National Ecological Observatory Network:
Opening new horizons in the science of large-scale ecology

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What is the effect of climate change on the future distribution of invasive species and diseases?

El Niño - Generated Sahel Dust Storms and Air Masses Transport Dust and Rust to the US
Invasive species

**Grand Challenge:** *Understanding and forecasting the distribution of biological invasions and their impacts on ecological processes and ecosystem services*

Example: invasive plant species in Hawaii are transforming 3-D structure

Past studies have documented impact of invasive species

Complexity and natural variability limit scaling local field studies to regional-scale

*Invasive Morella faya trees (reds) and native Metrosideros polymorpha trees (greens); Asner et al., 2008*
Connections: Biological Feedbacks at Continental Scales

Prediction of the North American Carbon Sink
Estimated using MODIS Algorithm Products”

- Dramatic inter-annual variation is not totally explained by physical factors (temperature, rainfall)
- Do biological processes determine/impact this variation?
- Can knowing life’s impacts on the system improve predictions? Inform carbon trading scenarios?
Enabling Cyberinfrastructure

Embedded CI

Web Portals

System CI

Collaboration Virtual Org.

Visualization
Challenge

• Centralized coordinated facility
  – Access, use, scheduling, funding

• Distributed infrastructure not under investigator control
  – Investigator experiments and instruments

• Remote data collection

• Open data policy

• New Organizational Structures
  – Program Assessment Committees, User groups

• Collaborations at many scales
  – Publications, professional “credit”, sociological change