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A West that works

Necessary meddling



Ecologist Craig D. Allen, on staff at Bandelier National Monument in New Mexico, says it's a mistake to think wilderness areas are pristine, or that a leave-it-alone approach will halt the deterioration of their soil, water cycles and forests.



Courtney

White writes a monthly column for Headwaters News that focuses on people who embrace a sustainable approach to western resources.

White is executive director of the Quivira Coalition, a Santa Fe-based group devoted to collaboration as the approach to an ecologically healthy region.

Much of Quivira's emphasis is on ranching, but its principles of education, cooperation and innovation apply to many of the region's biggest issues.

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Much of the Southwest's de facto wilderness needs work, including with chainsaws, or natural landscapes will disappear

By Courtney White for Headwaters News

Craig Allen is trying hard to make ecology relevant.

This effort is not only evident in the many articles he has written for scientific journals, the many lectures he has given on forests and fire to a wide variety of audiences, and in the elegant experiments in ecological restoration he is conducting, but also in the energy he puts into a conversation about forests while just hiking to a project site.

Clearly, Allen loves what he does,

And what Allen does is try to understand fundamental ecological processes in the woodlands and forests of the Jemez Mountains, west of Santa Fe, N.M. Employed by the US Geological Survey and stationed at Bandelier National Monument, Allen has devoted nearly 20 years of his professional life to gaining a comprehensive understanding of landscape health and sickness, and what constitutes appropriate cures.

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Without management intervention, they argue, this human-caused case of accelerated soil erosion will become irreversible.

But it is not merely an academic interest. Allen has become a vocal advocate for science-based "adaptive management" – carefully monitored experimentation – in our forests. By arguing for science-based decision-making, however, Allen walks a fine line between the research community, which is methodical by its nature, and land managers, who are often under pressure to move quickly. By choice, Allen has a foot in two worlds that historically have had an uneasy relationship.

He bridges both worlds for a reason: He believes the deteriorating conditions of some forests require that relationships between research and management be improved substantially, and quickly.

Functionality Crisis

Like many ecologists working in the West today, Allen will tell you that all is not well on the land. Anthropogenic change over the decades – overgrazing by livestock, fire suppression, exotic plant species introductions and heavy-handed remediation strategies – have combined to throw many ecosystems into a state of poor health. He often cites as "Exhibit A" the widespread changes in tree-choked Southwestern ponderosa pine forests that have led to dramatic increases in stand-replacing "crown" fires in recent years.

But it is not just the West's "working landscapes" that are in trouble. Allen sees serious damage in much of what conservationists, and the public, might consider to be "pristine" landscapes, including the federally designated wilderness of Bandelier National Monument – which is news for many.

In a 2001 article for the journal "Wild Earth," Allen and two colleagues wrote "Most wilderness areas in the continental United States are not pristine, and ecosystem research has shown that conditions in many are deteriorating."

The authors documented that the Bandelier Wilderness is suffering from "unnatural change," mostly as a result of historic use of the area that triggered unprecedented change in the park's ecosystems, resulting in degraded and unsustainable conditions.

"Similar changes," they write, "have occurred throughout much of the Southwest."

Specifically, semiarid soils in Bandelier pinyon-juniper woodlands are "eroding at net rates of about one-half inch per decade. Given soil depths averaging only one to two feet in many areas, there will be loss of entire soil bodies across extensive areas."

This is bad because the rapid loss of topsoil, and the resulting loss of water available for plants, impedes the growth of all-important grass cover, thus reducing the incidence of natural and ecologically necessary surface fires and reinforcing the accelerated erosion. And, several thousand archaeological sites are being damaged by erosion in the Bandelier area.

While too much bare soil is the root of the problem, eliminating grazing in this desertified landscape is no panacea for Bandelier's erosion crisis. Herbivore exclosures established in 1975 show that protection from grazing, by itself, "fails to promote vegetative recovery," they write.

Without management intervention, they argue, this human-caused case of accelerated soil erosion is causing irreversible damage.

They warn, "To a significant degree, the park's biological productivity and cultural resources are literally washing away."

Their summation is provocative: "We have a choice when we know land is 'sick.' We can "make believe," to quote Aldo Leopold, that everything will turn out all right if Nature is left to take its course in our unhealthy wildernesses, or we can intervene – adaptively and with humility – to facilitate the healing process."

And healing is what Allen is trying to accomplish as he tries to make ecology relevant.

"Once bare soils are exposed, this becomes is a harsh environment for plants," Allen said during a hike to a restoration study site on a dry mesa in Bandelier's wilderness.

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"There's pounding rain in the summer, when it rains, lots of freeze-thaw action in the soil in the winter, when it snows, and desiccating sunshine and winds in the spring."

These conditions have played havoc on Bandelier's semiarid and shallow soils – soils which are not atypical of many around the region.

Which is why Bandelier is a good case study in making the West "work" again.

Restoration

So what is a modern land manager to do in face of this persistent "erosion crisis?" Allen and other ecologists have an idea: restore the natural range of variability to the land. In other words, get natural processes, especially water retention and fire, up and running again.

He explained the strategy at the restoration site.

"In 1997, crews came in here and cut the smaller trees, lopped the branches and spread everything out over the land," he said. "The idea was to get a more natural water cycle going by allowing more infiltration by rain so grass would grow. We wanted to do this by improving microenvironments in the bare interspaces between grass clumps and trees, and we did that with the slash."

"There was an immediate response," said Allen. "Erosion nearly ceased, remnant grass bunches started growing again, a weedy successional cycle started, and new plants grew."

The slash did this, according to Allen, for three reasons: The branches and needles increased "surface roughness" by creating a "zillion" little checkdams that held back water and soil; the foliage provided a pulse of nutrients to plants and seeds; and shading by the branches reduced evaporation and the stress on plants.

"By reducing the harshness of the microenvironment," he said, "we increased the amount of plant-available water, which is essential to grow plants that slow and stop sheet erosion."

If rain runs off too quickly, grass and plants can't grow, and if grasses can't grow, they can't become fuel for a fire, and if a fire can't run its course, then too many trees grow, which compete with grasses and further reduces the amount of ground cover, which encourages additional erosion - round and round it goes, as it has for nearly a century.

When Allen and other scientists compared the restoration site to an adjacent "control" watershed that did not receive treatment, they were pleasantly surprised by the results.

"Overall herbaceous biomass went up four-fold," Allen said, "and sediment yield dropped a hundred-fold. Biodiversity and abundance went up, too. We even started to see many more butterflies because the plants were flowering."

"It was very encouraging," he continued. "It showed us that you can kick-start natural processes again without too much work or money. We didn't plant any seeds. All we really needed were chainsaws." ... In a wilderness area.

New Approach

All of this represents a new approach to restoration. First and foremost, it's humble.

"We can't erase history," Allen noted, "but what we can do is encourage ecological processes to function again as naturally as possible. And continue to learn and be ready to admit mistakes."

Allen is the first to acknowledge they don't know when they will reach the endpoint of this experiment exactly, but he does know they can't be actively managing it forever.

"We don't want to be endlessly intervening, deciding who lives and who dies out here," he says. That's why their approach has the goal of letting nature take over as soon as possible.

Their basic approach is also practical. Allen thinks this "mulching" method will appeal to landowners because of its simplicity. Outside of designated wilderness, or on a larger scale, with larger trees, he recommends also trying a "splatterer" –

a machine on rubber tires that "eats" trees from the top down using a fast-spinning rotary head and a rotating cab.

The irregularly shaped debris from this process is "splattered" for 200 feet in a random manner that Allen considers to be natural enough.

"Chipping" he said, "doesn't do it," because small uniform chips tend to blanket soils, choking grass and tying up too much nitrogen.

"Popping trees out of the ground may not be enough either," he warned. "You're just reducing tree competition, not addressing the problem of poor water cycling." Removing a piñon or juniper does not necessarily mean the grass will return, he notes. Often additional work is required, such as mulching.

Don't lose sight of the ultimate goal, he reminds us – which is to get fire back into the system.

Allen candidly admits that their approach may not be ideal for everyone, but he said some sort of approach is urgently needed.

"We've got 100,000-year-old soils in Bandelier that will be gone in two centuries if we don't do something," he said. "Some might argue that we should sit back and let nature take its course, but I'm not one of them when people have clearly caused the problem."

Once ecosystems have crossed a threshold, as they have in Bandelier and many other places, hands-off protection does not help much, he says. Action is required.

"Aldo Leopold observed 80 years ago that many Southwestern ecosystems were in trouble," said Allen. "They're still in trouble. We know now they've fallen out of their natural range of variability. The difference is today we know enough to make progress in repairing the damage."

That is in large part due to scientists like Craig Allen.

"We don't know it all," said Allen, "but we know enough to get started."

Citation: "Would Ecological Landscape Restoration Make the Bandelier Wilderness More or Less of a Wilderness?" by Charisse Sydoriak, Craig Allen, and Brian Jacobs. In "Wild Earth," Winter 2000/2001, pp.83-90.

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