MEETING

Land Management in the Anthropocene: Is History Still Relevant?

Incorporating Historical Ecology and Climate Change Into Land Management; Lansdowne, Virginia, 22–25 April 2008

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Ecological restoration, conservation, and land management are often based on comparisons with reference sites or time periods, which are assumed to represent "natural" or "properly functioning" conditions. Such reference conditions can provide a vision of the conservation or management goal and a means to measure progress toward that vision. Although historical ecology has been used successfully to guide resource management in many parts of the world, the continuing relevance of history is now being questioned. Some scientists doubt that lessons from the past can inform management in what may be a dramatically different future, given profound climate change, accelerated land use, and an onslaught of plant and animal invasions.

To address this issue, the U.S. Forest Service (USFS) and The Nature Conservancy (TNC) convened a weeklong workshop to (1) synthesize perspectives and approaches to incorporating historical ecology, natural variability, and future conditions into conservation and management of natural resources, and (2) provide leaders and decision makers with a more refined understanding of how a knowledge of history can inform their management decisions and actions.

The workshop attracted policy makers, ecologists working at the interface of science and management, experts in the science and application of historical ecology, and vegetation modelers. Participants represented the USFS, TNC, NatureServe, the Aldo Leopold Wilderness Research Institute, the U.S. Geological Survey, the Wilderness Society, Colorado State University, Oregon State University, and Oak Ridge National Laboratory. The workshop began with a review of past challenges and approaches and segued to case studies and an overview of current issues. A smaller working group closed the workshop with a day devoted to synthesis and planning.

Presentations and deliberations made it clear that it is no longer defensible to use historical information to establish static targets for restoration, conservation, or land management in a rapidly changing world. Approaches that assume "stationarity"—the idea that environments vary about some constant, long-term average—are no longer appropriate. They should be replaced by models that build from a historical context, using ecological responses to past environmental variability to shed light on the range of potential responses to future conditions. Historical trajectories of pattern and processes in ecosystems and landscapes should be integrated into projections of future climate, land use, and invasive species spread.

The workshop gave birth to several new initiatives. One working group is synthesizing workshop conclusions into briefing papers and talking points for agency leaders. Another is focusing on the development of a series of technical reports that will help to define proper standards for the use of historical information in ecological restoration and land management. Finally, efforts are under way to use national forest pilot projects within the U.S. Climate Change Science Program to help determine how to tie historical ecology to resource management practices that can accommodate climate change.

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BOOK REVIEW

Planetary Ring Systems

Ellis D. Miner, Randii R. Wessen, and Jeffrey N. Cuzzi
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Life used to be simple for ring scientists. Since the time of Galileo, anyone with even the most basic telescope could see that Saturn was the only planet with rings. Saturn's ring system is clearly bright, broad, and bland. James Clerk Maxwell proved that the rings could not be solid, and basic spectroscopy showed that they are composed primarily of water ice. There is also a clear connection between the location of the gap between Saturn's A and B rings and an orbital resonance with Mimas, one of Saturn's moons. No other connections between ring locations and moons were known.

The serendipitous discovery of Uranus's ring system by stellar occultation in 1977 changed everything. Uranus has a set of narrow, optically thick, sharp-edged rings. Such a system ought to have been impossible because the combined effects of interparticle collisions and Poynting-Robertson light drag, the process whereby a particle reemits incident radiation nonisotropically, should have caused the rings to spread over a timescale of at most a few million years. While ring dynamicists wrestled with the problem of finding a mechanism to confine a narrow ring, the application of the stellar occultation technique to Neptune suggested the presence of ring arcs rather than complete rings.

Even as the ground-based discoveries continued apace, successive in situ observations of the giant planets of the outer solar system by the two Voyager spacecraft revolutionized the subject. First, Voyager 1 discovered dusty rings at Jupiter in 1979. Then, the flybys of Saturn by the two spacecraft in 1980 and 1981 utterly transformed our knowledge of the ringed planet. The flybys revealed a ring system that was anything but bland. The striking images showed features as diverse as multiple ring structures; radial spokes; an apparently braided ring with a "shepherding moon" on each side to keep ring particles from straying; incomplete rings; and vast, diffuse rings. The spacecraft discoveries continued with the Voyager 2 flybys of Uranus in 1986 and Neptune in 1989.

After an extended infancy, the success of the Voyager flybys meant that the science of planetary ring systems was rapidly approaching adolescence. Now we are in the Cassini era when a spacecraft in orbit around Saturn has the opportunity to observe new phenomena and reveal changes in the ring system, thereby constantly testing our understanding. The subject has yet to reach maturity, but these data—combined with continuing ground- and space-based observations of all of the ring systems in the solar system—mean that the time is right for an overview of planetary ring systems. This book serves as a perfect introduction to the subject.