Not Preaching to the Choir: Communicating the Importance of Forest Conservation to Nontraditional Audiences

Introduction

Recognition of the critical links between humans and nature based on scientifically sound information is key to effective conservation. However, with the increasing dominance of technology, more virtual rather than actual experiences, and the media's increasing representation of nature solely as entertainment, humans are rapidly losing their sense of connection to nature and to the science and scientists who seek to understand those links (Shamos 1995). A survey of public attitudes toward science documented that Americans are highly supportive of the study of nature, but 70% lack knowledge of the scientific process, and less than 15% described themselves as well informed about the natural world (National Science Board [NSB] 2002). The general public has been categorized as follows (NSB 2002): (1) the scientifically active express a high level of interest in a particular issue and believe they are well informed about it; (2) the scientifically aware claim to have a high level of interest in an issue but do not believe they are well informed about it; and (3) the scientifically unaware are neither interested nor believe they are well informed about an issue and receive the least attention from scientists and informal science educators (Gregory & Miller 1998).

Ecologists and conservation biologists are charged with understanding the ecological values of the natural world and are trained to communicate their research findings to other scientists in language that is targeted almost exclusively toward their peers. Communication of science to the general public—either individually or via the mass media—is only minimally valued within the reward system recognized by scholars. Despite some high-level approval of the scientific community, efforts at popular communication are viewed at best as a distraction from the "real work" of academics, such as writing grant proposals and producing scholarly articles for scientific audiences. At worst, these efforts have been met with apathy or jealousy (Bodmer 1986).

Traditionally, the media rather than scientists have forged communication pathways between scientists and the public. In general, however, media communicators only incompletely bridge the gap between scientists and nonscientists because they are often hindered by deadlines, lack of technical expertise, and the perceived need to sensationalize research results (Friedman et al. 1986). This has resulted in a mistrust of the media on the part of many scientists and an impatience with seemingly defensive or inconclusive statements by scientists on the part of the media (Dunwoody 1992). Some scientists believe the media focuses exhaustively on a single specialized subject and does not pay sufficient attention to accuracy or detail (Goodell 1977).

When scientists do disseminate their research to the public, their audiences are almost always the scientifically active (e.g., visitors to botanic gardens, readers of natural history magazines). Communication with societal segments that already grasp the value of what might be considered esoteric research appears to make the most efficient use of scientists' limited time to disseminate research to nonscientists.

However, these efforts do relatively little to change the minds of people who are not already convinced of the importance of conservation and sustainability. Thus, ecologists and conservation biologists have been exhorted to expand their communication spheres and to go "beyond preaching to the choir" (Brewer 2001).

To help reverse these trends, scientists themselves can be more effective than the media in transmitting research to public audiences for two reasons. First, scientists have specialized, technical knowledge of the subject matter. Second, their passion about what they study is infectious and can inspire others to take an interest in science. In the long term, such efforts can contribute to a sociopolitical climate that enhances research support (Gregory & Miller 1998). Thus, I report on efforts to help ecologists and conservation biologists become more effective communicators to the general public by linking activities that engage the scientifically unaware to research that directly or indirectly relates to the audience's own activities and interests. I call such scientists "research/conservation ambassadors" because they are entering a "new country"

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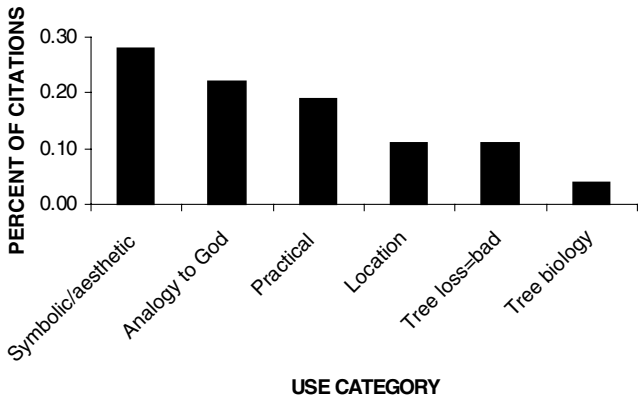

Figure 1. Histogram of the distribution of 328 references in the Old Testament to tree and forest. References include symbolic and aesthetic uses such as decorations of temples; analogies and metaphors of trees to God, life, and holiness; practical uses of trees for food, shelter, and tools; use of trees to mark or describe a geographical location; the loss of trees as causing spiritual damage and loss; and tree ecosystem services such as watershed protection and soil maintenance.

when they leave their academic turf for the land of the scientifically unaware. Just as the U.S. State Department trains and carefully places its diplomatic corps into regions of different culture, values, and priorities, so must research/conservation ambassadors learn new ways of communicating. Here, I describe experiences with disseminating information about the emerging field of forest canopy studies (Lowman & Nadkarni 1995) to six nonscientific venues or audiences: places of worship, health and hospitals, artists and musicians, urban youth, legislators and decision makers, and incarcerated persons.

Religious and Spiritual Venues

To create awareness and a sense of stewardship for trees and forests, I developed ways of engaging people in their places of worship. A religious person may not be inclined to visit a science museum on Sunday morning but rather will spend his or her time at church. Although some churchgoers are interested and active in environmental issues, the religious world is not a typical outlet for environmental scientists. However, people who come to places of worship are in a receptive mode: they make time, dress carefully, sit quietly, and consider matters of the spirit. Therefore, if scientists can link what they study to something that is valued by a particular religion, then the church itself can provide a venue for dissemination of research by ecologists or conservationists.

In 2002 I spoke to congregations of 14 churches of many faiths in the Pacific Northwest. First, I simply attended and listened to the tone and content of presentations. I then introduced myself to the preacher or rabbi and offered to give a sermon or lead a discussion group on trees and spirituality. The congregations I spoke to ranged from the fundamentalist to the progressive, including Unitarian Universalist groups, Zen Buddhist temples, Jewish synagogues, Catholic and Protestant churches, and secular interfaith organizations. I presented the sermons not as a scholar of religious studies, or as a religious person myself, but rather as a scientist interested in understanding trees and conserving forests.

I began my sermons with an explanation that my own affinity for trees began as a tree-climbing youth, which then developed into a career of studying trees. I articulated relationships between trees and spirituality, in a general sense for different religions and for that particular faith, grouping these into ecological, economic, aesthetic, and spiritual values. The major thrust of my sermons was that, in all religions, trees have broad spiritual and symbolic importance because they are linked closely to a number of spiritual concepts, including enlightenment, self-reflection, moral behavior, and mortality. Trees are seen as symbols or manifestations of divine knowledge, eternal life, or life renewal (e.g., Buddha achieved enlightenment under the Bodhi tree). Their form, with ground-bound roots and phototropic foliage, reminds us of the connection between what is of the earth and what is not. Through photosynthesis trees supply oxygen, the most basic need of humans. Analogously, the spiritual life force of many religions comes by way of respiration. Indeed the word spirituality is derived from the Latin *spirare*, to breathe. Zen Buddhists use the action of paying attention to air entering the nostrils to maintain a meditative state. Buddhist silence, samantha (stopping, calming, concentrating), is critical to spiritual development (Lettett 1960). Trees epitomize this practice because they are rooted in the ground and make no sounds. Trees also remind us that the world is dynamic, that the falling of a tree opens a gap that allows new seedlings to germinate, a pattern that reflects our sense of mortality and renewal.

A quantitative analysis of sacred writings supported these anecdotal references. I downloaded the Old Testament from the web (www.bible.com, King James version), did a search for all references to the terms tree and forest, and categorized the 328 references into seven groups (Fig. 1). I presented these findings to the congregations in a one-page handout. References to trees and forests in the Bible encompass an enormous breadth of Biblical values and activities. Although less than 5% of the references applied to what modern conservation biologists would call ecosystem services, trees were inextricably tied to the basic physical, aesthetic, and spiritual needs of humans.

Many faiths emphasize a sense of stewardship for trees and forests. The Jewish tradition of observing the Sabbath as a day of rest teaches its practitioners to consume less. The Talmud describes the recommended cycle of resting the fields 1 year for every 7 years of cultivation (Bernstein 1998). Buddhists recommend "secret virtue," which entails exercises in selflessness, doing something for others without seeking any reward or recognition; planting trees has only very long-term returns to the planter. I ended my sermons with a call to remember links of spirituality to trees whenever they are encountered. I provided handouts about specific environmental actions, such as joining a church-related or secular organization that carries out conservation activities. The discussions that followed these sermons revealed the deep sense of connection people have with trees within a religious context. Thus, an initial wake-up call can be delivered from the pulpit to elicit conservation actions (Nadkarni 2002).

Hospitals and Health Practitioners

Humans value trees because they participate in healing. A medical doctor in the congregation of a church invited me to speak about trees and healing to medical residents at his regional teaching hospital, which was followed by invitations to several major medical centers. At these talks, I reviewed with the audience how trees are directly involved with health by citing examples of medicines that are derived from trees (e.g., taxol from Pacific yew [*Taxus brevifolius*] for treatment of ovarian cancer). I also presented examples of how tree imagery might provide an inspiration for patients. For example, cancer patients who face chemotherapy might be encouraged that trees can sustain tumors ("burls") for decades; amputees might gain heart by knowing that trees lose limbs and adapt to the loss by growing epicormic branches.

I also presented behavioral psychology research on views of trees from hospital rooms (Ulrich 1984, 1991; Ulrich et al. 1991). Rates of recovery were compared between patients who had the same surgical operation (gall bladder removal) but whose view was either a tree or a blank wall. Patients who viewed a tree spent significantly fewer days in hospital recovery, used significantly fewer narcotic medications, and had significantly fewer complications than those who viewed a wall, suggesting that the visual presence of trees (or nature) enhances the recovery process. These results have influenced hospital design and residential areas for the elderly (Ulrich et al. 1991). Evaluations of these medical school talks revealed that over 65% of the residents felt that the talk was useful or very useful to their ability to treat patients. The openness of traditionally trained doctors to this nontraditional means of healing patients was surprising. Several doctors stated that they were more open to these ideas because they came from an established academic colleague in a scientific (though nonmedical) field.

Artists and Musicians

The potential synergism derived from bringing together artists and scientists to raise environmental awareness has been underexploited by conservationists. In one project, I brought ecologists together with people who focused on aesthetic values of the canopy. We installed four portable tree canopy platforms in an old-growth and adjacent secondary forest at Ellsworth Creek, a 2023-ha Nature Conservancy holding in Washington State. I invited 23 visual artists and musicians to spend a week at the site. After training each participant in basic rope-climbing techniques and safety, I encouraged them to express what they perceived, thought, and felt with their medium of choice in the canopy platforms for two 3-hour shifts each day. They created striking pastel, acrylic, and charcoal images. Oboe, bamboo flute, opera, and classical guitar music was composed that captured the aesthetic values of the forest canopy. The artists in the original group rapidly recruited a second cadre of artists for another session. Artwork from this project was shown in an exhibit called Branching Out: New Eyes in Old-Growth Forests at The Evergreen State College, thereby engaging even more new audiences.

Legislators and Decision Makers

To explore how a conservation message from scientists could be transmitted directly to decision makers, I invited 12 state legislators and their aides to the canopy. As for the artists and musicians, we installed canopy platforms in a local park and taught the participants how to ascend. Our discussions aloft included forest management issues, government funding of science, the reasons for high biodiversity in the canopy, and the importance of nonvascular plants in forest nutrient cycles. Our postsession evaluation, a written questionnaire distributed at the session with an email follow-up, documented that over 80% of the legislative audience felt "positive" or "highly positive" about the experience, and 75% stated that they would be willing to contact a forest

ecologist for advice or information about environmental issues in the future.

Urban Youth

Because natural systems are largely invisible in their immediate surroundings (Jolly 2002), urban youth are in great need of reinforcement of awareness of the connection between humans and nature. They fall significantly behind in their awareness and understanding of scientific methods relative to other youth groups (NSB 2002). To help me engage this large and important audience, I invited an Evergreen State College freshman, George "Duke" Brady, raised in central San Francisco, to our campus canopy platform. He composed a rap song about the canopy, which linked his passion for the music of urban youth with forest canopies, an excerpt of which follows:

> *Maybe I'll live in a tree top/like a hermit/I would never burn it or chop it down.*
>
> *Haven't smoked anything/ haven't eaten mushrooms/but I still want to sing,*
>
> *Rhyming e's and i's I don't know why I feel high up in the sky. . .*

Later, with support from the National Science Foundation, Duke performed his rap music for 600 tropical biologists during my plenary keynote talk at the annual meeting of the Association for Tropical Biology. His performance was met with astounding enthusiasm from scientists in the audience. Duke's songs also inspired a group of graffitti artists at Evergreen to paint a large mural with both wildland and urban elements that depicts the forest canopy, demonstrating that inspiration can leapfrog from one nonscientific audience to another.

Prisons and Incarcerated Persons

One the valuable characteristics of plants is their ability to inspire regeneration and renewal. I initiated a project called Plants in Prisons that trains prisoners to grow epiphytic mosses for emotional benefits (Kaplan 1991) and for profit in the horticulture trade (Kaplan 1991). This program also addressed the unsustainable harvesting of mosses from wild forests for the commercial floral and horticulture industry (Peck 1997*a*, 1997*b*). One mission of our program was to develop the capacity to farm rather than mine these plants from the wild. Prisoners can work with canopy-dwelling mosses easily because they can be cultivated without sharp implements and because their poikilohydric physiology makes them hardy. They are emblematic of the flora of the Pacific Northwest and may help "place" inmates in their location and provide a connection to wild lands, an important need for those confined to living indoors.

The pilot program had a nascent horticulture program and greenhouse (Cedar Creek Penitentiary, Shelton, WA; minimum- and medium-security adult men). Administrators were receptive to the concept and allowed eight inmates to participate. By 2004 we will have identified rapidly growing species, refined protocols to measure growth rates, and developed markets of local and regional moss distributors. We anticipate that prisoners will benefit socially by learning a skill they can use to earn a living after they are released and psychologically by having daily contact with growing plants. The ecological benefit is that this industry may reduce some pressure associated with extraction of mosses from primary forests.

Research and the Conservation Ambassador Program

These activities constitute the first step in communicating research information to the general public, but providing information and pathways for action is also critical. To follow up the awareness raising for forest canopy research, the staff at the International Canopy Network (ICAN) created a website (www.evergreen.edu/ican) that presents information on forest canopies for researchers, educators, and conservationists and includes materials that are both academic (e.g., citations database, images database) and nonacademic (e.g., popular articles database, short videos, information on canopy access and safety).

How do academic scientists react to these activities? In 2002–2003 I gave invited seminars on my activities at research universities (e.g., Stanford University, University of Washington) and keynote plenary talks at professional meetings (e.g., Association for Tropical Biology; International Canopy Conference; German Tropical Biology Organization; North American Forest Ecology Conference). Contrary to my expectations and fears that academics would deem these efforts a misguided waste of time, my colleagues agreed that outreach is important. They believed, however, that they were seldom able to overcome academic barriers at their institutions associated with promotion and tenure. The future, though, is hopeful. Since these presentations, I have received inquiries from more than three dozen researchers at both junior and senior levels who wish to learn how to replicate these outreach activities for their own studies.

Although many scientists are capable of conveying the excitement and importance of their work, they need help to overcome existing academic obstacles. Scientists—at least some scientists—must go beyond the typical modes of scientific communication if they are to motivate the large pool of nonscientists to understand and conserve nature (Brewer 2001). With the support of a research grant from the National Science Foundation (Informal Science Education program), we are training a group of researchers to become research/conservation ambassadors.

Newly recruited ambassadors are asked to describe their activities to a team of scientists and professional media people who then help create a scientifically sound and public-friendly website. The team collectively brainstorms to identify one or more nonscientist group(s) interested in the scientist's area of research; for example, the topic may relate to hobbies or trades of the audience. Then we help the scientist identify at least one venue for a public talk and/or workshop, and we offer ideas for at least one article destined for a popular publication with a nonscientific audience. To reduce the overhead costs of these efforts for the participating researcher, our program provides a financial honorarium ($1000), a letter of acknowledgment from a high-level academic professional (president of the National Academy of Sciences), assistance with graphics and targeting language to an appropriate level, and assessment tools formulated by professional education evaluators.

Conclusions

Five generalities about scientist-mediated dissemination of information to the scientifically unaware emerged from these activities. First, nonscientists are open to contact with researchers when they are in nonscientific settings. Second, nonscientists have their own well-developed networks to which they can easily link scientists for further contacts, and individuals from one nonscientist group can directly influence individuals in other groups in a leapfrog fashion. Third, trees remind humans of important spiritual and religious aspects of life, which can reinforce conservation messages conveyed by ecologists. Fourth, nonscientists are often amazed that scientists want to and are capable of communicating with them. And finally, nonscientists frequently generate observations and questions that are novel and useful because they bring a fresh perspective to research. Nonscientists are as passionate about their own interests as scientists are about their scientific interests, and if the two groups can be linked, then there is a powerful potential for education in both directions.

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