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Author: STOKES, DAVID L.

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Conservators of Experience

DAVID L. STOKES

At a recent talk on the global extinction crisis, prominent botanist and conservation biologist Peter Raven, in an aside, fondly reminisced about his boyhood plant-collecting trips in then semiwild Napa County, California. As I listened, I reflexively thought of my own early rambles in the Adirondacks of New York State. At the end of the talk, a member of the audience asked, "How can young people today have the experiences with nature that you had? Where will the Peter Ravens of the future come from?" This is a profoundly important issue that we biologists should consider.

Over the last several decades, the significance of biodiversity, and the need for its protection, has emerged as one of the organizing principles of biology. The selection of articles in this and other scientific journals reflects a large and growing research effort that explicitly addresses many aspects of biodiversity loss and protection. Even research on traditional topics of "pure" biology often includes the conservation implications of results.

Of course, whatever satisfaction we may take in our professional response to a crisis is overshadowed by the continuing diminishment of biodiversity attributable to human actions, and many conservation biologists and biodiversity scientists have recognized that science alone is not enough to bring about conservation. Thus many in these fields include public education, policy, and other nonbiological dimensions in their work. This is important for conservation, and is a defining feature of the field of conservation biology.

However, there is another critically important element of biodiversity conservation that has received insufficient attention from biologists: the *human experience* of biodiversity. When we biologists think about the biodiversity we study—whether a population, species, or ecosystem—we tend to think about the biological entity itself and its conservation needs (e.g., minimum viable population size, habitat requirements, and so on). We consider less the other half of the conservation equation, the people who will decide whether the object of our interest is worth conserving. In our increasingly human-dominated world, much of the biodiversity that survives will do so because people choose to protect it. Given that people are likely to decide to protect what is important to them, the public's increasing isolation from biodiversity should be viewed with as much alarm as the loss of biodiversity itself.

E. O. Wilson and others have hypothesized that humans have an inherent emotional affiliation with other living things, or "biophilia." Several lines of evidence support this view (Kellert and Wilson 1993). It appears that while biophilia is a widespread human attribute, to be expressed it must be triggered through contact with nature—perhaps at a young age (Nabhan and St. Antoine 1993). Even if one is not persuaded by the biophilia hypothesis, educational theory and intuition also suggest that interest in biodiversity is encouraged by early experience of nature.

In this regard, the worldwide trend of growing urbanization presents a grave threat to biodiversity. By 2030, 85 percent of North Americans and 60 percent of people worldwide are projected to be living in urban areas, double the proportion in 1950 (UN 2001). Concentration of humans in cities may produce some benefits for biodiversity conservation, such as leaving more land available for protecting habitat, should society wish to do so. However, it will also produce a world in which the vast majority of people are removed from wild nature, surrounded by human-created landscapes composed largely of nonliving materials and greatly reduced numbers of species. This adds up to what Robert Michael Pyle (1993) has termed the "extinction of experience" on a global scale. With appropriate education, these urban dwellers may acquire some information about natural systems and biodiversity. However, inasmuch as experience influences human preferences and values, the loss of firsthand experience with nature is likely to contribute to a reduced valuation of biodiversity by humans in the future—a dismal prospect for the diversity of life.

What can be done? Clearly there are many ways to facilitate human contact with nature. Some of these, such as outdoor recreation and education, are important and well established. However, we biologists have a great deal to offer as well. We have the potential to act not only as conservators of biodiversity but as *conservators of experience.* That is, nearly all biological research—including fieldwork, museum and laboratory studies, and other endeavors—has the potential to provide young people with close and meaningful experience of living things. This should become an explicitly defined goal of our activities, along with more traditional research objectives. It is important to recognize that this is not the same as providing information, although that is also useful. What is needed is the kind of direct experience that has the capacity to activate biophilia.

Of course, zoos and botanical gardens already do this, and much could be learned from scientists associated with those institutions. On the other hand, most researchers, for understandable reasons, do little to involve the young public in their work. This is a shame,

because those who study living things are in the best position to communicate the excitement and wonder of the life they study. Certainly there are scientific, logistical, and economic constraints to participation by children in research and related activities. Nonetheless, given the importance of public support for biodiversity, we must make greater efforts to provide these opportunities.

There currently exist many examples of research that includes the adult public. Earthwatch and similar programs provide opportunities for participation in fieldwork, and many field studies make extensive use of college students as field assistants. Several research programs, such as the Cornell Lab of Ornithology's Project FeederWatch, use observational data collected by the public. While these kinds of participation are often justified on the basis of logistics, labor, or financial support provided to the research, the outcome most important for conservation may ultimately be the experiences of the nonscientist participants.

We need to provide more such firsthand experiences to children, the people for whom contact with biodiversity is likely to be most significant. This does not mean that children must take part in actual research, although that is one avenue for experience. Rather, we should examine all aspects of our work for opportunities to engage children with biological systems. Some of the sorts of activities I am suggesting are long-established and simple, such as having school classes visit a field site or lab, or bringing a study animal to classrooms. Others may be more elaborate: establishing a digital link between the classroom and fieldwork, creating a book of photographs, or partnering with a teacher to explore the ecology of the schoolyard (Brewer 2002). Or children may participate in the scientific research itself. For example, elementary school students have carried out microscope work to distinguish cryptic species of insects (Condon 1995). Regardless of the form the involvement takes, the focus should be on the experience of the biological element rather than (or in addition to) information about it or the science used to study it, as interesting and valuable as these may be.

Some biologists already do these things. The vast majority of us, however, give too little attention to how children could experience nature though our work, and we need to do much more. This will not be a trivial matter for many of us. Integration of young nonscientists into research programs requires careful thought and a commitment to a process that will be new to many scientists. Even simple actions such as classroom or field visits require planning and allocation of time to activities that are not normally considered part of research nor emphasized in our professional reward systems of funding and advancement. However, with the continued existence of the objects of our research at stake, it is imperative that we provide as many of these experiences as we can.

Nearly all of us in the field of biology have come to what we do because of a love of biodiversity in some form. Informal surveys of colleagues indicate that most of us had meaningful experiences with nature at an early age. However, as humans live at an increasing remove from natural systems, that sort of experience can no longer be taken for granted. In our efforts to conserve biodiversity, we have done well to reach out to the public by providing information, by contributing to policy, and in many other ways. We must further expand our activity to protect the experience of biodiversity along with biodiversity itself. By adapting our activities to make the most of their potential to expose young people to the diversity of life, we may find the Peter Ravens and other conservation biologists of the future. By involving children with the treasures we biologists value, we increase the likelihood that a future society will recognize their value as well.

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David L. Stokes (e-mail: stokes@sonoma.edu) is a conservation biologist in the Department of Environmental Studies and Planning at Sonoma State University, Rohnert Park, CA 94928.

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