Abstracts, Reviews, and Meetings

To develop the following abstracts, the editorial staff searches more than 100 scientific journals, professional and organizational newsletters, conference proceedings, and other resources for information relevant to ecological restoration practice and research. Please send suggested abstract sources to the editorial staff (ERjournal@aesop.rutgers.edu).

Grasslands

Spatial Pattern Enhances Ecosystem Functioning in an African Savanna. 2010. Pringle, R.M. (Society of Fellows, Harvard University, Cambridge MA, rpringle@fas.harvard.edu), D.F. Doak, A.K. Brody, R. Jocqué and T.M. Palmer. *PLoS Biology* 8(5):e1000377.

In the semiarid savannas of East Africa, termites of the genus *Odontotermes* frequently build mounds in uniformly spaced arrangements. These are hotspots of primary productivity that support increased abundance and biomass of insects and insect-eating predators (secondary and tertiary productivity). Because of the even spacing, all points in the savanna are relatively closer to the nearest mound than they would be if the mounds were randomly spaced. The result is enhanced ecosystem-wide productivity. These observations support model predictions that regular spatial patterns emerging from local interactions among organisms may positively affect fundamental ecosystem functions.

Woodlands

Forest Management and Biodiversity Conservation Based on Natural Ecosystem Dynamics in Northern Europe: The Complexity Challenge. 2009. Kuuluvainen, T. (Dept of Forest Ecology, University of Helsinki, PO Box 27, FIN-00014, Helsinki, Finland, timo.kuuluvainen@helsinki.fi). *Ambio* 38(6):309–315.

This review demonstrates a basic fallacy in the prevailing north European forest management model, which is based on the misconception that the boreal forest is regulated by stand-replacing disturbances. This has justified clearcut timber harvesting and growing of even-aged stands. However, recent research reveals unexpectedly complex ecosystem structure and dynamics and the important role of non-stand-replacing disturbances in the boreal forest. Traditional management has severely reduced the forests’ structure as a consequence. Kuuluvainen concludes that, owing to the scarcity of protected forests in many parts of northern Europe, it is unlikely that native biodiversity can be sustained unless the forest management model moves toward one based on natural ecosystem dynamics and an understanding of forest complexity.

Paradise Lost: Climate Change, Boreal Forests, and Environmental History. 2009. Langston, N. (Nelson Inst for Environmental Studies and Dept of Forest and Wildlife Ecology, University of Wisconsin–Madison). *Environmental History* 14(4):641–650.

Langston’s address to the American Society for Environmental History discussed the interconnected human and ecological histories of boreal forests. Wind, fire, and insect activity have long shaped these disturbance-prone ecosystems, but anthropogenic influences (e.g., clear-cutting, pollution) have amplified the scale of disturbances, leading to increased fire intensities and worsening insect epidemics. Moreover, warming temperatures threaten to turn the forests from a major carbon sink to a major carbon source as soil-stored carbon compounds decompose faster. Although scientists argue for the critical importance of restoring and protecting the northern forests—or their essential processes—for their role in mitigating climate change, Langston suggests that it is mainly the language of forest management that is changing, not management practice itself.

Reduced Dispersal of Native Plant Species as a Consequence of the Reduced Abundance of Frugivore Species in Fragmented Rainforest. 2009. Moran, C. (Centre for Innovative Conservation Strategies, School of Environment, Griffith University, Nathan, Brisbane QLD 4111, Australia, +61 7 5494 3101, c.moran@griffith.edu.au), C.P. Catterall and J. Kanowski. *Biological Conservation* 142(3):541–552.

Using dietary data and field surveys of frugivore abundance, the authors assessed the potential of birds and bats to disperse seeds in fragmented Australian rainforest. Frugivores with reduced abundance were the only known dispersers of 27 of 221 native plant species studied. They were also important dispersers of plant species producing fruits more than 10 mm wide and members of the families Rubiaceae, Lauraceae, Myrtaceae, Meliaceae, Lamiaceae, and Vitaceae. Although dietary analysis suggested considerable potential for frugivore species to substitute for one another as seed dispersers, fragmentation has decreased...
the abundance of a suite of frugivores, which will likely reduce the dispersal of certain plant taxa and alter patterns of plant regeneration in Australian rainforest fragments.

On the Restoration of High Diversity Forests: 30 Years of Experience in the Brazilian Atlantic Forest. 2009. Rodrigues, R.R., R.A.F. Lima (LERF, Departamento de Ciências Biológicas, ESALQ–Universidade de São Paulo. Av. Pádua Dias, 11, CEP 13418-900, PO Box 9, Piracicaba, São Paulo, Brazil, raflima@esalq.usp .br), S. Gandolfi and A.G. Nave. Biological Conservation 142(6):1242–1251.

Most attempts to restore self-perpetuating forests in the Brazilian Atlantic Forest no longer begin with a predetermined idea of what to restore but rather seek to construct species-rich, self-sustaining communities that provide the desired ecosystem services. This paper discusses what has gone both right and wrong with restoration attempts, and lessons learned. It emphasizes the role of public policies and economic factors as well as ecological principles in optimizing restoration plans. The authors believe that the new restoration paradigm, increasing political will, and advances in restoration practice hold promise for the future of a complex, functional Atlantic Forest even though it will not be exactly like the one that is disappearing and much remains to be learned.

Wetlands

Exploring the Influence of Genetic Diversity on Pitcher Plant Restoration in Indiana Dunes National Lakeshore. 2009. Karberg, J.M. (Nantucket Conservation Foundation, 118 Cliff Rd, Nantucket, MA 02554), J. Marburger and M.R. Gale. Park Science 26(2):30–35.

Fragmentation of northern pitcher plant (Sarracenia purpurea) habitat raises questions regarding use of seeds or plants from isolated or distant populations in restoration projects. To evaluate whether distant plants might supplement decreasing populations at Indiana Dunes without compromising local population genetics or adaptations, the authors assessed the population genetics of pitcher plants in four western Great Lakes national park units (Apostle Islands, Isle Royale, Pictured Rocks, and Indiana Dunes). The Indiana population was genetically distant from the others. The authors recommend a controlled garden study to show whether these genetic differences are ecologically significant. Meanwhile, they suggest various habitat improvements to hasten pitcher plant recovery at Indiana Dunes.

Improved Wetland Mapping through the Use of Advanced Geospatial Technologies. 2009. Lang, M. (ARS Hydrology and Remote Sensing Lab, Beltsville MD), J. A wl, B. Wilen, G. McCarty and J. Galbraith. National Wetlands Newsletter 31(5):6–9, 30–31.

The authors discuss radar (radio detection and ranging) and LiDAR (light detection and ranging), remote-sensing technologies that greatly improve the detail and reliability of wetland mapping. Other radar and LiDAR applications include updating National Wetlands Inventory data, monitoring wetland changes, and monitoring key indicators of wetlands’ ability to provide ecosystem services on a watershed scale. In addition, hydrologic models and GIS have a place in the mapping toolkit. Hyperspectral data have potential use in mapping, but obstacles such as high cost and complex, underdeveloped image-processing techniques must be overcome.

Hybridization of Invasive Phragmites australis with a Native Subspecies in North America. 2010. Meyerson, L.A. (Dept of Natural Resources Science, University of Rhode Island, 1 Greenhouse Rd, Kingston, RI 02881, laura_meyerson@uri.edu), D.V. Viola and R.N. Brown. Biological Invasions 12(1):103–111.

This study is the first demonstration that native and non-native common reed (Phragmites australis) can hybridize. The authors grew field-collected rhizome fragments of four native and eight non-native common reed populations and manually cross-pollinated them in a greenhouse. Seed set occurred for 13 population pairs, but only when the pollen parent was non-native and the seed parent native, as confirmed by microsatellite marker analysis. The germination rate for hybrids was about 50%, roughly twice that of native populations. The results suggest a mechanism for further decline of the native reed in North America and a potential for formation of aggressive hybrid offspring.

Lakes, Rivers & Streams

Experimental Evidence for the Conditions Necessary to Sustain Meandering in Coarse-Bedded Rivers. 2009. Braudrick, C.A. (Dept of Earth & Planetary Science, University of California, Berkeley, CA 94720, xian@berkeley.edu), W.E. Dietrich, G.T. Leverich and L.S. Sklar. PNAS 106(40):16936–16941.

The authors designed channels in the laboratory to explore mechanisms at play in meandering rivers. After a stabilization period, they were able to maintain meandering with nearly constant channel width during repeated cutoff and regeneration of meander bends, while the channel migrated both laterally and downstream. Enhanced bank strength relative to sand and deposition of sediment in troughs between bars and the floodplain were necessary
for successful meandering. Although sinuosity was lower than in natural channels, the processes of bar growth, bank erosion, and cutoff were similar to those in gravel bed meanders in the field. These results can be used to test theories of meandering that model inner bank sediment accretion and predict channel width.

Making Way for Salmon: Fish Passage Barriers Removed from Streams. 2009. Ecklund, E. California Coast & Ocean 25(2):26–30.

Widening an old culvert in the Jacoby Creek watershed and regrading the stream above and below to raise the channel allowed coho salmon (*Oncorhynchus kisutch*) to return to their historic spawning grounds—70 in the first year and more than 200 in the second. Ecklund discusses how roads and other construction have created barriers to fish passage and how California counties and private landowners have collaborated to remove these barriers to restore salmon runs. Other projects have reduced runoff, restored wetlands, and initiated fish-friendly construction and maintenance practices.

Freshwater Crayfish Invasions: Former Crayfish Invader Galician Crayfish Hands Title “Invasive” Over to New Invader Spiny-Cheek Crayfish. 2009. Hirsch, P.E. (Dept of Ecology and Evolution, Limnology, Uppsala University, Husargatan 3, 751 23 Uppsala, Sweden, philipp.hirsch@ebc.uu.se). Biological Invasions 11(3):515–521.

Two non-native crayfish in Western Europe’s Lake Constance contrast sharply in their threat to biodiversity. An “old” invader, the Galician crayfish (*Astacus leptodactylus*), was introduced from Eastern Europe. Classified as “widespread but rare,” it has had no apparent adverse effects on ecosystem integrity or the two native crayfish. The spiny-cheek crayfish (*Orconectes limosus*), native to North America, is considered a “new and dangerous” invader, classified as “localized but dominant” in Upper Lake Constance. Spreading rapidly and a possible carrier of the crayfish plague caused by *Aphanomyces astaci*, it threatens the Galician crayfish as well as the native species. This illustrates that “non-native” need not mean “invasive,” and decisionmakers should beware of launching eradication measures against the wrong species.

Recovery of Endemic Dragonflies after Removal of Invasive Alien Trees. 2010. Samways, M.J. (Dept of Conservation Ecology & Entomology and Centre for Invasion Biology, University of Stellenbosch, Private Bag X1, Matieland, 7602, South Africa, samways@sun.ac.za) and N.J. Sharratt. Conservation Biology 24(1):267–277.

The authors studied dragonfly assemblages at South African river sites characterized by native riparian vegetation, invasive non-native trees (primarily black wattle, *Acacia mearnsii*), or clearance of non-native trees. They also recorded data on 22 environmental variables. Assemblage patterns reflected vegetation succession, the most significant determinants being percentage of bank cover and tree canopy cover. Dragonfly species richness and abundance were similar at native and restored sites. Widespread generalist dragonflies were the first to return after removal of non-native trees; endemic species followed only after recovery of indigenous vegetation. Two endemics, *Allocnemis leucosticta* and *Pseudagrion furcigerum*, could be used as indicators of the overall integrity of riparian ecology.

Coastal & Marine Communities

Mattole Integrated Coastal Watershed Management Plan: Foresight 2020. 2010. Mattole Restoration News 33:5–12.

This plan was developed by the Mattole Restoration Council, the Mattole Salmon Group, and Sanctuary Forest. It identifies ten priority issues facing Mattole restoration practitioners, such as climate change, invasive species, and water supply and quality. Specifically, it considers the low populations of adult coho (*Oncorhynchus kisutch*) and chinook (*O. tshawytscha*) salmon, and juvenile rearing habitat as the crucial limiting factor for salmonids; projected water use for the Mattole River and the impact of summer withdrawals; ownership density in the watershed; how human impacts can be reduced; the importance of grasslands and groundwater; and the status of sediment-reduction projects.

Using Ecological Function to Develop Recovery Criteria for Depleted Species: Sea Otters and Kelp Forests in the Aleutian Archipelago. 2010. Estes, J.A. (Dept of Ecology and Evolutionary Biology, Center for Ocean Health, Long Marine Laboratory, University of California, Santa Cruz, CA 95060, jestes@ucsc.edu), M.T. Tinker and J.L. Bodkin. Conservation Biology 24(3):852–860.

This recovery criterion for sea otters (*Enhydra lutris*) is based on their keystone role in kelp forest ecosystems. In the Aleutian archipelago, islands with abundant otters consistently had low sea urchin (*Echinoidea*) biomass and variable high kelp (*Laminariales*) densities; islands lacking sea otters had low kelp densities and variable high urchin biomass. The “phase state” (deforested or kelp dominated) was 95% predictable by the presence or absence of sea otters. Phase state is advantageous as a recovery criterion for otters because 1) the key organisms, kelps and sea urchins, being more abundant and less mobile than otters, are more easily and accurately sampled; 2) phase state is a discrete,
Managing Rock Outcrops to Improve Biodiversity Conservation in Australian Agricultural Landscapes. 2010, Michael, D.R. (Fenner School of Environment and Society, Hancock Bldg 43, Biology Place, Australian National University, Canberra, ACT 0200, Australia, +61 2 61250654, damian.michael@anu.edu.au), D.B. Lindenmayer and R.B. Cunningham. Environmental Management & Restoration 11(1):43–50.

After reviewing the geology and terminology associated with rock outcrops, the authors identify four management actions that can improve outcrop habitat, especially for reptiles, and help biodiversity conservation in agricultural landscapes. These are to preserve the physical condition of rock formations, monitor and manage vegetation structure and conditions to maintain thermally suitable environments, apply integrated pest animal control, and manage the surrounding matrix to enhance outcrop function and landscape connectivity. The same practices will not apply to all outcrops. For example, some may benefit from partial canopy removal, others from revegetation, and others from an appropriate fire regime.

Propagation & Introduction

Heat Increases Germination of Water-Permeable Seeds of Obligate-Seeding Darwinia Species (Myrtaceae). 2009. Auld, T.D. (Biodiversity Science, Dept of Environment & Climate Change (NSW), PO Box 1967, Hurstville, NSW 2220, Australia, tony.auld@environment.nsw.gov.au) and M.K.J. Ooi. Plant Ecology 200(1):117–127.

Darwinia shrubs are killed by fire, and regeneration after fire relies on germination from the seed bank. In trials with five Darwinia species endemic to fire-prone southeastern Australia, Auld and Ooi studied seed characteristics and the effects of heat on germination. Seeds of all species had moderate to high levels of dormancy even though their embryos are mature at release and able to imbibe water.
Germination rates increased with temperature up to about 100°C and decreased thereafter. The authors concluded that heat is an important factor in germination and suggested that soil temperature during fire strongly influences regeneration after fire. The role of other germination cues such as seasonal temperature is unknown.

Minimizing Genetic Adaptation in Captive Breeding Programs: A Review. 2009. Williams, S.E. and E.A. Hoffman (Dept of Biology, University of Central Florida, 4000 Central Florida Blvd, Orlando, FL 32816-2368, 407/823-4007, eahoffma@mail.ucf.edu). Biological Conservation 142(11):2388–2400.

This review covers 90 studies in which investigators used a strategy to minimize genetic adaptation to the captive environment in breeding programs. The strategies fell into several broad categories. Minimizing the number of generations in captivity was deemed most effective. In connection to this, the advantages and difficulties of delayed reproduction and cryopreservation were discussed. Other strategies, whose success depends on the species' natural history, are to minimize selection by breeding strategies or creating environments similar to natural habitat, or to fragment the population. Although the latter seems counterintuitive, selection pressure is weaker in small populations with low genetic diversity. If inbreeding is problematic, introduction of individuals from other populations is possible.

Control of Pest Species

Special Issue: Population, Community and Ecosystem Effects of Exotic Herbivores. 2010. Biological Invasions 12(2):297–419.

The case studies and reviews in this issue show that non-native herbivores, both vertebrate and invertebrate, are a global problem. They alter the distribution of dominant plants from the community to the ecosystem level, with significant consequences for biodiversity and ecosystem function. Authors document the effects of non-native deer and beaver in Argentina, ungulates in Canada, possum in New Zealand, and insects in eastern North America. A meta-analysis compares the effects of non-native vertebrate and invertebrate herbivores on native and non-native plants, finding that vertebrates preferentially feed on native plants whereas invertebrates prefer non-native plants. Together the papers reveal gaps in knowledge, especially how non-native herbivores facilitate non-native plants and other non-native animals (“invasional meltdown”). Although non-native herbivores have drastically modified native communities, it is not known whether some ecosystems are more prone than others to community shifts, and much more research is need in Africa and Asia.

Trained Dogs Outperform Human Surveyors in the Detection of Rare Spotted Knapweed (Centaurea stoebe). 2010. Goodwin, K.M. (Dept of Land Resources and Environmental Sciences, Montana State University, Bozeman, MT 59717, kgoodwin@montana.edu), R.E. Engel and D.K. Weaver. Invasive Plant Science and Management 3(2):113–121.

This study compared the ability of dogs and people to locate spotted knapweed (Centaurea stoebe) invasions in a Montana pasture. Trials were conducted in fall 2005 and spring, summer, and fall 2006. The same three tracking dogs trained to detect knapweed scent participated in all four trials with their handlers; three different, experienced, human surveyors took part in each trial. Dog and human accuracies for large (0.39–0.72 m³) infestations were similar, but dogs outperformed people 94% to 78% for medium-sized (0.106–0.141 m³) and 67% to 34% for small (0.004–0.053 m³) ones. Human precision was greater (100%) than dogs’ (94%). Dogs detected 80% of small targets at distances farther than 7.9 m, compared with humans’ 20%. Future studies could optimize search conditions for dogs.

How Much Is Europe Spending on Invasive Alien Species? 2010. Scalera, R. (riccardo.scalera@alice.it). Biological Invasions 12(1):173–177.

Increasingly, the European Commission is recognizing invasive non-native species as a major threat to biodiversity and cause of socioeconomic damage. Scalera analyzed funding for invasive species under the LIFE program and Framework Programmes for Research and Technological Development (FPs) from 1992 through 2006. Of nearly 300 projects funded for 132 million EUR, the majority were management oriented and funded by LIFE, whereas the greatest financial input was by the FPs, the main instruments for research funding. Both project number and total funding are trending upward, and for 2007–2013 increased funding is available for nature conservation projects. These numbers suggest the economic impact of non-native species invasions in Europe.

Fire Effects on Demography of the Invasive Shrub Brazilian Pepper (Schinus terebinthifolius) in Florida Pine Savannas. 2010. Stevens, J.T. (Dept of Plant Biology, Marsh Life Science Bldg, University of Vermont, Burlington, VT 05405, 781/630-3788, jenstevens@alumni.uvm.edu) and B. Beckage. Natural Areas Journal 30(1):53–63.

In this study of the fire response of low-density populations of Brazilian pepper (Schinus terebinthifolius) in an Everglades slash pine (Pinus elliottii) savanna, mortality of plants less than 0.1 cm in diameter was about 75% after burning but decreased sharply as plant size increased. Survivors exhibited reduced fecundity for at least two years,
Although those that resprouted grew rapidly the year after fire. A simulation indicated that a low-density population could be eliminated from pine savannas with a fire-return interval of four years or less, whereas individuals might persist for more than 50 years with a fire-return interval of eight years or more—supporting a frequent-fire regime to prevent Brazilian pepper invasion.

**Wildlife Habitat**

**Habitat Management of Little Terns in Japan’s Highly Developed Landscape.** 2009. Fujita, G. (School of Agriculture and Life Sciences, University of Tokyo, 1-1-1 Yayoi, Bunkyo-ku, Tokyo 113-8657, Japan, +81 3 5841 7542, go@es.a.u-tokyo.jp), K. Totsu, E. Shibata, Y. Matsuoka, H. Morita et al. *Biological Conservation* 142(9):1891–1898.

Populations of colony-nesting little terns (*Sterna albifrons*) are declining in Japan, largely owing to habitat loss. In this study at three sites along Tokyo Bay, the authors tested artificial nesting substrates and found that roughly 3 ha of rooftop with no vegetation cover could sustain more than 2,000 little tern nests. There was a strong relationship between colony size and hatching success. Egg predation rates were low when more than 100 nests were present and lower on areas covered with crushed concrete rather than with finer materials, which supported greater vegetation cover. Because terns readily change their nesting sites, the authors recommend establishing a network of protected sites within the dispersal range (ca. 40 km) of breeding terns.

**Ecological Dynamics**

**Evolution of an Invasive Phenotype: Shift to Belowground Dominance and Enhanced Competitive Ability in the Introduced Range.** 2009. Barney, J.N. (Dept of Plant Sciences, University of California, Davis, CA 95616, jbarney@ucdavis.edu), T.H. Whittle and A. DiTommaso. *Plant Ecology* 202(1):275–284.

This study examined how phenotypic traits related to competitive ability varied among 15 native (European) and 12 introduced (North American) mugwort (*Artemisia vulgaris*) populations. Seedlings of native mugwort emerged later than their introduced counterparts, and plants had 61% fewer ramets and 18% less biomass—although by the end of the 13-week study they averaged 27% taller. In competition experiments with Canada goldenrod (*Solidago canadensis*), the relative competition index was greater for introduced mugwort, and the goldenrod had greater belowground biomass and root-to-shoot ratios with native mugwort. These findings suggest that since its introduction, the North American mugwort has evolved from a largely aboveground competitor to an efficient belowground competitor characterized by many short ramets and more extensive root/rhizome networks.

**Kudzu (Pueraria montana) Invasion Doubles Emissions of Nitric Oxide and Increases Ozone Pollution.** 2010. Hickman, J.E. (The Earth Institute, Columbia University, New York, NY 10025, jeh2179@columbia.edu), S. Wu, L.J. Mickley and M.T. Lerdau. *PNAS* 107(22):10115–10119.

When the leguminous kudzu (*Pueraria montana*) fixes nitrogen, microbially mediated nitrogen transformations and emissions of NO and N₂O tend to increase, and NO emissions from soil are a strong determinant of ozone concentrations. Using data on the effects of kudzu invasion on greenhouse gas emission at three sites in Madison County, Georgia, the authors modeled the effects of kudzu invasion on air quality over a nine-state region of southeastern United States. The Georgia data showed a more than two-fold increase in NO emission. The regional model showed that extensive kudzu invasion would increase the number of high ozone events by up to 7 days each summer above the 10–20 days in a control scenario with no invasion.

**Highly Variable Spread Rates in Replicated Biological Invasions: Fundamental Limits to Predictability.** 2009. Melbourne, B.A. (Dept of Ecology & Evolutionary Biology, University of Colorado, Boulder, CO 80309, brett.melbourne@colorado.edu) and A. Hastings. *Science* 325(5947):1536–1539.

The role of stochastic (probabilistic) demographic and genetic factors in the variability of invasion spread rates was studied in identical experimental microcosms having discrete linked habitat patches, one of which was inoculated with 20 adult red flour beetles (*Trilobium castaneum*). The variance in distance spread ranged from 10 to 31 patches after 13 generations, suggesting that biological variability contributions greatly to the variance in spread. A standard stochastic model used to forecast spatial spread reasonably estimated the mean spread rate but greatly underestimated the variance. The authors concluded that forecast uncertainty due to biological factors such as founder effects is very high, and further study is needed to improve estimates of errors in prediction.

**Tools & Technology**

**Effect of Two Types of Tree Guards (with and without Weed Control) on Tree Seedling Establishment.** 2010. Ladd, B., J.R. Larsen and S.P. Bonser (Evolution & Ecology Research Centre, School of Biological, Earth and Environmental Sciences, University of New South Wales, Sydney, NSW 2052, Australia, +61 (0)2 93853863, s.bonser@unsw.edu.au). *Ecological Management & Restoration* 11(1):75–76.
This trial was conducted at Aldinga, South Australia, which has a Mediterranean climate. Both coreflute plastic tree guards and tree guards constructed from greenhouse plastic and bamboo stakes improved the establishment and increased the growth rates of pink gum (*Eucalyptus fasciculosa*) seedlings, but only when weeds were controlled. The authors conclude that the enhanced performance was due to microclimate amelioration by the tree guards, since there was no evidence of vertebrate herbivory or animal scats in any of the treatments, and that weed control should be given priority in any restoration project.

**Aerial Photography: A Rapidly Evolving Tool for Ecological Management.** 2010. Morgan, J.L. (Forest Sciences Center, University of British Columbia, Vancouver BC, jlmorgan@interchange.ubc.ca), S.E. Gergel and N.C. Coops. **BioScience** 60(1):47–59.

This paper summarizes the advantages and disadvantages of traditional aerial photography, digital aerial photography, and satellite imagery. It discusses photographic errors and their correction and the interpretation of aerial photographs—particularly automated analysis of digital imagery and new automated methods of image enhancement and classification. A table presents eight aerial photograph characteristics used in manual interpretation (such as color, size, or texture), the related ecological features (such as vegetation, land use, or biodiversity), and descriptions of corresponding automated techniques (contrast manipulation, variogram analysis, or gray-level co-occurrence matrix analysis). Automated methods permit consistent reconstruction of historic conditions from archived aerial photographs and can be important for characterizing the historic range of variability within ecosystems and developing strategies for managing ecological integrity.

**Traditional & Local Knowledge**

**Expanding Our Relationship with the Land.** 2010. Freedlund, A. **Mattole Restoration News** 33:1,15.

The Mattole Restoration Council’s Wild and Working Lands program is committed to incorporating the knowledge and perspectives of local First Nations peoples into restoration and land management in northern California’s Mattole River watershed. To this end, council staff and local community members participated in indigenous management field days and training, exploring and discussing land management from the coastal prairies to the headwaters forests. Participants gained a deeper understanding of native perspectives on land management and the need to work as a partner with the design and inclination of the landscape.

**Traditional Ecological Knowledge Trends in the Transition to a Market Economy: Empirical Study in the Doñana Natural Areas.** 2010. Gómez-Baggethun, E. (Social-Ecological Systems Lab, Dept of Ecology, c. Darwin 2, Edificio de Biología, Universidad Autónoma de Madrid, 28049 Madrid, Spain, erik.gomez@uam.es), S. Mingorría, V. Reyes-García, L. Calver and C. Montes. **Conservation Biology** 24(3):721–729.

This study measured traditional knowledge related to livestock farming and agricultural practices in eight rural communities linked to protected areas in southwestern Spain. The age span of informants, 19 to 90 years, covered the period during which the economy moved from one strongly dependent on local ecosystem services to a market economy with intensified production systems. The findings indicated a precipitous, nonlinear loss of traditional agricultural knowledge but retention of traditional knowledge related to livestock farming, an activity that maintains strong links with cultural identity and is allowed in protected areas. The authors suggest that traditional ecological knowledge can be preserved in protected areas, but local resource users must be included in management decisions.

**Evaluating Rapid Participatory Rural Appraisal as an Assessment of Ethnoecological Knowledge and Local Biodiversity Patterns.** 2010. Mueller, J.G. (Tufts University Biology Dept, 163 Packard Ave, Medford, MA 02155-5818, jocelyn.muller@tufts.edu), I.H. Bil Assanou, I. Dan Guíumbo and A.M. Almedom. **Conservation Biology** 24(1):140–150.

The authors compared rapid participatory rural appraisal (rPRA) with their own vascular plant surveys as methods for preliminary biodiversity assessment in three habitats bordering Park-W, Niger. Surveys and rPRA interviews agreed on measures of height and density of grasses and trees and tree richness, but correlated poorly on herb richness and Simpson’s diversity for trees and grasses. The local knowledge of men and women differed, perhaps because they collected plants for different uses. Overall, the rPRA process not only yielded useful data but helped create a common conservation language and build culturally grounded conservation programs. One week of interviews cost about US$3,000 and provided the information that would require a year of plant surveys at a cost of US$18,000.

**Cliff Roads: An Ecological Conservation Technique for Road Construction in Mountainous Regions of China.** 2009. Cao, S. (College of Soil and Water Conservation, Beijing Forestry University, No. 35, Qinhua Road, Haidian District, Beijing 100083, PR China, +86 10 6233 6097, shixiongcao@126.com), H. Ye and Y. Zhan. **Landscape and Urban Planning** 94(3–4):228–233.
In southwestern China, an ancient technique for constructing cliff roads is reducing environmental damage and conserving fragile cliff ecosystems. It combines cantilevered slab roads along the edge of the cliff with bridge structures where needed for additional support. Conventional construction, in contrast, requires extensive destruction of the cliff face and large volumes of fill material frequently obtained from great distances. This study of eight construction sites suggests that with the ancient technique, roads can be designed to withstand heavy traffic and natural hazards and perform as well as conventional roads, given traffic speed and vehicle weight restrictions like those for conventional bridges—at considerably less cost.

Climate Change

Assisted Migration of Plants: Changes in Latitudes, Changes in Attitudes. 2010. Vitt, P. (Dixon National Tallgrass Prairie Seed Bank, Chicago Botanic Garden, 1000 Lake Cook Rd, Glencoe, IL 60022, 847/835-8268, pvitt@chicagobotanic.org), K. Havens, A.T. Kramer, D. Sollenberger and E. Yates. Biological Conservation 143(1):18–27.

This paper discusses the rationale and plans for establishing seed banks to enable assisted migration of plants threatened by climate change, with special reference to the Dixon National Tallgrass Prairie Seed Bank, the goal being to mitigate extinction risks of as many species as possible. Criteria for seed collection are presented, and a flow chart suggests steps for determining, prioritizing, and developing collection strategies for target species. Seed banking has begun, but research is needed to suggest which species will most likely succeed under biotic and abiotic conditions different from those they came from, since novel combinations of climatic and edaphic conditions will arise.

For now, collect and bank the seeds; plan implementation when appropriate.

Managing for Climate Change within Protected Area Landscapes. 2009. Olson, D. (Irvine Ranch Conservancy, 4727 Portola Pky, Irvine, CA 92602, conservationearth@live.com), M. O’Connell, Y.-C. Fang J. Burger and R. Rayburn. Natural Areas Journal 29(4):394–399.

For various reasons, many species will be unable to migrate to more suitable environments as climate changes, although with assistance they may be able to adapt to new local conditions. This paper suggests that protected-area managers should focus on maintaining keystone habitats and habitat corridors along environmental gradients within the lands they manage and strive to ensure the diversity and resilience of the novel ecosystems that will likely emerge—an approach being applied in protected areas of California’s Santa Ana Mountains to provide favorable conditions for local adaptation. General guidelines for this strategy are offered, with examples from the Northern Santa Ana Range.

Management & Monitoring

Use of Abundance of One Species as a Surrogate for Abundance of Others. 2010. Cushman, S.A. (USDA Forest Service Rocky Mountain Research Station, 800 East Beckwith, Missoula, MT 59801, scushman@fs.fed.us), K.S. McKelvey, B.R. Noon and K. McGarigal. Conservation Biology 24(3):830–840.

To test the validity of the indicator species concept, the authors analyzed data on more than 70,000 observations of 55 bird species in a fragmented Oregon Coast Range forest. These were distributed among 1,046 point-count plots in 30 subbasins to ensure representative sampling. Species groups were defined by hierarchical cluster analysis based on abundance patterns, and by migratory status, micro-habitat association, seral stage association, and functional group. There were few significant indicator relationships at either plot or subbasin scale or for either grouping method, and even these few failed to explain the abundance of the remaining species. The authors concluded that the utility of indicators and similar surrogate approaches must be demonstrated, not assumed.

Birds as Suppliers of Seed Dispersal in Temperate Ecosystems: Conservation Guidelines from Real-World Landscapes. 2010. García, D. (Dept Biología de Organismos y Sistemas, Universidad de Oviedo, C/Rodrigo Uría s/n, Oviedo 33071, Asturias, Spain, danielgarcia@uniovi.es), R. Zamora and G.C. Amico. Conservation Biology 24(4):1070–1079.

The authors related the frequency of bird-dispersed seeds to habitat features and the abundance of fleshy fruits and frugivorous birds at sites in northern Spain’s Cantabrian forest, a Spanish Mediterranean shrubland, and Argentina’s Patagonian forest. In all three ecosystems, bird abundance predicted dispersed-seed occurrence throughout the landscape, including patches impoverished by anthropogenic disturbance. However, degradation affected seed-deposition patterns by decreasing woody cover or availability of fruit to attract birds. To manage seed dispersal for preserving or restoring ecosystems, the authors recommend considering the abundance of frugivorous birds as a surrogate for landscape-scale seed dispersal, woody cover and fruit availability as key features driving seedfall patterns, and birds as links connecting patches differing in habitat quality and degree of degradation via seed deposition.
Ecological Restoration of Cleared Agricultural Land in Gondwana Link: Lifting the Bar at ‘Peniup.’
2010. Jonson, J. (Gondwana Link, PO Box 5276, Albany WA 6332, Australia, +0427 190 465, justin@gondwanalink.org). Ecological Management & Restoration 11(1):16–26.

The Peniup Restoration Project in southwestern Western Australia is reestablishing a diverse plant system consistent with the heterogeneous mosaic of plant associations in the area and reflecting soil type and landscape position. It involved defining and mapping vegetation associations for each soil–landform unit, developing a direct-seeding machine to sow seed in a way that promotes structurally and spatially diverse plant communities, and establishing a 250 ha restoration project. The first year’s monitoring revealed seedling counts on track to achieve density goals, and establishment of 71 of 110 seeded species in the 0.79 ha sampling area. The author’s caveat is that large-scale restoration in a heterogeneous, species-rich landscape requires commitment to fine-scale planning and sophisticated implementation and sensitivity to initial conditions.

Foliar Morphology and Chemistry of Upland Oaks, Red Maple, and Sassafras Seedlings in Response to Single and Repeated Prescribed Fires. 2009. Alexander, H.D. (University of Florida, Dept of Botany and Zoology, 422A Carr Hall, Gainesville, FL 32611, hdalexander@ufl.edu) and M.A. Arthur. Canadian Journal of Forest Research 39(4):740–754.

This study was done after 0, 1, or 3 prescribed burns in eastern Kentucky, 2002–2007. The authors measured total leaf area, leaf mass per area, and leaf nitrogen content per area in seedlings of red oak (Erýthrobalanus spp.), white oak (Leucobalanus spp.), and their competitors red maple (Acer rubrum) and sassafras (Sassafras albidum). They found that low-intensity fires early in the growing season altered seedling leaf characteristics across species, but not in a way that favored oak seedlings over their competitors.

Pollination and Restoration. 2009. Dixon, K.W. (School of Plant Biology, University of Western Australia, Nedlands, 6009 Kings Park and Botanic Garden, West Perth WA 6005, Australia, kingsley.dixon@bgpa.wa.gov.au). Science 325(5940):571–573.

Although specialist pollinators are frequently the first casualties of ecosystem degradation, loss of generalist pollinators has the most pervasive effects on ecosystems. Dixon discusses the restoration and maintenance of pollinator services, covering topics from landscape disturbance and fragmentation to climate change. Research is needed to understand pollinator dispersability and migration into restored landscapes, what plant species can facilitate pollinator migration across landscapes, and what foraging patterns of pollinators will optimize plant reproductive outputs.

Reclamation & Rehabilitation

Use of Tree Shelters to Deter Predation of American Chestnut Seed on Reclaimed Mine Lands. 2010. Miller, J.O. (Dept of Forestry, University of Kentucky), C.D. Barton, R.L. Paris and F.V. Hebard. Journal of the American Chestnut Foundation 23(2):16–21.

The Forestry Reclamation Approach advocates use of loose-dumped mine spoils to create conditions conducive for establishment of native hardwoods, including American chestnut (Castanea dentata), on reclaimed surface mine sites. This study at such a site in Kentucky’s Cumberland Plateau evaluated the effect of Tubex tree shelters, which provide a growth-promoting environment and protection from wind and animals, on five chestnut species. Germination was 77%–84% with shelters but only 1%–12% without. Survival through the first growing season was 55%–75% with shelters and 7%–11% without. No nuts were found in many of the unsheltered holes, suggesting predation. The authors conclude that loose-dump techniques may be suitable for various chestnut genotypes, but direct seeding will require use of shelters.

Urban Restoration

Value of Artificial Habitats for Amphibian Reproduction in Altered Landscapes. 2010. Brand, A.B. (Dept of Biological Sciences, Towson University, 8000 York Rd, Towson, MD 21252-0001, abbrand@gmail.com) and J.W. Snodgrass. Conservation Biology 24(1):295–301.

A survey of 53 suburban and 18 forested wetlands in Baltimore County, Maryland, found that amphibians bred almost exclusively in stormwater ponds or artificial wetlands, perhaps because these had a more favorable hydroperiod for amphibian reproduction than other available wetlands. Although stormwater ponds with their often high load of pollutants can be an ecological trap, the authors suggest that with careful design and management they could provide important habitat for a variety of suburban wildlife.

Relationships between Avian Diversity, Neighborhood Age, Income, and Environmental Characteristics of an Urban Landscape. 2009. Loss, S.R. (University of Minnesota, Conservation Biology Graduate Program, 1980 Folwell Ave, St Paul, MN 55108, 612/624-4796, losssx004@umn.edu), M.O. Ruiz and J.D. Brawn. Biological Conservation 142(11):2578–2585.
Conservation of biodiversity in urban landscapes is of growing concern. Focusing on avian diversity in the Chicago metropolitan area, the authors found that avian species richness was negatively related to median housing age (the most important variable) and distance from natural preserves, and positively related to land cover heterogeneity and amount of undeveloped land. Densities of non-native and nonmigratory groups were higher in older developments, and richness of migratory species was lower. Per capita income was negatively related to richness of native species and positively related to non-native richness. The findings suggest that investigating both socioeconomic and environmental features of the built landscape may offer better understanding of influences on avian diversity in human-dominated landscapes than focusing on environmental features alone.

**Endangered Species**

**Mast and Weather Influences on Population Trends of a Species of Concern: The Allegheny Woodrat.** 2009. Manjerovic, M.B., P.B. Wood (Div of Forestry and Natural Resources, West Virginia University, Morgantown, WV 26505, pbwood@wvu.edu) and J.W. Edwards. *American Midland Naturalist* 162(1):52–61.

The authors investigated possible factors in the decline of the Allegheny woodrat (*Neotoma magister*) in north-central West Virginia. Using data from five years of trapping, they found a yearly decrease in numbers of total woodrats and adult females, but no significant changes for males or juveniles. Capture rates for adult females were related to the availability of hard mast the previous year and soft mast in the current year, suggesting that the energy requirement of reproduction makes breeding females most vulnerable to food limitation. Although numbers of summer-trapped juveniles increased with warmer temperatures the preceding winter, female summer-capture rates decreased with warmer spring temperatures, suggesting that the effects of warming may pose a threat to this species.

**Nonindigenous Species of the Pacific Northwest: An Overlooked Risk to Endangered Salmon?** 2009. Sanderson, B.L. (Northwest Fisheries Science Center, NOAA Fisheries Service, Seattle, WA, Beth.Sanderson@noaa.gov), K.A. Barnas and A.M. Wargo Rub. *BioScience* 59(3):245–256.

This literature review and discussion shows that the adverse effects of non-native fishes on Pacific salmon could equal or exceed those of habitat alteration, harvesting, hatcheries, and hydrosystem modification. In the Columbia River system alone, salmon en route to the estuary will encounter at least eight non-native predator and competitor fishes; altogether there are some 60 non-native fishes in the Pacific Northwest, equaling or outnumbering native fish species. The authors conclude that it may be imperative to manage non-native species if endangered salmon populations are to recover.

**Economics & Ecosystem Services**

**Enhancing the Multifunctionality of US Agriculture.** 2010. Jordan, N. (Agronomy & Plant Genetics Dept, University of Minnesota, St Paul MN, jorda020@umn.edu) and K.D. Warner. *BioScience* 60(1):60–66.

Multifunctional agriculture jointly produces agricultural commodities and a range of ecosystem services, yet it has not been widely adopted in the United States. The authors believe this is because of interrelated, mutually reinforcing sociopolitical, economic, and ecologic factors. Focusing on Midwest agriculture, they present a strategy for coordinated systemic change that reconfigures economic incentives to achieve multiple social goals and emphasizes bottom-up rural development, providing positive feedback loops to integrate and enhance rural resources. The strategy emerged from the Green Lands, Blue Waters initiative of a Midwestern university consortium and cites Minnesota's Koda Energy Fuelshed Project as an application of the theory of change.

**Quantifying the Contribution of Organisms to the Provision of Ecosystem Services.** 2009. Luck, G.W. (Inst for Land, Water and Society, Charles Sturt University, Albury, Australia, galuck@csu.edu.au), R. Harrington, P.A. Harrison, C. Kremen, P.M. Berry et al. *BioScience* 59(3):223–235.

The authors review, combine, and extend previous conceptual frameworks for ecological assessment of the organisms that deliver services to provide guidance for future research. Their new framework encompasses service providers across organizational levels, from populations of a single species to multispecies groups and ecological communities. They emphasize the importance of exploring relationships between service providers and the socioeconomic and environmental drivers of biodiversity change and of evaluating management strategies to ensure continued provision of ecosystem services. Indicators of environmental change must be linked to ecosystem dynamics and degradation, and the suitability of these indicators for assessing ecosystem services within the proposed model should be evaluated.
Obscuring Ecosystem Function with Application of the Ecosystem Services Concept. 2010. Peterson, M.J. (Dept of Wildlife & Fisheries Sciences, Texas A&M University, College Station, TX 77843-2258, mpeterson@tamu.edu), D.M. Hall, A.M. Feldpausch-Parker and T. Rai Peterson. Conservation Biology 24(1):113–119.

Conservation biologists have attempted to raise awareness of the importance of biodiversity by reframing ecosystem functions and biodiversity in economic terms as ecosystem services—marketable commodities that market forces will protect. However, this model has failed to garner the intended political and public support for conservation. The authors suggest that one reason for the failure is that any expression of a commodity’s price trivializes the value of the laborer (in this case, species or abiotic factors) and facets of the laborer’s existence. They reiterate the idea of Odum and Odum, that instead of using the language of economics to describe ecosystems, the language of ecosystems be used to describe economies.

Payment for Ecosystem Services and the Challenge of Saving Nature. 2009. Redford, K.H. (Wildlife Conservation Society Institute, 2300 Southern Blvd, Bronx, NY 10460, kredford@wcs.org) and W.M. Adams. Conservation Biology 23(4):785–787.

This editorial identifies and discusses problems with the headlong rush toward payment for ecosystem services: economic arguments about services valued by people may outweigh noneconomic justifications for conservation; not all ecosystem services are benign (e.g., fire, flood), and regulating these may compromise the survival of nonhuman parts of the ecosystem; services need not be provided by native species; systems may be engineered to maximize single services, increasing ecological fragility; valuation of ecosystem services is beset by problems; as ecosystem services become scarcer and more valuable, people will compete for their control, producing market winners and losers—and damage to biodiversity will be discounted; and the effects of climate change on ecosystem services are unknown. Unless these problems are addressed, the enthusiasm for ecosystem services may sour.

Collaboration

Public Participation and Willingness to Cooperate in Common-Pool Resource Management: A Field Experiment with Fishing Communities in Brazil. 2010. Cavalcanti, C. (Inst for Environmental Decisions, Federal Inst of Technology ETH, CHN K 77, Universitats-strasse 22, 8092 Zurich, Switzerland, carina.cavalcanti@env.ethz.ch), F Schläpfer, F. and B. Schmid. Ecological Economics 69(3):613–622.

Deliberation and participatory development of proposals by residents in the Lake Pedra do Cavalo protected area of Bahia, Brazil, strongly influenced attitudes toward and willingness to participate in sustainable self-management of the fishery. Most fishers were aware of the degradation and overexploitation of the resource, but their willingness to change their behavior strongly depended on their beliefs about whether others would contribute to sustainable resource use. Socioeconomic status and advice of community leaders had lesser roles. Those involved in the deliberative process were more willing to self-monitor state and local agencies, has been operating for about ten years. Land management professionals earn the Certificate in Natural Areas Management for continuing education credit by completing five workshops that cover basic skills of natural areas: conservation site assessment techniques, managing for diversity across Florida’s unique landscapes, working across boundaries to protect ecosystems, managing visitors and volunteers in natural areas, and interagency prescribed fire training. Five additional special-interest workshops are also offered. The academy is seen as a step toward endorsing a growing profession and codifying the skills these professionals need.

Reintroducing Native Flora to a Redevelopment Project in Midtown Omaha. 2010. Suda, P.A. (HDR 8404 Indian Hills Dr, Omaha, NE 68114-4098, 402/399-4969, paula.suda@hdrinc.com). Land & Water 54(1):45–47.

In a 28 ha mixed-use development project in the heart of Omaha, Nebraska, a 1.8 ha park houses a prairie garden that showcases 28 species of native grasses and forbs. The purpose of the privately owned and maintained park is educational and recreational, and it is designed to host community events. Its features include walkways, an amphitheater, plazas, benches, a water feature, shelter, and dining areas and it is adjacent to a hiking and biking trail. The author discusses the garden design: for example, buffalograss (Bouteloua dactyloides) and blue grama (Bouteloua gracilis) are planted next to the amphitheater lawn as a transition from conventional turf grass, to illustrate low native grasses that could be used in naturalized lawns.

Education

The Natural Areas Training Academy: Preparing Florida’s Land Managers for the Modern Challenges of Land Management. 2010. Colverson, P. (Pandion Systems, 102 NE 10th Ave, Gainesville, FL 32601, pcolverson@pandionsystems.com) and L. Demetropoulos. Natural Areas Journal 30(2):233–237.

The Natural Areas Training Academy, founded by the Nature Conservancy in partnership with the University of Florida and supported by numerous foundations and
and to denounce misbehavior by others. They were also more willing to replace their plastic-bottle shrimp traps with more sustainable traps if they believed others would do the same.

Planning & Policy

Nature as the “Natural” Goal for Water Management: A Conversation. 2009. Bishop, K. (Dept of Environmental Assessment, Swedish University of Agricultural Sciences, 750 07 Uppsala, Sweden, kevin.bishop@ma.slu.se), K. Bevin, G. Destouni, K. Abrahamsson, L. Anderson et al. Ambio 38(4):209–214.

An imagined conversation among people with differing perspectives on water management (a farmer, a fisher, government representatives, and an ecologist, among others) illustrates the difficulties created by using “natural” as the goal for water quality and ecosystem integrity. It stemmed from a real workshop addressing problems and progress in implementing the European Water Framework Directive. The difficulties include defining the natural state, modeling how a system might be moved toward it, and determining whether this state is achievable or even desirable. The fictional participants concluded that decisionmakers should take responsibility for defining goals and not uncritically fall back on the concept of a “natural” target. Failure to do so compromises the ability to manage issues in real basins, for both developed and developing nations.

Lions and Warriors: Social Factors Underlying Declining African Lion Populations and the Effect of Incentive-Based Management in Kenya. 2009. Hazzah, L. (Nelson Inst of Environmental Studies, University of Wisconsin, Madison, WI 53706, +1 254 (0) 726 817701, leelahazzah@hotmail.com), M.B. Mulder and L. Frank. Biological Conservation 142(11):2428–2437.

Among the Maasai, individuals who reported the highest propensity to kill predators were those who lose the most livestock to predation relative to loss from all causes, are affiliated with an evangelical church, or raise livestock mainly to sell. Lions are relatively insignificant livestock predators compared to other large carnivores, yet about 25% of Maasai reported intense anti-lion feelings—and lions, being the easiest carnivore to kill, are killed disproportionately to the damage they cause. Compensation for livestock losses reduced the inclination to kill a lion, and favorable opinion of the compensation program reduced the inclination to kill any predator. The authors suggest that conservationists promote better construction and herding practices to reduce predation, and encourage religious leaders to emphasize wildlife stewardship.

Reforesting “Bare Hills” in Vietnam: Social and Environmental Consequences of the 5 Million Hectare Reforestation Program. 2009. McElwee, P. (School of Politics & Global Studies, Arizona State University, PO Box 873902, Tempe, AZ 85287-3902, pamela.mcelwee@asu.edu). Ambio 38(6):325–333.

This case study summarizes the history of forest management and reforestation in Vietnam and then focuses on one rural area in the northern Ha Tinh province. Although the “bare hills” study area had a dense scrubby cover of woody plants and grasses containing many species of economic importance to local communities, the main aim of reforestation was to establish monocultures of non-native trees. A survey of households revealed that those relying on the bare hills had no alternative source of income. This, combined with the low prices brought by plantation trees, suggests that without a different approach reforestation projects will continue to have adverse social, environmental, and economic effects, especially on the poor.

Issues & Perspectives

Notes from the Greenhouse World: A Study in Coevolution, Planetary Sustainability, and Community Structure. 2010. Worden, L. (Environmental Science, Policy & Management, University of California, Berkeley, CA 94720-3114, wonder@riseup.net). Ecological Economics 69(4):762–769.

Worden models two contrasting coevolving biospheres in which adapting populations must collectively regulate the climate or face extinction. One model is based on the Gaia idea of coevolution for the common good; the other, based on the tragedy of the commons, assumes greed and self-interest. The results give some support to Gaia theorists: that homeostasis by and for the biosphere makes sense and Earth can be expected to have some self-healing mechanisms. They also suggest that homeostasis can be disrupted, precipitating catastrophic positive feedbacks. These observations apply to social as well as ecological communities. Longstanding communities of organisms and practices have become organized so their constituents are not lured into antisocial acts, but disruption of the established order can introduce a destructive incentive structure.

Motivating Online Publication of Data. 2009. Costello, M.J. (Leigh Marine Lab, University of Auckland, Warkworth, New Zealand, m.costello@auckland.ac.nz). Bioscience 59(5):418–427.

Society reasonably expects that scientific data, particularly if obtained through public funding, will be freely available. Costello laments the reluctance of many to publish data online, citing benefits of online publication to scientists, editors, publishers, funding agencies,
governments, and society in general. Scientists’ stated reasons for not making their data available are chiefly related to fears of plagiarism, being “scooped,” improper use of data, or profit to others. One way to motivate online publication is to assure peer recognition through adequate citation and tracking of data. Data centers can play important roles in quality control, standardization, archiving, and accessibility of data. Costello believes the only valid reasons not to publish data online are the same as for not publishing in print.

**Large-Scale Species Introductions to Preserve Global Biodiversity: Noah’s Ark Revisited.** 2009. Lev-Yadun, S. (Dept of Science Education–Biology, Faculty of Science and Science Education, University of Haifa Oranim, Tivon 36006, Israel, levyadun@research.haifa.ac.il). *Ambio* 38(3):174.

In a provocative piece similar to calls for “rewilding,” Lev-Yadun proposes warding off mass extinctions by large-scale introductions of multiple species whose habitats are threatened into ecosystems to which they are not native—perhaps first into damaged island ecosystems and later more widely. Many such attempts would fail, but some would likely succeed, slowing biodiversity losses. Lev-Yadun argues that too little time remains for an ecologically “correct” step-by-step experimental approach and that delay could have worse consequences than the potentially undesirable results of introductions. Moreover, large-scale multispecies introductions would reduce the likelihood of a single species escaping its enemies and competitors.

**Leadership: A New Frontier in Conservation.** 2009. Manolis, J.C. (Minnesota Dept of Natural Resources, Box 10, 500 Lafayette Rd, St Paul, MN 55155-4002, jim.manolis@dnr.state.mn.us), K.M. Chan, M.E. Finkelstein, S. Stephens, C.R. Nelson et al. *Conservation Biology* 23(4):879–886.

There are two types of conservation-science leadership: path-breaking research and integrating conservation science into policy, management, and society at large—which the authors believe holds the greater opportunity for advancing conservation. They discuss eight principles of adaptive leadership: recognizing the social dimension of the problem; cycling through action and reflection; capturing and maintaining attention; combining strengths of multiple leaders; extending influence through networking; timing efforts strategically; nurturing productive conflict; and cultivating diversity. For more effective application of conservation science, conservation professionals should support leadership as a subject worthy of study, teaching, and professional development at the self, individual, and institutional levels.

**On Advocacy by Environmental Scientists: What, Whether, Why, and How.** 2009. Nelson, M.P. and J.A. Vucetich (School of Forest Resources and Environmental Sciences, Michigan Technological University, Houghton, MI 49931, javuceti@mtu.edu). *Conservation Biology* 23(5):1090–1101.

This is a critical review of the literature concerning arguments for and against the appropriateness of advocacy by environmental scientists. Arguments were categorized as being related to such topics as credibility, conflicting moral obligations, and the nature of science. Many involved issues and the nature of neutrality. The authors found most arguments on both sides to be deficient in some respect. However, they concluded that for better or worse advocacy is virtually unavoidable, and that scientists, who are citizens first and scientists second, have a responsibility to advocate to the best of their ability in a transparent and justified manner. Rather than pondering whether they should advocate, scientists should concentrate on improving their advocacy skills.
Book Reviews

Wild Urban Plants of the Northeast: A Field Guide
Peter Del Tredici. 2010. Ithaca: Cornell University Press. Paper, $29.95. ISBN: 978-0-8014-7458-3. 392 pages.

I love field guides and am readily seduced by clear, concise descriptions paired with color photographs. Given this predilection, I was inclined to like Peter Del Tredici’s Wild Urban Plants of the Northeast: A Field Guide at first sight. Overall, I am pleased with the book and think it mostly lives up to its goals and my expectations. “The basic goal of Wild Urban Plants is to help the general reader identify the plants that grow spontaneously in the urban environment and develop an appreciation for the role they play in making our cities more livable” (p 1). It fulfills the latter goal admirably and is a mixed bag in the identification department.

What qualities make for an excellent field guide? Different people will have different preferences, I look for the following:

Portability. Will the book actually fit into my fanny pack? At 22.8 cm long by 15.2 cm wide by 2 cm thick, Wild Urban Plants fit into my fanny pack along with two other field guides, a hand lens, and a pruning saw.

Durability. Can it withstand rough handling and field use? This book has a sturdy binding, well-glued and sewn. Pages aren’t likely to fall out anytime soon.

Index quality. Are the species indexed by scientific name, common name, and variations on the common name? Plant families and scientific names are here, plus common names by both first and second word of the name (i.e., box elder is indexed under “box elder” and “elder, box”; false nutsedge is indexed under “false nutsedge” and “nutsedge, false”), making it easy to find species in the index.

Pictorial glossary. Are frequently used terms illustrated? Unfortunately, there are no illustrations of basic terms such as opposite, alternate, simple, compound, palmate, pinnate, entire, toothed, and lobed. A couple of pages devoted to illustrating these terms would help beginners better understand these terms, and thus the species descriptions.

Written glossary. Does the glossary include all technical terms and define them in plain English? Generally, yes. The glossary is very thorough. Given that the distinction between monocots and dicots is a basic one for the book’s organization, it would be helpful to include more characteristics (beyond number of cotyledons)—such as venation and number of flower petals—that distinguish these two classes in the definition or as a separate table, with the caveat that there are exceptions to generalities about these characteristics.

Sensible organization. This is tricky, and what is sensible to me may be confusing to others. Del Tredici lists the species by major botanical categories (ferns, horsetails, conifers, woody dicots, herbaceous dicots, and monocots) and breaks these categories down further into plant families arranged alphabetically. This works well for me, better than arranging by flower color or size, as plant size can vary considerably from site to site, and perceptions of flower color vary considerably from person to person (what is pink to me may be purple to you!). Those with some botanical training will be able to quickly find a description of an unknown specimen by turning to its likely family. Beginners would welcome brief descriptions of ferns, horsetails, conifers, woody plants, herbaceous plants, dicots, and monocots. Additionally, when a nonbotanist companion and I took the book for a test run at a nearby driveway crack, he was mildly frustrated with the exclusion of several plant families from Appendix Five, “Key Characteristics of Important Plant Families,” which covers just 64% of the species in the book. The appendix did not help him hone in on key attributes of the plant families that would have narrowed down his search to one or a few families. He also would have preferred to have the “How to Use This Book,” portion of the introduction as a separate section, listed in the table of contents.

Photos. Do the photos show the flowers and foliage close up, and is there a photo of the overall growth habit of each plant? The photos in this book are serving two purposes: as identification tools, and to tell the story of our urban landscapes. For the majority of the species featured, the several photos provided are good enough to allow for plant identification because the images are sharp, close enough to show details of foliage and flowers, and convey the growth habit of the plant. There were, frustratingly, several species that had photos taken from too far away to permit definite identification (to name some: European spindletree (Euonymus europaeae), common buckthorn (Rhamnus cathartica), wild apple (Malus spp.), Siberian elm (Ulmus pumila), redroot pigweed (Amaranthus retroflexus), spotted knapweed (Centaurea biebersteinii), tufted lovegrass (Eragrostis pectinacea), common reed (Phragmites australis), and Kentucky bluegrass (Poa pratensis).

What the photos sometimes lack in identification detail, they make up for in telling the stories of our urban landscapes. Many of them conjured up poignant feelings of loss to me. Maybe because it’s the city of my birth, the photos of plants colonizing abandoned factories, home sites, and the Central Train Station in Detroit moved me nearly to tears. What lives have run down, what dreams dried up in these neglected corners of our industrial lands? I felt a bit like the character in the Talking Heads’ song “(Nothing But) Flowers” who sings,

There was a factory,
Now there are mountains and rivers. . . .
There was a shopping mall,
Now it’s all covered with flowers. . . .
Once there were parking lots, now it’s a peaceful oasis. . . . Don’t leave me stranded here. I can’t get used to this lifestyle.

The feelings were more powerful than those stirred up when visiting castle ruins in Europe, because the loss is so recent, and so close to home. The mourning is tempered with relief that plants are moving in to cover some of the wounds in the landscape, providing vital greenery, oxygen, and other ecosystem benefits to all urban denizens.

In his introduction, Del Tredici brings up the conditions and challenges present in America’s urban areas. He pushed me to consider what type of ecological restoration is possible in cities, with their large expanses of pavement, elevated temperatures, high level of disturbance, soil compaction, air pollution, and high level of salt use. If not the vegetation of pre-European settlement, then what?

Del Tredici’s book will be a great resource for those working on greening our industrial landscapes, and coping with the loss of revenue and people power to maintain or reclaim open spaces. I can envision creative park managers, urban planners, do-it-yourself urban restorationists, permaculture practitioners, neighborhood activists, and others turning to this field guide to get ideas for free, readily available seed mixes for speeding up the greening of landfills, abandoned yards, decaying asphalt, and unused railroad lines. People dealing with severely degraded landscapes in urban, suburban, and rural settings could also use this book to choose species that would quickly revegetate eroding land and resist (by virtue of thorniness) grazing. I was glad that *Wild Urban Plants* listed the region of origin for each species, because it gives a sense of history of a species’ wanderings, and, if one is using the book as a resource for species selections, it allows one to be deliberate in selecting native or introduced species.

Gardeners wanting to identify unknown plants, teachers looking for a field guide to use with students on field trips to the wilds of the parking lot and playground, mail carriers and door-to-door salesmen seeking to enliven the daily rounds will be keenly interested in Del Tredici’s book. *Wild Urban Plants* inspired me to visit the nearest abandoned parking lot (next to a torn-down grocery store) and cast a fresh eye on my surroundings. Rather than just drive by and write off the scene as a blighted landscape, I got out of my car and found a field of alfalfa, prickly lettuce, common ragweed, yellow and white sweet clovers, white clover, lady’s thumb, prostate knotweed, and several grasses. In the center of the lot I was delighted to find two ponds in low-lying areas, watered by recent heavy rains, edged by cattails, a sedge of some kind (not being in flower, I couldn’t tell if it was yellow nutsedge or not), and bulrushes. A few bees buzzed around, a dragonfly zipped past, and barn swallows and house sparrows added their vocalizations to the hum of nearby automobiles. I enjoyed this book so much that I plan to share it with my brother, a meter reader and avid naturalist who has daily opportunities to visit the unkempt corners of our cities.

*Reviewed by Judy Kingsbury, Volunteer Program Coordinator at the University of Wisconsin–Madison Arboretum, jakings@wisc.edu. Ms. Kingsbury formerly worked as a naturalist and ranger at the Arboretum.*

**The Carrifran Wildwood Story**

*Mylre and Philip Ashmole, with members of the Wildwood Group. 2009. Jedburgh, Scotland, UK: Borders Forest Trust. Paper, £15. ISBN 978-0-9534346-4-0. 224 pages.*

What does it take to turn an ecological “green desert” into a diverse, native deciduous forest—especially when the templates available to serve as guides are, at best, tiny fragments with uncertain land use histories stretching back centuries? This was the daunting task faced by the all-volunteer Wildwood Group working in the harsh Southern Uplands of Scotland as they sought to acquire an entire watershed and “re-create . . . an extensive tract of mainly forested wilderness with most of the rich diversity of native species present in the area before human activities became dominant.” *The Carrifran Wildwood Story*, published to commemorate the tenth anniversary of the planting of the first trees on the site on New Year’s Day, 2000, in the “Millennium Grove,” documents the project’s complete history from conception and land acquisition through the reforestation of nearly the entire 1,640 acre (665 ha) Carrifran Burn watershed.

The book is a popular (not scientific) account—highly readable, well written, and lively. Nevertheless, the authors do not short-change the essential climatic, edaphic, hydrologic, topographic, botanic, and ethnographic characteristics of the region and the site that underpin the project. In this sense, the Wildwood Group’s planners were following in the footsteps of noted environmental landscape architect Ian McHarg (1969), who advocated for developing as thorough an understanding of a locale as possible prior to undertaking any action on the ground. Furthermore, the authors are remarkably adept at presenting the details of the restoration planning and implementation without overwhelming or losing sight of the overarching goal guiding the work.

The book is divided into 12 roughly chronological chapters, each introduced by a brief outline of the topics addressed in the chapter. The first two chapters provide an overview of the conception of the project. The Wildwood Group envisioned purchasing a small catchment whose native vegetation had been severely depleted by centuries of intensive sheep and goat grazing, and then restoring native
forest to the watershed. The third and fourth chapters review the Wildwood Group’s five-year efforts to locate and raise money to purchase a suitable watershed—first in the Scottish Borders (the counties bordering England) and then, when a suitable site could not be located there, a bit further north in the Southern Uplands. A thorough and comprehensive overview of planning for the restoration, including evaluating the current conditions in the drainage, examining the prehistoric palynological record, and identifying contemporary woodland sites that could serve as models and sources of propagules for a re-created forest is the subject of Chapters 5–7. The decade-long planting program carried out by forestry contractors and a large cadre of dedicated volunteers is covered in Chapters 8–11. Finally, because forest restoration by its very nature requires centuries to complete, the twelfth chapter chronicles the encouraging short-term changes observed in the valley over the first decade and projects the site’s ecological trajectory into the future.

The Wildwood Group adopted the name Carrifran Wildwood for their initiative. Carrifran, freely translated as “seat of ravens” or “raven’s crag,” has many local spellings and pronunciations, none of which, apparently, were the ones ultimately adopted by the Wildwood Group (which calls the valley CarriFRAN). Recognizing that readers outside Scotland may not be familiar with local topographic and geographic terms, the authors thoughtfully included a glossary of “descriptive words with various origins” on page 52, though the list is not comprehensive. For example, the authors frequently use the word cleugh but don’t define it (a cleft in a hill or a ravine). In addition, readers may want to keep a bookmark lodged between pages 68 and 69 to make frequent reference to the place names and planting sections shown on the excellent site map.

The book will appeal most directly to deciduous forest restorationists working in the temperate zones. However, its value is hardly restricted to this audience, because the authors and contributors took great care to present detailed information that is essential for any successful restoration: the wisdom of thorough advance planning, the need for flexibility and adaptive management, and the importance of monitoring the effectiveness of the restoration interventions, both to meet regulatory and funding requirements as well as to modify and adjust similar interventions in the future.

The book is also of value because it introduces many readers to an unfamiliar location and ecosystem, offering some insight into the idiosyncratic place-based challenges faced by all restorationists. For example, the Wildwood Group always envisioned that “access will be open to all,” but the group was forced to enclose the entire watershed with perimeter fencing to exclude wild roe deer, domestic sheep, and feral goats. In the process of protecting the newly planted trees, the fence excluded “hillwalkers”—hikers who enjoy the privilege of traipsing freely over private property throughout Britain. In addition, once the fence was in place, the Group had to remove the feral goats that roamed throughout the hills. The rural residents of the Southern Uplands expected to encounter goats, and their exclusion from the Wildwood through a combination of live capture and relocation and (in the case of a few highly elusive individuals) lethal sharpshooting, proved controversial. In his foreword to the book, Professor Aubrey Manning notes that “it must have been very demanding of the tolerance and forbearance of the local people, of planners and statutory bodies like Scottish National Heritage and the Forestry Commission and of charitable trusts. A lot of persistent persuasion will have been involved and this story is set out here in a fascinating way” (p. 3).

Excluding hikers with a fence would cause few problems in North America; in fact, hikers here need to secure permission before entering private property. Similarly, in most cases, North American landowners have the right to control feral animals on their own property and also may be able to control wild populations like deer if landowners can document that the animals are causing economic loss or hardship.

Another difference between the restoration efforts at Carrifran and those in many parts of temperate North America was the lack of non-native invasive plant species that needed to be managed in the Scottish project. To be sure, the trees planted at Carrifran had to compete with dense patches of native bracken fern (*Pteridium aquilinum*), which the Wildwood Group was forced to manage mechanically and chemically. Forest restorationists working in eastern North American woodlands with very high white-tailed deer densities often must contend with a similar situation when the ground-layer vegetation has been decimated by browsing, leaving only a dense cover of unpalatable hay-scented fern (*Dennstaedtia punctilobula*). However, the absence of the fast-growing introduced vines, lianas, and shrubs that can overtop saplings planted in eastern North America during a single growing season made me almost wish that bracken was my greatest challenge in establishing new woodland.

The savvy Wildwood Group recognized that, regardless of the eventual success of the restoration, Carrifran would remain a very small natural outpost in an overwhelmingly human-dominated landscape, so its value for regional biodiversity would be limited. As the book was going to press, however, the Borders Forest Trust (the nonprofit entity that owns the Carrifran valley) announced that it had purchased Corehead Farm, located in the Moffat Hills to the west of Carrifran, and that it planned to implement more ecologically sustainable agricultural management there.

Corehead extends to within 3 km of Carrifran, offering the possibility of making a connection. If sensitive management could be extended into some of the neighboring
land, sufficient habitat might—one day—develop for the lost mammals and birds, including some of the predators, such as eagles, kite, wildcat, pine marten, and lynx, or even eventually wild boar and wolf. The Moffat Hills could then play a key role in promoting the survival and free movement both of these species and the host of other animals and plants whose vanguard is already seen in the developing Wildwood at Carrifran (p. 206).

The book is thoughtfully designed and visually appealing. The designer restricted the text to two-thirds of each page, and then devoted the remainder of the page to maps, schematics, sidebars, and full-color photographs. In fact, the authors and designer used the abundant photographs to great effect, documenting the restoration, demonstrating the techniques, and helping the reader develop a real sense of the Carrifran valley. The pictures of volunteers planting trees in midwinter above 700 m on the windy Firth Hope flats almost induce an involuntary chill. The sidebars explore the details of subjects mentioned in the accompanying text and occasionally contain good poetry, evocative watercolor reproductions, and anecdotes and testimonials contributed by Wildwood Group members who were integral to the project’s success. These highly personal conceits go a long way toward conveying the members’ devotion and love of the landscape they have chosen to adopt.

Those of us who fancy ourselves to be stewards of the earth will find ample inspiration in the audacity and execution of this truly visionary project.

Reference
McHarg, I.L. 1969. Design with Nature. Philadelphia: Falcon Press.

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Recently Received Titles

36 Acres: A Portrait of the Reed-Turner Woodland Nature Preserve
Tobin Fraley. 2010. Long Grove IL: Woodland Grove Press. Cloth, $34.95. ISBN: 978-0-913751-85-5. 128 pages.

Wildlife on the Wind: A Field Biologist’s Journey and an Indian Reservation’s Renewal
Bruce L. Smith. 2010. Logan; Utah State University Press. Cloth, $19.95. ISBN: 978-0-87421-791-9. 186 pages.

Temperate and Boreal Rainforests of the World: Ecology and Conservation
Dominick A. DellaSala. 2010. Washington, DC: Island Press. Cloth, $80.00. ISBN: 978-1-59726-675-8. Paper, $40.00. ISBN: 978-1-59726-676-5. 336 pages.

Aldo Leopold: His Life and Work
Curt D. Meine. 2010. Madison: University of Wisconsin Press. Paper, $29.95. ISBN: 978-978-0-299-24904-5. E-book, $18.45. ISBN: 978-0-299-24903-8. 672 pages.
Meetings 2011

March 14–19. 76th North American Wildlife and Natural Resources Conference will occur in Kansas City, Missouri. Visit www.wildlifemanagementinstitute.org to learn more.

March 22–25. 1st EnvironmentAsia International Conference will take place in Bangkok, Thailand. For more information, visit www.tshe.org.

April 3–10. 9th International Rangeland Congress will meet in Rosario, Argentina. Visit www.rangelandcongress.com for information.

May 9–13. 5th International Wildland Fire Conference will convene in Sun City, South Africa. Go to www.wildfire2011.org for updates.

May 9–14. 11th International Coastal Symposium will take place in Szcecin, Poland. Visit www.ics2011.pl for details.

May 14–18. 2nd International Marine Conservation Congress will gather in Victoria, British Columbia, Canada. Check the conference Facebook page for more information.

May 25–27. 6th International Conference on River Basin Management and Sustainable Water Management will take place in Riverside, California. To learn more, go to www.wessex.ac.uk/11-conferences/riverbasinmanagement-2011.html.

May 30–June 3. 54th Annual Conference on Great Lakes Research will take place in Duluth, Minnesota. For details, visit www.iaglr.org/conference/index.php.

June 11–16. American Society of Mining and Reclamation Annual Meeting will take place in Bismark, North Dakota. For details, visit www.asmr.us/Meetings/UpcomingMeetings.htm or www.asmr.us.

July 17–21. Coastal Zone 2011 will gather in Chicago, Illinois. Click on www.doi.gov/initiatives/CZ11/index.htm for details.

July 23–30. 18th International Botanical Congress will meet in Melbourne, Australia. For details, go to www.ibc2011.com.

August 1–5. 4th National Conference on Ecosystem Restoration will convene in Baltimore, Maryland. Go to www.conference.ifas.ufl.edu/NCER2011/index.html for more information.

August 7–12. 96th Ecological Society of America Annual Meeting will occur in Austin, Texas. For updates, check www.esa.org/meetings/upcomingmeetings.php.

August 21–25. 4th World Conference on Ecological Restoration will gather in Mérida, Mexico. For details, visit www.ser2011.org.

September 25–29. 12th European Ecological Federation Congress will meet in Ávila, Spain. To learn more, go to www.eefcongress2011.eu.

September 25–30. 23rd Asian-Pacific Weed Science Society Conference will meet in Cairns, Queensland, Australia. Visit www.apwss2011.com for more information.

October 2–7. 3rd Symposium on Environmental Weeds and Invasive Plants will be held in Ticino, Switzerland. The event flyer can be found at www.ewrs.org/IW/doc/invasive_meeting_Ticino.pdf.

November 6–11. 21st Coastal and Estuarine Research Federation Biennial Conference will meet in Daytona Beach, Florida. Check www.erf.org for updates.

2012

June 8–15. American Society of Mining and Reclamation Annual Meeting will take place in Tupelo, Mississippi. For details, visit www.asmr.us/Meetings/UpcomingMeetings.htm or www.asmr.us.

September 30–October 5. 4th EcoSummit will gather in Columbus, Ohio. Visit swamp.osu.edu/ecosummit2012/ for updates.