Filling Generation Gaps

When an English fertilizer tycoon subdivided land in the mid–19th century to test inorganic fertilizers against old-fashioned manure, he surely never imagined that ecologists today would revere his modest grass plots for the insights they have afforded into plant ecology. But as Pickrell discusses in a News story (p. 625) in this special issue, Park Grass and other experiments are emblematic of the scientific riches derived from studying ecosytems across the long march of time.

In a well-designed ecological research or monitoring program, the value of the results is unlikely ever to reach an asymptote. Most habitats are subject to irregular perturbations, ranging from catastrophic events such as storms and floods to local disturbances such as the death of a single tree. Illustrating the rewards of gleaning patterns over many years is the Long Term Ecological Research Network, which has generated eye-opening and politically relevant findings in its 2 decades of operation, as Kaiser describes in a News story (p. 624). Plenty of surprises emerge from long-term data collection. For example, in a Report (p. 690), Packer *et al.* describe the egalitarian nature of female African lion society, a conclusion that would have been impossible to reach without data from hundreds of lions over several decades.

Although systematic record-keeping for the purposes of ecological research was a 20th century innovation, it is possible to obtain insights into earlier patterns from historical records. Using such information, Jackson *et al.* (p. 629) examine the history of human influences on life in coastal waters, concluding that much of today's community structure was shaped by human impacts that occurred centuries or even millennia ago. Their analysis suggests that no coastal ecosystem now resembles its pristine precivilization state.

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Populations of many animal species experience cyclical fluctuations that have been the subject of intense interest since ecology became a recognized branch of science. Ecologists have been able to reconstruct time series for many species spanning unbroken periods deep into the 19th century. The development of statistical techniques has rejuvenated this field, as set out by Bjørnstad and Grenfell (p. 638). Inchausti and Halley (p. 655) describe a new electronic resource, the Global Population Dynamics Database, which contains time-series data for more than 1800 animal species.

Long-term research increasingly complements ecological monitoring. Brown *et al.* (p. 643) document the interface between experiment and observation in southwestern U.S. deserts, whereas Rees *et al.* (p. 650) consider the advances made in core areas of plant ecology using methodology rooted in the Park Grass tradition. And as Zimmer describes in a News story (p. 627), a novel experiment in scientific cooperation in the Red Sea aims to combine monitoring with political healing.

Following a trail blazed by Rachel Carson nearly half a century ago, ecologists are ever more concerned with forecasting ecological patterns. Clark *et al.* (p. 657) explore the potential fruits of forecasting decades into the future. As ecologists decipher past impacts and predict future impacts of humanity on long-term ecological processes, their achievements must be translated into unassailable advice for policy-making.

–ANDREW SUGDEN AND RICHARD STONE

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