Biodiversity monitoring programs and lessons for observing system design – The Long Term Ecological Research Network Example

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Fact Sheet

The Arctic Observing Network (AON)

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What is the Arctic Observing Network (AON)?

The AON is envisioned as a system of atmospheric, land- and ocean-based environmental monitoring capabilities— from ocean buoys to satellites—that will significantly advance our observations of Arctic environmental conditions. Data from the AON will enable the interagency U.S. government initiative--the Study of Environmental Arctic Change (SEARCH)--to get a handle on the wide-ranging series of significant and rapid changes occurring in the Arctic.

What is the rationale for developing an Arctic Observing Network?
The Long Term Ecological Research Network

• Site-based
• Began as a non-network
• Projects within sites
• Research Focus – 5 Core Areas

Tropical Carbon Cycling
Tropical forest at El Verde, Puerto Rico, site of the Luquillo Long-Term Ecological Research Program

The LTER Network
The Long Term Ecological Research (LTER) Network was created by the National Science Foundation (NSF) in 1980 to conduct research on ecological issues that can last decades and span huge geographical areas.

News/Opportunities

- Long-term research reveals causes and consequences of environmental change
  Wednesday, May 9, 2012 - 16:41
- LTER All Scientists Meeting, September 10-13, 2012 in Estes Park, Colorado
  Wednesday, May 9, 2012 - 16:41

Featured Site
Arctic LTER
The Arctic LTER research site is in the foothills region of the North Slope of Alaska and includes the entire Toolik Lake watershed and the adjacent watershed of the upper Kuparuk River, down to the confluence of these two watersheds. This area is
1) **Pattern and control of primary production** Plant growth in most ecosystems forms the base or “primary” component of the food web. The amount and type of plant growth in an ecosystem helps to determine the amount and kind of animals (or “secondary” productivity) that can survive there.

2) **Spatial and temporal distribution of populations selected to represent trophic structure** A population is a group of organisms of the same species. Like canaries in the coalmine, changes in populations of organisms can be important indicators of environmental changes.

3) **Pattern and control of organic matter accumulation in surface layers and sediments** The entire ecosystem relies on the recycling of organic matter (and the nutrients it contains), including dead plants, animals, and other organisms. Decomposition of organic matter and its movement through the ecosystem is an important component of the food web.

4) **Patterns of inorganic inputs and movements of nutrients through soils, groundwater and surface waters** Nitrogen, phosphorus and other mineral nutrients are cycled through the ecosystem by way of decay and disturbances such as fire and flood. In excessive quantities nitrogen and other nutrients can have far-reaching and harmful effects on the environment.

5) **Patterns and frequency of site disturbances** Disturbances often shape ecosystems by periodically reorganizing or destroying them, allowing for significant changes in plant and animal populations and communities.
1980 – 6 sites

2006 – 26 sites

Site selection based on research focus

Sub-optimal network, but “back-filling” by NSF
Loose organization of international LTER sites
Interaction though bylaws (based on U.S. LTER)
Information Management important focus
AON could be a model for science
Site Based, regional (biome) data representation
Common projects – Core Data
Monitoring Focus
Contribute to DataONE as a DUG Member

Latest News
Call for abstracts: Conference on Public Participation in Scientific Research
Posted: 05/11/2012
DataONE Users Group Meeting (Jul 1)

About
What is DataONE?
DataONE Organization
Working Groups
Partners
Communication

Participate
DataONE Users Group
Member Nodes
Internships
Developer Resources
Open Positions

Resources
Investigator Toolkit
Data Management Planning
Best Practices
Software Tools Catalog
Publications

Education
Training Activities
Education Modules
Graduate Courses

Data
Find
Contribute
Cite
Use
CUAHSI enables the university water science community to advance understanding of the central role of water to life, Earth, and society. CUAHSI focuses on water from bedrock to atmosphere, from summit to sea and from the geologic past, through the present and into the future.
OCEAN OBSERVATORIES INITIATIVE (OOI)

Transforming Our Understanding of How the Ocean Works

The OOI is a long-term, NSF-funded program to provide 25-30 years of sustained ocean measurements to study climate variability, ocean circulation and ecosystem dynamics, air-sea exchange, seafloor processes, and plate-scale geodynamics. The OOI will enable powerful new scientific approaches for exploring the complexities of Earth-ocean-atmosphere interactions, thereby accelerating progress toward the goal of understanding, predicting, and managing our ocean environment. The OOI can foster new discoveries that will, in turn, move research in unforeseen directions. To learn more, click here.
Similarities – and Differences?

- LTER, NEON are Site – based – projects within Sites
- CUAHSI, OOI, DataONE GEON and AON are Project based?
- Interoperability between LTER, NEON, DataONE
- For LTER – Coordination / Support through the LTER Network Office
Structure of LTER

- Core funding as NSF research program – peer review of site science decides continuity
- By–laws as basis for government
- Executive Board for day–to–day business
  - Composed of rotating subset of full Science Council
- Science Council as Governing Body – meets to discuss science, approve business
  - Composed of Lead PI of each LTER site (peer interactions)
- Committees of Science Council for specific focus
  - Information Management, Education, Publications etc.
- Information Management large part of site infrastructure – 10% – 50% of site funding
LTER Priorities for Science Support:

- Planning Support – Research Prospectus and Strategic Planning Working Groups
  - Top-down planning and synthesis
- LTER Science Council (and Executive Board)
  - Planned synthetic efforts
- LTER Working Groups and Post-doc projects
  - Bottom-up synthetic efforts
- Triennial LTER All Scientists Meetings
  - Major Network-wide synthesis
LTER Network Planning

The Decadal Plan for LTER

BioScience

Long Term Ecological Research Network

Strategic and Implementation Plan
Long-term Ecological Research Network (LTER):
Research and Education
2011

Lead Institution
University of New Mexico (Network Office)

Partner Institutions
- Arizona State University (CAP)
- Cary Institute of Ecosystem Studies (BESS)
- Colorado State University (SGS)
- Cornell University (HFR)
- Florida International University (FCE)
- Harvard University (HFR)
- Kansas State University (KNZ)
- Michigan State University (KBS)
- New Mexico State University (JRN)
- Oregon State University (AND)
- University of Alaska (BNG)
- University of California-Santa Barbara (MCR, SBC)
- University of California-San Diego (CCE)
- University of Colorado (MCN, NWT)
- University of Georgia (CWT, OCE)
- University of Minnesota (CDR)
- University of New Mexico (SEV)
- University of Puerto Rico (LUG)
- University of Virginia (VCR)
- University of Wisconsin-Madison (NTL)
- Marine Biol. Lab., Woods Hole (ARC, PAL, PIF)
Planning Support:

2006 – 2009
- Network Level Planning and Governance Meetings
- Decadal Plan Summary
- Integrative Sciences for Society and Environment Initiative

2009 Research Prospectus Working Groups

Initial Focus:
- Land and water use change
- Climate variability and extreme events
- Nutrient mobilization and species introductions
- Disappearing Cryosphere
  - 2009 Science Council Workshops and presentations
  - 6-8 Follow-on Planning Meetings

2012 Result:
  - BioScience Special Issue

2010 LTER Strategic Planning

- 2010 LTER Science Council Meeting Special Focus

2011 Result:
- LTER Strategic and Implementation Plan (SIP)
LTER Science Council Meetings
Focus on:

- Presentations related to a Network–level Science Theme
- Proposals to conduct Network–level science
- Education objectives
- Synthesis activities resulting in Network–level publications, Synthesis volumes
- Effective governance – Administration and LTER bylaws
LTER Working Groups
Working groups: What they accomplish

- They bring scientists from different disciplines, organizations and sites (including international) together

- They integrate site scientists and graduate students into LTER

- They provide impetus for collaborations with potential to attract larger funding
Jeanine Cavender-Bares (Cedar Creek): Working Group – Linking phylogenetic history, plant traits, and environmental gradients to understand community organization at local and continental scales

- For $9,895, – 2 meetings involving 25 total participants and produced:

- Willis, C; Cavender-Bares, J; Halina, M; Lehman, C; Reich, Peter; Keen, A; McCarthy, S – 2009. Community phylogenetic structure in Minnesota oak savanna is influenced by spatial extent and environmental heterogeneity – Ecography
- Funded NCEAS working group: $120,000 One graduate student and three post-docs are participating in this working group
- An Encyclopedia of Life workshop to train students in "megaphylogeny" assembly, held at the Field Museum in Chicago
- A software tool "Phylografter" (Richard Ree) for building well-documented "megaphylogenies" was also developed.
Katherine Suding (Niwot): Working Group – Functional response to resource change across LTER sites

For two awards, a total of $17,000 produced publications:


- Gough, L; Goss, KL; Cleland, EE; Clark, C.M.; Collins, Scott L.; Fargione, J. E.; Pennings, SC; Suding, K.N. 2011. Incorporating clonal growth form clarifies the role of plant height in response to nitrogen addition Oecologia (In Press)

Working Group content:

- Funding integrated into LNO budget
- Focus on *synthesis of data* to produce databases, publications, and follow-on activities and proposals
- Results from bottom-up science and collaboration
- New experiments and data collection *not* supported
- Call for Working Groups developed and decided by the LTER Executive Board (not LNO)
LTER All Scientists Meetings
2009 LTER ASM

The All Scientists Meeting (ASM) will once again be held at the YMCA of the Rockies in Estes Park, Colorado, September 10-13, 2012. Visit the website.

LTER Scientists, students and guests:

2009 All Scientists Meeting

The 2009 All Scientists Meeting was held at the YMCA of the Rockies in Estes Park, Colorado from September 13 to the 17th. The Program Committee, working with the LTER Network Office, created a program that by all accounts, formed an exciting and productive meeting. Six plenary speakers (Phil Robertson, Jim Collins, Dave Schimel, Bill Clark, Laura Ogden, Carol Brewer), including an evening plenary presentation on the pre-history and future of LTER (Dave Coleman and Henry Gholz). There were over 75 Working group meetings in seven working group sessions, over 400 posters, four evening mixers, and pre-ASM meetings for information managers, graduate students, education representatives, international attendees, and the LTER Executive Board.

Logistics for the meeting are handled by the LTER Network Office in collaboration with The Schneider Group, a company specializing in meeting organization. Special thanks to Luke Cola (VCR) and Kirstin Schwarz (BES) who designed the ASM Logo.

Working Group Organizers: Please add your final report and participant list to your working group information as well as presentations or other meeting materials. To do this, Log in on the ASM web page, go to your working group and go to the "Edit" tab to update the "Official Participants" and "Presentations" tab. Please submit your final report as a PDF - if you have problems converting your document to a PDF, please use the Contact tab on the main web page.

POSTERS:

There were more than 400 poster abstracts submitted for the meeting. Abstracts for additional posters put up during the meeting that were not included in the final meeting agenda can be seen on the "Posters" tab.

Note that you need to log in to this site with your LTER account information to update Working Group information or see your account information and schedule. If you don’t have a LTER account, follow the instructions from the Login sidebar to request a new account.

717 Participants

417 Posters

9 Plenary presentations (recorded)

75 Working Group Meetings

7 Ad-hoc Working Groups

Final Reports from almost 100% of meetings
Plans for:

- 800 Participants (15 LNO funded/site)
- 6 Plenary Talks including NSF AD John Wingfield
- NSF and LTER Town Halls
- 80+ Working Groups
- 450 Posters
- Beta release of LTER NIS
- Release of new LTER Public Website
From 2000 to 2009
- LNO coordinated 219 research, planning, and governance meetings
- More than 4,200 participants
- Decadal Plan
- 2009 All Scientists Meeting

Since 2009:
- 56 Training and Synthesis Working Groups
- More than 627 participants
- 21 Publications
- 12 Manuscripts
- 9 Proposals
- 7 Websites or databases
- 25 Posters or scientific meeting presentations
- ESSI, SIP Planning Documents
- LTER BioScience edition

2012 – 15 Working Groups, 3 Post-doc Projects, All Scientists Meeting