Resilience

A VOICE OF THE NEW AGRARIANISM

LESSONS LEARNED

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- Restoring Land Health to Small Properties: Lessons from Quivira's Red Canyon Reserve
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QUIVIRA COALITION

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From the Editor's Desk

Lessons from the Radical Center

It has been nearly twenty years since the collaborative conservation movement —often called the "radical center"—ignited across the American West. From the founding of the Malpai Borderlands Group in southern Arizona and New Mexico, to the rise of the Blackfoot Challenge in Montana, this movement challenged long-standing paradigms about natural resource preservation, extraction and the role of working lands in the West. Initially it was met with a great deal of skepticism, and some outright hostility, by a variety of organizations, agencies and institutions who considered the movement as either hopelessly naïve, unworkable in practice, of dubious scientific merit or contrary to the aims of conservation generally. However, in spite (or because) of this opposition, the collaborative effort grew from a few isolated outposts into a region-wide movement that today has been broadly institutionalized in federal policy, academic curricula, foundation programs and nonprofit mission statements.

The question now is: What's next? What worked? What didn't? What lessons have been learned? How has the movement changed? What are its successes? Failures? Did it have demonstrable results? Does it address the challenges of the 21st century?

In this special edition of our Journal, we explore these and other questions from our experience as an early member of the radical center. It opens with a review of Quivira's work as a "Do Tank" to date, moves to an in-depth analyses of a Quivira-directed restoration project, and concludes with a rumination on agrarianism and the future of the conservation movement.

Thanks for reading!

Quivira Coalition Board Members*

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Reflections from a "Do" Tank: Quivira and Conservation in the West

by Courtney White

Recently, an acquaintance asked me what I did for a living. After explaining that I ran a nonprofit that worked with ranchers and conservationists in the Southwest on land health and sustainability issues, he said summarily "Oh, you run a Think Tank." Without pausing, I replied "No, Quivira is a 'Do' Tank," which elicited a nod and smile.

Land health expert, Kirk Gadzia, leads an outdoor classroom on rangeland health for Quivira in 1998.

Afterwards, I thought about this brief exchange. What did I mean? Partly, I was being provocative—I believe the world needs another Think Tank likes it needs another TV pundit or another Beltway lobbyist. I wanted him to understand that we are an organization that implements new ideas and not merely promotes them. But he wasn't so far off either. Like a Think Tank, the Quivira Coalition has prospected for innovative ideas that solve problems, in this case "from-the-ground-up." But we don't just talk about "feeling the soil between our toes," as Aldo Leopold once described the purpose of conservation. We actually get dirty—which is the only way to understand if ideas actually work or not.

And what we are trying to do is build economic and ecological resilience. It's the best way we know to meet the rising challenges of the 21st century. The dictionary defines resilience as "the ability to recover from or adjust easily to misfortune or change." In ecology, it refers to the capacity of plant and animal populations to respond to the effects of fire, flood, drought, insect infestation or other disturbance. Socially, resilience also describes a community's ability to adjust to big changes in economic or environmental conditions.

Since our founding in 1997, at least one million acres of rangeland, 30 linear miles of riparian drainages and over 15,000 people have directly benefited from the Quivira Coalition's collaborative efforts. We've explored many strategies that try to build resilience, enduring our share of failures along with successes. Initially, we focused on land health, collaboration, and progressive livestock management. Over time, our work expanded to incorporate riparian restoration, grassfed beef production, and youth mentorship. In the near future, we will try to integrate all of these ideas into mitigation and adaptation strategies for climate change, which, along with resource depletion, are the two great conservation challenges of the 21st century.

Meeting these twin challenges means doing so in a way that creates a resilient system that can bend without breaking under the expanding stress we're beginning to feel. And the only real way to do that is by testing this system in the real world—not just in a lab, classroom or think tank.

At the same time, Quivira has worked hard to disseminate both the innovative ideas of others and the lessons learned from our experience through a vigorous outreach program. In addition to our Annual Conference, we have organized over 100 educational events on topics as diverse as drought management, riparian restoration, fixing ranch roads, reading the landscape, water harvesting, low-stress livestock handling, grassbanks and grassfed beef. We have published numerous newsletters, journals, bulletins, field guides and books, including a rangeland health monitoring protocol and a how-to manual on riparian restoration titled ***Let the Water Do the Work***.

I guess that makes us an "Information" Tank too. But everything that we "inform" people about has been vetted through on-the-ground implementation of one sort or another. In other words, we make sure that there's always "soil between our toes" even when people are sitting in chairs listening to speakers. In this way, "Doing" and "Informing" are integrated in our work, one informs the other, hopefully to the benefit of all.

What follows is a reflection from Quivira's experience to date—what has worked and what has not so far. It is important to note that most of these ideas and practices came originally from the fringe, where innovation invariably starts, and were developed primarily to break through paradigmatic logjams in the mainstream. Quivira didn't invent these ideas, but we were among the first organizations to give them a trial run.

The first ranch tour Quivira organized was held on the Carrizo Valley Ranch, hosted by rancher, Sid Goodloe.

Idea: The Radical Center

Implementation: Quivira endeavored to create a common ground where ranchers, conservationists, scientists and others could meet to explore their shared interests rather than argue their differences.

The term 'the radical center' was coined by rancher Bill McDonald in the mid-1990s to describe an emerging consensus-based approach to land management challenges in the West. At the time, the conflict between ranchers and environmentalists had reached a fever pitch, with federal agencies and others caught in the crossfire. This conflict was one of the reasons why the West had balkanized, or separated, into ideological fiefdoms, an important consequence of which was gridlock where it hurt the most, on the ground. Very little progress was being made on necessary projects, such as lighting prescribed fires, improving the chances of endangered species on private land or helping ranchers fend off the predatory interests of real estate developers. Instead, it was a war of attrition, with the only real winners being those who had no interest in the long-term environmental or social health of the region.

(© Gene Peach)

Ranchers ,Doc and Connie Hatfield, lead a "talking circle" at the Quivira Coalition's 6th Annual Conference in 2007.

The Radical Center was a deliberate push-back against this destructive process of balkanization. It was radical (whose dictionary definition means "root") because it challenged various orthodoxies at work at the time, including the conventional belief that conservation and ranching were part of a zero sum game—that one could only advance if the other retreated. There were plenty of examples to the contrary, as Bill McDonald and the group he helped co-found, the Malpai Borderlands Group, demonstrated. Success, however, also meant working in the center, which refers to the pragmatic, middle-ground between extremes. It meant partnerships, respect and trust. But most of all, the center meant action—a conservation plan signed, a prescribed fire lit, a workshop held, a hand shook. Words were nice, but working in the radical center meant walking the talk.

In 1997, two Sierra Club activists, myself and Barbara Johnson, and rancher Jim Winder decided to put the radical center to a test in New Mexico by founding the nonprofit Quivira Coalition. Jim had an idea: step outside the continuum of brawling between ranchers and environmentalists and create a "third way" that emphasized progressive cattle and land management practices. We called it the "New Ranch" and invited any rancher, conservationist, agency person, scientist or member of the public who was interested in sharing common-sense solutions to the rangeland conflict to join us. We took a public vow of no legislation and no litigation. We promised ourselves not to waste energy trying to pry open closed minds. We focused instead on those who literally wanted to start over at the grass and the roots.

Quivira was different from other radical centrist groups at the time principally because we weren't confined to a watershed or a bounded region. We went wherever we could find eager learners willing to try new ideas. As a result, we embarked on a lengthy series of workshops, tours, outdoor classrooms, conferences, clinics and public speaking engagements around the Southwest. In the process, we helped to define what the radical center in the so-called 'grazing debate' actually meant, culminating in an "Invitation to Join the Radical Center" signed by twenty ranchers, conservationists and others in 2003 that we hoped would signal the end of conflict and the beginning of a era of peace.

Here's an excerpt and a list of its radical centrist conditions:

We therefore reject the acrimony of past decades that has dominated debate over livestock grazing on public lands, for it has yielded little but hard feelings among people who are united by their common love of land and who should be natural allies. We pledge our efforts to form the Radical Center where:

- *the ranching community accepts and aspires to a progressively higher standard of environmental performance;*
- *the environmental community resolves to work constructively with the people who occupy and use the lands it would protect;*
- *the personnel of federal and state land management agencies focus not on the defense*

of procedure but on the production of tangible results;
- *the research community strives to make their work more relevant to broader constituencies;*
- *the land grant colleges return to their original charters, conducting and disseminating information in ways that benefit local landscapes and the communities that depend on them;*
- *the consumer buys food that strengthens the bond between their own health and the health of the land;*
- *the public recognizes and rewards those who maintain and improve the health of all land; and*
- *all participants learn better how to share both authority and responsibility.*

Fast forward. Were we successful? Did the radical center hold? Yes, mostly, but with an important caveat.

First, the radical center successfully helped to end the long-running "war"' between environmentalists and ranchers, launching an important process of de-balkanization in the West that continues to this day. Although there are still some fisticuffs going on in places, indisputably, for a variety of reasons, the general attitude toward ranchers and livestock among a cross-section of the American public, including lawmakers, opinion leaders, newspaper letter-writers and many conservationists, has shifted substantially toward the positive. We've seen this shift first-hand in New Mexico, a battleground state in the grazing wars, where dialogue has largely replaced debate and cooperation is usually sought before confrontation (not on every issue, alas). It is not unusual for mainstream environmentalists to work collaboratively with ranchers today on many fronts. In fact, across the West there has been a significant and dramatic increase in formal coalitions, partnerships, and alliances between agricultural and environmental interests in recent years, both at regional and national levels. I believe these changes are here to stay.

Second, the radical center helped to get on-the-ground projects implemented across the region, which has further assisted with the de-balkanization of the West. Success has been uneven, however, revealing limitations to the radical center idea. Experience shows that certain types of activities are easier to build cooperative partnerships around than others. These include the eradication of noxious weeds, protection of open space from development, restoration of riparian areas and the creation of local food markets. Much more difficult are hot-button issues of a political nature, such as predator control, endangered species protection, climate change mitigation and nearly anything to do with the wolf.

The difference between the two is important. The radical center isn't a process of conflict resolution, which requires mediation and/or political intervention to resolve, instead, it is a process of finding common ground and moving forward proactively to implement consensus-based action. It works too, which is why there has been an explosion of watershed-based collaboratives across the West. As the saying goes, many hands make light work, especially if people are sincere in their desire to improve land and lives.

Third, the radical center's strength, its grassroots nature, has also been a handicap, however. A bottom-up, from-the-fringe-to-the-center approach like the radical center takes time to reach the political, environmental and academic Establishment, which often refuses to climb out of old trenches. This is especially true if leaders of environmental organizations, agricultural trade groups, university departments, agencies and political bodies have been in place for years (if not decades). They often can't let go of old paradigms. Fortunately, this is changing as a new generation of leaders rises through the ranks of their professions, many of whom have grown up in this emerging culture of cooperation and innovation.

Images from the Quivira Coalition's Valle Grande Ranch, circa 2006.

Idea: The New Ranch

Implementation: Quivira directed the only public lands grassbank in the American West. This was one example of innovative land and livestock models which we call The New Ranch.

The New Ranch wasn't just a meeting place, it was also a land management toolbox, much of which was filled initially with techniques pioneered by Allan Savory, a wildlife biologist from Africa. As we described it, the New Ranch "operates on the principle that the natural processes that sustain wildlife habitat, biological diversity and functioning watersheds are the same processes that make land productive for livestock." The key component is land health, which is the degree to which the integrity of the soil and ecological processes of rangeland ecosystems are sustained. In other words, before land can sustainably support a value, such as livestock grazing, hunting, recreation or wildlife protection, it must be functioning properly at a basic ecological level.

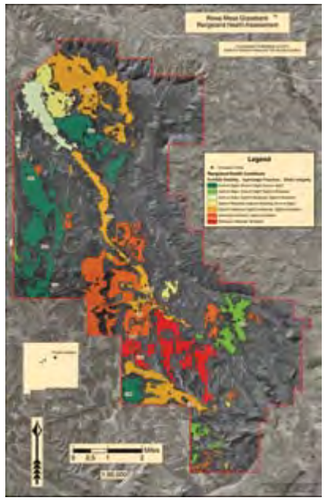
Components of the New Ranch include: herding or other rotational grazing strategies that control the timing, intensity and frequency of livestock impacts on the land (often called planned grazing); documenting the success of land management practices with scientifically credible monitoring protocols and articulating their results to diverse audiences; helping to create a common vocabulary for ranchers, scientists, agency officials and conservationists to use in addressing rangeland and other land health issues; educating various audiences about the complexity and difficulty of managing rangelands well; and engaging in collaborative conservation and restoration projects.

Initially, the number of New Ranches across the West was small and scattered. Many considered themselves outliers of a sort—bucking both the orthodox model of livestock management as well the conventional, negative attitude toward cattle held by urban-based conservationists. Over time, however, especially as stories of success began to be told, the New Ranch model, in its various permutations, began to gain traction among ranchers, agencies and the public. Especially important was a cross-fertilization of ideas and practices—ranchers doing riparian restoration work, consumers wanting grassfed beef, agencies willing to use livestock to knock back invasive weed species. This cross-fertilization broke open the rather rigid, early ideas of Allan Savory, allowing them to develop locally and then spread around the region. Today, although the numbers of New Ranchers is still comparatively small, they are indisputably no longer viewed as outliers. And as innovation and cross-fertilization continues, their numbers will continue to grow. As Quivira found out the hard way, not every innovative idea works out.

In 2004, when we took ownership of the Valle Grande Grassbank, a path-breaking project in northern New Mexico created by author and conservationist Bill deBuys, we were granted an opportunity to pull many of the New Ranch elements together and put them into action.

A grassbank is defined as a physical place as well as a voluntary collaborative process where forage is exchanged for one or more tangible conservation benefits on neighboring or associated lands.

In 1997, deBuys had a question on his mind: could cattle, curlews, prescribed fire, ranchers, environmentalists and the U.S. Forest Service all get along? To find out, he assembled the Valle Grande Grassbank, employing a 36,000-acre allotment of forest service land on Rowe Mesa, twenty-five miles east of Santa Fe. In assembling it, deBuys set out three goals:



Above: Valle Grande Grassbank land health map. Left: Craig Conley leads a discussion of a forest restoration project on Rowe Mesa.

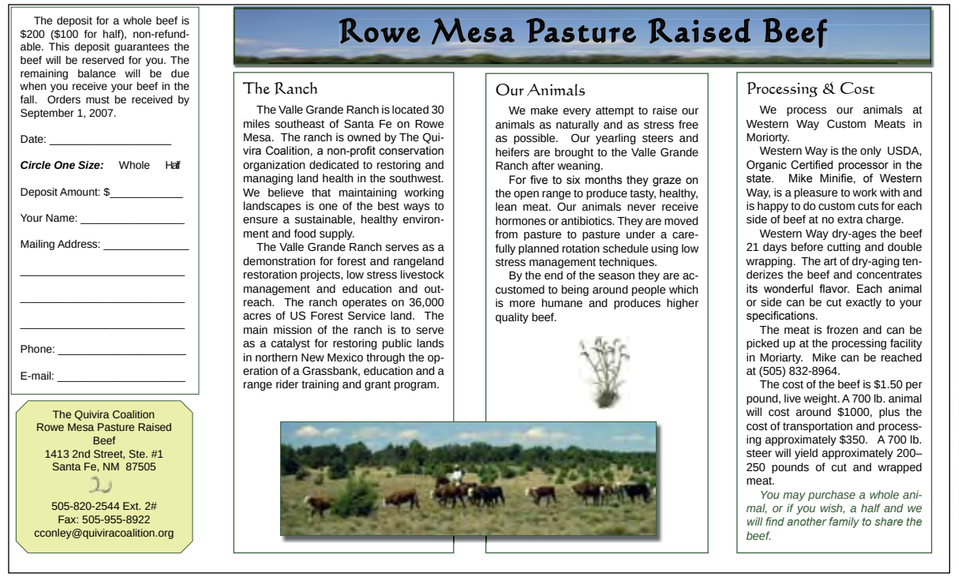
- To improve the ecological health of public grazing lands for the benefit of all creatures dependent on them.
- To strengthen the environmental and economic foundation of northern New Mexico's ranching tradition, which is arguably the oldest in the nation.
- To show that ranchers, conservationists, and agency personnel can work together for the good of the land and the people who depend on it.

The grassbank idea originated among ranchers of the Malpai Borderlands Group, in southwestern New Mexico, who were granted access to forage on the vast Gray Ranch in exchange for placing conservation easements on their private land. On the Valle Grande allotment, deBuys proposed to offer grass as a *bank* to other national forest permittees around the region in exchange for restoration work on their home ground, principally forest thinning and prescribed fire.

The project worked well for a while, with a variety of restoration projects being accomplished and a total of nine different grazing associations coming onto the grassbank. When the Quivira Coalition took over in 2004, we tried to build on the successes of the project, principally by adding additional New Ranch elements, including the creation of a land health map of the entire allotment, new monitoring procedures, a low-stress approach to livestock handling and an entrepreneurial approach to the business side of the operation.

By 2007, however, the Valle Grande Grassbank had ceased to function. And it did so for four main reasons.

First, the modest conservation gains came to an end during the final three grazing seasons (2004-2006) when no restoration work was completed by the Forest Service on the home allotments of the permittees. This happened for a variety of reasons, including drought, National Environmental Policy Act (NEPA) hurdles and budgetary tensions within the agency. It exposed a weakness in the grassbank model: relying on an overworked and understaffed federal agency for the conservation half of the grassbank equation.



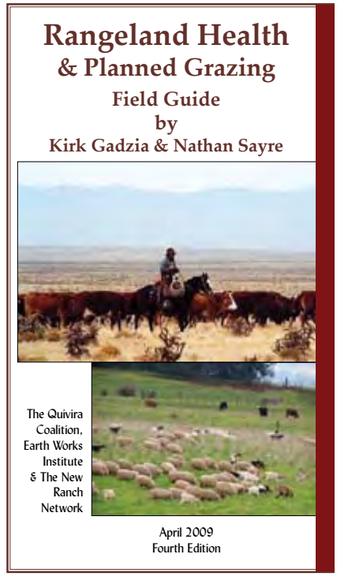
Quivira produced grassfed beef from its Valle Grande Ranch and sold locally in the Santa Fe area.

Second, the funding ran out. The Grassbank's budget was entirely grant-funded and when the grants dried up in 2006, so did the project. We were warned of this risk when we took over the Grassbank by a rancher on Quivira's Board of Directors, who said bluntly, "This place has all the costs of a ranch and no income!" Indeed, this raised a big question in general about the model: How can grassbanks pay for their operation without grants or other types of subsidies? If the model hopes to replicate itself and spread across the region as a viable conservation tool, it needs to be economical at some point. Unfortunately, the answer to this important question remains unclear.

Third, participation in the Grassbank by ranchers in the region declined over time, as did their enthusiasm and support for the project. Partly this was economic. Ranchers had to pay transportation costs to the allotment, and as diesel prices rose, more and more ranchers, already hurting in economically-depressed northern New Mexico, dropped out. Also, the slow progress of restoration work on their home allotments, especially in light of the high cost of getting to the Grassbank, discouraged participation.

Fourth, ultimately the project proved to be too much of a challenge to traditional paradigms. In the early years (circa 2000), the grassbank idea generated a great deal of interest among agencies, range professionals, conservation groups, ranchers and others across the West, only to see that interest fade over time.

This is unfortunate because we need reform and fresh ideas. Innovation is like a seed planted in the soil. Policy can help prepare the ground for planting, but nothing will grow without rain, sunlight, nutrients, education, culture and economics—which can't be mandated by a government. In the 21st century, growing the seeds of innovation will require the attention of a new type of gardener as well, one who must be able to navigate a changing climate and other challenges. The Grassbank was a seed, but the soil wasn't very fertile and the rains were sparse. It grew, but withered ultimately.



Examples of poor land health, including incised channels, eroding banks and lack of vegetative ground cover.

Hopefully, the public lands grassbank experiment left some seeds in the ground across the region, which now await the right conditions to grow again.

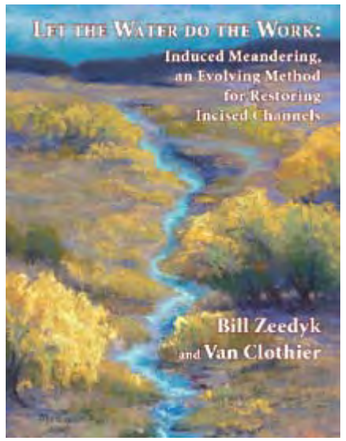
Idea: Land Health

Implementation: Quivira has directed a series of innovative riparian restoration projects in various locations around New Mexico.

The term land health was coined in the 1930s by the great conservationist Aldo Leopold. He was referring to the ecological processes that perpetuate life—the processes of biological self-renewal that ensure fertility among communities of plants and animals, including the proper cycling of water and nutrients in the soil. Metaphorically, he sometimes likened land health to a self-perpetuating engine or organism whose parts (soil, water, plants, animals and other elements of the ecosystem) when unimpaired and functioning smoothly would endlessly renew themselves. Leopold frequently employed words such as stability, integrity and order to describe this "land mechanism," drawing an image of nature that when healthy operated smoothly and ran in top shape.

By contrast, land became sick when its basic parts fell into disorder or broke down. This wasn't just a scientific theory. Leopold began to recognize signs of land illness almost from the start of his career as a U.S. Forest Service Ranger in 1909. They included abnormal rates of soil erosion, loss of plant fertility, excessive floods, the spread of plant and animal pests, the replacement of "useful" by "useless" vegetation and the endangerment of key animal species. These examples of disorder in the land mechanism, whether caused by natural catastrophe or by human interference, often led to adverse consequences for wildlife and human populations alike. That's because when nature's ability to regenerate itself over time is damaged—what Leopold called the "derangement" of nature's health—its ability to provide plants for wildlife or food for humans breaks down as well.

After World War II, the rapidly emerging science of ecology refined Leopold's ideas. The engine and body metaphors were replaced by a dynamic, even chaotic, vision of nature as ceaselessly



Bill Zeedyk explains his concept of Induced Meandering which, in 2009, was expanded into a how-to manual for restoring incised channels.

changing, subject to bouts of disruption and stress. This revised idea of ecological health still focused on self-renewal and self-organization, but now scientists saw nature as fluid, not static; complex, not reductionistic. This view employed a new set of terms and concepts, including resilience, variability, sustainability, diversity and perturbation.

Moreover, it cast human impact on ecological processes in a new light. Rather than simply upsetting the balance of nature, our activities could now be evaluated according to their roles in the processes of stress, adaptation, restoration and recovery. Those activities that encouraged resilience, for example, could be considered to be promoting land health, while those activities that reduced an ecosystem's ability to recover from a disturbance could be considered deleterious.

A further refinement of the land health idea began in 1994 with an effort by the National Research Council to address the persistent disagreement among range scientists, environmentalists, ranchers and public agency personnel about the health of the nation's 770 million acres of rangelands. Not only was there a substantial lack of data on the condition of the land itself, but there was also an important lack of agreement among range experts on how and what to monitor. These voids contributed significantly to the acrimonious debate raging at the time about livestock grazing on the nation's public lands. Were rangelands improving or degrading? Everyone had an opinion, which was precisely the problem.

A collaborative effort was launched by an interagency team of government scientists to develop both qualitative and quantitative criteria for assessing and measuring the health of the land. This effort reached fruition in 2000 when the team settled on seventeen indicators of land health, grouped into three categories:

- Soil stability: The capacity of a site to limit redistribution and loss of soil resources(including nutrients and organic matter) by wind and water. It is a measurement of soil movement.
- Watershed function: The capacity of the site to capture, store and safely release water from rainfall and snowmelt; to resist reduction in this capacity; and to recover this capacity following degradation. It is a measurement of plant-soil water relationships.
- Biotic integrity: The capacity of a site to support characteristic functional and structural communities in the context of normal variability; to resist the loss of this function and structure due to a disturbance; and to recover from such disturbance. It is a measurement of vegetative health.

All of this important work set the foundation for a variety of land management practices that aimed at both maintaining land health and

A "poop-n-stomp" project in action on the Nacimiento Mine near Cuba, New Mexico.

restoring it. We now had clear goals to shoot for, methods by which we could measure success, and a vocabulary to use collaboratively.

For Quivira, the opportunity to implement an on-the-ground land health restoration program began in 2000 when we met riparian specialist, Bill Zeedyk. Soon, we were working together on a creek project at the Williams Ranch, in western Catron County, New Mexico. We employed Zeedyk's innovative restoration methodology, which he calls Induced Meandering (for details, see *Let the Water Do the Work: Induced Meandering, an Evolvoing Method for Restoring Incised Channels* by Bill Zeedyk and Van Clothier, published by the Quivira Coalition in 2009).

Within a few years, we had been awarded two substantial grants from the EPA's 319 program (Clean Water Act) to conduct riparian restoration work on the Dry Cimarron River, in the northeastern New Mexico, and on Comanche Creek, within the Valle Vidal Unit of the Carson National Forest. Both grants contained funding for a series of educational workshops, publications and conference symposia on diverse land health and restoration topics. Eventually, we expanded our restoration work to a variety of public and private landscapes across the Southwest.

Getting into the riparian restoration business was not an unprecedented step for the Quivira Coalition. Our "poop-n-stomp" project on the Nacimiento copper mine near Cuba, New Mexico, in 1999-2000, which was directed by rancher Terry Wheeler and employed his cattle (which he called FLOSBies – Four-Legged Organic Soil Builders) was an novel approach to land restoration on highly degraded land. We also created a land health map of the Valle Grande Grassbank, employing the seventeen indicators of health mentioned earlier, in order to prioritize potential restoration treatments on the allotment. The scale at which we entered into the restoration work with Bill Zeedyk was much more widespread.

We learned two big lessons from all this work. First, land health can be improved and maintained relatively easily and at a low cost if you "think like a creek and let nature do the work," as Bill Zeedyk likes to put it. Second, almost anyone can do it. The key is understanding

Examples of how incised channels and headcuts can damage riparian and upland health by lowering the water table and creating erosion.

natural processes, such how water flows across the land, the role of riparian vegetation in soil stability and how grazing animals use the land. One doesn't need a Ph.D. to understand these processes. What is required is a working knowledge of land function, which anyone can pick up with the right amount of training, study and in-field experience.

Many farmers and ranchers intuitively understand how land works. What they often lack (if they are open-minded) is the technical knowledge of restoration. Many conservationists have picked up this knowledge quickly as well. In fact, most of the volunteers, as well as the contractors, on our restoration projects have an urban/conservationist background.

This knowledge works. Our restoration projects have been highly successful, particularly in their goal of improving and maintaining land health. In case after case, we have documented the recovery of riparian health as a result of Induced Meandering and other methodologies, including the repair of low-standard ranch roads. This, in turn, helped break logjams.

Initially, Zeedyk's ideas were met with resistance from some agency personnel and some academics, but over time his high success rate on-the-ground convinced most critics to change their tune. Quivira helped, not only by organizing the restoration work itself, but also by providing workshops, symposia, training seminars and other educational opportunities for the curious and the eager. This helped to change the culture of restoration work in the region. Once considered an outlier activity in itself, restoration has now become quite mainstream, and innovators like Bill Zeedyk and his trainees, once marginalized, are now in wide demand.

In sum, the details of land health and the restoration toolbox to improve and maintain it are now well-developed, thanks to many people and a lot of hard work. What remains to be accomplished, however, is making this work economically, i.e., figuring out a way to compensate landowners and others for improving land health. This will be critical to efforts to manage land for climate change and resource depletion, which will, frankly, require paychecks and entrepreneurial energy to be effective. We can now confront the West's legacy of degraded riparian areas and rangelands proactively. Hopefully, soon we'll be able to do so profitably.

Idea: Collaborative Conservation on Public Lands

Implementation: We have directed a multi-year, multi-party restoration project on National Forest land in northern New Mexico.

The idea of collaborative conservation, once controversial, has now become widely accepted among many landowners, agencies, researchers, ranchers, and conservationists. What remains a challenge, however, is implementing collaborative conservation on public lands, which comprise one-half of the West's 425,000 square miles.

This challenge is becoming more difficult, not easier, as the idea of collaborative conservation grows, in our experience, with important implications for any effort to manage the federal estate for the effects climate change and resource depletion. Since 2001, the Quivira Coalition has led a habitat restoration project on Comanche Creek, located in the Valle Vidal Unit of the Carson National Forest, in partnership with a wide range of organizations and agencies. The goal of this project is to restore degraded portions of the 27,000-acre watershed to health with the aim of improving the survival chances of the Rio Grande cutthroat trout (RGCT), New Mexico's state fish. Over 200 in-stream structures and 50 elk/livestock grazing exclosures have been constructed along Comanche Creek with the aim of reducing erosion, improving water quality and restoring riparian vigor to the creek. Our experience has taught us that successful solutions include:

- in-stream structures that stabilize stream-bank erosion, increase stream-bank water storage capacity and improve riparian zone vegetative cover and diversity;
- side-stream restoration activities that reduce erosion, stabilize headcuts, re-wet meadows and improve hydrological cycles;
- mitigation or elimination of "bad" roads and road-related features (such as poorly placed culverts) that increase sediment erosion;
- encouragement of the growth of bank-side native plants (to shade the water for the fish);
- management of the impacts of herbivory;
- annual maintenance and modification of structures as needed; and
- annual monitoring of progress.

This project is still ongoing, but we can speak to some lessons learned about collaborative conservation:

- The technical challenges of creek and habitat restoration pale in comparison to the "people issues," especially in a remote location such as Comanche Creek. The key to success is the personality of the Project Manager.

Comanche Creek bank stabilization using post vane structures to move the main flow away from an eroding bank while building a new bankfull bench. Left, July 2006, right, September 2010. Photo view looking upstream.

  This person must be equal parts diplomat, agitator, ringmaster, delegator and must have persistence, patience and a good sense of humor.
- Diversity is critical. The power of collaborative conservation comes from the ability to look at one problem, or one landscape, from multiple perspectives. That means having a variety of perspectives represented, and not just specialists. Volunteers have great ideas too. The key is to respect each perspective and learn from other people's ideas, which is hard to so sometimes, especially if they prick your paradigms.
- Keep innovating. New ideas are always coming down the pike. Keep your eyes and ears open. Don't get stuck in a restoration rut.
- Monitor, monitor, monitor. Collect qualitative as well as quantitative data at every opportunity. It helps in so many ways.
- Have fun.

These are the easy lessons. The harder ones involve the knowledge that it is becoming increasingly difficult to do collaborative conservation on public lands. The level of complexity involved in dealing with federal agencies has steadily increased over the eight years of our work on Comanche Creek to the point where it has verged on becoming a disincentive to collaborative work.

For example, the Forest Service recently imposed a requirement that we pay for all NEPA costs associated with new work on Comanche Creek. Previously, this critical work was done by the agency. The rationales for passing these substantial costs onto their partner include reduced staffing, increased workloads, internal priorities and a trend toward outsourcing certain governmental functions in order to reduce costs. Its practical effect, however, is devastating. Where will this money come from? Foundations are very reluctant to pay for work they consider the government's responsibility. Nonprofits can't pay for it with their "profits" because we don't have any! But come up with the money we must, or else the project will languish because compliance with NEPA regulations is legally required. So, it's a worst-case scenario: we get to partner with the Forest Service if we are willing to absorb rising financial, procedural and institutional costs.

At the same time, federal agencies are saying publicly that they recognize the need for more partnerships, more flexibility and more innovation in order to meet rising challenges on public land, including climate change. However, the view from the trenches in this regard is not encouraging. Partly it is in the nature of bureaucracies to pile on the layers of paperwork as they become more complex over time. Add in a diverse constituency, many of whom have conflicting expectations of federal agencies (and are not shy), plus a bewildering array of congressionally-mandated laws and regulations and you have a recipe for a great deal of gridlock on public land.

Some of this could be addressed by policy changes, but a lot of the problem is institutional, cultural and often linked to the personalities of agency individuals (who have a lot of on-the-ground power). In my mind, unless there is wholesale reform, which is highly unlikely today, it won't change the fundamental problem: innovation and entrepreneurial energy are essentially impossible on public lands today. The government can't or won't provide the incentives and the private sector is discouraged or largely prohibited from trying to implement innovation. This will become increasingly troublesome in the near future as serious challenges grow, such as drought.

In sum, Quivira's experience to date demonstrates that building resilience on private and public lands is possible, practical and potentially scalable. Much of the toolbox necessary to manage the West for multiple pressing challenges has been developed and field-tested by many individuals and organizations across the region. But two important elements are lacking in order to get things moving faster: an economic model that values regeneration and restoration over exploitation and waste; and strong leadership at the county, state and federal levels to break through "business-as-usual" paradigms and policies. Both have proven to be frustratingly elusive, but I am hopeful that as more and more organizations take the lead by "doing" and "informing" others will follow and contribute their own innovation and entrepreneurial energy.

Most importantly, I see hope in the next generation. I believe that young people today are much more open to collaboration, innovation and the implementation of back-to-the-future ideas, such as herding or grassfed food production, than the current generation of environmental, agricultural and scientific leaders. They have also come of age during a time when a crisis such as climate change is part of their everyday zeitgeist, which, combined with their technological savvy, means they are prepared for modern challenges in a way their parents probably are not. Their interests are also more agrarian than their predecessors, especially their interest in food systems, which means they have a lot of "soil between their toes" already. This may be one reason why they are more interested in pragmatic solutions to problems rather than finger-pointing or ideological posturing. In any case, we should do everything we can to teach, encourage and mentor this new generation of leaders.

If anyone can build resilience in the West for the long run, they can.

Restoring Land Health to Small Properties: Lessons from Quivira's Red Canyon Reserve

by Courtney White, Steve Carson, Cullen Hallmark and Kirk Gadzia

Abstract: *Many small parcels of land in the Southwest suffer the same land health challenges as large properties: a past history of overgrazing by livestock, active soil erosion and gully formation, poorly designed and maintained low-standard roads, lack of plant species diversity and vigor, and inadequate or aging infrastructure. Small properties, however, face the additional challenge of not being economically viable which means they cannot easily produce the revenue needed to meet and reverse these challenges. The Quivira Coalition confronted this dilemma when it inherited a 320-acre parcel of land south of Socorro, New Mexico, in early 2003. Our success to date in restoring the land to health on a shoestring budget in a short period of time can provide important lessons for other landowners.*

Nine years ago, the Quivira Coalition was offered a small tract of high desert in the eastern foothills of the San Mateo Mountains, south of Socorro, New Mexico. Bounded on three sides by the Cibola National Forest and bisected by Red Canyon, it was an unexpected bequest from the estate of Michael Belshaw, an economics professor who had retired to the property. Although he was a member of Quivira, no one recalled meeting him. But suddenly here was this wonderful gift of land, called Red Canyon Ranch, bequeathed to us with the stipulation that it be devoted to "the preservation of the land and the wildlife, including, but not limited to, a wildlife refuge, research station, study retreat or a demonstration ranch." We were honored, but what exactly were we getting? An initial reconnaissance revealed two things.

First, we saw the beauty and richness. The views were stunning, and the silence (except for the wind) was profound. It was an ecologically interesting property with signs that large mammals and many species of birds were inhabiting the property. There was also evidence of historic use by Native Americans, including archaeological sites, campsites and structures and rock art along canyon walls.

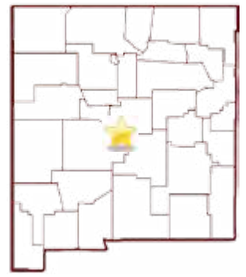
View of the Red Canyon Reserve, looking west toward the San Mateo mountains.

Second, we saw that the land was generally in poor condition. Its challenges included dilapidated fences, recent overgrazing by trespass cattle, poor plant vigor in many spots, numerous deep gullies and other soil erosion features, and badly designed and maintained dirt roads.

There were pluses—a good water well, decent grass cover in places, a healthy riparian area in the canyon, a few simple wooden infrastructures and decent access from the nearby Interstate.

Professor Belshaw left a small cash endowment, which, when combined with the proceeds from the sale of various unwanted items on the property, added up to approximately $20,000. When the reconnaissance was done, we had decisions to make.

The first one was easy: We would keep the property. From the beginning, Quivira had directed a variety of land health demonstration projects, so applying our knowledge and organizational experience to restoring Red Canyon Ranch to health was a logical extension of our work. We also believed the property would offer a useful educational site for workshops, research and recreational opportunities. We changed its name to reflect its new purpose to Red Canyon Reserve.



(© Lary Cary)

Photos from around the Reserve shortly after Quivira acquired the property. Aerial view of Red Canyon and Red Canyon Reserve, June 2003.

The second decision was harder: Where should we begin? Idling the property wasn't an option. Our mission as an organization was to restore and maintain land health for the benefit of people and wildlife. We knew that resting the land from cattle grazing by itself wouldn't do the job, especially because of the erosion challenges posed by the gullies and deteriorating ranch roads. The property required active management. In addition to asking where to start, we also asked the following questions: How do we use our limited resources? How do we best honor Belshaw's wishes while furthering the goals of the Quivira Coalition? And how do we accomplish all this without over taxing the organization, its staff and volunteers? Fortunately, we had ideas – and friends.

Today, we are happy to report that vegetation cover and ecological diversity are increasing; erosion has been reversed in many places, and the overall health of the land has been substantially improved. What follows are Lessons Learned so that other owners of small land parcels may benefit for our experience.

What We Do

There have been six steps to restoring Red Canyon Reserve (RCR), each one implemented according to available resources, time, opportunities and relationships. To implement these steps, Quivira created a committee of staff, board members and interested volunteers who:

- set goals and develop and update a management plan;
- conduct assessments and implement a monitoring program;
- improve the vegetative cover by fixing fences, resting the land and implementing a planned grazing program;
- get to know the neighbors;
- close and repair roads, and arrest and repair gully erosion; and
- upgrade infrastructure, conduct volunteer programs and improve wildlife habitat.



Challenges met: closing and revegetating unnecessary roads; trespass cattle fenced out; and a "loo."

We set goals, made a plan and built an outhouse. Through our experience, we knew that the key to successful land management was an overall holistic goal and a sound plan, without which we would be making things up as we went along. After a series of discussions, we wrote:

The RCR should be managed so that it is economically, ecologically, and socially sustainable, and in compliance with the larger mission of the Quivira Coalition. This includes:

- *reliance upon income generated from property activities, with minimal reliance upon outside grants and donations;*
- *a balancing of the various goals, rather than emphasis upon one or very few objectives;*
- *use of natural resources (water, flora, fauna, and minerals) in a manner that improves or does not deplete availability or quality for future users; and*
- *installation of an infrastructure that minimizes expense and adverse impacts upon other property objectives.*

RCR should serve as a model of collaborative resource management. This objective should be accomplished by:

- *providing a positive example of the management of finances, natural resources, infrastructure and human resources;*
- *establishing an outreach program that identifies potential collaborative projects and partners that furthers management objectives;*
- *conducting educational workshops and collaborative projects; and*
- *maintaining positive relationships with neighbors and other users of RCR resources.*

The RCR should encourage and facilitate scientific inquiry and education by:

- *encouraging work with people who wish to study and implement resource management hypotheses;*
- *developing techniques that test and demonstrate various hypotheses of resource management; and*
- *maintaining relationships with colleges and other institutions that have the ability to disseminate the results of the experiments.*

In the meantime, our good friend, Steve Carson, built a very nice outhouse for the property. Goals and plans are important, but so is an outhouse!

We conducted assessments and created a monitoring program. In order to carry out the plan, we needed to understand what we had and where we were going. We have done this by carrying out a series of surveys, developing a monitoring system and updating our management plans.

For example, we took an inventory of the roads, trails, fences, water system and buildings. The road inventory resulted in the closure of unnecessary roads and the correction of problems that interfered with water movement or increased road maintenance expenses. The trail inventory allowed us to improve access to certain parts of the ranch. The fence, water system and building inventories provided us with a maintenance and replacement schedule and an understanding of threats to systems integrity.

Cullen Hallmark took the lead in setting up the monitoring program on the Reserve.

Next, we commissioned volunteer geological, botanical and wildlife surveys which we have maintained over the years. The wildlife surveys led to a decision to install a wildlife drinker system and "lizard ladders" to enhance accessibility of existing water sources. The botanical surveys affected decisions on the timing, location and extent of livestock grazing. These surveys have drawn the interest and attention of scientists and teachers who use the surveys in their own projects and then reciprocate with expertise and advice.

We set up a series of monitoring points along roads, at restoration projects and at selected sites around the ranch. At least once a year we take photos of these points as well as conduct a more detailed assessment of conditions on the ground. This monitoring gives us objective data on how our management plan is affecting the land. **(1)**

We fixed fences and implemented a planned grazing program. Red Canyon Reserve is located in a very 'brittle' (arid) environment and is subject to wide extremes of climate. Livestock grazing had taken place on the property regardless of the amount of rainfall received during any particular season and without any apparent control of the timing, intensity or frequency of the grazing impact on the land. This management regime had left much of the uplands with marginal ground cover and reduced plant diversity, vigor and functionality.

During the first two years of Quivira's ownership of RCR, we allowed a neighbor's small herd of cattle to graze the property for two months during the dormant season (winter). However, after reviewing rangeland health assessment data and fixing the fences around the property to keep out trespass cattle, we decided that livestock grazing on the RCR would be suspended for a period of time. This would allow preferred species to regenerate and plant litter (dry grass and plant parts) to accumulate on the ground surface.

Today, the rangeland health monitoring shows that positive results have been achieved in 14 different health indicators. Plant species diversity, vigor and quantity have rebounded significantly.

Livestock grazing is still part of the management tool box and will likely be applied again in the near future. It will be targeted at achieving specific objectives and may involve higher numbers of animals for a shorter period of time. Whatever the prescription, we will work




More challenges met: fences repaired, eroded areas treated, roads permanently closed and East Red Canyon crossing upgraded.

closely with our neighbors on this management option and closely monitor the results towards our goal.

We created working relationships with our neighbors. As news of our ownership spread among neighbors, it was apparent that many were unclear about Quivira's mission. They believed us to be radical environmentalists, antagonistic to their way of live. We worked hard to correct this misperception with efforts that included: face-to-face meetings, invitations to workshops and other neighborly gestures. While we made mistakes early on, and we haven't been able to overcome every suspicion, our relations with neighbors are much better today.

The key has been an ongoing effort to maintain open communications. First and foremost, we have made sure that the neighbors know how to reach us and that we know how to reach them. We don't just store this information in a file, but try to contact them regularly to discuss issues when they arise. For example, we initially had a trespass cattle problem. Rather than calling the livestock inspector or pushing the cattle out through the nearest gate, we were able to work out a plan with our neighbors for handling this problem as it arose.

In another opportunity to work with our neighbor, we clarified the maintenance of our shared water system. We prepared a written water well-sharing and maintenance agreement and then registered the well with the State Engineer. Recently, we cost-shared for a new solar water pump for the well and we continue to inform our neighbor of leaks and other maintenance issues with the system.

In a third illustration, Quivira was also able to resolve a road issue with our neighbor. The access road to the ranch, an easement through the neighbor's property, was in bad shape, drying out part of his pasture and creating erosion problems. Consulting with our neighbor, we prepared and implemented a road repair plan that not only made it easier for us to access our property, but improved vegetation cover on our neighbor's property.

To be sure, good communication does not always eliminate disputes. But we find that if people feel that they are able to freely discuss problems, they tend to stay small and are usually easier to resolve.

We closed roads, repaired others and commenced erosion stabilization. Our assessment showed us that the road system across the property had been badly designed and poorly constructed. Many roads were washing away due to the lack of proper drainage. Numerous new roads had been cut across the property that served no apparent purpose and were now contributing to erosion and lack of vegetation. It was clear that the road system needed to be stabilized quickly or it would degrade further with every rain event. The need for a plan and action was urgent!

Utilizing the $20,000 from the Belshaw estate and the expertise of road restoration specialists Bill Zeedyk and Steve Carson, we set down our first priorities:

- rework and properly drain the more than two miles of access road and a half mile of ranch roads deemed necessary to keep open;
- close, decommission and reseed all unnecessary roads (approximately 1.75 miles, or 80 percent of the total);
- Relocate and properly drain the road to the windmill; and
- rework the failing earthen dams and start the stabilization of the large gully in Windmill Draw.

A rolling dip in action on Red Canyon Reserve. Moving water off the road and onto a buffer zone—harvesting water to grow vegetation.

We considered this the baseline stabilization work for all subsequent years. The goals were:

- to stop the downward trend of rapid soil loss; and
- to hold things in place until an upward, healing trend could get established. Later projects and priorities could then be built into the baseline. The plan moved forward and all the baseline stabilization was completed before the monsoon season of 2004.

We monitored the existing road system to determine if the drainage and water harvesting treatments were functioning as designed. Our monitoring findings told us that we still had road surface scour, i.e., water running too far down the road surface and removing the surfacing materials, which deprived pastures of needed moisture. To reduce this road surface erosion we had to add more Rolling Dip Cross Drains to the system. **(2)** So, over the next six years a number of Rolling Dips have been added to the road system with the goal of creating a road system that is as close to scour-free as possible. Today, we have largely achieved this goal.

Lessons Learned: When in doubt, install more Rolling Dips. This lesson has been applied to all the road workshops and road drainage projects that we have been involved in over the last six or seven years. This is a good example of collateral knowledge and why a place like RCR is valuable as a laboratory. Knowledge gained from road and other work can now be used, disseminated and transferred to other locations with confidence in the practice and the end results.

Once this emergency stabilization phase was completed, a two-pronged plan was developed for the next step:

- develop "creature comfort" infrastructure for volunteers and staff to improve the logistics of working and doing workshops at RCR; and,
- start work on stubborn erosion control challenges in Windmill Draw in order to stabilize erosion, begin water harvesting and get vegetation growing again (note: Windmill Draw utterly lacked vegetation when we began).





Installing wildlife drinkers on the reserve in 2011. Water supplied by our solar-powered well.

Over the past four years, we have devoted considerable time and energy to arresting and reversing the severe gullying on the property. This was accomplished by volunteer hands over the course of many workshops under the direction of restoration specialists Bill Zeedyk, Steve Carson and Craig Sponholtz. The restoration methodology that we implemented has been employed in arid upland sites across the Southwest and involves the general principle of "letting the water do the work." This work has paid off handsomely despite a few setbacks, including a couple of large storm events. The problems of erosion and gully formation across the property are significantly better than it was when we took over—but there's no end to the work needed! **(3,4)**

We upgraded infrastructure, implemented wildlife projects, and opened the property to groups. From 2004 to present, there has been a mix of work to improve the base camp site and make it more useful to Quivira staff and volunteers. This work has gone slowly but has adhered to the original goal of maintaining the camp's primitive character. We have water, but no other utilities. We removed unnecessary structures and debris, provided a sheltered cooking area, designated camping spots and maintained the outhouse. This has made the RCR a pleasant place to visit for volunteers. We have plans to implement further upgrades without altering the camp's primitive character, and continuing to work on a shoestring budget.

In recent years, the property has attracted school and Boy Scout groups interested in conservation, geology, astronomy and wildlife.

In 2011, we installed a wildlife drinker system at RCR with the help of a U.S. Fish & Wildlife Service Partners Grant. **(5)** This addition was a quantum leap towards our goal of creating a wildlife refuge. The diversity of available permanent watering locations allows wildlife access to different parts of RCR.

Lessons for Other Landowners

Incrementalism works. Having a master plan and chipping away at it day by day, year after year, is effective. Even with only small amounts of time, landowners can propel the health of their land forward towards their goal—build a One Rock Dam, cut two trees, mend a fence. The results speak for themselves. Knowledge has been gained from the laboratory with many restoration volunteers taking away practical information to be utilized elsewhere. Land health on RCR is on a strong upward trend.

If the land has been hard used, restoring it to health requires a combination of passive and active management. If the land has been overgrazed or is suffering from drought conditions, it will likely require a period of rest from livestock use until sufficient vegetative cover and overall ecological health has been reestablished. Conversely, ongoing erosion and gully formation will continue unless checked by active repair and thoughtful stewardship. Roads in particular are an under utilized source of opportunities and challenges on small properties—poorly designed and maintained roads can cause serious problems and letting them go unattended will make the situation much worse. With active repair and management, however, good roads can help a landowner harvest water efficiently across the property.

You don't need to spend a lot of money to get significant results. Setting goals, writing a plan, implementing a monitoring program, resting the land and even fixing erosion (with low-tech methods) are all low-cost activities, especially if volunteers are involved. Big yellow diesel machines, loads of cement, tons of rock and wire, and other big expenses normally associated with restoration work are NOT required to improve the health of the land. Of course, some money is necessary, but too often landowners start with the presumption that bigger is better (and thus more expensive) when, in fact, a parsimonious approach to land improvement and management is just as effective, if not more so, because you can accomplish more.

It is important to have friends. Collaboration brings diverse ideas, perspectives and opportunities to the table. No one should presume they know it all. Owners need to ask questions, seek advice, entertain ideas on the

One of our many educational workshops and project tours on the Reserve.

Big things can happen in small places! Mega Zuni bowl on Red Canyon Reserve.

fringe and engage diverse opinions. Rummaging through the land management tool box is important too. New tools are being developed every day. If you are an absentee landowner, as we are, it is also important to have friends. In the case of the RCR, we have been very fortunate to have a friendly neighbor, Larry Cary, looking after the property. His prior knowledge of the management of RCR has been very helpful and his proximity to the property has allowed him to be our eyes and ears at RCR. Larry also has a great love for the Reserve which gives a pride of ownership and stewardship that has helped reinforce and propel all the other efforts that have taken place there.

Summary:

At Quivira, we often get inquiries from owners of small properties about what to do with their land. There are many options, we tell them, depending on their goals and resources. In our experience, however, there is a *core* element to all small properties, especially if they have been hard used historically, as many parcels of land across the Southwest have been. The core is land health. Is the land functioning properly at the level of soil, water and grass? If it is not, then achieving your goals for the property, whatever they may be, will be difficult, if not impossible. If the land is healthy, however, then much is possible, as we have happily discovered on Red Canyon Reserve.

Keys to Success:

- Sick to the priorities and take care of the most important and weakest links first.
- Make sure someone is in charge and responsible for following through and getting things done.
- Maximize the available dollar resources by doing as much work as possible at one time; and monitor the work to determine if it is functioning as intended and if adjustments are needed.

Mountain Lion paw print.

Red Canyon Reserve headquarters.

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Building Resilience: Lessons from a Decade on Comanche Creek, Valle Vidal, New Mexico

by Avery C. Anderson, Tamara Gadzia and Courtney White

The mission of the Quivira Coalition is "to build resilience by fostering ecological, economic and social health on western landscapes through education, innovation, collaboration, and progressive public and private land stewardship." In ecology, "resilience" refers to the capacity of a system to absorb a shock or perturbation, such as a forest fire, large flood event or prolonged drought, while maintaining its integrity, i.e., not crossing a threshold into a new ecological state. It has a social parallel as well — bankruptcy, for instance, can cause a household or business to cross an economic threshold into an unsustainable state. Building resilience means restoring, maintaining or expanding the ability of an individual, family, community or component of an ecosystem to stay healthy and handle change constructively.

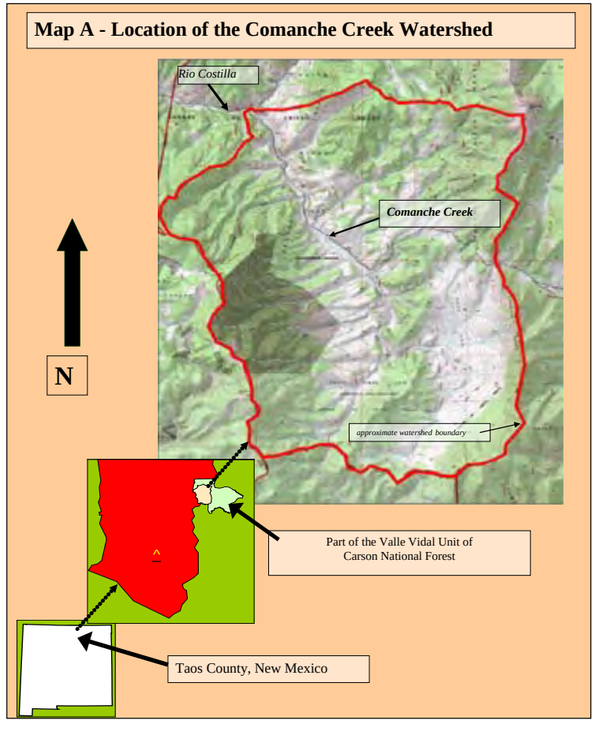
Since 2001, the Quivira Coalition has directed a public lands riparian restoration project within the 27,430-acre (43 square-miles) Comanche Creek watershed which lies in the heart of the 100,000-acre Valle Vidal Unit of Carson National Forest in north-central New Mexico. Our goal has been to build long-term resilience and restore habitat for the Rio Grande cutthroat trout (RGCT). In this article, we attempt to answer two questions: Are we succeeding? And what lessons have we learned that might help others? The quick answer to both questions is twofold:

- we've had good success at building ecological resilience into the Comanche Creek landscape, which means we have a great deal to share about methodology, implementation and monitoring; and
- there have been more challenges on the social and economic side of restoring degraded riparian systems to health than we expected, with some sobering implications for the long-term capacity of these systems to remain resilient.

Our restoration work appears to have successfully rebuilt resilience, evidenced by the system's capacity to withstand documented flood events and continuing drought that otherwise might have further degraded ecological health. This success is largely a result of a trial-and-error process that required constant adjustments to the fieldwork based on data collected as part of our ongoing monitoring program, observations made by experienced practitioners of restoration ecology, and dialogue between project partners as on-the-ground circumstances evolved over time. This process improved the effectiveness of the restoration work which, in turn, increased the resilience of the system.

At the same time, we have learned that ecology cannot be isolated from social and economic factors. Profit, collaboration, sustained funding, bureaucratic processes and personal relationships are as much a part of building resilience on the land as any best management practice. The constant ebb and flow of all these dynamic components is both the beauty and the bane of trying to answer the question: Are we succeeding? The beauty lies in the complex and adaptive nature of the work; the bane is trying to separate what works specifically at a location and what works generally anywhere.

What follows is a brief review of this long-running project. We provide some background, discuss goals and objectives, detail the work to date, and attempt to answer the question: Are we building resilience? At the end of this essay, we summarize our experience and take a stab at some lessons learned.



Comanche Creek: Background and Challenges

Throughout history, human actions have impacted riverine and wetland ecosystem functions and services. These impacts, including reduced vegetative cover, poorly constructed roads, livestock trailing, dams, mining, etc., have markedly increased during the age of European exploration and significantly accelerated since the advent of the Industrial Revolution. Due in large part to these impacts, riverine systems in the American Southwest and around the world are undergoing an epoch of channel down-cutting characterized by the loss of floodplain access, reduced sinuosity, accelerated rates of streambed and bank erosion, reduced bank water storage, radical fluctuations between flooding and no flow events, loss of wetlands and wetland habitats, and declines in wildlife and fish species diversity and abundance.

In addition, our current understanding of the local effects of climate change include a significant increase in the severity and intensity of precipitation events, increased stream water temperatures, and earlier snowpack run-off; all of which will increase stress on and put at risk riverine, riparian, and wetland systems. If this ecosystem decline is not addressed in a proactive manner there is the sobering probability that the associated ecological functions and services that all humans depend on will suffer continued degradation as well.

The challenges facing the Valle Vidal Unit of the Carson National Forest are not unlike the challenges pressing down on the rest of the Southwest. Comanche Creek is typical of areas that have experienced adverse historical impacts, including poor timber management, livestock overgrazing and mineral extraction.

These activities have created numerous inadequately constructed and maintained roads, depleted vegetation in riparian zones and raw stream banks — all of which increase erosion rates and amplify the sediment load within the watershed.

Over the last few decades, populations of Rio Grande cutthroat trout across the region have been reduced to 10 percent of their historic range. This is the result of a variety of factors, including competition from non-native trout species, habitat degradation and loss, surface water diversion and depletion, stream fragmentation, and isolation. All of these factors threaten the viability of the RGCT as a species. The Comanche Creek watershed has been identified by the New Mexico Department of Game and Fish as a potential refuge for these threatened fish. In response, the U.S. Forest Service has engaged a variety of collaborators to enhance existing trout habitat and restore degraded parts of the larger Comanche Creek ecosystem.

In addition to historical pressure on the Comanche Creek watershed, there are also ongoing impacts as a result of elk and cattle grazing. There is a substantial elk herd in the Valle Vidal and, although elk are native herbivores, their largely unregulated numbers and grazing behavior have impacted the rate of recovery of woody species along the streambanks. Recognizing this challenge, in the 1990s the Forest Service built a 62.5-acre elk exclosure in a meadow along Comanche Creek in order to protect streamside vegetation. However, because the entrance gate was lower than the fence and the structure was not properly maintained, it proved to be an ineffective deterrent to roaming elk. As a consequence, a decision was made to shift to mini exclosures (less than one-half acre in size) built to protect populations of willows and other woody plants along the creek. These structures have been more effective.

The management of cattle grazing in the Comanche Creek watershed has also proven to be a challenge. When the Forest Service acquired the Valle Vidal back in the early 1980s, they decided that the cattle would be managed by a herder who would stay with the animals all summer. The Valle Vidal Unit comprises eight pastures and Comanche Creek resides within two of these. All cattle were to be rotated through the pastures one-by-one during the course of the grazing season (May–October), with one pasture at rest each year. The herder was to keep the cattle together in a bunch within these pastures and keep them moving so they wouldn't overgraze.

This was the theory. The reality in our experience has been different. The Valle Vidal Grazing Association, the permittee on the

Large exclosure showing gate and fence, September 2005. Questa Ranger District and volunteers are in the process of decommissioning this structure.

Thriving willows and other riparian species in mini-exclosure, July 2008.

Valle Vidal, was not an active participant in the restoration process on Comanche Creek. Often cattle were observed in multiple pastures simultaneously. Additionally, our monitoring revealed a number of "hot spots" in side drainages caused by cattle trampling. If unaddressed, these areas could potentially adversely impact restoration efforts. We reported these "hot spots"' to the U.S. Forest Service, the supervisory agency. We will continue our efforts to involve the permitted livestock association in future restoration efforts in concert with the Forest Service.

A Collaborative Effort

In 2001, New Mexico Trout, a nonprofit conservation organization, approached the Quivira Coalition for assistance in their efforts to improve the survival chances of the native Rio Grande cutthroat trout, New Mexico's state fish, in Comanche Creek.

For the past 10 years, Quivira has worked collaboratively with a diverse team called the Comanche Creek Working Group to plan and implement projects that benefit the Rio Grande cutthroat trout in Comanche Creek. Over the years, Comanche Creek Working Group partners have included the Quivira Coalition; U.S. Forest Service (the Carson National Forest and the Questa Ranger District); New Mexico Department of Game and Fish (NMG&F); New Mexico Environment Department–Surface Water Quality Bureau; New Mexico Trout; Trout Unlimited, Truchas Chapter; Albuquerque Wildlife Federation; Philmont Scout Ranch and the Boy Scouts of America; Vermejo Park Ranch; Patagonia; the Taos Soil and Water Conservation District; Rocky Mountain Youth Conservation Corps; Valle Vidal Grazing Association; and various private companies and specialists, including Rangeland Hands, Inc.; Zeedyk Ecological Consulting; Resource Management Services; Dryland Solutions, Inc.; Blue Earth Ecological Consulting; and Keystone Restoration Ecology, Inc.

Documenting headcuts and gully formation on the upper reach of Springwagon Creek, a tributary of Comanche Creek, September 2005. This tributary exhibits "hot spots" due to trampling by cattle.

The goal of this long-term project has been to fully implement a restoration plan for the greater Comanche Creek watershed. This effort includes:

- returning stable stream dynamics to the main stem of Comanche Creek and tributaries;
- restore and maintain the integrity of the Comanche Creek watershed for the survivability, adaptability and health of RGCT and other native species in the creek, thereby positively impacting the species' ability to survive anthropomorphic challenges such as global climate change; and
- provide New Mexico residents/volunteers with hands-on educational opportunities that directly relate to maintaining the resilience and function of riparian ecosystem services by demonstrating sound, effective restoration theory and practices.

The innovative restoration methodology that Quivira employs was developed by Bill Zeedyk, a pioneering watershed restoration specialist. His techniques use native materials (e.g., river rock and cedar posts) to re-establish native riverine and riparian habitat, reinstate natural river length and sinuosity, reduce erosion, address the causes of increased water temperature, and add wetland acreage to riverine systems. Zeedyk's

methods work because they address the root causes of what ails a creek—the effects of poorly constructed and maintained roads, overgrazing, mineral/timber extraction, etc.—and Quivira's implementation of his techniques has been proven to effect positive change over the long-term.

In the beginning, we didn't use the word "resilience" to describe our goals. The "shock" or perturbation had already happened to the system, and heavily so, which meant our objective was to speed the watershed's recovery to a state of health so the RGCT could enjoy a productive home again. Eventually, however, we realized that the RGCT faced a significant new threat: climate change. This challenge includes a likely reduction in the abundance of clear, cold water that trout require for survival, rising water temperatures, increased incidence of diseases and parasites, decreased abundance of insect food sources, decreased dissolved oxygen levels, increased demand for water by human populations, increased potential of flooding, and increased fragmentation of habitat. Taken together, all of these stressors pointed to the need to talk about resilience. It didn't change the best management practices being implemented, but it did redefine what success meant.

Our experience has taught us that on-the-ground restoration solutions include:

- in-stream structures that stabilize streambank erosion, increase streambank water storage capacity, and improve riparian zone vegetative cover and diversity;
- restoration activities in tributaries that reduce erosion, stabilize headcuts, re-wet meadows and improve hydrological cycles;
- mitigation or elimination of "bad" roads and road-related features, such as poorly placed culverts, that increase sediment erosion into the creek;
- encouragement of the growth of bank-side native plants (to shade the water for the fish);
- management of the impacts of herbivory;
- annual maintenance and modification of structures as needed; and
- annual monitoring and assessment of progress.

Accomplishments

The project began in 2001 with a riparian, rangeland and cultural assessment of the watershed followed by the development of a plan for restoration work. We obtained National Environmental Protection Act (NEPA) clearance and 404/401 permits from the US Army Corps of Engineers and the New Mexico

Documenting the condition of road drainage structures and their contribution to sediment supply in Comanche Creek, June 2005.

Monitoring the condition and effectiveness of a post vane bank stabilization structure on the middle reach of Comanche Creek, August 2011.

Before treatment, this one cutbank along Comanche Creek was contributing 110 to 120 cubic yards of sediment per year, September 2004.

This section of the creek was treated by realigning the channel to the opposite side of the willow stand. Now the willow stand acts as a buffer between the creek and the eroding bank, August 2011.

Environment Department for each of the grants awarded. Our baseline monitoring protocols call for rangeland health assessments, Rosgen Level II geomorphology surveys, riparian vegetation surveys and yearly documentation of established photo monitoring points.

Over the course of the last decade, volunteers (approximately 750 contributing some 15,000 person hours), staff and restoration specialists accomplished the following:

- installed 50 mini enclosures for herbivores for the purpose of protecting vulnerable streambank vegetation, including willows, cottonwoods, alder and riparian grasses/rushes/sedges;
- re-aligned one overextended meander to protect a 15-foot tall eroding terrace (estimating that this simple modification to the stream position would reduce the sediment contribution to the stream by 230 cubic tons per year);
- re-vegetated the better part of three miles of eroding stream banks with hundreds of locally-sourced willow cuttings;
- installed 208 in-stream structures at strategic locations to shift the strongest part of the stream's flow away from eroding streambanks
- stabilized the channel bed using several cross-vane structures and one hardened low-water-road-crossing;
- controlled sediment sources from upland eroding side gullies using 172 one rock dams, Zuni Bowls and head-cut control structures;
- conducted an extensive road survey, and as a result, repaired more than 10 miles of forest road with treatments that included closures, natural contours, stream crossings, rolling dip cross drains, waterbars, culvert removal, culvert plugs, and raised culvert inlets; and
- re-seeded disturbed areas, or when in the riparian corridor, planted with sedge.

Fish barrier where Comanche Creek crosses Forest Road 1950.

In tandem with our habitat restoration work, the New Mexico Department of Game & Fish installed a fish barrier along Comanche Creek in 2006. The intent of the fish barrier was to isolate the native RGCT from other non-native trout species that can genetically

out-compete their native counterparts. After installing the fish barrier, the NMDG&F spent two years removing all non-native fish from this upstream creek barrier, thus achieving a significant milestone in the recovery process for the RGCT in Comanche Creek.

Evidence of Resilience

Over the past 10 years, the Quivira Coalition has kept detailed records of the observed changes along Comanche Creek and its tributaries. Results serve not only as testament to the effectiveness of our work, but also have guided our subsequent activities. Quantitative and qualitative monitoring over the past 10 years has shown that restoration treatments on seven miles of Comanche Creek have had a net gain effect.

From an ecological perspective, we have had tremendous success. To begin with, the impressive scale of this project —10 years, a 43 square-mile watershed, hundreds of volunteers, more than 200 in-stream structures, 50 small grazing exclosures, 83 road improvement structures, and several wet meadows restored— demonstrates the effectiveness of involving members from different communities over an extended period of time in a united restoration effort. We have documented:

- dramatic recovery of wet meadow systems;
- the resurgence of wetland vegetation at bank full width along the stream which provides essential habitat for RGCT by shading the creek and keeping the water cool;
- cleaner/clearer/cooler in-stream flow;
- healed head-cuts;
- reduced contribution of sediment from poorly drained gravel/dirt roads;
- narrowed channel width and deepened channel depth with raised streambed elevation in some locations; and
- increased diversity and quantity of stream bank vegetation.

Volunteers repairing exclosure fencing, August 2011.

A headcut in Holman Meadow was healed using a log and fabric step falls structure, July 2010.

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The restoration treatments and their effects have been recorded by geomorphologic and vegetation monitoring, photo-documentation, and a yearly survey by stream restoration practitioners. Among other tests, the ability of the Comanche Creek system to withstand the crushing force of the 2005 and 2010 spring flood events (two 50-year floods in a single decade) and the effects of the ongoing drought is the ultimate testament to the resilience that has been built into the system.

From a social perspective, measurable results have come in the form of volunteers and collaborators. The usual route for the recovery of a "species of concern" like the Rio Grande cutthroat trout is through regulation, litigation and confrontation—action which can be very divisive to affected communities. This project, in contrast, uses proactive collaboration and innovation to achieve species recovery by working to unite communities in the restoration effort, and we believe it is succeeding. In addition, more than 150 volunteers have contributed 2,400 hours over the last three field seasons at Comanche Creek. Volunteers are our lifeblood! They provide invaluable assistance in all aspects of the work in the Comanche Creek watershed, and in exchange, they benefit from the expert instruction provided by our watershed restoration specialists during Quivira's FREE summer workshops. We are actively increasing public awareness about the importance of being stewards of trout habitat, and simultaneously using volunteer enthusiasm and energy to get work done on the ground.

In addition to our volunteer base, the Comanche Creek watershed has the potential to become a major, long-term demonstration site for the U.S. Forest Service. They are committed to continuing this work, as are the New Mexico Department of Game & Fish, the New Mexico Environment Department and the U.S. Fish & Wildlife Service. Within the next 10-15 years, their goal is to restore RGCT to the entire Costilla River watershed, of which Comanche Creek is a major part.

Lastly, an important point about the financial resilience of the Comanche Creek project: A significant challenge that we have faced in our work at Comanche Creek relates to the expense associated with doing landscape-scale restoration projects and the corresponding monitoring and adaptive maintenance. Non-profit organizations like Quivira have an explicit obligation to educate the public. Long-running demonstration projects like Comanche Creek serve a critical role in our education program because we have partners we can count on, continuity in our tasks, investment from our volunteers, funding that we can leverage and demonstrated ecological success over many years. Simultaneously, however, each year we face the daunting challenge to raise the requisite funds to maintain/monitor our existing success and create the potential for expanded success within the 43 square-mile watershed.

As federal and state funding for restoration work continues to decline, possibly steeply in the next few years, the challenge of maintaining current levels of work will become more difficult. New funding strategies will need to be developed in order to build financial resilience on Comanche Creek.

Eighty percent of mini-exclosures along Comanche Creek were damaged during the flood of 2005 and again in 2010 (June 2005). Construction, installation and location protocols were adapted to withstand future high water events.

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Assessing post van performance, July 2008.

Headcuts unzipping the La Belle wet meadow drainage of Comanche Creek, July 2008.

Cattle in the Comanche Creek riparian area, September 2006.

Lessons Learned

Constant Vigilance. There's an old saying that the price of democracy is constant vigilance. It is the same for building resilience, especially in degraded ecosystems. Restoration work needs constant monitoring, adjustment and maintenance. At some point, a creek or river or watershed will become healthy enough to "take over'" its own maintenance, but many systems have been so degraded over time that reaching this point will take decades to achieve. This assumes, of course, that no further degradation take place within the system. On Comanche Creek, for example, there is a small but persistent problem with cattle. Inadequate control of livestock grazing by the permittees and U.S. Forest Service in portions of the watershed, especially in side drainage wet meadows, has retarded the healing process and could theoretically undo much of the restoration work if allowed to continue or expand. This situation demonstrates the need for constant vigilance and pressure—one "thread" could unravel the whole tapestry.

Unfortunately, monitoring, adjustment and maintenance is expensive, labor-intensive and demanding of a long-term commitment on the part of the landowner, often making them difficult to achieve. Additionally, funding for this work is hard to find; many funding sources prefer to support "new" work as opposed to ongoing monitoring and maintenance of "old"work. On public land, this commitment is probably best met by the agency. On private land, it is probably best met as a cost of doing business, i.e., from the profits of an economic enterprise though grants could supplement portions of the work. One potential solution would be the development of an "ecosystem services" model that compensates landowners for their restoration work.

The Ecology is the Easy Part. We know how to fix creeks affordably and effectively, thanks to a great deal of trial-and-error by many people in many places over the years. What is much more difficult is managing the social and economic relationships that are necessary to build and maintain resilience in the long run. This is a truism, of course, but it does not lessen the challenges. For example, the bureaucratic gauntlet that must be run to direct restoration work on public lands these days, including the costly NEPA process (costly in time and money), requires considerable patience, persistence and good humor. Personnel changes, rising administrative requirements, shifts in agency priorities and a confounding bureaucracy often pose significant obstacles to collaborative projects. Unfortunately, in our 10-year experience on Comanche Creek, these obstacles have grown, not shrunk, over time. The NEPA process in particular discourages proactive partnerships, especially in recent years as federal agencies have begun to shift their costs onto the partners.

On private land, relationships are just as crucial, though often for different reasons. Working with a single landowner or a family means the ecological work can happen faster and more efficiently, but it also means economic factors will likely come into play that could affect a project's ability to build resilience over time. Redirecting the profit motive away from short-term exploitation of a resource toward the long-term sustainability that is necessary to build resilience often involves an educational process that goes far beyond the nuts-and-bolts of riparian restoration. This process can be a serious challenge for partners if they are not prepared from the start to deal with educational and economic components of their collaboration.

Who Are You Trying to Please? Building resilience means answering the question: Who is your audience? Researchers and academics may require a high degree of quantification and data-processing as well as peer review before they consider an effort to have achieved success. Farmers and ranchers may be satisfied, on the other hand, with anecdotal or plain-to-their eye signs of success. Agencies in charge of wildlife, especially those involved with threatened or endangered species, may employ an entirely different set of metrics for evaluating resilience in a system. Similarly, a federal land agency, a regulating authority (such as the EPA), or a funder may have their own criteria for measuring success. Knowing who your "client" is at the start of a project may affect how one goes about building resilience and determining its success.

Tips for Success

- Create a detailed design and implementation plan. Pencil out the calendar, but expect that things will not always go as planned.
- Consider a time frame for implementation in relation to regional hydrology and climate. Implement when flow rates are low. Understand that natural events such as drought, floods, timing of snow, and forest closures can disrupt an implementation schedule.
- If the project is a collaborative endeavor or will have a volunteer component, work with people who are open to new ideas and have a personal commitment to the land.
- Create a budget that incorporates the time for acquiring funding and adequately reflects inflation over the entire length of the project. Remember, prices usually don't go down.
- Be aware of the local, state and federal regulations and required permits for working in a riverine system. If possible, bring regulators to the project site.
- Hire professional restoration specialists who have experience with a variety of riverine systems and an understanding of geomorphology, hydrology, soils and the local ecology.
- Livestock grazing of project areas must be managed. Consider creating a riparian pasture for a drought reserve or a dormant season only grazing pasture. Understand what the true dormant season months are for your location.
- Set up permanent photo points before the project begins to adequately reflect changes to the river system over time.
- Expect the river system to make ecological adjustments over time. These types of treatments nudge the natural progress of a river's ability to heal itself and so the system is not "fixed" overnight with these treatments.
- Monitoring for maintenance and effectiveness of the treatments. Review project after each major flow event and repair, maintain or adjust as needed.

Conclusions

As the authors of a recent report by Trout Unlimited titled "Healing Troubled Waters" (TU October 2007) note, trout are a resilient species and have repeatedly adapted to fluctuations in climate and environmental conditions over their long evolutionary history – though current conditions are unprecedented. If given some help, trout should be able to withstand the modern challenges confronting them. To do so, the authors propose a strategy that emphasizes "restoring entire watersheds, not just individual streams," and a "sustained conservation and recovery effort." This strategy includes:

- restoring habitat health;
- restoring native fish populations;
- engaging diverse communities in a collaborative effort over a significant period of time; and
- monitoring and evaluating success.

This is what the Comanche Creek project has tried to accomplish, with success, and points the way for future work in the watershed.

There are basic benchmarks that can satisfy almost all interested parties while building resilience for the long-run. These involve basic ecological processes, such as improving the water, nutrient and mineral cycles; slowing or reversing sedimentation; growing grass; building soil; and improving plant vigor. These are the foundations of ecological resilience without which social, cultural and economic resilience is not possible. They're relatively easy to accomplish, as we have discovered, and relatively simple to measure. Building resilience means starting at the level of soil, grass, and water. From there, everything else will flow.

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The Fifth Wave: Agrarianism and the Conservation Response in the American West

by Courtney White

"All things alike do their work, and then we see them subside. When they have reached their bloom, each returns to its origin…This reversion is an eternal law. To know that law is wisdom."
– Lao-Tsu (6th century, B.C.)

Abstract: *Social movements are like ocean waves. They arise at a certain period of time for a specific reason and work under a particular set of historical circumstances toward a defined goal. They gather strength, grow and become an effective agent of change for a while. At their height, they either succeed outright in their goals or else begin to fade as circumstances evolve and their effectiveness declines. Some movements regain strength with fresh ideas and energy in order to make another run at the shore, but many are carried out to sea by the irresistible tide of history. In the American West, the conservation response to natural resource depletion and crisis has followed this pattern. Since the late nineteenth-century, there have been four distinct waves of conservation—federalism, environmentalism, scientism, and collaboratism. Each is now in a different stage of the "back-to-sea" cycle, making way for an emerging fifth wave—agrarianism. This wave builds on the strengths and weaknesses of the previous waves as it meets the emerging conditions and challenges of the 21st century.*

The First Wave

In the fall of 1909, twenty-two year-old Aldo Leopold rode away from the ranger station in Springerville, Arizona, on his inaugural assignment with the newly created United States Forest Service. For this Midwesterner, an avid hunter freshly graduated from the prestigious Yale School of Forestry, the mountainous wilderness that stretched out before him must have felt both thrilling and portentous. In fact, events over the ensuing weeks, including his role in the killing of two "timber wolves"—immortalized nearly forty years later in his essay "Thinking Like a Mountain" from *Sand County Almanac*—would influence Leopold's lifelong conservation philosophy in important ways. The deep thinking would come later, however. In 1909, Leopold's primary goal was to be a good forester, which is why he chose to participate in a radical experiment at the time: the control and conservation of natural resources by the federal government.

Beginning in 1783, the policy of the federal government encouraged the disposal of public lands to private citizens and commercial interests, including retired soldiers, homesteaders, railroad conglomerates, mining interests and anyone else willing to fulfill America's much-trumpeted "manifest destiny." However, this policy began to change in 1872 when President Ulysses Grant signed a bill creating the world's first national park, Yellowstone, launching the U.S. government down a new path: retention and protection of some federal land on behalf of all Americans. In 1888, the year after Leopold's birth, this trend accelerated when Congress created the National Forest Reserve System which protected large swaths of valuable timberland from development. These reserves were dramatically and controversially doubled in size in 1906 by President Theodore Roosevelt who burned the midnight oil with Gifford Pinchot, his visionary secretary of agriculture. Three years earlier, Roosevelt had burnished his conservation credentials by creating the first National Wildlife Refuge, Pelican Island, in southern Louisiana.

These parks, forests and refuges were part of an audacious conservation philosophy at a time that emphasized governmental control and scientific management of natural resources. For Pinchot and other leaders in the budding conservation movement, the need for a new approach could be summed up in one word—scarcity. Take timber, for instance. Appalled by the razing of the great white pine forests of the upper Midwest by private industry after the Civil War, Congress created the Forest Reserve System and gave it the mission of conserving valuable timber for future national needs. It was a mission vigorously supported by Pinchot, who studied forestry in Europe and came to believe that a nation's natural resources should serve "the greatest good" for the greatest number of citizens. This new conservation philosophy was captured in the U.S. Forest Service's first field manual: "Forest Reserves are for the purpose of preserving a perpetual supply of timber for home industries, preventing destruction of the forest cover which regulates the flow of streams, and protecting local industries from unfair competition in the use of forest and range. They are patrolled and protected, at Government expense, for the benefit of the Community and home builder." Reversing resource scarcity and arresting the associated land degradation that went with it would now be the job of the federal government.

Since the late nineteenth-century, there have been four distinct waves of conservation—federalism, environmentalism, scientism, and collaboratism. Each is now…making way for an emerging fifth wave: agrarianism.

Meanwhile, scarcity of a different sort motivated other conservation leaders to support this new federal role, including John Muir, an itinerant mountain-lover and amateur geologist from Scotland. Worried about the loss of wildness and beauty to development, Muir campaigned vigorously for the creation of national parks and monuments (the latter a product of the Antiquities Act of 1906), adding his voice to what was quickly becoming a chorus of support for the protection of wilderness, wildlife and natural wonders for non-utilitarian purposes. It worked. The National Park System expanded from two dozen units in 1916, the year Congress created the National Park Service, to over 400 units eight decades later. The federal role in the West continued to expand after World War II when the vast public rangelands were organized into the Bureau of Land Management (BLM). In 1964, Congress added an additional layer of protection with the passage of the Wilderness Act, which ensured that roadless areas on public lands would remain "untrammeled" for generations to come.

It was all part of the First Wave of conservation called "federalism."

It was a remarkable ride for those who caught the Wave, heady days for professionals such as Leopold, but also exciting times for day-trippers and vacationers across the nation newly liberated by rising affluence and declining prices of automobiles. Recreation quickly took its place alongside resource protection as part of the mission of federal land agencies. Starting in the 1920s, America embraced its parks and forests with a fervor as citizens hit the road in record numbers. In the process, a benevolent and ever-helpful "Ranger Rick" became synonymous with the U.S. government in the public's eyes.

Meanwhile the nation's embrace of the Great Outdoors had an important collateral effect: federalism as a conservation philosophy

began to extend beyond land ownership and management to the belief that governmental regulation of the environment was needed in order to protect citizens from harm. Thanks to pressure from activists, more and more regulatory work was assigned to the federal government over the decades, culminating in the creation of the Environmental Protection Agency in 1969 and a raft of historic environmental legislation in the early 1970s.

Federalism, it seemed, was destined to keep rolling ashore.

Fast forward to today, however, and it is clear that this First Wave of conservation has pulled back to sea. In retrospect, its high water mark as an effective conservation strategy in the West was reached in the early 1950s, just prior to the eruption of major controversies involving the government's dam-building program on the Colorado River and its over-harvesting of timber on our national forests—controversies that began to sour the public on some of our federal agencies. This souring mood grew during the 1960s and 1970s as activists fought the government over hard-rock mining, cattle grazing and endangered species protection on public lands, thus causing many urban residents to shift their view of federal agencies from the "good guys" to the "bad guys." Ironically, the shift was also shared by rural residents who began to view the government as captive of urban interests, and specifically environmental activists. As a result, federal employees began to find themselves in the crossfire of an increasingly rancorous struggle between activists and rural residents across the West. It added up to one inescapable conclusion: federalism as an effective conservation strategy was ebbing.

That's not to say the idea of public land staled. The democratic ideal represented by public ownership of western lands is still strong and necessary. What has changed is the government's ability to do conservation effectively. It has faded in recent years for a variety of reasons including shrinking budgets, reduced personnel, increased public demands and a bevy of conflicting laws and regulations. The conservative and conformist nature of bureaucracies had a role too. Over time a resistance to innovation grew among the agencies, as did issues of power, control and a certain degree of arrogance. Toss in a lack of synchronicity with the times as public opinions changed and new ideas came along, and by the 1970s the result was increased ineffectiveness.

These parks, forests and refuges were part of an audacious conservation philosophy at a time that emphasized governmental control and scientific management of natural resources. For Pinchot and other leaders in the budding conservation movement, the need for a new approach could be summed up in one word: scarcity."

In a sense, that's alright. One could argue that federalism achieved its original goal: to halt to the destruction of the West's forests, grasslands and rivers and to do so by way of public ownership and sound stewardship. It also achieved a second goal: to provide diverse recreational opportunities for a restless, urbanizing nation. For a time, this second mission pushed the Wave farther onto the shore, propelled by the nation's love affair with its national parks and forests. But it didn't alter the inevitable ebbing, not that federalism didn't try to evolve with the times. Over the years, it embraced a variety of new conservation concepts, including wilderness protection, sustained yield, adaptive management, endangered species protection, an ecosystem approach and so on. None of these altered the basic fact that what had once been federalism's chief asset, its role as a buffer between nature and its exploiters, had, by the 1970s, become its chief liability. It now stood between the land and innovation.

I experienced this first hand beginning in the mid-1990s, initially as an activist with the Sierra Club and then as a co-founder of the nonprofit Quivira Coalition. In our work with federal land agencies, including our promotion of progressive livestock management, our direction of riparian restoration projects and our operation of the only public lands grassbank in the West (where Quivira became a Forest Service livestock permittee), evidence of the First Wave's ebbing became manifest. I'll cite three examples: first, it became clear that the default position of agencies on anything out-of-the-box was "no" — *no to this idea, no to that activity, no you can't do this, no you can't do that*. Getting to "yes" wasn't impossible with the agencies, but their regulatory mandates, musical-chair personnel changes and ever-rising workloads, made getting to "yes" a time-consuming, expensive and frustrating process for potential partners. It was much simpler for the federal agencies to say, "No."

Second, there were few positive internal incentives for agency employees to try anything new. In fact, disincentives abounded, including the perpetual threat of lawsuits by watchdog groups. Innovating within the system was rarely rewarded, and was sometimes punished. Thinking out-of-the-box might mean getting pushed out of your job. There was much less stress for employees if they acted "by-the-book", a situation which often made partners feel like they were talking to a stone wall.

Third, there was a culture of command-and-control within the federal agencies, the Forest Service especially, that discourages partnerships and innovation. Agencies often had the last word on a project, and knew it. This meant that when they entered into a collaborative effort, the partnerships were unequal. The agencies had the ability to shut things down and all it took was one person in a position of power. Throw in the inevitable change of leadership among line officers every three to four years and the risk of "no" rises substantially. For example, of the approximately 20 Forest Service employees involved in the creation of the grassbank project in 1998, 19 had moved to new jobs within five years, essentially orphaning the project from the government's perspective.

It all adds up to a status quo on public lands today. The trouble is that in the 21st century, the status quo isn't really an option anymore. Managing land for climate change, for instance, will require rapid, flexible and innovative responses; a tall order for federal agencies stuck in a business-as-usual paradigm. To their credit, agencies sense this and are trying to find ways to respond, but reform, innovation and breaking gridlock look largely unreachable for federalism now. Perhaps the First Wave will reinvent itself, gather strength and rise again as a new wave of conservation, headed for shore. I hope so—the idea of public land ownership is an important one in a democracy. There is still a big need for federal oversight and expertise as well. However, three other waves of conservation have come ashore since Leopold rode away from the ranger station in 1909, with a fourth one rising. If federalism swells again into a new wave, I suspect it will be propelling a new sort of surfer toward shore.

It added up to one inescapable conclusion: federalism as an effective conservation strategy was ebbing. That's not to say the idea of public land staled – the democratic ideal represented by public ownership of western lands is still strong and necessary. What has changed is the government's ability to do conservation effectively.

The Second Wave

The next wave of conservation in the American West is what we today call "environmentalism." The early stirrings of this wave can be traced back to the mid-19th century as the destructive effects of the Industrial Revolution began to visibly impact the natural world, in particular

wildlife populations. Early prophets included Henry Thoreau, George Perkins Marsh and John Muir. A vocal advocate for federalism, Muir also played a key role in the development of the Second Wave when he founded the Sierra Club in San Francisco in 1892. Initially a hiking and camping association for outdoor enthusiasts, the Sierra Club quickly drew activists into its fold, no doubt inspired by Muir's relentless campaign to protect Yosemite National Park from a proposed dam in its heavenly Hetch Hetchy Valley (a dam that Gifford Pinchot supported). Although Muir lost the fight, his defeat propelled the Sierra Club and other budding conservation organizations to become vigilant in defense of the nation's parks, forests and refuges, and to keep a watchful eye on the federal agencies entrusted to protect them.

As the nation's love affair with the Great Outdoors took off, this Wave swelled with new members and advocates, beginning a vigorous push toward shore. It showed its first substantial "white water" in 1955 with a highly public fight to stop another dam project, this one located in Echo Park, deep inside Utah's Dinosaur National Monument. Led by the Sierra Club's charismatic and energetic president David Brower, an avid mountain-climber, the conservation community set itself squarely against Congress and the federal government in a high-stakes showdown. It won. The dam was never built. Riding the momentum of this victory, the Second Wave swelled in 1963 with the publication of Rachel Carson's *Silent Spring* which propelled activists into the arena of human health and industrial pollution, transforming the conservation movement into what today is called environmentalism.

There are two principle reasons why this Wave became large and successful:

- it built on the strengths of federalism while confronting its weaknesses; and
- it synchronized itself with the rapidly changing times, embracing new ideas and values and putting them to work effectively.

Although the early phase of the Second Wave was consonant with the goals of federalism, especially the push to create new parks and monuments. As early as the 1930s, it started to have doubts about governmental effectiveness. Led by Aldo Leopold, who had left Forest Service employment in 1924, conservationists began to question the ability of agencies in the wake of the national calamity of the Dust Bowl to implement what Leopold later dubbed a "land ethic." Some government programs worked but many did not, especially with the end of the positive incentives they employed such as direct payments to landowners and technical assistance. That left many agencies holding the familiar "stick" approach to conservation, rather than the proverbial "carrot." However, Leopold came to believe that both approaches were antithetical to good stewardship over the long run. A land ethic needed to come from the heart, he argued, not a bureau. He urged the conservation movement to lift it sights – to change America's ethics, not just its policies.

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Activists responded vigorously to Leopold's call and the Second Wave swelled, especially as America's economy rocketed into the stratosphere after World War II. They began by leaning on federal agencies to adopt higher environmental standards. Activists pushed back, for example, when the Forest Service embarked on a vast timber-cutting program

in the 1950s that included widespread use of clear-cuts. They also criticized the BLM for its poor oversight of livestock grazing and hard-rock mining on public lands; they maintained their struggle with the Bureau of Reclamation over its dam-building program, winning a widely publicized fight to stop two projects in the bottom of the Grand Canyon. They also criticized the U.S Fish and Wildlife Service for its inadequate oversight of endangered species; and they even turned up the heat on the National Park Service, which they thought was dragging its feet on wilderness designation.

In this work, the Second Wave both shaped public opinion concerning environmental protection as well as followed its lead. In the mid-1960s, a series of natural disasters and slow-boil crises caught the public's attention, including choking smog in big cities, toxic waste dumps, oil spills, rivers catching on fire, urban sprawl and a growing concern about nuclear power. The consequence of this rising concern was the passage of a raft of federal legislation in the early 1970s aimed at ensuring clean air, clean water, endangered species protection, wild and scenic river designation, and an open planning process for the management of public land.

The Wave also tapped into changes on the economic front out West as recreation and tourism became significant engines of prosperity, a development that would eventually be called the "New West." It was a booming amenity-based economy that emphasized play (hiking, fishing, biking and "ranching the view") over traditional forms of work (mining, logging, farming, livestock ranching). However, the denigration of work in favor of play, especially on public lands, led to numerous clashes with rural residents, many of whom staunchly opposed this new economy. Feelings on both sides hardened during the 1980s, causing environmentalists to dig in and redouble their efforts, and on many fronts they appeared to be successful. In reality, it was an early sign of the Wave's inevitable ebbing.

Fast forward to today. Despite environmentalism's continued hard work, high profile and healthy membership, it is clear that the Second Wave has ebbed significantly and is no longer an effective conservation strategy in the West.

Two important metrics support this observation:

- the continued steady decline of animal and plant species populations and their habitats around the planet; and
- a steady loss of interest in nature and outdoor activities among Americans, especially the younger generation - a trend with alarming ramifications for both nature and people, a condition that author, Richard Louv, calls "nature deficit disorder."

Environmentalism didn't cause these two developments, of course, but it has become increasingly ineffective at reversing, or even curbing, them. There are three primary reasons why.

The first is author and farmer Wendell Berry's long-standing criticism that environmentalism never developed an economic program to go along with its preservation and health programs. It had no economic retort, in other words, for industrialism. It never truly confronted our economy, the source of most environmental ills; and, without an effective alternative, the average American had no choice but to participate in a destructive model of economic growth. Wallace Stegner, one of Berry's mentors, voiced a similar complaint years ago when he wrote that his fellow westerners had not yet "created a society to match the scenery."

I saw this played out during my time in the Sierra Club, where I learned that most activists considered environmental problems to have environmental solutions and ignored their economic sources. This meant we spent too much time and energy on symptoms instead of causes. Aldo Leopold flagged this problem decades earlier when he cautioned us against trying to "fix

the pump without fixing the well." We didn't heed his advice, and for 50 years focused our attention on the pump while the well began to run dry.

Many environmentalists might argue, in contrast, that they did have an economic agenda—tourism and recreation. This is true and for awhile the benefits of both looked generous. Over time recreation and its associated side effects (congestion, exurban sprawl, transitory populations) began to take on darker hues and may have even made the situation worse in some places. And as the 21st century progresses with its concerns about climate change, carbon footprints, oil depletion, food-miles and sustainability in general, an economy based on tourism looks increasingly shaky.

Second, environmentalism is ebbing because it left the land behind. The movement lost the feeling of "the soil between our toes," as Leopold put it, meaning it lost an intimate understanding of how land actually works. As a result, it lost what Leopold described as the role of individual responsibility for the health of the land. "Health is the capacity of the land for self-renewal," he wrote, and "conservation is our effort to understand and preserve this capacity." By losing the feel of soil between our toes, the movement missed the opportunity to understand, and thus preserve, land health—the foundation on which all health depends.

For example, I learned that while activists and others could recognize poor land use, such as overgrazing, and rightly worked to correct it, they lost an understanding of good land use, particularly those for-profit activities such as logging and ranching that could be conducted sustainably. Instead, as the movement drifted away from land, it began to equate non-use with the highest and best use of land, especially on the public domain. The exception was recreation, of course, though as one western historian commented on 21st century challenges; "play can't handle the weight."

Third, the environmental movement never really walked the talk of a land ethic. While trumpeting Leopold's famous call to enlarge our ethical sphere to include plants and animals, environmentalists ignored his insistence that people and their economic activities be included too. "There is only one soil, one flora, one fauna, and one people, and hence only one conservation problem," Leopold wrote in the *Sand County Almanac*. "Economic and esthetic land uses can and must be integrated, usually on the same acre." Or this from his essay *The Ecological Conscience*: "A thing is right only when it tends to preserve the integrity, stability, and beauty of the community, and the community includes the soil, waters, fauna, and flora, as well as people."

[However] despite environmentalism's continued hard work, high profile and healthy membership, it is clear that the Second Wave has ebbed significantly and is no longer an effective conservation strategy in the West. Two important metrics support this observation: 1) the continued steady decline of animal and plant species populations and their habitats around the planet; and 2) a steady loss of interest in nature and outdoor activities among Americans, especially the younger generation…

A land ethic encompassed it all. But environmentalists didn't heed Leopold's advice. Instead, many engaged in a form of environmental isolationism. Work was segregated from nature, and nature was largely confined to parks, wildernesses, refuges, and other types of protected areas. Not only was there no attempt to integrate people into nature economically under this preservationist paradigm, some activists made an energetic effort to curtail certain land uses, such as ranching, whether they preserved the integrity, stability and beauty of the community or not. The land, in their mind, had to be *saved* apart from the people, and their pitch to the public emphasized dehumanized landscapes—pretty pictures of wild country and charismatic wildlife. In general, while activists were quick to invoke Leopold in their campaigns to save this or that, they ignored his holistic view that "bread and beauty grow best together."

In its time, environmentalism accomplished an astonishing amount and the world has benefitted immensely from its diligent efforts. But waves come and go. Federalism reached its high water mark in the mid-1950s and by the 1980s had pulled back to sea. Environmentalism reached its high mark in the mid-1970s and is nearly back out to sea today. In the meantime, two more Waves rose to replace them.

The Third Wave

The next Wave of conservation, which stirred after World War II, had two principal components: an emphasis on science and a focus on private land. This was no accident – these components represented important shortcomings of the previous two Waves. Federalism, by definition, focused on public lands, which meant that one-half of the American West which is privately-owned land, had been largely neglected by the conservation movement. This became a pressing concern after WWII as the suburban and exurban development of private land sped up considerably. Meanwhile, the rise of ecology and other environmental disciplines meant that data and scientific study could now complement, and sometimes supplant, the emotional and romantic nature of environmentalism. In fact, many of the private land acquisition and protection strategies employed by this new Wave of conservation were driven by ecological or biological objectives, which is why I call this Wave "scientism."

An illustrative example of this Wave is the rise and growth of The Nature Conservancy, a landmark nonprofit organization that is now one of the largest conservation groups in the world.

In 1946, a small group of scientists in New England formed a organization called The Ecologists Union and tasked it with the goal of saving threatened natural areas on private land, especially biological hot spots that contained important native plant and animal species. The protection of biologically significant parcels of land had traditionally been the job of the federal government, state wildlife agencies, or private hunting and fishing groups. Parks, forests, refuges, wilderness areas and game preserves were the dominant means by which protection was provided to critical areas in the years leading up to World War II. A growing number of scientists believed this strategy wasn't sufficient any longer because it largely overlooked privately owned property, land that was rapidly being paved over in the post-war boom.

Gearing up for the challenge, the Ecologists Union changed its name in 1951 to The Nature Conservancy (TNC) and embarked on a novel strategy for the time: private land acquisition for ecological protection. In 1955, the organization made its first purchase, 60 acres along the New York/Connecticut border. Six years later it donated its first conservation easement, which restricts development rights on a property in perpetuity, on six acres of salt marsh (again in Connecticut). This new strategy of buying and preserving land proved popular with members and donors, causing the organization to grow rapidly. By 1974, TNC was working in all fifty states, often in tandem with state and federal agencies. It wasn't all about acquisition, however. Frequently TNC acted as the "middle-man" buyer between a willing seller and the federal government, the eventual owner of a property. In the process, TNC became adept at deals, especially real estate deals, developing a business acumen that was as novel for a conservation organization at the time as was its land protection strategy. TNC also launched an ambitious land trust program which included an important decision to accept conservation easements on property it did not own.

Soon, TNC was working internationally, buying land and facilitating major conservation projects. In 2000, it launched the "Last Great Places" campaign, raising over $1 billion dollars for land acquisition and research. By 2007, TNC was protecting more than 117 million acres of land and 5,000 miles of rivers in the U.S. alone, as well as directing over 100 conservation projects in a variety of environments.

However, it wasn't just about buying land. Employing hundreds of scientists on staff, TNC has based much of its conservation work on research, including a science-based modeling approach to large landscapes which helps the organization determine where to work, what to conserve and what strategies should be employed. In other words, their work was no longer simply focused on saving the rarest species here and there, as it had been in the 1950s. Now, they worked at the ecosystem level across large landscape so that all species might thrive, a strategy TNC calls "enough of everything." They do this by establishing science-based priorities and then setting out to influence the social, political and economic forces at work in these critical landscapes.

TNC's success has been mirrored by many other Third Wave conservation organizations, including Conservation International, the Trust for Public Land and the World Wildlife Fund. It also helped to ignite a land trust movement around the world. Today, there are over 1,700 individual land trusts in America alone focused on private property of every shape and size from small community or regional trusts to state-wide agricultural organizations. A great deal of science-based conservation work was also integrated into various nonprofit organizations, public agencies and private operations. The emergence of ecology in the 1940s, thanks in no small part to Aldo Leopold, also led schools and universities to embrace science-based curriculums and implement numerous environmental study programs across the country. Professional journals in ecology and conservation biology proliferated as a result. At the same time, many public lands-focused environmental organizations incorporated science into their advocacy work, especially those focused on large predators, wildlife corridors and endangered species.

In contrast to environmentalism, however, the Third Wave eschewed the noisy emotionality and confrontational tactics of the Second Wave, preferring the quiet diplomacy of research and deal-making to accomplish its goals. Although it still adhered to a "protection paradigm" that it shared in common with the first two Waves, scientism was guided by data, not poetry, and it sought cooperation, not regulation or litigation, to accomplish its objectives. And as the success of TNC demonstrates, for a time this Wave was extraordinarily effective.

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But like all waves, this one too eventually began to ebb.

In the West, the high water mark for the Third Wave began in 1990 when TNC purchased the beautiful and biologically-rich, 322,000-acre Gray Ranch, located in the boot-heel of southwestern New Mexico. Sheltering more than 700 species of plants, 75 mammals, 50 reptiles and 170 species of breeding birds, the Gray Ranch was considered one of the most significant ecological landscapes in North America. That is why the U.S. Fish & Wildlife Service had coveted the Gray Ranch as a wildlife refuge for decades. Indeed, in the 1980s a similar-sized ranch in southern Arizona, the Buenos Aires, was purchased by the U.S. Fish & Wildlife Service from the same Mexican millionaire who owned the Gray Ranch. This time however, the financial terrain was different and TNC was needed to broker a deal, which it did at a high financial cost to the organization. No matter – TNC had every intention of quickly reselling the Gray Ranch to the federal government and thus recouping its investment.

Except the transfer never took place.

When local residents heard of the Gray Ranch purchase and pending resale to the federal government they raised vigorous objections. Going first to their elected representatives and then to the media, their opposition became front page news across the West, and for a reason: it fit a changing mood in the region. Across the West, a pushback against federalism and environmentalism had been gathering steam, often expressed noisily as an exercise of "private property rights." It was more complicated than that, of course, but the bottom line was the same: Push had come to shove in the rural West.

Scientism ebbed for two main reasons. First, the benefits of a protection paradigm, whether science-based or not, began to be less and less effective over time as the nature of environmental trouble diversified. Climate change, for instance, largely defies the paradigm: What does "protection" mean under rising temperatures, water scarcity and climatic disorder?... Second, as with environmentalism, scientism failed to develop a viable economic program to go along with its protection paradigm.

The Animas-area residents raised three specific objections to what TNC was trying to accomplish:

- the Gray Ranch was still a working cattle ranch, and thus a tax-paying, cowboy-hiring member of the local economy that residents wanted it to stay that way;
- a wildlife refuge would devalue the cultural and historical significance of the Gray Ranch, which was part of the historic Diamond A Ranch, one of the area's legendary operations; and
- it was time to stop this pattern of transferring private land to the federal government.

It was this last point that made the headlines. Local residents took their complaints directly to TNC officials where, to their surprise, they found a sympathetic reception. That's because TNC was hearing similar complaints in other places around the West. It gave the organization pause not simply because they didn't like controversy but because TNC had always considered itself to be a cooperative conservation group. Their method was to buy land and easements from willing sellers, to work collaboratively with government agencies, and to create deals that benefited people and nature while keeping a low profile. However, local residents disagreed, saying TNC was not being cooperative (not with them anyway). The complaints stung, causing TNC to ask itself an important question: could it accomplish its scientifically-guided conservation goals while maintaining the Gray Ranch as a privately-owned working cattle ranch? And perhaps just as importantly: could it find conservation buyer who would help them recoup their substantial financial stake in the property?

The answer to both questions proved to be "yes." But it also signaled the start of the Third Wave's ebbing.

In 1993, The Nature Conservancy sold the Gray Ranch to Drum Hadley, a local rancher who also happened to be an heir to the Budweiser beer fortune. After the sale, Hadley and members of his family created the Animas Foundation, named for the nearest town, to manage the ranch for conservation as well as community goals. It would remain a working cattle ranch, but one with conservation objectives as well. That seemed like an oxymoron to many environmentalists who subsequently objected to TNC's new plan, though to no avail (it was another sign of the Second Wave's ebbing). It all added up to a new approach toward conservation. Success required that TNC, the Gray Ranch, local residents and public agencies cooperate with each other. To that end, a year later TNC and the Animas Foundation became charter members of the Malpai Borderlands Group, a pioneering collaborative partnership of ranchers, conservationists and government agencies in the region. And the stirring of the Fourth Wave of conservation in the West was born.

Scientism ebbed for two main reasons. First, the benefits of a protection paradigm, whether science-based or not, began to be less and less effective over time as the nature of environmental trouble diversified. Climate change, for instance, largely defies the paradigm: What does "protection" mean under rising temperatures, water scarcity and climatic disorder? Piecemeal protection also exposed the paradigm's limitations as subdivision developments boomed across the West. TNC and other organizations were confronted with a growing dilemma: What benefit does buying a large property for protection purposes do if the neighboring ranches sell out to a subdivider who fragments the surrounding land? Also, the top-down approach of scientism, which shared a command-and-control philosophy with federalism and environmentalism, met increasing resistance from bottom-up groups, limiting its effectiveness. Locals wanted to be heard and involved now. Directives by outsiders, no matter how well-meaning, provoked pushback among the grassroots.

Second, as with environmentalism, scientism failed to develop a viable economic program to go along with its protection paradigm. While supportive of working landscapes, it struggled to help local residents find paychecks in conservation-friendly enterprises. For example, while TNC could afford to manage its own land without a profit motive, it had great difficulty finding an economic strategy that would keep its neighbors in business (and thus keep "For Sale" signs from appearing). As the "subdivision crisis" in rural counties heated up in the 1990s, TNC realized that it could not buy all the critical land needed to protect species. There simply wasn't enough money. Nor would easements complete the job. Some sort of "conservation" economy, other than tourism and recreation, would be necessary. To this end, TNC tried a variety of economic strategies, including a "Conservation Beef" pilot project in Montana, but it wasn't enough. Despite TNC's success, it became clear to many that in order to accomplish the landscape-scale effort needed to help species and local people, especially if it involved public lands, a new approach would be required, one that featured partnerships and profits. These realities gave rise to the next Wave of conservation.

The Fourth Wave

Mixing metaphors for a moment, the Fourth Wave began as spot fires across the West, and in one place that meant literally.

In 1991, the Forest Service extinguished a 500-acre fire burning on private land along a stretch of the remote Geronimo Trail Road, located in southeastern corner of Arizona. On the surface, it was an unremarkable event—the Forest Service had long reacted to wildfires with the same response: Put it out. Period.

Except this fire proved to be different. The local ranchers did not want it extinguished, agreeing with scientists that fire had an important role to play in ecosystem health. They asked the federal government to let the fire burn, arguing that it posed no appreciable threat to life or property. The landowner was supportive too; in fact he had thinned the overgrown brush recently in order to create the right conditions for fire's return. But the Forest Service didn't listen. It put the fire out over all protests. This routine act, however, ignited the community into action. "No more," it said aloud. Consequently, within three years, the nonprofit Malpai Borderlands Group was born – a coalition of ranchers, scientists, conservationists, public agencies and concerned citizens in the area. They were determined to do things differently within the nearly one million-acre border land they called home. They decided to give collaboration a try.

…the Fourth Wave emphasized profits along with protection, arguing persuasively – as Aldo Leopold tried years earlier – that good stewardship flowed from ethical and regenerative attitudes toward land, business and people. Profit could be a force for conservation, the Fourth Wave said, not against it as so many environmental activists had insisted. The proof was in the pudding of these early collaborative efforts: conservation and capitalism (of the local sort) worked effectively side-by-side across the West.

It was a similar story with other spot fires around the West at the time. When a federal judge shut down logging in old-growth forests throughout the Pacific Northwest in 1991 in response to a lawsuit by environmentalists over the Spotted Owl, a firestorm of protest in rural communities was ignited. It also lit two small but important bonfires of change. The first was in the Applegate Valley of southwestern Oregon, where a small coalition of activists, loggers and Forest Service personnel met for potluck suppers and peacemaking. The second was a similar group that met in the only place they considered neutral in the logging-dependent town of Quincy, in northern California – the public library. The goal of both groups was the same: better forest management through collaboration, not confrontation. Both groups took an extraordinary amount of heat from all sides for their efforts. But these, and other, bonfires wouldn't go out despite the assaults. In fact, they soon grew into a major conflagration across the West.

Up in Montana, the Malpai Borderlands Group quickly inspired two groups of ranchers to form nonprofits and give collaboration a try. One was in the Blackfoot River valley northeast of Missoula and the other in the Madison Valley, northwest of Yellowstone National Park. Like Malpai, residents in both valleys grappled with a host of challenges, including the threat of land fragmentation due to subdivisions, curtailment of livelihoods due to endangered species regulations, and changing demographic trends. Instead of fighting the future, however, they chose to link arms with conservationists, scientists and agency employees with the goal of making progress where it mattered: on the ground. It wasn't easy, especially in the beginning. In many places trust had to be rebuilt or created; in others, key players wouldn't come to the table. This changed over time, however, as people began to see genuine results. The process was messy, difficult, time-consuming and frustrating, but it worked. In time these bonfires spread, watershed by watershed, into a Wave that I call (for want of a better word) "collaboratism."

Others called it the "radical center", a term coined by rancher Bill McDonald of the Malpai

Borderlands Group. It was radical because it challenged various orthodoxies of the other three Waves at work at the time, including the belief of environmentalists that conservation and ranching were part of a zero sum game in which one could only advance if the other retreated. The "center" referred to the pragmatic, middle-ground between extremes. It meant partnerships, respect and trust. But most of all, the 'center' meant *action*—a plan signed, a prescribed fire lit, a workshop held, a hand shaken. Words were nice but working in the radical center really meant walking the talk.

The Fourth Wave drew strength from the first three waves while filling in blanks and correcting important deficiencies. It aimed to protect open space and wildlife, it valued working landscapes, it incorporated public lands, it employed ecology and other sciences, and it required trust and fairness. It also strove toward economic realities, often by exploring and promoting the diversification of business enterprises on private lands. These include: fees from hunting, fishing, camping and wildlife viewing; bed-and-breakfast services; dude ranching and other amenity-based activities that attract urban visitors; grants from foundations and agencies for a variety of watershed-based improvements; and involvement in various energy projects (wind, solar) or small-scale development projects (a few home sites), that create additional revenue for the ranch operation.

In doing this work, the Fourth Wave emphasized profits along with protection, arguing persuasively, as Aldo Leopold tried years earlier, that good stewardship flowed from ethical and regenerative attitudes toward land, business and people. Profit could be a force for conservation, the Fourth Wave said, not against it as so many environmental activists had insisted. The proof was in the pudding of these early collaborative efforts: conservation and capitalism (of the local sort) worked effectively side-by-side across the West. The keys were partnerships and dialogue— handshakes and countless meetings. It all led to an explosion of collaboratives of varying stripes in the late 1990s, including the formation of many watershed-based nonprofit organizations. The radical center united, rather than divided; it was a practical and fact-based approach to land and people.

For all its success, however, the Fourth Wave will too, in time, reach a high water mark and commence its inevitable ebbing. In fact, there are signs that this pullback may already be underway. As the wave evolved from its gridlock-breaking and peace-making roots into a proactive effort that has brought ecological and economic health to the region and its people, the world evolved too, bringing with it new challenges and opportunities.

One area where it worked best was ecological restoration. Ecology had led to a deeper understanding of land "sickness" — to use Leopold's term, and methods to restore forests, rangelands and riparian areas back to health. Ranchers, conservationists, agency personnel and others began to implement these ideas in pilot projects around the region. These included: controlling noxious weeds; the proactive use of livestock; conducting riparian and upland restoration work for water quality and wildlife habitat improvement; tackling forest overgrowth through thinning and prescribed fire; and repairing and upgrading low-standard roads in order to restore natural hydrological cycles. Success, however, required cooperation among multiple stakeholders, particularly across private/public and urban/rural divides.

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The Fifth Wave

Sustainability. Adaptation. Mitigation. Local. Grassfed. Resilience.

These words, so much in the news and on the minds of people today across the globe, barely registered on radar screens fifteen years ago. When we founded the Quivira Coalition in 1997, we were focused on peacemaking, collaboration, land health and good stewardship. Issues such as climate change, peak oil, local food production, grassfed meat and other "modern" concerns were rarely discussed, if at all. That's not the case today, of course, which is an indication of how much the times have changed. In particular, the prospect of hotter and drier conditions in the Southwest as a consequence of climate change—a near certainty under current greenhouse gas emissions rates according to scientists—is very much a concern for people these days (or ought to be, anyway). Soon, I predict, these words will dominate our lives and require a new conservation response in the American West, one that combines the ecological, the economic and the social. In fact, it has already started. Here are two examples:

Local Food Production. There has been an explosion of interest in recent years among urban residents in local, organic, natural and grassfed food. The reasons for this explosion are varied, including concerns about chemicals, feedlots, globalization and "food miles." But the net result of this interest is clear—increased social and economic profitability for ranchers. Grassfed beef, for instance, can frequently command 50 percent more per pound in price than commodity (feedlot) beef. This price difference, which is offset somewhat by additional costs involved in raising and marketing niche products, can make the difference between turning a profit on a ranch and going further into debt. Almost as important, however, are the social and emotional benefits of getting into local food markets such as face-to-face contact with customers (who often become advocates for the farm or ranch). Producing healthy, locally-raised food for grateful customers while contributing to the local community, in my experience, creates an emotional lift to ranch work that puts a spring in a landowner's step, an intangible benefit whose significance should not be underestimated.

Ecosystem Services. For centuries, well-managed farms and ranches have been delivering to cities ecosystem services, such as healthy topsoil, wildlife habitat, clean water, fuel sources, food, functioning wetlands, buffers against floods and fires, and on and on. It is only recently, however, that these services have come to be recognized, and therefore valued, as something worthy of protecting, restoring and maintaining, especially as urban populations grow and negative pressures mount on natural resources. Mechanisms for compensating ranchers and other landowners for delivering ecosystem services to society (including the protection of open space) are the subject of intense analysis, experimentation and debate right now. What seems indisputable, though, is that their importance will only rise over time. The capacity of watersheds, for instance, in arid and semi-arid environments to deliver sufficient water to downstream users will depend significantly on the skill of upstream landowners and managers. It will require stewardship, it will

require people and it will require profit.

Another example is what I call a "carbon ranch," purpose of which is to mitigate climate change by sequestering additional CO2 in plants and soils, reducing greenhouse gas emissions, and producing co-benefits that build ecological and economic resilience in local landscapes.

Right now, the only possibility of large-scale removal of greenhouse gases from the atmosphere is through plant photosynthesis and related land-based carbon sequestration activities. Strategies include: enriching soil carbon, no-till farming with perennials, employing climate-friendly livestock practices, conserving natural habitat, restoring degraded watersheds and rangelands, increasing biodiversity, lowering agricultural emissions, and producing local food. Over the past decade, these strategies have been demonstrated individually to be both practical and profitable. A carbon ranch bundles them into an economic and ecological whole for the benefit of all living things.

There are six strategies that can increase or maintain the carbon content of grass-dominated ecosystems:

- planned grazing systems using livestock, especially on degraded soils;
- active restoration of degraded riparian and wetland zones;
- where appropriate, removal of woody vegetation to encourage grass to grow in its stead;
- the conservation of open space, so there is no further loss of carbon-storing soils;
- the implementation of organic no-till farming practices; and
- management of land for long-term resilience.

Fortunately, a great deal of the land management *toolbox* required to implement these strategies has largely been tried and tested by practitioners, landowners and researchers. Over the past decade, these strategies have been demonstrated individually to be both practical and profitable. A carbon ranch bundles them into an economic and ecological whole with the aim of reducing the atmospheric content of CO2 while producing substantial co-benefits, including local food production, improved ecosystem services, restored wildlife habitat, rural economic development and the strengthening of cultural traditions.

But none of this is the principle job of the first four Waves of conservation. Parts of these Waves can help, but progress in tackling sustainability, adaptation, mitigation, local, grassfed and resilience requires a new paradigm. Fortunately, one is emerging, and it has a name: "a new agrarianism."

Across America, there is a resurgent interest in local, family-scale, sustainable food, fiber and fuel production. It began slowly but has gathered speed recently. Local food is the focus and key to this new movement, but it's more than food systems. It's collaborative watershed groups focused on restoring health to riparian areas, it's the innovative use of livestock to combat noxious weed infestations, it's the carbon-sequestering practices of good land stewardship and much more.

What is this new agrarianism? Here are three definitions. The first is by Wendell Berry:

There is another way to live and think: it's called agrarianism. It is not so much a philosophy as a practice, an attitude, a loyalty and a passion – all based in close connection with the land. It results in a sound local economy in which producers and consumers are neighbors and in which nature herself becomes the standard for work and production.

The second is by Prof. Eric Freyfogle:

Agrarianism, broadly conceived, reaches beyond food production and rural living to include a wide constellation of ideas, loyalties, sentiments, and hopes. It is a temperament and a moral orientation as well as a suite of economic practices, all arising out of the insistent truth that people everywhere are part of the land community, just as dependent as other life on the land's fertility and just as shaped by its mysteries and possibilities."

The third is one I wrote from my own experience:

It is an ecological economy centered on food and land health that builds resilience, encourages ethical relationships and celebrates life.

I credit Aldo Leopold for laying the foundation for this resurgent agrarianism. Over the course of a diverse and influential career, Leopold eloquently advocated a variety of critical conservation concepts including wilderness protection, sustainable agriculture, wildlife research, ecological restoration, environmental education, land health, erosion control, watershed management and famously, a land ethic. Each of these concepts resonates today, perhaps more so than ever as the challenges of the 21st century grow more complicated and more pressing. It was Leopold's emphasis on conserving whole systems—soil, water, plants, animals and people together—that is most crucial today. The health of the entire system, he argued, is dependent on its indivisibility; and the knitting force was a land ethic – the moral obligation we feel to protect soil, water, plants, animals and people together as one community.

This is the Fifth Wave of conservation in the West. It is a vision of local, sustainable food production from farms and ranches that are managed for land health, biodiversity and human well-being. It is a vision of new agrarians working to sequester carbon in soils, improve water quality and quantity, restoring native plant and animal populations, fixing creeks, developing local energy sources, and replenishing the land for people and nature alike. It is a vision of coexistence, resilience, and stewardship – a place for people in nature, not outside it.

After Leopold's death in 1948, however, the idea of a whole system broke into fragments by a rising tide of industrialization and materialism. Fortunately, today a scattered but concerted effort is underway to knit the whole back together, beginning where it matters most, on the ground. Leopold's call for a land ethic is the root of a new agrarianism – a diverse suite of ideas, practices, goals and hopes all based on the persistent truth that genuine health and wealth depends on the land's fertility.

The new agrarians practice what Aldo Leopold called a unifying force, something "… that reaches into all times and places, where men live on land, something that brackets everything from rivers to raindrops, from whales to hummingbirds, from land estates to window-boxes. I can see only one such force: a respect for land as a living organism; a voluntary decency in land-use exercised by every citizen and every land-owner out of a sense for and obligation to that great biota we call America."

A new agrarianism is that decency. And as we begin to tip over on the other side of the bell-shaped curve called "industrialism", the issues of decency, food, hope, joy and good land use couldn't be more important. We are all agrarians now. Our health and wealth depends on what we choose to eat, how we produce our energy, where our water comes from, who benefits from sustainable practices—and each has its root in the land. It is from these roots that the Fifth Wave is forming.

One can view the history of conservation in the American West as a transition from placing people outside of nature to placing people within it. In the late 19th century, early conservation efforts were designed primarily to protect nature from the long arm of civilization, be it in the form of overgrazing livestock, development, logging or some other exploitative activity. That's why the early responses included national parks, forests, wildlife refuges, wilderness areas and other

"fortresses" of conservation that aimed to keep people at a distance. Today, however, conservation is focused on finding a place for people within natural systems, especially as it pertains to ensuring enough food, fuel, fiber and fresh water to ensure human well-being.

Recently, The Nature Conservancy's chief scientist, Peter Kareiva, said the goal of conservation in the 21st century is better management of nature for human benefit. Kareiva believes that by restoring and protecting essential ecosystem services for humans, such as clean water or soil fertility, we'll end up protecting a significant portion of the natural world's biodiversity, as well as creating legions of grassroots advocates for nature. The key is engaging in activities that ensure the health of both land and people, he insists. Besides, we don't have much choice.

"Look," he said, "we're in nature. The deal is how to work with it and how to help it work for us." Most of the world's seven billion people don't care about biodiversity, he said. What people want is security, food and shelter, and an opportunity to better their lives. They will use natural resources in any way they want to accomplish these goals regardless of what conservationists think. This means the movement needs to focus less on protected areas and more on working lands.

"The key is to take each of the major needs of people," he said, "and find the future that meets these needs and protects nature. This should be the endgame for The Nature Conservancy and the conservation movement…until we make a vivid and compelling connection between what people want and the need for conservation, our work will never save the world."

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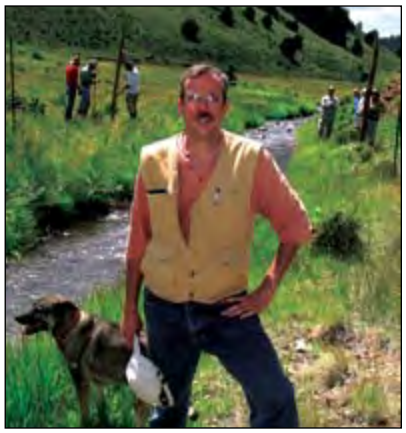
But more importantly, this wave is being led by youth as every wave before it has been. The difference, however, is that today's young agrarians can stand on the shoulders of their predecessors and thus see farther. I have no doubt that what they see is both energizing and daunting, but I am equally confident they have the skill sets and the right attitudes to tackle these challenges. Fortunately, the toolbox at their disposal is full of ideas and practices that have been tried and tested in the field already. And undoubtedly they will innovate new ones to go along with what we know works. Our role, for those of us who have surfed earlier waves, is to provide as much mentoring, inspiration and encouragement as we possibly can…and cross our fingers.

This wave will eventually crest and ebb, as previous waves of conservation have done—following a timeless law of human nature. That's off in the future, however. In the meantime, I intend to do all I can to help this new generation of surfers ride this wave all the way to the shore.



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