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# The Moss-in-Prison project: disseminating science beyond academia

Nalini M Nadkarni

My secretary stuck a post-it note on my door: "Telephone call from your prison warden. He said Inmate Hunter has another hypothesis to test about your mosses. He wants to put some moss flats under big-leaf maple trees in the prison yard, where they'll get natural throughfall – does that make sense?" Although it seemed an unlikely request from a medium-security prisoner to a professor of forest ecology, I had grown used to such queries. Inmate Hunter was participating in the Moss-in-Prisons project, an ecological research and outreach program I initiated in 2005 to counteract the destructive effects of collecting wild-grown mosses from old-growth forests for the floral trade.

Since 2000, the moss industry has grown rapidly, reaching an economic value of nearly US$200 million in 2005 (Muir *et al.* 2006a). This has raised concern among ecologists, because canopy-dwelling mosses fill important ecosystem roles, but are slow to regenerate. Mosses capture and retain atmospheric nutrients and provide habitat for arboreal animals. However, moss communities take decades to regrow after disturbance, so stripping mosses from trees is not sustainable (Muir *et al.* 2006b). No protocols exist for growing mosses in large quantities. To learn how best to grow them, I needed help from people who have (1) long periods of time available to observe and measure the growing mosses, (2) access to extensive space to lay out flats (shallow plastic trays) of plants, and (3) fresh minds to put forward innovative solutions. All three of these can characterize incarcerated individuals. In addition, people who are confined from nature – the elderly, the disabled, and prisoners – gain emotional and social benefits from working with living plants.

Mosses possess poikilohydric foliage, which enables them to survive drying, and are therefore suitable for novice botanists. This resilience increased the probability that the prisoners would successfully nurture the plants, which is critical for people who may have histories of destructive behavior. Carrying out primary research on growing mosses in captivity could be even more meaningful than simply growing food, as people with little opportunity to use their intellects could learn about the process of research and the rationale for conservation.

After scouting prisons in my region, I found that the Superintendent of Cedar Creek Correctional Center (CCCC) in Littlerock, WA, was amenable to our program. Our moss-growing team included a warden, two of my students, an adult volunteer, and 12 inmates. Our questions were basic: Which species should we use? How much water and nutrients do mosses need? Should solutions be delivered as droplets or as mist? At the outset, my students collected moss samples with a permit from the Olympic National Forest. We gave each inmate a notebook and pencil to write observations. The prisoners quickly learned to identify common moss species, using their scientific names. They devised their own methods to grow the mosses (eg hanging clumps of moss in mesh bags); contrived ways to deliver water with first aid tubing and hardware clamps; and learned how and why to obtain random samples to dry for our moss growth measurements. We regularly reviewed the growth data with the prisoners, and after 18 months, collectively shared the excitement of our results (Fischer 2005). We have since been working with two online nature gift companies to sell the "sustainably grown moss pots"; each pot includes information about the ecological importance of mosses on an attached card. Although inmates are not allowed to gain financial benefit while they are in prison, we hope that they might pursue this avenue after release.

Our results were dramatic in many realms. One of the inmates joined the horticulture program at the local community college after his release, with a career goal of opening his own nursery. As an outgrowth of this project, I launched an in-prison lecture series called "Sustainable Futures – Sustainable Lives." Visiting scientists from regional universities and environmental agencies gave talks on sustainability and ecology to inmates and prison staff. This was unique in terms of the sociology of the prison, as we were allowed to have prisoners and staff sit together in the audience, rather than the usual practice of separating them. The questionnaires that we circulated before and after each lecture provided us with interesting feedback, such as: "I understood everything the teacher said"; "Bring someone who can talk about soils next time"; and, "How come the mosses don't fall off the trees?"

The Superintendent invited corrections officials from other institutions to attend the lecture series, opening doors to replicating these programs at other prisons. My students provided over 220 hours of volunteer time to train the inmates, process samples, and interpret the data. Lastly, by the time the project ended, the desks of three prison staff sported "moss pots", indicating their engagement in this "obscure" life form. Some prisoners made profound personal connections with the plants themselves. Inmate Juarez told me he had taken an extra mesh bag of moss from the greenhouse and placed it inside the drawer of his

*The Evergreen State College, Olympia, WA 98505 (nadkarnn@evergreen.edu)*

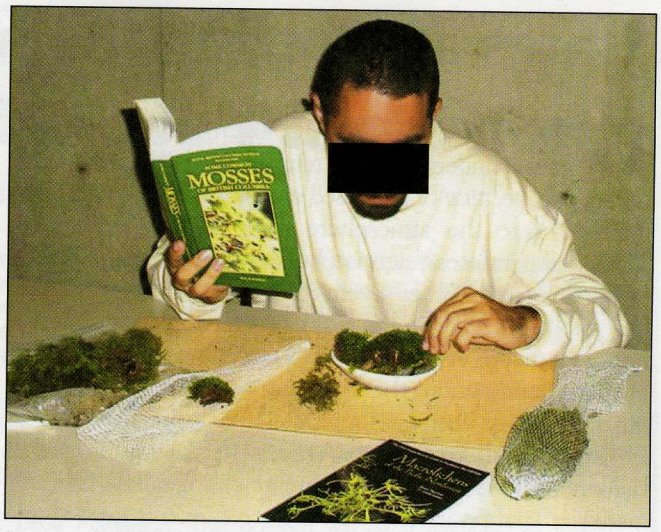
bedside night table. Each morning, he explained, he opens the drawer to see if the moss is still alive. "And even though it's been shut up in a dark place for so long, it's still alive and growing in the morning", he said, grinning. And then, more quietly, "Like me."

One of the most important results was that the prisoners became engaged in learning about the process of science as well as the results of moss growth. Inmate Hunter informed me that no one ever shared notebooks or notes with him, and vice versa. Was this due to a sense of competition? No, he explained. He knew that working together was important for some aspects of the project, but if he saw what someone else had written, it might influence what he recorded. I was thrilled that this individual – with no formal scientific training – had intuitively recognized the need for objectivity.

The corrections center staff were astonished at the energy, interest, and patience exhibited by the participants. The challenges of moss taxonomy and the tedious nature of watering and making observations on nondescript, slow-growing plants would seem to discourage participants. Being a physically captive audience, one might expect resentment rather than the receptivity we found. Why were the inmates so engaged? First, the participatory way the project was presented decreased resistence to doing work that was challenging and repetitious. Rather than being told what to do – the norm of their existence behind bars – the inmates saw themselves as active and valued participants in an ongoing exploration of how to solve a critical environmental problem. Second, the project was presented as solving a real-life problem that occurs in their home region of the Pacific Northwest, reinforcing their existing connections to nature. Third, even though they were incarcerated for contravening a societal norm, their actions and conversations reflected their desire to make a difference to society.

This project presents a context for a challenge that faces all of us: how to bridge the gap between scientific knowledge and active environmental engagement in people who might not have positive or protective attitudes about nature. Our results provide insights into how scientists can participate in solving two major problems facing our society: the growing gap between science and society, and the decreased awareness of the importance of the health of our planet's biota (NSB 2002; Miller 2004). Traditionally, scientists have played minor roles in direct dissemination of research to the public. Science outreach is largely facilitated by informal science education centers and media professionals, which are geared primarily towards segments of the "scientifically aware" public (Falk and Dierking 2002). However, researchers can be effective disseminators because of their deep passion for, and knowledge of, what they study (Nadkarni 2004). In addition, scientists have much to gain from increasing the public's understanding of science because of the positive relationship between society's views of science and levels of scientific funding (Miller 2004).

The Moss-in-Prisons project is one example of how a scientist operating at a local scale can empower a segment of society that appears to be disengaged with science to connect with both the scientific process and a specific environmental issue. Bringing an authentic environmental problem to this prison audience engaged a non-academic community that might otherwise be excluded from both nature and science, to the benefit of all participants. Further work should examine how the small scope of this project (12 inmates in one prison) can be expanded to larger arenas, and how to evaluate the long-term impacts on all participants, especially the scientists.



*Inmate identifying a species of moss.*

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*For a further list of suggested readings and websites, see WebOnly material*