UC SANTA BARBARA

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Julie Cohen

How Chemicals Affect Ecosystems

The U.S. Environmental Protection Agency has awarded an $800,000 Science to Achieve Results (STAR) grant to UC Santa Barbara's Roger Nisbet. He will use the funding to develop a model to better understand biological and ecological consequences of exposure to metals, nanoparticles and certain flame retardants in industrial and consumer products. Such materials could pose a threat to human and environmental health.

"Most ecological risk assessments of chemical stressors are motivated by the societal need to avoid unacceptable impacts on natural populations and ecosystems from exposure to manufactured chemicals," said Nisbet, a professor in the Department of Ecology, Evolution, and Marine Biology. "A major challenge is that ecological change usually occurs on long time scales and involves many interacting species, but the data available for risk management typically comes from short-term studies on individual organisms or on biochemical processes."

Nisbet's project — "Dynamical Systems Models Based on Energy Budgets for Ecotoxicological Impact Assessment" — is expected to enhance the understanding of how the effects of exposure to chemical stressors are expressed ecologically. New mathematical models will be developed with feedback representing physiological control processes within an organism and interactions among species in an ecosystem.

"The anticipated expected outcome is an enhanced and improved ability to identify key toxic mechanisms within individual organisms and to make quantitative

predictions of the implications for the sustainability of populations," Nisbet said. "If models are found to have predictive value, this will enhance the capacity for using such information for evaluation of chemicals. If, as is likely, reliable predictions require additional information on whole organisms or populations, the nature of the required information will be defined."

UC Santa Barbara is among six universities nationwide sharing almost $4 million in funding to study the ecological impacts of manufactured chemicals. The overall goal of the research is to develop better chemical risk assessments and decisions for protecting the environment. The other recipients are Harvard University, Michigan State University, the University of North Carolina at Wilmington, Oregon State University and Texas Tech University.

"The STAR program ensures that our next generation of scientists and engineers will be ready to meet future environmental challenges," said Jared Blumenfeld, EPA's regional administrator for the Pacific Southwest. "We are pleased to support UCSB in its scientific efforts and innovative ideas."

The STAR grants are part of the EPA Chemical Safety for Sustainability research program's efforts to develop new methods to improve chemical evaluation and support environmental sustainability.

About UC Santa Barbara

The University of California, Santa Barbara is a leading research institution that also provides a comprehensive liberal arts learning experience. Our academic community of faculty, students, and staff is characterized by a culture of interdisciplinary collaboration that is responsive to the needs of our multicultural and global society. All of this takes place within a living and learning environment like no other, as we draw inspiration from the beauty and resources of our extraordinary location at the edge of the Pacific Ocean.