ESD Mission

The Environmental Sciences Division (ESD) seeks to understand our environment from molecular to global scales to provide strategic solutions to complex environmental challenges. We accomplish our vision through research at the intersection of human and natural systems. We apply the latest technologies in environmental genomics, advanced data and simulation systems, observational networks, and probing the relationship between molecular-scale processes and field-scale behaviors.

Scientists in ESD conduct research, develop technology, and perform analyses to understand and assess responses of environmental systems at the environment-human interface and the consequences of alternative energy and environmental strategies. We seek to understand how natural and anthropogenic factors (e.g., global and regional change, environmental stress, and energy production and use) interact to influence environmental systems and society. Our methods integrate field and laboratory methods with new theory, modeling, data systems, policy analysis, and evaluation to create solutions to complex environmental challenges.

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Environmental Sciences Division

Science to Sustain Our Environment

Oak Ridge National Laboratory
Managed by UT-Battelle, LLC
For the U.S. Department of Energy

Oak Ridge National Laboratory

ESD Science

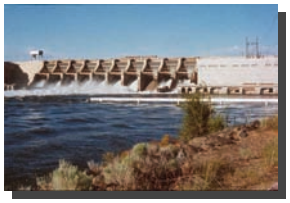
Earth Sciences

Understand fate and transport processes at multiple scales to allow extrapolation across domains of observation and prediction.

- Atmospheric and Aerosol Sciences
- Behavior of Natural & Artificial Nanomaterials
- Biogeochemistry of Contaminants
- Bioremediation
- Climatic Change, Carbon Cycle, and Carbon Sequestration
- Field Research Facilities
- Subsurface Stewardship Science

Ecological Management

Create and apply effective methods to measure, assess, and manage ecosystems.



- Aquatic Ecology
- Environmental Analysis
- Human Toxicology
- Regional Studies
- Sustainable Development
- Water Resources

Environmental Data

Provide environmental data archive management and analysis for the nation's research community and policymakers.

- Atmospheric Radiation Measurements
- Biogeochemistry of Terrestrial Ecosystems
- Biodiversity
- Carbon Cycle and Carbon Sequestration
- Climatic Change Research
- Carbon Dioxide Information and Analysis

Social, Behavioral, & Economic Sciences

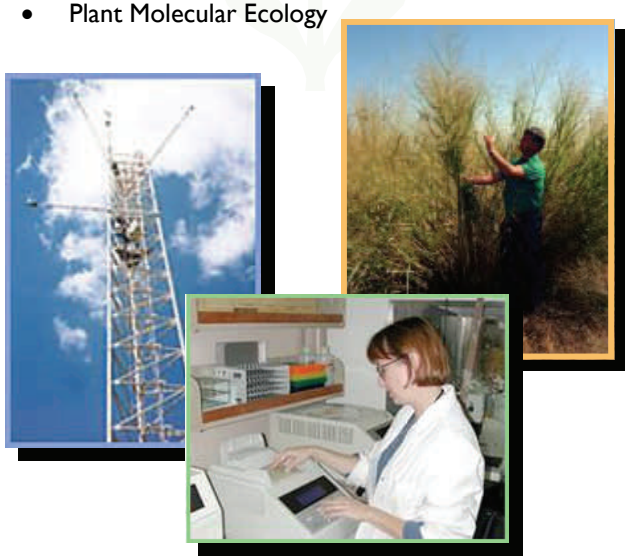
Develop methods and models; conduct analyses; and produce tools that address key issues at the intersection of science, technology, society, and policy.

- Bioenergy Resources and Engineering Systems
- Decision Support
- Emergency Management
- Energy Systems Analysis
- Global Environmental-Energy Issues
- Human Toxicology
- Society-Technology Interactions
- Transportation

Terrestrial Ecology

Understand and predict the dynamic behavior of ecosystems at multiple scales (molecular to watersheds).

- Bioenergy
- Carbon Cycle and Carbon Sequestrations
- Climatic Change Experiments and Simulations
- Landscape Ecology and Regional Studies
- Plant Molecular Ecology



ESD Facilities

ESD's **Field Facilities** include a variety of **Global Change Facilities:** (1) open-topped chambers to examine the effects of elevated levels of atmospheric CO_2, temperature and troposphere ozone on vegetation; (2) Free Air CO_2 Enrichment (FACE) facility, (3) and the Old-Field Community Climate and Atmospheric Manipulation (OCCAM) site.

The **Subsurface Science Facilities** include the Oak Ridge Integrated Field Challenge research site to study uranium biogeochemistry, and the long-term watershed research facilities in Walker Branch and Melton Branch Watersheds.

Another ESD field facility is the **Oak Ridge National Environmental Research Park** which is ~10,000 ha of land owned by DOE that gives scientists the opportunity to investigate large-scale environmental issues.

ESD is a leader in digital archiving and distribution of environmental data. ESD's **Environmental Digital Information Resources** include:

- Atmospheric Radiation Measurement Program
- Carbon Dioxide Information Analysis Center
- Geographic Information Systems Laboratory
- ORNL Distributed Active Archive Center

ESD's **Laboratory Resources** give ESD scientist on-site capabilities to conduct a wide variety of research. Those resources include:

- Aerosol Research
- Aquatic Ecology Laboratory
- Molecular Biogeochemistry
- Plant Molecular Biology