground-level habitat patches in an urban area" by Scott MacIvor and Jeremy Lundholm, Saint Mary's University, will be held Tuesday, August 3, 2010 at 8:00 am.

Other sessions on urban ecology include:

The poster session "The effect of urbanization on bumble bee communities in greater Philadelphia" led by Rosemary Malfi, University of Virginia; the contributed oral session "Biodiversity and community assembly in urban ecosystems" led by Christopher M. Swan, University of Maryland, Baltimore County; and the organized oral session "Students as sustainable designers: Integrating green roof design principles into a high school curriculum" by Michael Moretti, Prospect Hill Academy Charter School.

Invasion ecology of the human body

What makes someone susceptible to an infectious disease? According to research to be presented in a symposium at ESA's Annual Meeting, the resilience of naturally-occurring microbes in the human body plays a large role in susceptibility. That is, the diversity and abundance of normal microbial communities in the human body can help fight off pathogen invasions. With this in mind, ecological and biomedical scientists will merge their research to create a comprehensive analysis of human infectious disease and discuss opportunities for prevention.

In one of the presentations, for example, Steven Kembel and colleagues

from the University of Oregon will discuss how building design influences airborne microbes in a hospital environment. The study revealed that bacteria are abundant in airborne microbial communities, regardless of the type of ventilation a hospital uses. However, the diversity and composition of these communities, they found, differed between mechanically- and naturally-ventilated rooms. They discovered that several types of bacteria with effects on human health were more common in mechanically-ventilated rooms than rooms with open windows and no fans. The scientists will address the implications of their findings for hospital ventilation planning.

The symposium "The invasion ecology of disease: Understanding the drivers of microbial community assembly and host-microbe dynamics in the human body," co-organized by Vanja Klepac-Ceraj of the Forsyth Institute and Petra Klepac of Princeton University, will be held Friday, August 6, 2010 from 8:00-11:30 am.

Other sessions on ecology and human health include:

The symposium "Towards a general theory for how climate change will affect infectious disease" organized by Jason Rohr, University of South Florida, and the contributed oral paper "Ecosystem services, air quality and human health: The need for realistic expectations" led by Thomas Whitlow, Cornell University.

Provided by Ecological Society of America