Director of Science Policy Report

It's Time for a Long-Term Agroecosystem Research Network

by Karl Glasener

Almost 30 years ago, the National Science Foundation (NSF) established the visionary Long-Term Ecological Research (LTER) Network program (www.lternet.edu). This coordinated network of 26 field sites representing diverse natural ecosystems supports fundamental ecological research that requires long time periods and large spatial scales. It's high time that the successful LTER model be expanded to the nation's agricultural lands (agroecosytems), which make up more than 900 million acres, or about 41% of the U.S. land area!

Of particular interest is acquiring an understanding of the more than 400 million acres of intensively managed croplands in the Corn Belt, Great Plains, and other regions. Understanding the ecological phenomena associated with agroecosystems over long temporal and broad spatial scales is critical for land managers to achieve sustainable yields while minimizing environmental impacts. Establishing a system of Long-Term Agroecosystem Research (LTAR) sites is critical as the managed ecosystems have impacted and will continue to impact the so-called natural ecosystems.

Doesn't USDA Have an LTAR Program?

It is true that the USDA Cooperative State Research, Education, and Extension Service, now the National Institute of Food and Agriculture (NIFA), did issue a Request for Applications (RFA) for fiscal year (FY) 2009 calling for proofs of concept for a proposed Sustainable Agroecosystems Science Long-Term Agroecosystem Program (SAS-LTAP). Because of funding constraints, however, the agency could only fund five proofs of concept, each at $200,000 over two years. From the five, one LTAP site will be selected and funded at $1 million, provided funding is available.

And that's the kicker: "provided funding is available." Granted, the

Research & Education Opportunities

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Environmental Synthesis Center

Program Solicitation, NSF 10-521

This solicitation will establish a new environmental synthesis center to stimulate research, education, and outreach at the interface of the biological, geological, and social sciences. The center will foster synthetic, collaborative, and cross-disciplinary efforts to understand and predict the complex interactions among ecological populations, communities, and ecosystems; the geophysical environment; and human actions and decisions that underlie global environmental change. It will play a pivotal role in forecasting adaptive responses to environmental change and understanding sudden shifts in dynamic systems.

The center will also directly involve policymakers, managers, and conservation efforts and will educate an informed citizenry. It will be international in its scope, addressing the most pressing challenges posed by global environmental change. The center represents a new effort, based on NSF's substantial investments in ongoing synthesis activities and is not intended to extend or duplicate these activities. The Biological Sciences Directorate expects this center to lead the next generation of synthesis activities.

Preliminary Proposal Deadline (required): 23 Mar. 2010. Full Proposal Deadline: 14 July 2010. Cognizant Program Officer(s): Saran Twombly (703-292-8133 or stwombly@nsf.gov) and Kathleen C. Weathers (703-292-8227 or kweather@nsf.gov). Details: www.nsf.gov/pubs/2010/nsf10521/nsf10521.htm.

Agriculture and Food Research Initiative (AFRI) competitive grants program through which SAS-LTAP is funded did get a $62 million, or approximately 30%, increase in funding for FY 2010, bringing total funding to $262 million. However, it is becoming increasingly apparent that the FY 2010 AFRI RFA will fund just a handful of research areas in line with President Obama's priorities, including climate change, food security, renewable energy, and the environment. It is therefore unlikely that individual programs such as SAS-LTAP will see a significant bump in funding. At the time of this writing, the AFRI RFA had yet to be released for FY 2010, which makes funding predictions a bit risky. Only time will tell.

Focus on Impacts of Managed Ecosystems

Shortly after his election victory, President Obama and his cabinet began planning to address water quality[1] impairment in some of the nation's major watersheds, including the Chesapeake Bay and Mississippi River Basin.

At a recent meeting with USDA leaders, one official said that voluntary measures such as USDA's recently announced Mississippi River Basin Healthy Watersheds Initiative, which provides a $320 million investment over four years to support programs in 12 states[2] to help farmers voluntarily implement conservation practices that mitigate nutrient runoff, improve wildlife habitat, and maintain agricultural productivity, represents a last chance to demonstrate that voluntary measures can in fact lead to improved water quality. He added that regulation was the next step.

Last May, Obama, via Executive Order 13508 (Chesapeake Bay Protection and Restoration),[3] directed federal agencies to submit draft reports to a federal leadership committee to address key challenges in the Chesapeake Bay and its watershed and recommend actions for addressing them. It is likely that regulations may be forthcoming in the Chesapeake Bay watershed as well.

An LTAR Network addressing the agroecosystems that have a significant impact on both of these watersheds would provide the data needed to determine if voluntary and/or regulatory measures would result in improved water quality. Otherwise, land managers may have regulations and associated costs imposed on them, which at the end of the day, do not result in cleaner water.

Where Do We Go from Here?

During the past year, ASA, CSSA, and SSSA began educating policymakers about and advocating for a multi-agency (USDA, NSF, USEPA, and Department of Energy Office of Science) LTAR Network representing America's 10 major agroecosystems[4] comprising more than 41%, or 900 million acres, of the U.S. land area. We propose a multi-agency approach because funding for the SAS-LTAP is unlikely to increase significantly. In addition, NSF has almost 30 years experience running the LTER Network, which could be applied to an LTAR Network. Finally, the Department of Energy Office of Science, like NSF, receives strong support from the administration and Congress and has a history of conducting carbon sequestration and other related research. We propose that the LTAR:

- provide a comprehensive understanding of emissions and sequestration as well as strategies for mitigation of greenhouse gases (CO_2, CH_4, N_2O) from agriculture;
- lead to the development of adaptation strategies to climate change;
- provide economic indicators of success; and
- enhance agroecosystem goods and services, while limiting impact on air, water, and soil resources.

Complementing NSF's successful LTER Network, which is focused on understanding natural ecosystems, LTAR will also provide a better understanding of the interaction between natural and managed ecosystems and give land managers the knowledge they need to reduce adverse impacts on agroecosystems on the wider environment. Furthermore, LTAR will provide baseline data not yet available for the 10 major agroecosystems, which is needed to verify the integrity of agricultural offsets based on life-cycle analysis of agricultural systems.

During the coming year, the Societies will continue to explore opportunities to move a multi-agency LTAR Network concept forward. Essential to gaining traction will be bringing the agriculture and ecology communities together, which isn't always easy. Still, the Societies have successfully collaborated with the ecology community during the past decade, including holding joint congressional educational briefings on carbon sequestration and ecosystem services and joint congressional visits seeking support for the biological and ecological sciences. The agricultural community can and should work closely with the Ecological Society of America and other ecology-focused organizations in pursuit of an LTAR Network.

The nation's well-being fundamentally depends on the sustainability of agroecosystems, which provide food, fuel, feed, and fiber as well as ecological services. Creating an LTAR Network will generate the critical information needed to help sustain agricultural productivity while increasing agriculture's role in providing other environmental benefits including soil carbon storage, soil and water quality, and biodiversity and wildlife habitat.

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[1] President Obama has also recently begun dealing with air quality though we have yet to hear his administration refer to soil quality.

[2] Arkansas, Kentucky, Illinois, Indiana, Iowa, Louisiana, Minnesota, Mississippi, Missouri, Ohio, Tennessee, and Wisconsin.

[3] View Executive Order 13508 at www.gpoaccess.gov/presdocs/2009/DCPD-200900352.pdf.

[4] Northeast, Appalachia, Southeast, Delta States, Corn Belt, Southern Plains, Lake States, Northern Plains, Mountain, and Pacific regions. These 10 major agroecosystems were identified by experts within the Societies.