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ABSTRACTS

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Success Correlated with Resource Availability: Support for a Theory of Invasibility.

Mark A. Davis and Melissa Pelsor.

One of the goals of this study was to test a new theory of community invasibility. Fluctuating Resource Availability Theory predicts that invasibility of plant communities changes over time as the amount of unused resources fluctuates due to periodic changes in resource supply rates and/or rates of resource uptake by resident vegetation. The effects of competition and fluctuating resource availability on the invasive success of five plant species were studied in summer 1999 at Cedar Creek Natural History Area, Bethel, Minnesota. The experimental design consisted of eight replicates of four treatments—wet weeded, wet unweeded, dry weeded, and dry unweeded. Invasive success of species hand seeded into plots was measured by percent cover and success of transplants by survival. Resource availability (soil water, nitrogen, light), community productivity (neighbor biomass) and species richness were also recorded. Results showed that introduced plants had greater success in wet than dry plots and that competition reduced establishment in dry, but not wet, plots. Overall, results showed that community invasibility was strongly and predictably correlated with resource availability, particularly water, but not with productivity, diversity or disturbance as predicted by other hypotheses. The results support a new theory of community invasibility based on fluctuating resource availability.

Water, Sediment and Nutrient Fluxes at Patch and Landscape Scales within the Jornada Basin.

John Wainwright, Anthony J. Parsons and Athol D. Abrahams.

The overall aim of our research within the Jornada LTER is to understand the movements of water, sediments and nutrients within the Jornada Basin. In LTER III, we have focused upon a number of specific processes at the patch scale, particularly in the creosotebush shrubland on the Summerford Mountain bajada. We have characterized the processes of infiltration, flow hydraulics, rainfall interception, stemflow, sediment and nutrient losses from interrill areas, effects of animal disturbance on hydrologic processes, transmission losses in rills, and transport distances of nutrients in interrill flows using small plot experiments. A subset of these processes has also been investigated in the grassland and degraded grassland communities of the bajada. In addition, we have established two small monitored watersheds which have been used to characterize flow events and sample sediments and nutrient transfers in these events, and to provide validation data for small scale modelling. The focus of the work under LTER IV will be to elaborate the upscaling work commenced in the current project, and develop further our large scale hydrological model to look at transfers within and between landscape units. A particular consideration here will be the development of basin-wide parameters relating to topography, soils and vegetation.

Long-Term Ecological Research in the Patagonian Steppe.

O. E. Sala, M. R. Aguiar, J. M. Paruelo, R. A. Golluscio, A. T. Austin, M. Oesterheld and R. Fernández.

The research site is located in the temperate zone of South America at 45° 25' S and 70° 18' W. Mean annual precipitation is 141 mm and mean annual temperature is 8°C. The site has a long history of ecological research by the researchers of the University of Buenos Aires, starting in 1954 with the establishment of the first grazing enclosure. Currently, 7 researchers and more than 15 graduate and undergraduate students are conducting ecological studies which range from topics in ecophysiology, plant-animal interactions, population dynamics as well as community and ecosystem-level ecology. Funding for research is provided by National Research Council of Argentina, University of Buenos Aires, Inter-American Institute for Global Change Research, and the Antorchas Foundation. The National Institute for Agronomic Technology (INTA) generously grants the use of facilities. Cooperation with the CPER-LTER site has grown during the last decade through grants from the National Science Foundation (NSF) and there has been a continuous exchange of researchers and graduate students over the last fifteen years. A data base of climate, aboveground net primary productivity (ANPP), vegetation inventory, soil water content, and satellite imagery have been maintained for more than twenty years.

Palmer LTER: Education Outreach and Sustained Partnerships.

K. S. Baker, D. S. Rawls, B. Dawson, W. Swanson and M. Wallace.

Partnerships incorporating teachers, educators, scientists and information management have produced varied outreach collaborations and products for the Palmer LTER. LTER schoolyard funds (1998 to present) support the effort to coordinate and build upon existing education opportunities and programs. LTER Education Workshops at the Biosphere and Kellogg Biological Station, augmented by the Palmer Education Workshop in Santa Barbara, focused development of a Palmer LTER Education program upon goals and guidelines for creating a long-term perspective in classroom science. In cooperation with the existing NSF program Teachers Experiencing Arctic and Antarctic Program (TEA), three teachers were trained in the LTER long-term focus during workshops and training sessions. These teachers were placed with the Palmer LTER for research field experience in Antarctica.

LTER Information Management: Paradigm Shift or Paradigm Stretch?

K. S. Baker, B. Benson, J. Brunt, N. Gardiner, D. L. Henshaw, E. Melendez, J. Porter, P. McCartney and D. Steigerwald.

As our understanding of data management broadens into information and knowledge management, both individual research sites and networks of sites are using a variety of methods to structure, process, synthesize and present data. The Long-Term Ecological Research (LTER) network, consisting of a network office and twenty-four research sites, incorporates an information management component at each site. The strategic vision for the LTER Network Information Management is "to promote ecological science by fostering the synergy of information systems and scientific research". A conceptual model for the Network Information System balances local-site science and network coordination through a flexible, modular design. An information management paradigm must address key elements such as to describe, sustain, integrate, inform, elicit, interface and visualize data. The LTER cooperative efforts provide a range of examples for these tasks including metadata standards, intersite databases, exchange formats, Web forms for data entry, and visualization.

Characterization of an urban to rural land-use gradient in the southern Appalachians.

Mitchell A. Pavao-Zuckerman.

Areas in the southern Appalachians are currently undergoing rapid growth and development, making them a prime area for the study of urban ecology. Urban development and population demographics is quite varied in this region, with some counties of western North Carolina having no urban population to those with greater than 60 per cent urban population. A study of the effects of urbanization on ecosystem processes in southern Appalachian riparian forests was initiated in the winter of 1999/2000. Twelve sites were located in western NC along a transect (45 x 15 km) running from Asheville, NC to the National Forest lands to the south-west. This research uses a framework proposed by other scientists for the design of studies of ecology along urban-rural gradients. This research framework accounts for: (1) factors constituting urbanization, (2) the effects of urbanization on biota and the environment, and (3) the resultant effects on ecosystems. Presented here will be soil and geographical data used to characterize the study sites in terms of degree of urban land use. Additionally, research examining leaf litter decomposition and the use of environmental indices to assess the health of urban ecosystems will be discussed.

Palmer LTER: Potential Ecological Impacts from Variations in Polar Climate.

R. C. Smith and Palmer PI's.

Polar regions are unique in that sea ice, a dominant and distinguishing characteristic of Southern Ocean marine ecology, forms a range of habitats for animals as well as extensive and varied surfaces for algal and microbial populations. The Palmer Long Term Ecological Research (PAL) program focuses on understanding the ecological role of sea ice with the primary objective being to gain a general understanding of the physical and climate controls on interannual sea ice variability, the effects of this variability on trophic interactions, and the biogeochemical consequences thereof. Climate research to date shows the western Antarctic Peninsula (WAP) region has experienced a statistically significant warming trend during the past half