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ALDRICH, PRESTON R.,* JAMES L. HAMRICK, and GARY KOCHERT. University of Georgia, Athens, GA 30602. Genetic neighborhoods, unstable sources and sinks, and the fragmentation of tropical tree populations.

This study examines the effects of forest fragmentation on genetic neighborhoods and population dynamics of the tropical tree *Symphonia globulifera* (Guttiferae) through the use of microsatellite markers. Adults, saplings, and seedlings were mapped and collected from a 38-hectare plot of disturbed forest and from two study plots in adjacent continuous forest in southern Costa Rica. Three microsatellite markers were developed for *S. globulifera* that provide a 99.6% exclusion probability for the assignment of dispersed seedlings to parent-pairs in the study area. Gene flow rates into patches were exceptionally high, as high as 92% for one patch, with seed dispersed by bats a more important source than pollen dispersed by hummingbirds. This demonstrates that genetic neighborhoods of 1-ha patches can extend well beyond physical patch boundaries. However, adult fecundity distributions were highly skewed, with a few pasture adults contributing most of the patch recruitment. Further, many of the seedlings arose through selfing, possibly due to territorial behavior of hummingbirds at large floral displays of pasture adults. Finally, both seedling recruitment and sapling mortality were higher in patches than in continuous forest. Together, these factors suggest a Source-Sink relationship which appears to be intrinsically unstable due to poor seedling survivorship in pastures.

ALKAFF, HUDA F. University of Georgia, GA 30602 USA. Dagger handles and the African black rhinoceros: A conservation problem in Yemen.

For generations, the horn of the endangered African black rhinoceros *Diceros bicornis* has been used for dagger handles in Yemen; however, a government ban on the trade of rhino horn has been implemented. Educational outreach efforts have been organized and extended to isolated villages. Nonprofit volunteer organizations are promoting and marketing alternatives, such as plastic and cattle horn. An environmental education program illustrating this problem is being developed for use in elementary schools. These efforts have resulted in a significant decline in the illegal trade of rhino horn in Yemen. This presentation reports on results derived from an ongoing study to assess the cultural, environmental, and economic aspects of conservation efforts.

ALKAFF, HUDA F. University of Georgia, Athens, GA 30602 USA. A GIS-based study of the impacts of sea-level rise on coastal wetlands at the Sapelo Island complex, Georgia, USA.

Coastal wetlands provide numerous ecological functions and protect urban areas from saltwater intrusion and storm surge. Because these areas occur at the land-sea interface they are strongly influenced by changing sea-level. Hence, it is of interest to characterize the effects of sea-level rise anticipated to accompany global climate change in the next century. I used a geographic information system (GIS) to define the impacts of sea-level rise on coastal wetlands. This study presents a quantitative analysis of both perimeter and interior wetland loss and/or gain of the Sapelo Island complex, during the period from 1920 to 1993, due to sea-level rise, river deposition and land erosion. Results indicate significant perimeter and interior changes (loss and/or gain) in the coastal wetlands of the Sapelo Island complex. This study is a prerequisite for the quantification and prediction of responses of coastal wetlands to sea-level rise.

ALLEN, ANDREW S.,* LORAINE U. KOHORN, DAVID T. TISSUE, BOYD R. STRAIN, and WILLIAM H. SCHLESINGER. Duke University, Durham, NC 27708 USA. Microbial biomass and net N mineralization in an old field exposed to elevated CO_2.

When ecosystems are exposed to elevated CO_2, pools of soil microbial biomass may increase, thus immobilizing soil nutrients. We tested this hypothesis by measuring microbial biomass and net N mineralization in plots of a North Carolina (USA) old field that were exposed to elevated (660 ppm) or ambient CO_2 (360 ppm) using open top chambers. Microbial biomass and net N mineralization were not significantly affected by elevated CO_2 ($P > 0.05$). When the experiment began, microbial biomass N and net N mineralization were not correlated with initial plant biomass ($r^2 = 0.02$, $P = 0.62$; and $r^2 = 0.01$, $P = 0.74$, respectively). However, after two growing seasons, microbial biomass N was correlated with initial plant biomass ($r^2 = 0.34$, $P = 0.01$), while net N mineralization was negatively correlated with initial plant biomass ($r^2 = 0.34$, $P = 0.01$). This suggests a delayed link between plant productivity and net N mineralization: In plots that began with high plant biomass, the eventual incorporation of large amounts of fresh plant litter (with high C:N ratio) caused increased microbial N immobilization, and thus net N mineralization decreased relative to plots that began with low plant biomass.

ALLEN, BRUCE P.,* ERIC F. PAULEY, and REBECCA R. SHARITZ. Savannah River Ecology Laboratory, Aiken, SC 29802 USA. Six years of seedling dynamics in a disturbed southeastern floodplain forest.

Hurricanes influence forest regeneration patterns by altering environmental conditions at the ground level. This study has focused on seedling dynamics in an old-growth floodplain forest following Hurricane Hugo. Seedling plots were established in bottomland hardwood and slough forests to annually monitor seedling density as influenced by microsite, canopy condition, and vegetative competition. In bottomland hardwood plots, densities of large seedlings (>30 cm tall), such as *Asimina triloba, Ilex,* and *Acer rubrum,* have been quite stable while those of small seedlings have fluctuated considerably. Ranks of species' densities have also been relatively stable and show little evidence of disturbance-induced shifts. Dominant canopy species in bottomland hardwoods are uncommon in the seedling layer, particularly *Pinus taeda.* In wetter slough plots, seedling densities peaked in 1993, an especially dry year. In subsequent years, growing season floods nearly eliminated the large cohorts of new germinants in sloughs (especially *Nyssa* and *Fraxinus*). Hydrology, rather than disturbance, appears to remain the dominant factor influencing recruitment.

ALLEN, CRAIG D.,* and DAVID SNYDERMAN. U.S. Geological Survey, Jemez Mts. Field Station, Los Alamos, NM 87544 USA. Spatial patterns of prehistoric and historic fires in the Jemez Mountains, New Mexico.

We reconstructed fire occurrence patterns over the past several hundred years across the Jemez Mountains to determine spatial patterns in such parameters as fire frequencies, seasonality, and extent. Using a GIS, we mapped 5181 historic fires in the Jemez Mountains for the period 1909-1995 from administrative records of local land management agencies. Fire scars were sampled and mapped at a network of 24 sites (35 subsites) across the Jemez Mountains, yielding 3500 prehistoric fire dates from over 500 sampled trees, snags, and logs extending back 500 years. We used the fire-scar data to develop fire histories at multiple spatial scales, building up from individual trees (samples) to the 35 separate subsites and ultimately the entire mountain range (all sites). Significant spatial variation in past fire regimes is evident, depending upon such local factors as vegetation/fuel type, topography, and land use history. Fire frequencies and area burned have been greatest in mid-elevation ponderosa pine forests. Fire synchrony between sites is related to underlying topographic and vegetation patterns, as well as adjacency, resulting in patchiness in fire occurrence at all spatial scales. However, prior to ca. 1900 fires were often widespread and some years most of the Jemez area apparently burned.

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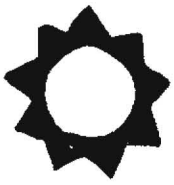

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