LETTERS

edited by Etta Kavanagh

Post-Fire Logging Debate Ignores Many Issues

RECENT CONTROVERSY CONCERNING POST-FIRE LOGGING IN OREGON is emblematic of the problems of "salvage logging" globally (*1*). Although tree regeneration after disturbances in forested areas is important (*2*–*4*), a narrow view of this issue ignores important ecological lessons, especially the role of disturbances in diversifying and rejuvenating landscapes. Scientific advances in recent decades demonstrate that disturbances are not catastrophes, trees in these landscapes are not wasted if they are not harvested, and post-fire logging is not forest restoration (*5*).

Fires (*6*), floods (*7*), volcanic eruptions (*8*), hurricanes (*9*), and insects (*9*) create and sustain the structure and composition of forests; disturbed areas also support species that are rare or absent from closed-canopy forests, including many that are restricted to recently burned areas (*6*). The extraordinary habitat mosaics of southwest Oregon's Biscuit fire area (*10*) and characteristic post-disturbance communities present in forests throughout the world (*11*) are in large part due to periodic "catastrophic" disturbances. Relative to naturally disturbed forests, intensively managed forests and plantations lack biological legacies, including intact understory vegetation, snags (standing dead trees) and logs, and patches of undisturbed or partially disturbed forest (*11*). Additionally, the heterogeneity associated with natural disturbances typically includes areas of low tree density and high shrub cover (*12*), which results in structural complexity required by many elements of the forest biota (*13*).

Two views of forests after the Biscuit fire of 2002 in the Siskiyou National Forest, southwest Oregon: (left) unlogged botanical reserve with legacy trees present and (right) adjacent logged area with legacy trees removed and soils damaged (blackened areas) by burning of logging slash. [Photos taken November 2005.]

CREDIT: R. SKAR

Ecological damage caused by post-disturbance logging may outweigh short-term economic benefits. If conducted improperly, timber harvest of any kind damages soils and below-ground processes, spreads invasive species, increases sediment delivery to streams, and destroys or degrades key environments for terrestrial and aquatic species. With post-disturbance logging, however, these impacts occur when forest recovery is most vulnerable to the effects of additional, especially anthropogenic, disturbances, creating cumulative effects not associated with logging in undisturbed forests (*14*, *15*). Such effects can extend for a century or more, because of the removal of long-persisting and functioning biological legacies (*11*). Moreover, a focus on post-disturbance logging will divert the attention of forest managers from conducting legitimate fuels reduction in fire-prone areas by, for example, thinning overly stocked trees and undergrowth, especially within at-risk rural communities, thereby exacerbating the already existing problem of declining local agency staffing and budgets.

The effects of post-disturbance logging require careful consideration of whether to log at all, and if so, how to conduct such logging to minimize negative consequences. If we must conduct post-disturbance logging for timber production, stringent ecological safeguards must be in place to minimize impacts to terrestrial (*14*) and aquatic (*15*) ecosystems. When viewed through an ecological lens, a recently disturbed landscape is not just a collection of dead trees, but a unique and biologically rich environment that also contains many of the building blocks for the rich forest that will follow the disturbance.

DOMINICK A. DELLASALA,[1*] JAMES R. KARR,[2] TANIA SCHOENNAGEL,[3] DAVE PERRY,[4] REED F. NOSS,[5] DAVID LINDENMAYER,[6] ROBERT BESCHTA,[7] RICHARD L. HUTTO,[8] MARK E. SWANSON,[9] JON EVANS[10]

[1]National Center for Conservation Science and Policy, Ashland, OR 97520, USA. [2]Professor Emeritus, University of Washington, Seattle, WA 98195, USA. [3]David H. Smith Research Fellow, Department of Geography, University of Colorado, Boulder, CO 80309, USA. [4]Professor Emeritus, Ecosystem Studies, Department of Forest Science, Oregon State University, Corvallis, OR 97331, USA. [5]Davis-Shine Professor of Conservation Biology, University of Central Florida, Orlando, FL 32816, USA. [6]Centre for Resource and Environmental Studies, The Australian National University, Canberra, ACT 0200, Australia. [7]Professor Emeritus, College of Forestry, Oregon State University, Corvallis, OR 97331, USA. [8]Avian Science Center, Division of Biological Sciences, University of Montana, Missoula, MT 59812, USA. [9]Forest Ecosystem Analysis, College of Forest Resources, University of Washington, Seattle, WA 98195, USA. [10]Landscape Analysis Laboratory, Department of Biology, University of the South, Sewanee, TN 37383, USA.

*To whom correspondence should be addressed. E-mail: Dominick@nccsp.org

References

1. D. B. Lindenmayer *et al.*, *Science* **303,** 1303 (2004).
2. M. Newton *et al.*, *Science* **313**, 615a (2006).

3. B. N. Baird, *Science* **313**, 615b (2006).
4. D. C. Donato *et al.*, *Science* **313**, 615c (2006).
5. R. F. Noss, D. B. Lindenmayer, *Conserv. Biol.* **20**, 946 (2006).
6. R. L. Hutto, *Conserv. Biol.* **9**, 1041 (1995).
7. M. Parsons, C. A. McLoughlin, K. A. Kotschy, K. H. Rogers, M. W. Rountree, *Front. Ecol. Environ.* **3**, 487 (2005).
8. C. M. Crisafulli, F. J. Swanson, V. H. Dale, in *Ecological Responses to the 1980 Eruption of Mount St. Helens*, V. H. Dale, F. J. Swanson, C. M. Crisafulli, Eds. (Springer Science, New York, 2005), pp. 287–299.
9. D. R. Foster, D. A. Orwig, *Conserv. Biol.* **20**, 959 (2006).
10. A. DellaSala, S. B. Reid, T. J. Frest, J. R. Strittholt, D. M. Olson, *Nat. Areas J.* **19**, 300 (1999).
11. D. B. Lindenmayer, J. F. Franklin, *Conserving Forest Biodiversity: A Comprehensive Multiscaled Approach* (Island Press, Washington, DC, 2002).
12. P. N. Neitlich, B. McCune, *Conserv. Biol.* **11**, 172 (1997).
13. D. B. Lindenmayer, R. F. Noss, *Conserv. Biol.* **20**, 949 (2006).
14. R. L. Beschta *et al.*, *Conserv. Biol.* **18**, 957 (2004).
15. J. R. Karr *et al.*, *BioScience* **54**, 1029 (2004).

Preventing HIV/AIDS in Adolescents

I WAS PLEASED TO SEE THAT THE UNITED Nations Population Fund (UNFPA) is cooperating with the Interreligious Committee in Honduras without compromising its own principles, particularly as regards the effectiveness of condoms in fighting HIV/AIDS ("Mission possible: integrating the Church with HIV/AIDS efforts," J. Cohen, Special Section on HIV/AIDS: Latin America & Caribbean, 28 July, p. 482). UNFPA has taken on a special mandate to work with the world's staggering numbers of adolescents who need scientifically based information and the wherewithal to make responsible decisions.

In 2002, Lois Abraham and I started 34 Million Friends, a grassroots organization that raises money and awareness of UNFPA (*1*). I have witnessed UNFPA youth centers in Mali and Senegal where the young are enticed by sports and perhaps a cyber cafe and then are deluged with information and peer counseling about sexual matters. Lois has witnessed the same dedication toward AIDS prevention in Nicaragua. The Bush Administration has withheld $34 million from UNFPA every year since 2002 and touts "abstinence only" policies abroad, which do not take into account forced early marriage of girls to older, more sexually experienced men and often their need to trade sex for food or school tuition. The United States should fully support the UNFPA in its human rights–based work for sexual health. UNFPA works in 140 countries at their invitation. Last year, 171 countries contributed to UNFPA, but not the United States. For shame!

JANE ROBERTS

Redlands, CA, USA.

Reference

1. See www.34millionfriends.org.

On Purpose in Conservation

THE EMPHASIS ON THE PRESERVATION OF biodiversity as the objective of conservation ("Global biodiversity conservation priorities," T. M. Brooks *et al.*, Review, 7 July, p. 58) has three distressing faults.

First, species contain ecotypes that are unique to their locales. As the range of the species is restricted, ecotypes are lost and the functional integrity of the natural communities in that region suffers. Although the ecotypes may be reproducible over many generations from a population residual in a protected "hot spot," the reproduction is not guaranteed and is certain to be slow.

Second, the very best efforts in preserving species in parks will be defeated if we allow the environment to erode out from

under them. The issues are not simply climatic disruption, but also include physical, chemical, and biotic disruption.

Finally, the focus on biodiversity by well-financed and obviously influential scientists appears to be an authoritative statement that the needs of conservation are finite and can be met adequately by establishing parks to preserve species in hot spots. The fact is that these objectives are appropriate but completely inadequate and, presented without elaborated conditions, become distracting to the point of being misleading.

The objective of conservation is the preservation of a fully functional biosphere as the only human habitat. That entails preservation of the full range of genetic potential in species, the species in all of its intrinsic diversity. This argument presents a far more aggressive mission for conservation, one much closer to the objective recognized, at least nominally, by Brazil in preserving by law a high fraction of each land holding in forested regions as intact forest and by New York State's Adirondack Park, which embraces villages, towns, and businesses operating under special rules governing forested land over 6 million acres. Success also entails immediate implementation of the Framework Convention on Climate Change to stabilize the heat-trapping gas content of the atmosphere at levels safe for nature and for people. Conservation as a whole demands a new design on how to manage the world, not one based on parks alone, which are bound to fail.

GEORGE M. WOODWELL

Woods Hole Research Center, Woods Hole, MA 02543, USA. E-mail: gmwoodwell@whrc.org

Response

WOODWELL'S DISTRESS APPEARS TO STEM from confusion about the objective, strategy, and scale of conservation addressed by our Review. As suggested by our title, our aim was to review biodiversity conservation as an objective, and prioritization as a strategy, at the global scale. First, other conservation objectives beyond biodiversity are also valid, such as cultural diversity (*1*) and ecosystem services (*2*). Happily, there are many synergies between these objectives and that of biodiversity conservation, because they have similar distributions and threats and can therefore harness similar conservation responses.

Second, Woodwell's assertion that conservation should represent the "preservation of the full range of genetic potential in species, the species in all of its intrinsic diversity" is in no way antagonistic to the strategy of prioritization, as others have mistakenly claimed (*3*). Representation is about conserving everything; prioritization is about what to conserve first (*4*).

Third, the scale of coverage of our review was global: which regions should be the first targets for flexible resources worldwide? Woodwell concentrates his criticism on the scale of individual parks; we agree with him that this is not the only scale at which biodiversity conservation must be implemented. At the broadest, planetary scale, tackling the effects of climate change (*5*) will require intergovernmental policy instruments to reduce greenhouse gas emissions (*6*). At intermediate scales, management needs to maintain the landscape/seascape-level ecological processes on which biodiversity depends (*7*). However, at the finer, pragmatic level of much current conservation implementation, clear targets for safeguarding individual sites of global biodiversity significance are essential. This is the case whether the appropriate conservation tactic is the establishment or better management of protected areas, or the implementation of other site-scale efforts.

The "Key Biodiversity Areas" approach, for instance, is being used to identify sites through local and national processes and ownership, but following global standards and criteria (*8*). This work uses two decades of experience in 170 countries in identifying "Important Bird Areas" (*9*) as a foundation to incorporate newly available comprehensive data for mammals, amphibians, and other taxa (*10*). Major efforts are now under way through the Species Survival Commission of IUCN (the World Conservation Union) to compile equivalent data sets for reptile, plant, marine, and freshwater biodiversity [e.g., (*11*, *12*)]. A particularly urgent subset of Key Biodiversity Areas are the 595 sites identified by the "Alliance for Zero Extinction" and endorsed by more than 60 biodiversity conservation organizations (*13*, *14*).

We respectfully refer Woodwell to the last four paragraphs of our paper, and references therein, for further discussion of these points.

T. M. BROOKS,[1,2,3] R. A. MITTERMEIER,[1] G. A. B. DA FONSECA,[1,4] J. GERLACH,[5,6] M. HOFFMANN,[1]

Letters to the Editor

Letters (~300 words) discuss material published in *Science* in the previous 6 months or issues of general interest. They can be submitted through the Web (www.submit2science.org) or by regular mail (1200 New York Ave., NW, Washington, DC 20005, USA). Letters are not acknowledged upon receipt, nor are authors generally consulted before publication. Whether published in full or in part, letters are subject to editing for clarity and space.

J. F. LAMOREUX,[3] C. G. MITTERMEIER,[1] J. D. PILGRIM,[7] A. S. L. RODRIGUES[5]

[1]Conservation International, Washington, DC 20036, USA. [2]World Agroforestry Centre (ICRAF), University of the Philippines, Los Baños, Laguna 4031, Philippines. [3]Department of Environmental Sciences, University of Virginia, Charlottesville, VA 22904, USA. [4]Departamento de Zoologia, Universidade Federal de Minas Gerais, Belo Horizonte, MG 31270, Brazil. [5]Department of Zoology, University of Cambridge, Cambridge CB2 3EJ, UK. [6]Nature Protection Trust of Seychelles, Post Office Box 207, Victoria, Mahé, Seychelles. [7]BirdLife International in Indochina, 4/209 Doi Can Street, Ba Dinh, Hanoi, Vietnam.

References

1. W. J. Sutherland, *Nature* **423**, 276 (2003).
2. R. Costanza *et al*., *Nature* **387**, 253 (1997).
3. K. Schmidt, *Science* **274**, 916 (1996).
4. R. A. Mittermeier *et al*., *Am. Sci.* **91**, 384 (2003).
5. C. D. Thomas *et al*., *Nature* **427**, 145 (2004).
6. T. Flannery, *The Weather Makers* (Text Publishing, Melbourne, Australia, 2006).
7. R. M. Cowling, R. L. Pressey, M. Rouget, A. T. Lombard, *Biol. Conserv.* **112**, 191 (2003).
8. G. Eken *et al*., *Bioscience* **54**, 1110 (2004).
9. BirdLife International, *State of the World's Birds 2004* (BirdLife International, Cambridge, UK, 2004).
10. J. E. M. Baillie *et al*., *Global Species Assessment* (IUCN, Gland, Switzerland, 2004).
11. W. Darwall, K. Smith, T. Lowe, J.-C. Vié, *The Status and Distribution of Freshwater Biodiversity in Eastern Africa* (IUCN, Gland, Switzerland, 2005).
12. A. S. L. Rodrigues, J. D. Pilgrim, J. F. Lamoreux, M. Hoffmann, T. M. Brooks, *Trends Ecol. Evol.* **21**, 71 (2006).
13. T. H. Ricketts *et al*., *Proc. Natl. Acad. Sci. U.S.A.* **102**, 18497 (2005).
14. D. S. Wilcove, *Living Bird* **25** (no. 3), 8 (2006).

TECHNICAL COMMENT ABSTRACTS

COMMENT ON "Pairing and Phase Separation in a Polarized Fermi Gas"

Martin W. Zwierlein and Wolfgang Ketterle

Partridge *et al*. (Reports, 27 January 2006, p. 503) reported pairing and phase separation in a polarized Fermi gas. We argue that it is not possible to distinguish the superfluid from the normal regimes in the presented data, or to discern which clouds were phase-separated. Some of the reported conclusions are inconsistent with recent experiments.

Full text at www.sciencemag.org/cgi/content/full/314/5796/54a

RESPONSE TO COMMENT ON "Pairing and Phase Separation in a Polarized Fermi Gas"

Guthrie B. Partridge, Wenhui Li, Ramsey I. Kamar, Yean-an Liao, Randall G. Hulet

Zwierlein and Ketterle fail to establish that trap anharmonicities or other objective mechanisms affect the conclusions of our report. Instead, they make the subjective assertion that our claims are not supported by the data. In emphasizing discrepancies between our results and theirs, they ignore potentially important differences in physical parameters. We stand by the statements and claims made in our report.

Full text at www.sciencemag.org/cgi/content/full/314/5796/54b