

Proposal Number: DEB-1548175
Collaborative Research: The Confluence of Music, Art and Science at Long Term
Ecological Research Sites

Non-Technical Abstract

Human societies in the 21st century are faced with increasingly broad, complex and connected social and environmental challenges. Examples include the need to understand and respond to a rapidly changing global climate, and the increasing and often competing needs to provide a growing world population with food, water, and fiber, while at the same time maintaining the health, vitality and cultural values of the natural ecosystems that provide these very services. During the last century, a trend has emerged to increasingly rely on science alone to provide solutions to global issues. The roles of the arts and humanities, which have been intertwined with science since the time of the ancient Greeks, have been marginalized or outright ignored. Although science can provide powerful insights on how humans impact the natural world, the arts and humanities imbue that knowledge with empathy, engagement and a deeper level of understanding. An emerging need exists to revitalize genuine relationships between the arts (written large) and sciences in order to bring together the combined expertise of these diverse disciplines to create a more unified approach to solving the inter-related ecological and social issues of the 21st century. In this project, scientists and artists from two ecological research stations (The Hubbard Brook Experimental Forest, NH and the HJ Andrews Experimental Forest, OR) will work closely together to better understand, visualize and communicate pattern and process in high frequency, long term ecological data sets. The overarching goals of this project are to 1) provide new scientific insights on forest ecosystem dynamics, and 2) serve as a case study to demonstrate how the full intellectual integration of artists and scientists can help to provide a deeper level of understanding and engagement about the environment.

New techniques will be developed in this project to better integrate an array of cognitive approaches to address, understand, and communicate complex ecological issues. Specifically, high frequency, real-time data from an array of environmental sensors at two LTER sites will be used to encode animated visualizations, sonifications, and other digital media that will allow the viewer to easily understand and interact with multiple components of the ecosystem in real time. The project will test the hypotheses that 1) multi-sensory experiences such as those evoked by a new generation of data visualizations and sonifications will simultaneously engage the reasoning, visual, and acoustical centers of the viewer's brain, and make pattern and process in large ecological data sets easier to comprehend, providing a foundation for new discoveries; 2) neurobiological tools and theory can provide a mechanistic understanding for this increased understanding of pattern and process in ecological data; and 3) the process of engaging artists and scientists from different disciplines in a discrete and focused project will stimulate new ideas and insights to better address complex environmental problems. The project will engage scientists, artists and musicians in encoding the data, neuro- and social scientists in evaluating the efficacy of this engagement, and educators and science communicators to more broadly disseminate the results of the project. Taken together, this project will better integrate both the existing community of practicing scientists and artists, and help to inspire the next generation to follow.