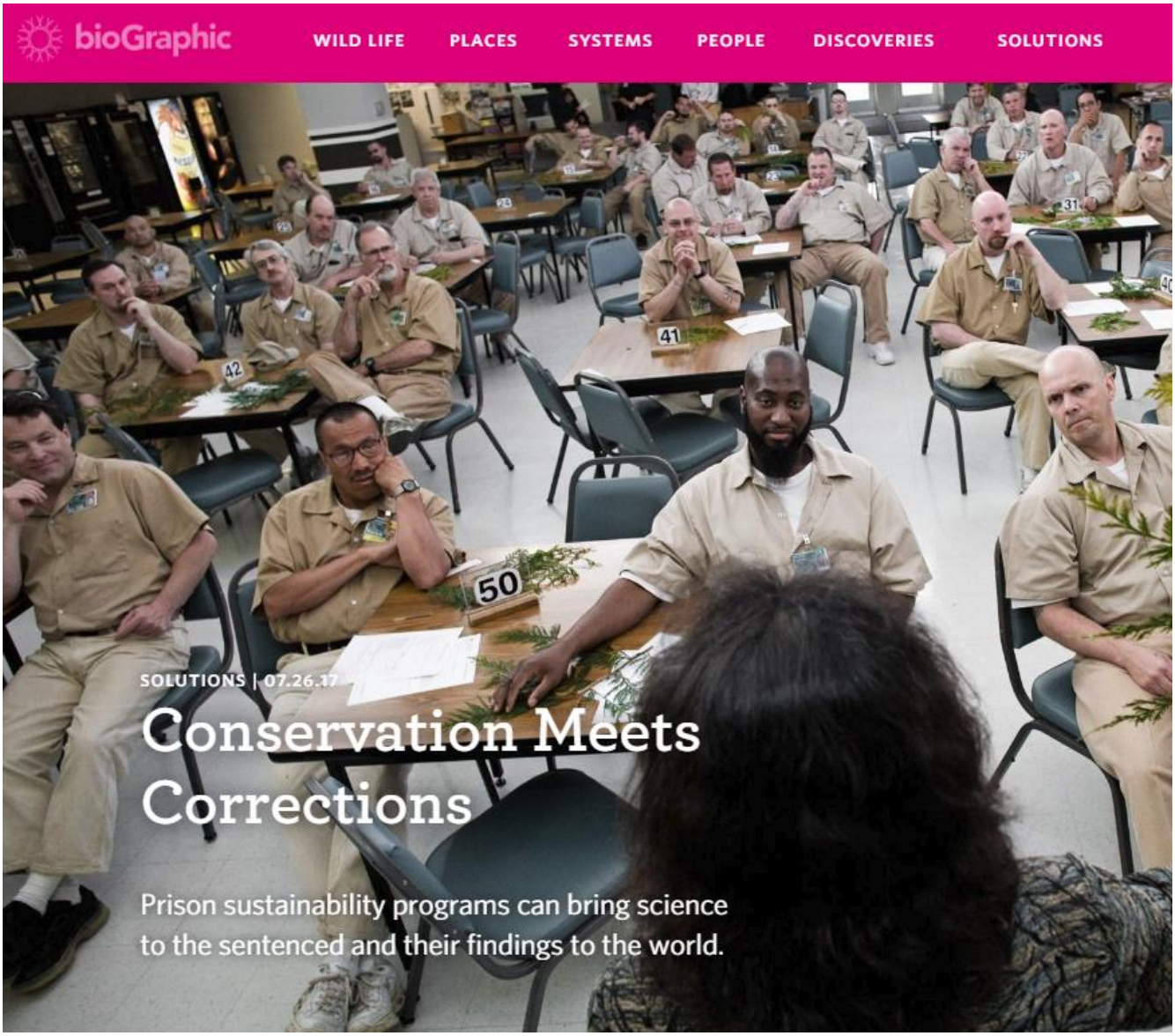

Story by Katie Jewett
Photographs by Cyril Ruoso and Benjamin Drummond

Nalini Nadkarni probably looked out of place as she walked up to the chain-link and razor-wire fence enclosing the Cedar Creek Corrections Center. She certainly would have felt more at home in the forest that surrounded the minimum-security prison. As a rainforest ecologist at The Evergreen State College, just 25 miles northeast in Olympia, Washington, Nadkarni usually spent her days studying the role that tree canopies play in forest ecosystems. Using modified rock climbing techniques, she clambered to dizzying heights in the treetops of Costa Rica's tropical rainforests and the temperate forests of the rain-soaked Pacific Northwest. But by this time, in 2005, she had become a regular visitor to Cedar Creek. "I like going where people haven't gone before,"

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Nadkarni says. “I like testing borders and seeing how far I can push them.” That penchant for exploration, along with her unbounded appreciation for the natural world, had led Nadkarni from uncharted canopies straight into one of the most nature-deprived spaces humans have ever created.

Whereas most people see prisons only as places to lock up the dangerous and disobedient, Nadkarni saw tremendous potential. She saw eager minds far outside the traditional tracks of academia that could contribute fresh perspectives and benefit from participating in meaningful research—both as scientists and subjects. She wanted to bring the great outdoors inside to incarcerated populations that didn’t have access to it, and to use science as a tool so that inmates could share their findings with the world.

The United States has the dubious distinction of locking up more people per capita than any other country in the world. Nearly 2.3 million people in the U.S. are behind bars—one in five for non-violent drug crimes. One in seven are serving a life sentence. To Nadkarni, this meant far too many bright minds were being squandered.

With hope and trepidation Nadkarni presented her proposal to bring nature and science into prisons to Cedar Creek’s recently appointed superintendent Dan Pacholke. The 22-year veteran of corrections was a pragmatist, but also a forward thinker. He had already been exploring ways to provide inmates with a more constructive and engaging incarceration experience, and a clearer path forward upon release, and he was excited about this idea. “I don’t see my job as to punish or forgive inmates,” he has said. “But I do think they can have meaningful lives—even in prison.”

Just like that, the shoestring Sustainability in Prisons Project (SPP) was born—an unlikely collaboration between The Evergreen State College and the Washington State Department of Corrections, with Nadkarni and Pacholke at the helm. Creating the project and giving it a name was the easy part. Whether the collaboration could have any meaningful impact on conservation and sustainability issues or on fundamental scientific understanding seemed like more of a long shot, but Nadkarni was determined to try.

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Tackling the Moss Market

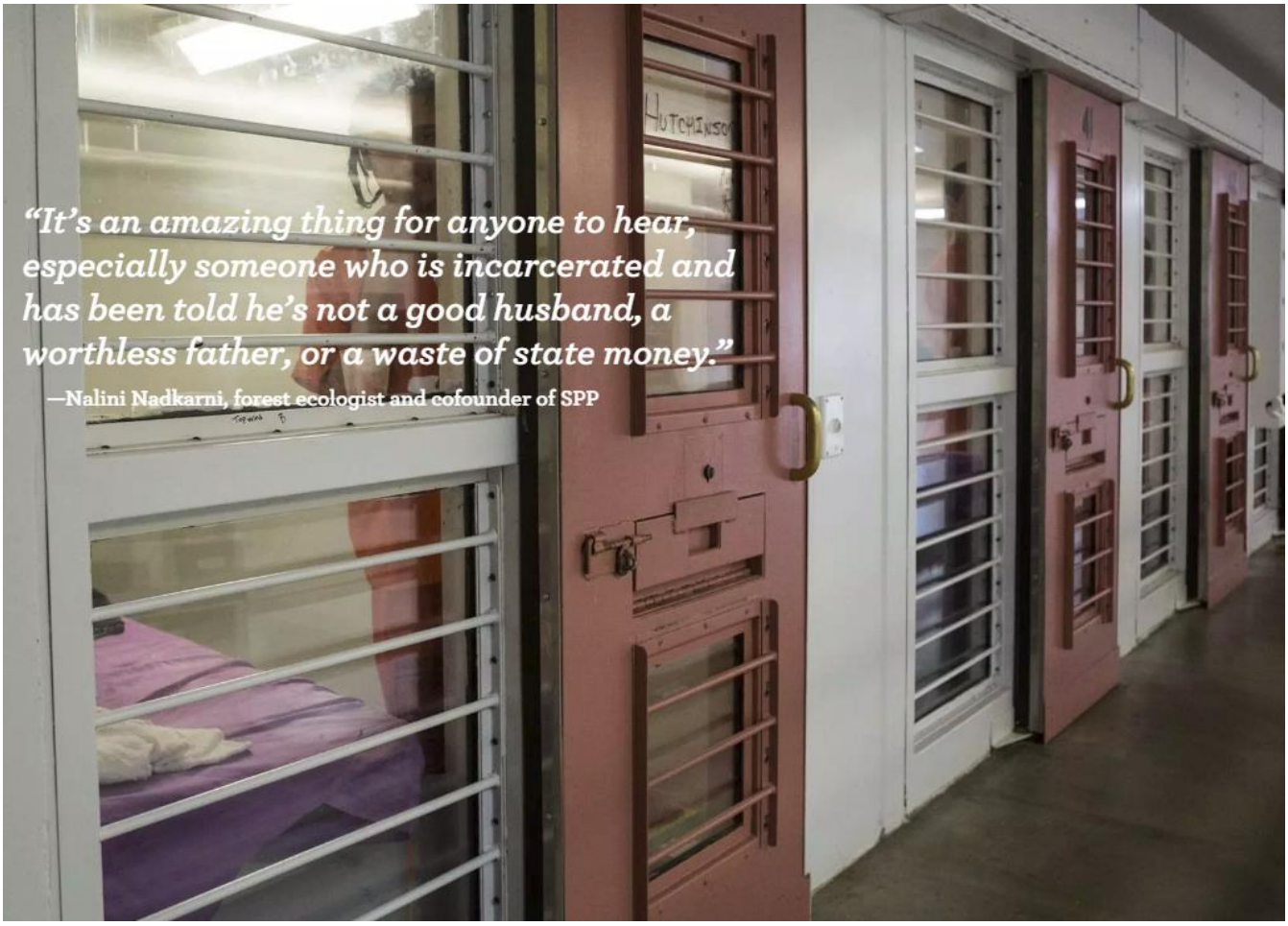
Nadkarni had spent much of her career studying the critical role that canopy-dwelling mosses play in old-growth forests across the Pacific Northwest. The plants act like sponges, acquiring nutrients and moisture from the atmosphere and the surrounding environment and making them available to the rest of the forest ecosystem. Slowly, over the course of decades, mosses grow to carpet the crooks and crannies of trees and provide important habitat and nest material for forest insects, birds, and mammals.

But some people saw moss as the proverbial money growing on trees. Prized for its use in floral arrangements and as packing material, moss was in high demand by the multi-million dollar horticulture industry. Back in 2005 and still today, the only source of moss was in the wild—more than half of it stripped from old-growth forests in the Pacific Northwest. The harvest was managed, but some collectors ignored permitting requirements and limits, so moss was being removed at rates that far outpaced its ability to regenerate. Nadkarni wondered if moss could be grown at a commercial scale, like any other crop, to relieve the pressure on wild populations.

When Nadkarni started digging into the literature, she found no information on how to cultivate temperate rainforest mosses. She needed help developing

techniques that might make this possible and that could be scaled up in the future. The project was perfectly suited to a prison environment, she thought: Moss is forgiving and resilient (even when watered inconsistently), and cultivating the plants doesn't require any sharp tools. In addition, developing techniques for growing mosses on a large scale would require a great deal of time and attention—something prisoners have in abundance.

To start, Nadkarni taught inmates how to identify moss species with a botanical key and monitor their growth. Prisoners cared for trays of mosses and experimented with different growing regimes. They filled notebooks with data, that, when compiled at the end of the project, showed that two of the four species tested had the potential for production at a commercial scale. While there was no guarantee that florists would pay a premium for sustainably sourced mosses, Nadkarni's inspiration paired with the prisoners' effort had proven a concept. "When you provide intellectual stimulation," she explains, "even if [people] don't have the training, they rise to the occasion and can contribute to the scientific enterprise."



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Progress in Leaps and Bounds

Buoyed by the success of the moss project, Nadkarni started calling everyone she knew in conservation, including a graduate school colleague, Marc Hayes, who had since become a senior scientist for the Washington Department of Fish and Wildlife. She said, "I know this sounds funny, but if you need a partner to help with your project, I can recommend these prisoners."

Hayes recalls, "My reaction was highly skeptical, but I didn't say no." He was developing a project to breed threatened Oregon spotted frogs (*Rana pretiosa*). Once widespread across the Pacific Northwest, the amphibian has now vanished from the majority of the freshwater marshes it used to inhabit. It's been driven out by habitat loss, ravenous exotic fish, and the fatal gulp of the invasive American bullfrog (*Lithobates catesbeianus*). The Oregon spotted frog now occupies a range about as spotty as the tiny black dots that cover its back. Hayes had the permits, protocols, and populations ready; he was just short on research technicians. So he invited Nadkarni to present her proposal to the working group of local zoos, government agencies, and other conservation partners trying to protect the frog.

"In about half an hour she had the group completely convinced," Hayes says. He wasted no time getting the prisoners started on their own captive breeding efforts. A section of Cedar Creek's grounds was quickly transformed into rearing

facilities, and Hayes taught inmates the protocols for rearing frogs from delicate eggs to tadpoles to full-grown adults ready to produce the species' next generation.

Breeding a threatened species of frog in captivity was no small commitment. Inmates spent long shifts—sometimes full days—in the lab, meticulously monitoring water temperature, ammonia levels, and pH. They cleaned, flushed, and conditioned water that went into the tanks. To feed the tadpoles, inmates ground and froze individual servings of kale and lettuce grown on the prison grounds. And when the crickets fed to the adult frogs became too costly to buy, the inmates established methods to rear and harvest the insects themselves. At each developmental phase, the prisoners weighed and measured the frogs' growth.

See a slide show of frog rearing in prison at https://www.biographic.com/posts/sto/conservation-meets-corrections

"They were very competitive," Hayes laughs. "When they found out that other rearing institutions were involved, they decided they were going to rear the biggest frogs." And that they did. The prisoners had more time on their hands than the zoo employees, for example, so they were able to feed the frogs multiple times a day and observe their health more closely. As a result, the

size and survival rates of frogs at Cedar Creek consistently surpassed those of the other captive breeding facilities.

In 2012, the Association of Zoos and Aquariums recognized the Oregon-spotted frog project and its captive breeding program (including Cedar Creek) with an award for exceptional conservation efforts. “We became just another partner at the table,” Hayes says. For many inmates, the project was a chance to prove that, with the proper training and opportunities, they could be capable, competent technicians in animal husbandry—not to mention innovators. Nadkarni says many inmates asked if their work and the techniques they were refining were improving the chances of saving the species from extinction. She assured them it was: “It’s an amazing thing for anyone to hear,” she says, “especially someone who is incarcerated and has been told he’s not a good husband, a worthless father, or a waste of state money.”

Sustainable Prisons

Having seen the contributions that SPP participants had made to scientific research and conservation efforts, superintendent Pacholke wanted to see how these newly developed science skills and budding community partnerships might affect change within the prisons themselves. SPP launched a program to explore how corrections infrastructure could be made more sustainable, both environmentally and financially.

Composting was among the first of many projects Cedar Creek would develop to reduce waste. They didn’t have funding, so, like many scientists, they had to be creative with the resources at hand. The prison’s staff and inmates re-purposed concrete blocks and an old woodshed from the prison grounds to build a structure that would serve as their new composting facility. Inside, mounds were piled high, a mixture of food waste scraped from kitchen trays and sawdust from a Department of Natural Resources sawmill that operated on the prison grounds.

Four and a half years into his six-year sentence, an inmate named Craig Ulrich approached Nadkarni wanting to make the most of his remaining time at Cedar Creek. His quiet demeanor and eagerness to learn had already caught the eye of both Pacholke and Nadkarni. Compost wasn’t an easy sell, but Nadkarni’s passion for science was contagious. When she extended Ulrich a thermometer and small notebook in which to detail his findings, he didn’t hesitate.

“Nalini and Dan gave me full rein to ask and address questions.” Ulrich says. “It reinvigorated my idea of why I liked science.” Ulrich had majored in molecular biology at the University of Washington before his sentence, and now he began to design and conduct his own experiments—an intellectual freedom he says he never experienced as an undergraduate.

“That’s the beauty of prison—it allows you time to do the scientific method correctly.”

—Craig Ulrich, pharmacologist and former inmate

Ulrich became a key player in the project. He monitored moisture content and temperature, as well as more subjective measurements like odor. “If it smelled bad, you weren’t getting enough heat or carbon,” Ulrich explains. He also designed and tested different incubation racks to maximize efficiency. Before long, Cedar Creek had moved from basic composting techniques in the shed to industrial-sized barrels using worms to speed up the process. “If it works, you continue. If not, you scrap it and start over,” Ulrich says. “That’s the beauty of prison—it allows you time to do the scientific method correctly.”

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Over the course of two years, Cedar Creek cut landfill-bound waste in half, downsizing from a dumpster of 30 cubic meters to one of just 15. This allowed the prison to avoid a $1.3 million sewage treatment expansion. When assessors saw how efficient the prison had become at diverting food waste (which is processed as sewage when it goes down a garbage disposal) they deemed the expansion unnecessary. “The cost-savings at Cedar Creek ended up being the unintended consequence of just doing the right thing,” Pacholke says.

Entering the Blue Room

Despite SPP’s success in bringing science to the incarcerated, Nadkarni knew there was one prison population still entirely isolated from nature: inmates in solitary confinement. Prisoners in solitary confinement are allowed only one hour a day to walk outside of their prison cells, either in an exercise room or escorted through an empty prison yard. Without intellectual stimulation or social interaction, researchers have shown that solitary confinement can exacerbate and cause mental illness. Nadkarni also knew from studies she’d read that nature—even simple images of the natural world—can be therapeutic.

In 2013, Nadkarni was contacted by the Snake River Correctional Institution in Ontario, Oregon to take on a new challenge. They had seen a TED Talk she had given about science in prisons and wanted to collaborate. She brought a video projector to their exercise room, which was equipped with nothing more than a pull-up bar and a chair. Inmates serving time in solitary confinement were brought to this bleak windowless room a few times a week. Here, they could watch their choice of 38 different nature videos such as chattering forests, roiling waves, cloud fly-throughs, and views of Earth from space.
Prior to this experiment, Nadkarni had tested which types of scenery would have the most calming effect on inmates. As an ecologist, most relaxed and at

ease in the woods, she was sure that forests would offer the greatest mental relief. In contrast, most inmates opted for the open desert or prairie—scenes that helped the inmates envision, albeit briefly, a world not surrounded by four walls.

Nadkarni split the 48 prisoners in solitary confinement into two groups: one half watched the videos, and the other half didn't. Over the course of a year, Nadkarni's research team revealed that inmates who viewed nature videos committed 26 percent fewer violent infractions compared with those who didn't. Some prison staff were critical of the experiment, arguing that the intervention coddles dangerous and deeply troubled convicts. But many prison guards used the room as a calming intervention, sometimes leading inmates they perceived as distressed to the Blue Room (so called because it was later painted blue—a calming color) outside of their allotted exercise time. Most staff agreed that inmates with exposure to the videos were calmer, less agitated, and more empathetic—creating a safer and more positive prison environment for everyone.

Nadkarni has spent 14 years exploring the scientific, conservation, and psychological benefits that can result from bringing the outdoors into nature-deprived spaces like prisons. She is now a biology professor at the University of Utah and collaborates with SPP as director of the Initiative to Bring Science Programs to the Incarcerated (INSPIRE). "None of us is prevented from helping nature and our planet," Nadkarni says. "An inmate that has been locked up for six years can contribute to the scientific record; someone who has been in solitary confinement for ten years in the same cell can reduce violence." While there's still no perfect approach for accessing our nation's most hardened inmates, Nadkarni and the SPP network blazed a trail for others to follow.

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A Darker, Greener History

SPP's projects are, in a way, a return to old roots. In the late 18th and early 19th centuries, Washington state prisons were arguably more self-sufficient than they are today. Inmates would maintain gardens, tend orchards, and operate their own dairies. But in many cases, it wasn't nearly as bucolic as it might sound. Prisoners often toiled in the fields as punishment rather than reward—a model that some legal scholars have compared to slavery.

To this day, the practice of prison labor remains controversial and draws criticism, though conditions vary a great deal from one prison or one state to the next. Washington State has put prisoners to work since the late 1800s.

Today dozens of industries in the state draw from their labor, including cabinet-making, printing, laundering, and meat-cutting. In a 2015 investigation, reporters from The Seattle Times called prison labor programs "broken," claiming they cost the state millions of dollars, victimize small businesses with unfair competition due to low prison wages, and fail to improve the skillsets of inmates for greater post-release success. Many argue that prison laborers constitute a disenfranchised group vulnerable to workplace exploitation but afforded none of the protections gained by the modern labor movement.

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SPP pays its participants a small stipend, but it's a paltry sum compared to the outside world. The Oregon-spotted frog program, for example, paid inmates just 42 cents an hour. The official explanation is that the program is meant to be educational and therapeutic first, and vocational second. "We're trying to make change within the system, but we're not able to change everything about the system," says Kelli Bush, SPP's program manager. "We're hoping to chip away at it." Being able to earn a little money provides inmates some control of their lives (to send a gift home or cover a phone bill) in an otherwise highly restrictive environment.

> *"The reality is, these inmates are coming back to a neighborhood near you when they're released. What sort of experiences, skills, and socialization do you want them to have had when it comes time for them to re-enter society?"*
>
> —Dan Pacholke, past prison superintendent and SPP cofounder

Every inmate in Washington State is strongly encouraged to partake in corrections programs or to hold a job. Some sentences require inmates to enroll in certain programs like substance abuse or addiction support, but many inmates are able to choose how they spend their time. They may participate in SPP, but they may also opt for custodial work, enroll in a GED program, or participate in vocational training. "If you had the option to choose between being in a cell or learning how to weld, how would you want to spend your time?" Pacholke asks. There is never any shortage of volunteers for the conservation projects. "No matter how many SPP programs we implemented, we always found people who would raise their hand to partake," Pacholke says. "I think it was simply the appeal of having a choice to do something meaningful."

The composting project spurred a number of other SPP directives. The facility began operating a zero-waste garbage center to hand-sort every piece of trash before it went to the landfill. This reduced disposal costs, as well as fuel costs and pollution from the trucks that haul it.

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Rainwater catchment systems were introduced, single-use plastics were eliminated, and compost was used to fertilize organic gardens. In addition to offsetting food costs, organic gardens produced onions, cilantro, and tomatoes that were used to flavor the institutional food. When beekeeping began, fresh honey appeared with biscuits at mealtimes. Inmates got to taste the fruits of their labor.

Pacholke departed from corrections work in 2016, and he now researches innovative criminal justice projects at New York University's Marron Institute of Urban Management. He says SPP initiatives represent a paradigm shift for corrections. Imagine the impact, he says, if every prison in every state took on just one sustainability project. Beyond forging strong allies for local conservation and global sustainability, Pacholke says changing the nature of prisons also benefits communities. "The reality is, these inmates are coming back to a neighborhood near you when they're released," he says. "What sort of experiences, skills, and socialization do you want them to have had when it comes time for them to re-enter society?"

Growing Impact

The SPP network now encompasses more than 120 programs and nearly 100 community partners throughout Washington and seven other states—with as many as 25 more states expressing interest in implementing future programs.

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“We just don’t have the resources to fully support them right now,” says SPP’s Kelli Bush.

Some programs help to advance ecological projects, like the cultivation of prairie plants at Stafford Creek Corrections Center in Aberdeen, Washington to restore the state’s lowland prairies and provide habitat for endangered pollinators. Other programs breed threatened Taylor’s checkerspot butterflies (Euphydrayas editha taylori) or rehabilitate western pond turtles (Actinemys marmorata). Still others focus on improving sustainable operations and offering environmental education that can be transferred for academic credit upon release. At least 3,000 inmates in Washington alone participate in these programs. Many more beyond that participate in a monthly lecture series that brings in outside experts to speak about sustainability, natural history, and ecology. There are even budding collaborations with NASA this year to bring astrobiology lectures to prisons in Utah and Washington.

“Sure, the occasional inmate might fall asleep at presentations,” Nadkarni chuckles. But almost every scientist reports that prisoners ask thought-provoking questions that help them see their work in new and different ways. In addition to making prisons more sustainable and research programs more successful, SPP programs are designed to improve the lives of prisoners, too. “Almost everyone has felt some sense of transformation in these projects,” Nadkarni continues. “I attribute it to the power of education and nature—it gives inmates the sense that they’re not just a crummy convict but have the potential to be a Ph.D.”

32%

of prisoners in Washington State are rearrested within 3 years of release; the national average is 43 percent

Still, the effectiveness of nature-focused programs like SPP at reducing recidivism—when a prisoner is released only to get arrested again—is difficult to prove. For one, the factors that impact whether or not someone has another run-in with the police are complex, including public safety regimes, economic disparities, the availability of educational opportunities, and the like. Plus, when a prisoner is released, prisons have no way of knowing their successes or failures unless they’re arrested again. Despite a lack of conclusive data, Washington State Department of Corrections puts the state’s rate of recidivism at 32 percent, far less than the national average of 43. A recent editorial from a social psychologist at Princeton University argues that green programs like

SPP appear to radically reduce rates of recidivism, but calls for more systematic data collection.

Some success stories do filter back to SPP. Numerous former inmates have enrolled in higher education and pursued newfound interests in science. Several have moved on to study at The Evergreen State College (including one who was later hired to work on the SPP team). Others have pursued degrees in horticulture at local community colleges, and many more have reported that their families told them they were proud of them—for the first time.

Breaking Down Barriers

As an early and critical player in the sustainable waste management program, Craig Ulrich sought to formalize the process and his findings while he was still incarcerated. But, like many things, writing a scientific paper was far more complicated a process in prison. With limited access to a computer, he couldn't input any of his data into a spreadsheet or type up his results. Instead he passed his handwritten notes to Pacholke who would deliver them to Nadkarni. She would incorporate his revisions, type up a new draft, and deliver it to Pacholke to give back to Ulrich a week later. Maybe ten marked-up versions were passed back and forth through the bars until the paper detailing the findings of Cedar Creek's conservation and sustainability projects was accepted

and published in the academic journal Environmental Development and Sustainability in 2008. Ulrich was the lead author.

> *"I walked in a prisoner and out a scientist."*
>
> —Craig Ulrich, pharmacologist and former inmate

With this scientific success under his belt, after his release from prison that same year, Ulrich went on to pursue his Ph.D. in biochemistry at the University of Nevada, Reno's School of Medicine, where he is now a post-doctoral researcher in pharmacology. The focus of his research is to identify the molecular mechanisms that cause premature birth, and develop pharmacological methods to keep fetuses in utero as long as possible. Ulrich also sits on the SPP network's advisory panel and is a staunch advocate for the program's ability to transform lives. "A lot of sporadic decisions get made in prison. If you can show people there's an alternate way to approach life—questioning things, testing them, analyzing the outcome, and making a new decision based on what was learned previously—you can teach them a more rational way to think." Ulrich also asserts that this kind of intellectual stimulation could provide benefits well beyond prison. "These institutionalized places—prison or a military camp or even a senior home—they can benefit from that usage of the scientific process to engage the brain.

Scientific questioning shaped Ulrich's life both within prison and beyond it. Shortly after his release, with permission from his parole officer, Ulrich hopped a plane to Milwaukee at the invitation of the Ecological Society of America to speak at their annual meeting. Several hundred ecologists were in attendance, and his

parents flew down from Alaska. Ulrich shared the findings of SPP's waste management project and explained, to a rapt audience, how unlikely partnerships for ecological research could drive valuable data—and dreams. "I walked in a prisoner and out a scientist."

Photo credits:
Header image: Project cofounder and forest ecologist Nalini Nadkarni lectures inmates about trees. Photograph by Benjamin Drummond.
Inmates in solitary confinement at Snake River Correctional Institution. Photograph by Benjamin Drummond.
A prisoner in the Blue Room at Snake River Correctional Institution. Photograph by Benjamin Drummond.
Watching a nature film in the Blue Room at Snake River Correctional Institution. Photograph by Benjamin Drummond.
Inmate Karen Lockhart tends to a newly planted vegetable bed at Washington Corrections Center for Women. Photograph by Benjamin Drummond.
Footer image: The Oregon spotted frog captive breeding program at the Cedar Creek Corrections Center readies frogs to be released into the wild. Photograph by Cyril Ruoso.

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ABOUT THE PHOTOGRAPHER
Cyril Ruoso has been a professional photographer since the mid-1990s, and now travels the globe in search of visual stories to tell. He is particularly interested in primates, and has published several books and dozens of feature stories about apes and monkeys of the world. More recently, he has turned his attention to amphibians and their plight, spying on frogs in the snowy Alps, giant salamanders in Japan, and goliath frogs in Cameroon. With his images, Ruoso hopes to bring more attention to the issues of biodiversity and ecosystem loss, and inspire people to care more about conservation.

ABOUT THE PHOTOGRAPHER
Benjamin Drummond is a photographer and producer who works in collaboration with his partner, Sara Joy Steele, and nonprofits, academic institutions, and others to create change through filmmaking, photography, and interactive design. Drummond's and Steele's films have toured internationally and been featured by Telluride Mountainfilm, Wild & Scenic Film Festival, and Yale Environment 360. Drummond's photography has appeared in *National Geographic, Photo District News, Smithsonian,* and other publications.

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