

NEON: ENHANCING ECOLOGICAL FORECASTING

The **National Ecological Observatory Network (NEON)**, funded by the National Science Foundation, is a proposed constellation of 60 sites across the United States that will collect data on key environmental variables. The data will

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be used to develop forecast models describing likely long-term changes unfolding across the continent.

Data collected by NEON will be freely available to scientists, educators, decision makers, and the general public, providing tools with which to address current and future environmental challenges.

ESA: INFORMING POLICY WITH ECOLOGICAL SCIENCE

The **Ecological Society of America (ESA)** is the world's largest professional society of ecological scientists. ESA focuses on raising public awareness and ensuring the appropriate use of ecological science in environmental decision making.

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NEON and ESA priorities include:

- **Climate change**
- **Land-use change**
- **Invasive species**
- **Science education**

ENVIRONMENTAL OBSERVATORIES

SIGEO & CRC: PROVIDING ENVIRONMENTAL OBSERVATIONS FROM LOCAL TO GLOBAL SCALES

The **Smithsonian Institution Global Earth Observatories (SIGEO)** is a multi-institutional, global network of 34 forest research plots, and is among the premier US-led international partnerships in the environmental sciences.

In today's rapidly changing environment, there is a growing demand for tools capable of predicting how ecosystems will respond to management decisions, societal changes, and natural phenomena. Central to these tools' success is the ability of environmental monitoring projects to shift their focus from observing to forecasting.

The **Smithsonian Conservation and Research Center (CRC)** houses a partnership between SIGEO and NEON, bridging the unparalleled scope of the SIGEO network with the unprecedented predictive abilities of NEON. The resulting synergy will equip society with ecologically and economically sustainable solutions to environmental challenges such as climate change and habitat degradation.

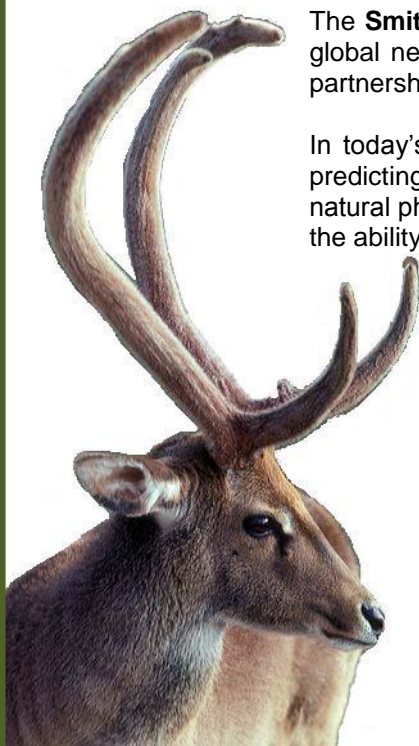
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www.sigeo.si.edu

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ECOSYSTEMS AND THE CHANGING CLIMATE

A United States Climate Change Science Program report (SAP 4.3) states that temperature increases, increasing CO₂ levels, and altered patterns of precipitation are already affecting U.S. water and land resources, agriculture, and biodiversity. These changes will in turn affect the ability of ecosystems to provide society with services like clean air and water.

Forest ecosystems, such as those included in SIGEO and NEON, provide a vast range of services. Tropical and temperate forests contain nearly 40% of terrestrial carbon—their ability to sequester carbon dioxide, the primary anthropogenic greenhouse gas, may help limit the effects of climate change.

Environmental observatories allow scientists to measure the impact of the changing climate on carbon storage, ecosystem function, and biodiversity across different ecosystems, including forests, tundra, deserts, and grasslands.

The SIGEO-NEON collaboration makes it possible to assess the impacts of climate change at local, continental, and global scales. The scope of today's environmental challenges calls for action and cooperation from government agencies, private industry, NGOs, and the general public.

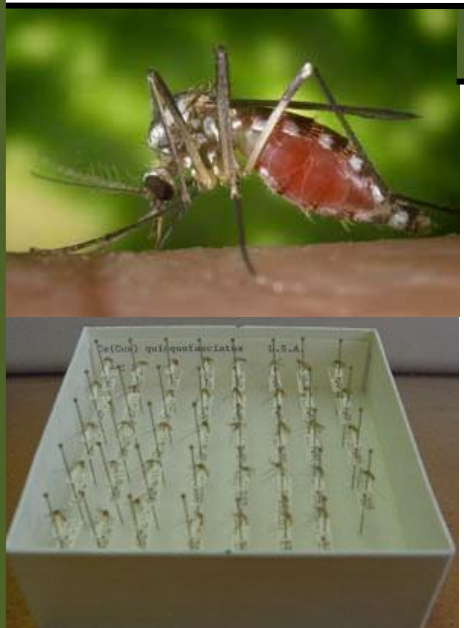
SCIENCE EDUCATION OPPORTUNITIES

CRC is uniquely positioned to train the next generation of ecological scientists and resource managers, providing them with the statistical and technical skills necessary to enhance ecological observation and forecasting initiatives.

A new partnership with George Mason University makes it possible for undergraduate students, graduate students, and conservationists to live and study at CRC, where they work alongside practicing scientists and researchers and gain hands-on experience with laboratory and field techniques.

This partnership complements the existing NEON and SIGEO education programs, which seek to increase both understanding and professional capacity in the sciences, domestically and in the developing world.

These science education programs help ensure that the work done in environmental observatories leads to sustainable management of natural resources throughout the world.



TRACKING EMERGING DISEASES

The Smithsonian Institution is a member of the Consortium for the Barcode of Life, an international effort to establish DNA barcoding as a global standard for species identification. DNA barcoding designates a short DNA sequence from a standardized position in the genome as a molecular “barcode” with which to identify species.

The Smithsonian participates in the **Mosquito Barcode Initiative (MBI)**, which is working to produce a global mosquito identification system. MBI will be instrumental in combating mosquito-transmitted disease, which is on the rise as climate change allows the insects to spread to new regions. NEON complements this by collecting mosquitoes across the network to monitor the distribution of insect-vectored disease.

Having an efficient and accurate means of identifying mosquito species will help researchers track and limit the spread of disease bearing species, which infect hundreds of millions of people each year. Environmental observatories make it possible to relate this biological data to large-scale climate processes, providing forecast models that improve society's ability to respond quickly and effectively.