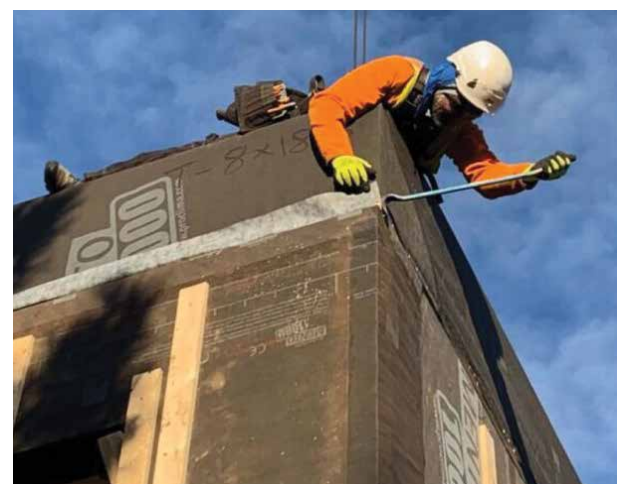


MARCH / APRIL 2022

STRENGTHEN THE THINGS THAT REMAIN

GREEN FIRE TIMES

News & Views from the Sustainable Southwest



NORTHERN RÍO GRANDE ORAL HISTORIES

VOLUME 14 NUMBER 2

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COVER TOP: GREENROOTS INSTITUTE'S COMMUNITY LIAISON, JOSELUÍS MIGUEL ORTÍZ Y MUNÍZ WITH DAUGHTERS IN NORTHERN NEW MEXICO COLLEGE'S SOSTENGA GREENHOUSE IN ESPAÑOLA; ARNOLD VALDEZ IN FRONT OF MURAL BY JUANITA LAVADIE DEPICTING THE RÍO CULEBRA BASIN IN COLORADO; GALISTEO BASIN LANDSCAPE SOUTH OF SANTA FE; CENTER: THE RÍO GRANDE NEAR TAOS; ADOBE CONSTRUCTION WITH HEMP-INFUSED BLOCKS; B.PUBLICPREFAB'S PANEL CONSTRUCTION; BOTTOM: CHICOS AND RED CHILE; ENVIRONMENTAL SCIENCE PROFESSOR KARLETTA CHIEF; ATALAYA ELEMENTARY SCHOOL CORN GROWER, LEXTON CHANG

GREEN FIRE TIMES NEEDS YOUR SUPPORT

Green Fire Times is a platform for regional, community-based voices—useful information for residents, businesspeople, students and visitors—anyone interested in the history and spirit of New Mexico and the Southwest. GFT's small, dedicated staff and multitude of contributors generate articles documenting the interrelationship of community, culture, the environment and the regional economy. The sustainability of our region affects all of us, and requires people from all backgrounds working together to create solutions. One of the unique aspects of GFT is that it provides multicultural perspectives that link green, cutting-edge innovations with time-honored traditions.

Storytelling is at the heart of community health. We have an opportunity to change the story going forward, which can lead to positive transformational change. GFT shares inspiring stories of hope and community action. By helping our communities discover who they once were and what they can become, a more positive future can be created.

Of course, it is an extremely challenging time to continue to produce a free, quality, independent publication. Production costs have greatly increased. Many local and regional publications have folded or have been bought up by corporate entities. Fortunately, a growing number of publications are receiving boosts from nonprofits that are devoted to protecting journalism. GFT is owned by Southwest Learning Centers, Inc. (est. 1973), a nonprofit educational organization. SWLC provides a mentorship program for some of GFT's writers, aspiring journalists and documentarians.

Green Fire Times is struggling to survive. We also need funding to upgrade our on-line archive and make 13 years of articles more accessible to community members, students and researchers. Don't assume that someone else will help. Please consider making a tax-deductible donation through our website, or send a check made out to Southwest Learning Centers (with a notation 'for GFT') to P.O. Box 8627, Santa Fe, N.M. 87504-8627. Also, please advertise! The print edition—currently published every other month, while our website is updated more frequently—is widely distributed from Albuquerque to Taos and beyond. For a rate sheet, visit GREENFIRETIMES.COM.

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GREEN FIRE TIMES

News & Views from the Sustainable Southwest

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Rezolana Farm, San Luis, Colorado (Page 22) © Seth Roffman

DOCUMENTING THE NORTHERN RÍO GRANDE'S ORAL HISTORIES

BY MARGARET C. CAMPOS

As busy as my grandparents were living their daily lives, my grandfather always had time for stories, *dichos* and tales of his travels—explorations he or members of our small community experienced. After dinner, I would sit and listen to him anxiously, respectfully waiting to ask a question when there was a pause. Inspired by his stories, my imagination was much better than any movie I have ever watched. My grandmother was a bit more reticent in sharing or answering questions. When I would ask about the past, she would say “*Era muy triste, la gente muy pobre, no quieres saber*” (It was very sad, the people were very poor, you don’t want to know.)



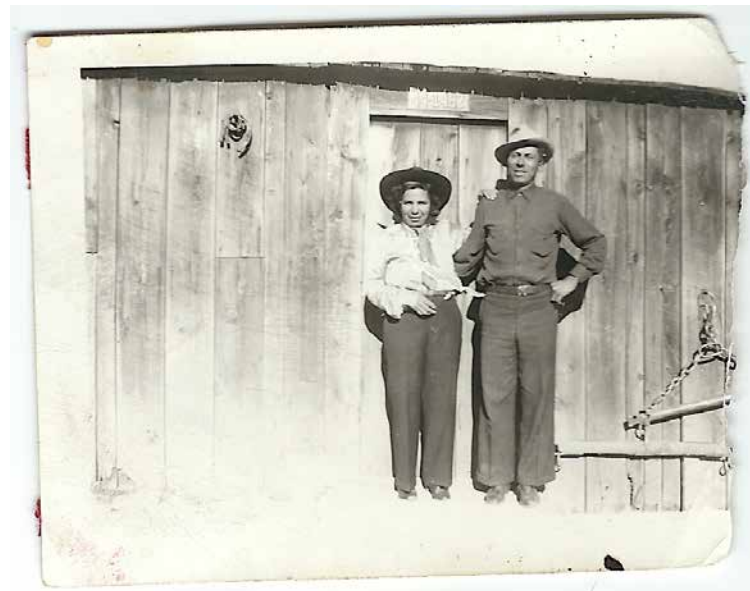
My grandfather, Fidolino Leyba with Bernardino Armijo of Ojo Sarco and Frank López of Las Trampas

It was always my grandfather’s habit to nap every afternoon; you have to when you get up at 4 a.m. every day. I remember spending that quiet time doing the most interesting things, like going through my grandmother’s can of buttons and her *beliz* (suitcase) of old photos. The large gallon-size metal can itself was interesting. It formerly held hard candy, the kind they gave us grandchildren at Christmas. The buttons, some plain in shape and color—brown, black and white—but then there were the ones that had military insignia, the small round pearl, the carved wooden ones, those shaped like flowers, and in every color of the rainbow. Remarkably, as we sorted through the buttons, her stories would come out. She knew exactly where each one came from and who wore the dress or the shirt, and the stories easily flowed.

We invite members of the community to share your stories, or call us to schedule a time to sit, visit and digitize your old photos.

Our very ancient multicultural and mixed populations represent a complex, seminal and dynamic spiritual and historical continuum.

My favorite pastime during those quiet afternoons was going through an old metal suitcase where she kept all of her old photos. Knowing the poverty my mother and grandparents experienced in the earlier parts of their lives, I always wondered who had enough money to buy a camera. “Who took these photos,” I would ask, and she would only say “*un hombre con una camara?*” More a question than an answer, a man with a camera. But my question was answered one day when I visited my cousin Ida. She was looking online at old photos from Ojo Sarco and Las Trampas. As it turns out, the federal government commissioned photographers as part of the United States Work Progress Administration (WPA). The Federal Writers’ Project,



My grandma’s cousin, Reyes Aguilar from Vadito, with Fidolino Leyba of Ojo Sarco



created in 1935, commissioned photographers to document homes, schools and all aspects of life in rural communities. In particular, the photos in my grandmothers’ old suitcase were taken by John Collier ([HTTPS://WWW.AAA.SI.EDU/COLLECTIONS/](https://www.aaa.si.edu/collections/)). I was fortunate enough to have made notes of the people in the photos while my grandmother was still alive. I appreciate the glimpse into the lives of my *antepasados* (ancestors) that those treasured photos provide. They continue to fascinate anyone I share them with.

It was from this love of the past that so many of us share that the Manitos Digital Resolana was born. Founded by former New Mexico state historian, Estévan Rael de Gálvez,

My great-grandfather, Jesus Leyba



My great grandmother, Ursulita Medina Romero of Ojo Sarco and her sister, Estefanita Medina Ortega of Las Truchas

oral histories of our most treasured (*tesoros*), we wish to preserve those memories for future generations to enjoy.

The Northern Río Grande National Heritage Area (NRGNHA) is a congressionally enacted National Heritage Area that receives its funds and is administered through the National Parks Service (NPS). NRGNHA's mission is to sustain the communities, heritages, languages, cultures, traditions and environment of this very special northern New Mexico region of the Upper Río Grande, through partnerships, education and interpretation.

The NRGNHA encompasses a vast geographical area, from the Colorado border on the north, to Taos Mountain to Española and the Río Arriba pueblos, cities and towns, to Santa Fe (city and county). Our National Heritage Area includes the Pueblos of Taos, Picuris, Ohkay Owingeh, Santa Clara, San Ildefonso, Nambé, Pojoaque and Tesuque, as well as the Jicarilla Apache Nation.

Our NHA also contains immense deposits and arrays of natural resources and useful minerals. The Río Grande flows through and gives life to the region, and our very ancient multicultural and mixed populations represent a complex, seminal and dynamic spiritual and historical continuum of peoples that is truly unique in the U.S.

Since its inception, our NHA has consistently sought to improve in the performance of our mission, and we are grateful for the able, professional cooperation of the National Parks Service, which works with us to provide support for the Northern Río Grande National Heritage Area.

Currently, NRGNHA has a film student, Samantha Herrera, from Northern New Mexico College working with us, using a high-quality scanner. Our goal is to capture the stories, histories and memories we treasure as a contribution to the *Manitos Digital Resolana*, so they can be shared publicly. *Resolana* is the term used for the southernmost or sunny spot, where people would sit and visit, a place of sharing. We invite members of the community to share your stories, or call us to schedule a time to sit, visit and digitize your old photos.

As I well know, memories fade. We would like to help you capture the stories that are important to you, to us, to ensure that they will be stored and saved for future generations. I would have loved for my children to have met my grandparents, to have heard their wisdom and shared the stories, some that I have long forgotten. The photos I have are the next best thing. ■



Margaret C. Campos is executive director of the Northern Río Grande National Heritage Area. David Fernández of Taos, the NRGNHA's vice-president, also contributed to this article. 505-753-7273, [HTTPS://RIOGRANDENHA.ORG](https://riograndenha.org)

the primary purpose of the archive is to document “where people connected to these villages now live, to reconnect, recollect, record and reflect on their shared cultural heritage.” The term *manitos* itself, indicative “of identity, has been widely used by the people of the mountains, valleys, hills and plains of the northern-most part of New Mexico and beyond, whose experiences and histories are firmly rooted in this region.” The term is derivative of the word *hermano*, which is how my grandfather related to all those respected in his community, as most of the men were *hermanos* in the *moradas*, or *Penitentes*. *Hermano* means brother, a true reflection of the Hispano culture in northern New Mexico that I remember growing up. By capturing the



Above: Frank Vigil (my mother's godfather), Bernardino Armijo, Daniel Romero, Frank Vigil Sr., Manuel Armijo, Felipe Armijo and Feliciano Leyba—all of Ojo Sarco. Bottom: Celia Pacheco Leyba (“Grandma Pacheca,” as we affectionately called her)



L-R: My aunt, Lucy Leyba Montoya; my great-grandmother, Ursulita Medina Romero; my mother, Eremita Leyba Campos

ESPIRITU DE LA TIERRA

Las Vegas, NM Museum Exhibit Opens March 19

A culturally significant exhibit titled: “*Espíritu de la Tierra: La Morada de Los Enmascadoras Gorras Blancas en los montes de Sangre de Cristo*” opens at the City of Las Vegas Museum and Rough Rider Collection on March 19. Presented with respect and a sensitivity for the closed practices of the Penitente Brotherhood, the exhibit is anchored by a complete, deconsecrated Morada altar, the first known public reveal of such an artifact.

The exhibit is the result of a three-year collaboration among content development studio, wetFuture; the Penitente brothers of the featured Morada; and scholars from New Mexico Highlands University’s Native American and Hispano Studies Program, working with the staff of the museum. It is produced by the Friends of the City of Las Vegas Museum and Rough Rider Memorial Collection, with funding from the Board of County Commissioners for San Miguel County.

A press release describes the primary focus of the exhibit as “the regional formation of the metaphysical concept of *querencia* as it applies to the Sangre de Cristo mountains, [and] how *querencia* informed the emergence of the Penitente Brotherhood of the featured Morada and *Las Gorras Blancas*. A secondary focus is to correct misinformation, reframing the historical context of both secretive groups and exploring their histories as manifestations of *querencia*.”

The City of Las Vegas Museum and Rough Rider Memorial Collection is located at 727 Grand Avenue, Las Vegas, N.M. For more information, contact Shane Flores at 858-414-5805 or WETFUTURESTUDIO@GMAIL.COM.

GROUNDBREAKING DIGITAL PROJECT FOCUSED ON ENSLAVED NATIVE AMERICANS

The Andrew W. Mellon Foundation has awarded a \$1.5-million grant to fund *Native Bound-Unbound: Archive of Indigenous Americans Enslaved*, an initiative created by Dr. Estévan Rael-Gálvez. An anthropologist, historian and Indigenous slavery scholar, Dr. Rael-Gálvez has served as the state historian of New Mexico, executive director of the National Hispanic Cultural Center, and senior vice president of historic sites at the National Trust for Historic Preservation.

“The stories of enslaved Native Americans have been quieted over the years by whispers as much as by silence, even by their heirs—carrying, if not geography in their faces and hands, certainly its memory in an aching consciousness. Recovering these stories is especially imperative for descendants endeavoring to see themselves reflected in history and to recover a sense of self and heal from the past,” said Dr. Rael-Gálvez, who himself descends from enslaved people.

Although obscured from the national narrative and consciousness, slavery was experienced by millions of Indigenous people beginning in 1492 across North and South America, including entire regions of the United States. These histories are reflected in records that exist in archival repositories globally and include legal cases, censuses, letters, last wills, newspapers, photographs and church records for baptisms, marriages and burials. Families also hold personal records, objects, photographs and stories about their ancestors.

A digital database and centralized repository centered on the experiences and histories of millions of enslaved Indigenous Americans will be created during the three-year project. According to Dr. Rael-Gálvez, “The goal is to transform that content into digital exhibitions, chronologies and new types of cartographies on a single, public website. The repository will provide a major source for educators, scholars, storytellers, artists and, most critically, descendants.”

NORTHERN RIO GRANDE NATIONAL HERITAGE AREA | RIOGRANDENHA.ORG

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**2ND PRIZE DAVID VEDOE
Taos County (left)**

**3RD PRIZE CRUZ LOPEZ
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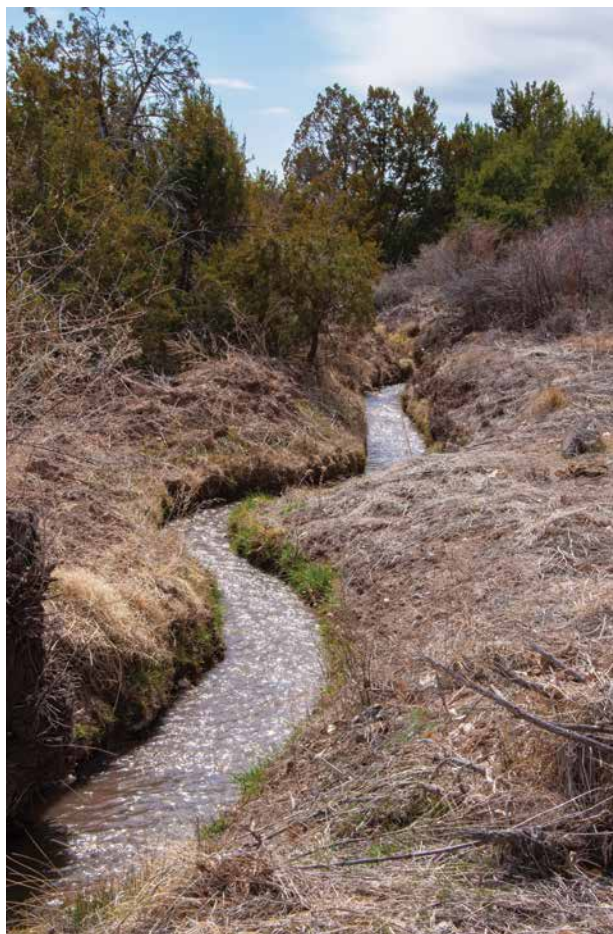


OUR MISSION To sustain the communities, heritages, languages, cultures, traditions, and environment of Northern New Mexico through partnerships, education and interpretation.

Strengthen the Things that Remain

*Greenroots Institute and Northern New Mexico College
Implement Community-Based Solutions*

BY JOSELUÍS MIGUEL ORTIZ Y MUNÍZ



Acequia in La Cienega © Seth Roffman

Awareness, interest and cross-sector conversations are growing in northern New Mexico around the need for greater community involvement and inclusion in creating holistic, grassroots approaches that address issues of land, water, and importantly, our cultural and economic self-determination. There is a deep understanding that *Agua es Vida* (Water is Life), which can only be defined as *querencia*. We know that *acequia* systems of water-sharing and community self-governance create a powerful way for us to connect to each other, our environment, our history and our identities as land-based northern New Mexicans. If these connections exist, they can serve as a pathway out of poverty, erasure, and ultimately, land and culture loss.

As the region has changed dramatically over the last

century, particularly in the last three decades, northern New Mexicans have struggled to maintain what makes us unique and helped us survive in this arid region for hundreds if not thousands of years—our land-based ways of living and knowing, our acequias and *mercedes* (land grants), and our rich agricultural heritage.

ANSWERING THE CALL

The Greenroots Institute was founded and is led by traditional farmer, water rights advocate, community leader and elder, Española's own Don Bustos. The institute is homegrown, straight out of Santa Cruz de La Cañada, irrigated from the *Acequia del Llano* and deeply rooted in northern New Mexico.

Greenroots is coordinating development of grassroots, community-driven processes to determine and implement environmentally, economically and culturally sustainable plans related to water, food and economic security for the future of the Española Valley and northern New Mexico culture. The institute's role as a community partner is to be a convenor and incubator of projects and programs that advance dialogue, understanding, action and policies that protect regional water, land and cultural agency.

COMMUNITY-BASED SOLUTIONS

Greenroots Institute operates based on the understanding that solutions need to

evolve directly from community engagement processes and participatory, democratic and inclusive programs. Over the last three years, the institute's staff have quietly engaged various institutions and organizations in the Española and the Santa Cruz de la Cañada valleys whose missions benefit residents, specifically around food, water, education and community self-governance. Greenroots has collaborated to provide leadership, technical and human resources support.

THE LITTLE FARM THAT COULD

Sostenga!, the Center of Sustainable Food, Agriculture and Environment, has been housed at Northern New Mexico College in Española, the only college with a historic acequia running through it—a truly unique and remarkable landscape for students, faculty and the community. Sostenga! was the brainchild of Dr. Camila Bustamante, with support from a variety of funders who recognized the unique character of the region's traditional agriculture. NNMC was the perfect place to create such a program. When Dr. Bustamante started Sostenga, under her leadership, the college had recently established an Environmental Science program and curriculum in traditional agriculture. NNMC had over 1,600 students and primarily served rural communities (including eight Native American) within a 40-mile radius of the campus in one of the most underserved regions in the state and nation.

Initial funding allowed for infrastructure development, which included a certified commercial kitchen and storage capacity for value-added products, scientific equipment, as well as a greenhouse and fields for cultivation of fruits, vegetables and seeds. Unfortunately, after a couple of very successful years, a change in NNMC's leadership and the loss of valued faculty and employees led to Sostenga having to cease its operations.

Despite this situation, with the help of the American Friends Service Committee's (AFSC) statewide farmer training program (then under the direction of Don Bustos), and with help from NNMC's faculty and volunteers, Sostenga! continued to present its Garlic Festival and various community events. The fields were cultivated, interns were trained, and most importantly, food was harvested in a community-based way.

A few seasons later, things shifted again. The Sostenga kitchen was under new management, Bustos retired and AFSC shifted their efforts in support of projects in different areas of the state. What that meant for "the little farm that could" was that it was time for yet another change. For the two seasons that followed, seeking to demonstrate to the community an appropriate use for the land and water—a traditional farm—the Sostenga farm was maintained by Bustos and the team from Santa Cruz Farm and Greenhouses. During that time, Bustos was also developing a foundation for the Greenroots Institute. It is important to note that the faculty at NNMC never gave up hope that Sostenga would become a thriving farm and Environmental Sciences program.

In 2018, concerns about preserving, protecting and sharing New Mexico's water for diverse needs were at an all-time high, as were concerns about the preservation of northern New Mexico's culture, language and land-loss. In the fall, Bustos and Greenroots' staff discussed the idea of re-engaging NNMC to reimagine and re-create an impactful Sostenga program from the bottom up. A series of

meetings with Dr. Patricia Trujillo, Dr. Ana X. Gutierrez-Sisneros, professor Joaquin Gallegos and former NNMC President Dr. Richard Bailey led to that group becoming Sostenga's core advisory team.

They developed a pilot project that put the land back into production, engaged interns and students and provided a place for the community to learn about traditional farming. During the initial phase, the core team met monthly to





Santa Cruz Farms cold-frame; L-R: Greenroots Institute Executive Director, Don Bustos; Community Liaison, Joseluis Ortiz y Muniz; Sostenga Garlic Festival, Northern New Mexico College, 2010 © Seth Roffman

plan and engage community members and stakeholders to support development of the project.

Then the COVID-19 epidemic hit. Despite the barriers it created, Greenroots Institute, with the help of students, faculty, community organizations and three youth interns, was able to supply produce for local nonprofits to distribute. Over 5,600 pounds of healthy, organic food was grown and delivered to local families. More than 20,000 plants were donated and sold.

After two successful pilot years, it was clear that agricultural demonstrations and locally grown food distribution, combined with internships and farmer training are a perfect mechanism to stimulate the region's land base. Greenroots Institute has since partnered with NNMC to develop a renewed Sostenga, where area residents and students can connect with core cultural and higher-learning activities rooted in northern New Mexico's land-based cultural heritage. By incorporating service-learning with traditional, regenerative and biodynamic agriculture, acequia and land-grant culture, seed preservation, land and water stewardship, Sostenga is now providing a space where individuals and families can nurture healing while gaining professional development. In the process, they may also engage with the community and come to a deeper understanding of history and self-identity.

The farm is also researching and addressing the increasing impacts of the climate crisis by demonstrating methods of water conservation, crop selection and companion planting. Demonstrating food production and providing food to the community closes the food security loop. Sostenga includes leaders of the *Acequia de los Vigiles*, who are experts in acequia irrigation. And so, the cultural approach to healing, led by Dr. Ana X. Gutierrez-Sisneros, is being addressed. This year, a medicinal herb garden will be sowed and tended by Luzero Velásquez, a traditional herbalist. Sostenga is working with NNMC faculty and staff so educators can utilize the farm as an outdoor classroom and work with the farm team to provide lesson plans that explore land-based ways of living and knowing as core principles of learning. The project will also provide the community with organic vegetable seedlings.

A FUTURE FOR US ALL

As northern New Mexicans, we have the ability to feed ourselves and our families by using traditional farming knowledge passed down by our elders. This is a kind and gentle way of participating in honoring the land and water that is to be shared and nurtured for all.

It is important for us to take time to create relationships between community members and empower ourselves through authentic unity among all people within this diverse and beautiful region. After all, "The people of the State of New Mexico shall be entitled to clean and healthy air, water, soil and environment; a stable climate; and self-sustaining ecosystem, for the benefit of public health, safety and general welfare." (New Mexico Constitution)

We look forward to the work that lies ahead as we strive to address the issues that put at risk our livelihoods, our rich diverse cultures, our histories, and problems that undermine our cultural and economic self-determination, our community and political will-power. We are stronger united.

Sostenga is seeking to grow its team to increase its impact and the distribution of locally grown food. If you or someone you know are interested in participating or working to restore New Mexico culture through agriculture, land grants, acequias, or through volunteering, email DREAMNEWMEXICO@GMAIL.COM. Greenroots Institute's website is [HTTPS://GREENROOTSINSTITUTE.ORG](https://greenrootsinstitute.org). ■

Joseluis Miguel Ortiz y Muniz, a research scientist and Greenroots Institute's Community Liaison, is coordinating Sostenga's program at NNMC. Ortiz y Muniz, an Embudo Valley resident, is an heir to the indigenous Genízaro land grants of La Merced de Santo Tomas el Apostol del Río de Las Trampas, La Merced de Santa Barbara, The Embudo Land Grant, and La Merced de la Nueva Villa de Santa Cruz de La Cañada. He is a devoted father and a proud, land-based norteño.

LEGISLATURE FUNDS NNMC'S SOSTENGA AND RURAL, CULTURAL AND ECONOMIC DEVELOPMENT PROJECTS

In the 2022 Legislative session, N.M. Rep. Roger E. Montoya sponsored a capital outlay appropriation that will be given to the Northern New Mexico College's Board of Regents to support the Sostenga program's four-acre demonstration farm. Additionally, Sen. Leo Jaramillo and Rep. Montoya collaborated to provide an additional \$50,000 in recurring funds through SB48 to support staffing for the project. This investment will build educational programming at the college level for a new generation of socially conscious farmers and acequia protectors.

Here are a few of the appropriations being granted to New Mexico agencies, organizations and institutions through Capital outlay and through SB48-Junior funds:

- \$150,000 to NNMC for critical infrastructure, tools, supplies and staffing
- \$350,000 to the North Central New Mexico Economic Development District (NCNMED). This will help communities apply for hundreds of millions of dollars in funding for clean drinking water systems, wastewater treatment, broadband internet and economic development opportunities.
- Funding for the Interstate Stream



Commission (ISC) staff to leverage tens of millions of dollars in grants to preserve, rebuild and complete many critical acequia programs

- \$35,000 to the Santa Cruz Irrigation District for the preservation of historic water-rights documents
- \$150,000 to the Santa Cruz Irrigation District to develop and implement a watershed management plan and community engagement for the Río Santa Cruz basin
- Millions of dollars for the many Acequias, land grants and community centers in rural areas



Chimayó produce, Santa Fe Farmers' Market
© Seth Roffman

NNMC's Sostenga Core Advisory Team would like to thank our elected officials who stepped up at this critical moment to sponsor bills that will provide continued support for work that positively impacts our communities. We especially want to thank Rep. Roger E. Montoya and Sen. Leo Jaramillo for championing our work and fighting for the preservation of sustainable agriculture and arts & culture in northern New Mexico. *iSostenga Vive!*

New this spring:

Donate your state tax refund to New Mexico's Healthy Soil Program to support farmers and ranchers in soil health stewardship! The benefits of doing this are immense.

Go to **NMhealthysoil.org** to learn how and why to participate

If you are due a refund on your New Mexico Personal Income Tax, you have the opportunity to donate all or part to the Healthy Soil Program using the PIT-D, Schedule for New Mexico Voluntary Contributions, when you file your taxes.

SEMILLAS PA' LA GENTE

A project of the New Mexico Acequia Association

New Mexico's acequias and food traditions have never been more important. Local food, family and youth connections to the land, and caring for neighbors can be vital to people's survival and well-being. Strong communities and land-based traditions have provided support and have helped minimize suffering and loss of life from COVID-19.

Previous generations kept acequias flowing, cared for the land and water, and saved seeds. As they witness the beginnings of a profound transformation of economies, educational systems and communities, *acequeros* continue to be vigilant in protecting water, acequias and farmland. They also have a renewed focus on engaging more families in growing gardens with the water, land and seeds that are their common heritage. Seeds carry ancestral memory, and by sharing and growing seeds, growers are taking practical action to ensure health, food access and food security for their communities, as well as shaping the future for their children and grandchildren.

The New Mexico Acequia Association (NMAA) has launched its "*Semillas pa' la Gente*" campaign to provide native seeds to acequia community members to plant gardens and grow food for their families and neighbors. As soon as seeds are planted, fresh greens can be available in about 30 days. The NMAA also collects stories about the gardens grown.

THE ROLE OF SPANISH AND MEXICAN-ERA LAND GRANTS IN THE CREATION OF HISPANO-INFLUENCED CULTURAL LANDSCAPES

BY MARÍA MONDRAGÓN-VALDEZ, PH.D.



Figure 1 Map of San Luis Valley, Northern New Mexico (Adapted from Briggs & Van Ness, 1987)

Mountains, Water and the Ecology of Place

After the Spanish occupied New Mexico, colonial administrators delineated two geopolitical districts in the province based on the location and elevation relative to the Río del Norte, or the Río Grande. The Río Abajo, the lower course of the Río Grande, extends from central to southern New Mexico. In contrast, the Río Arriba includes terrain in all directions north, from Santa Fe to the San Luis Valley.^[i] Because of the broad distinction, the Río Arriba bioregion was simply *El Norte*, or

the north. The boundary is marked by La Bajada Mesa, south of Santa Fe. The mesa is a panoramic and dynamic transition point between the upper and lower bioregion.^[ii]

Spanish/Mexican land grant customs from New Mexico, coupled with Hispano settlers adapting to the local environment, imbued the landscape with culture and history.

Extending 675 miles from Chihuahua, México, through New Mexico, and northward beyond the San Luis Valley—the Río Grande Rift is a deep scar in the terrain which channels

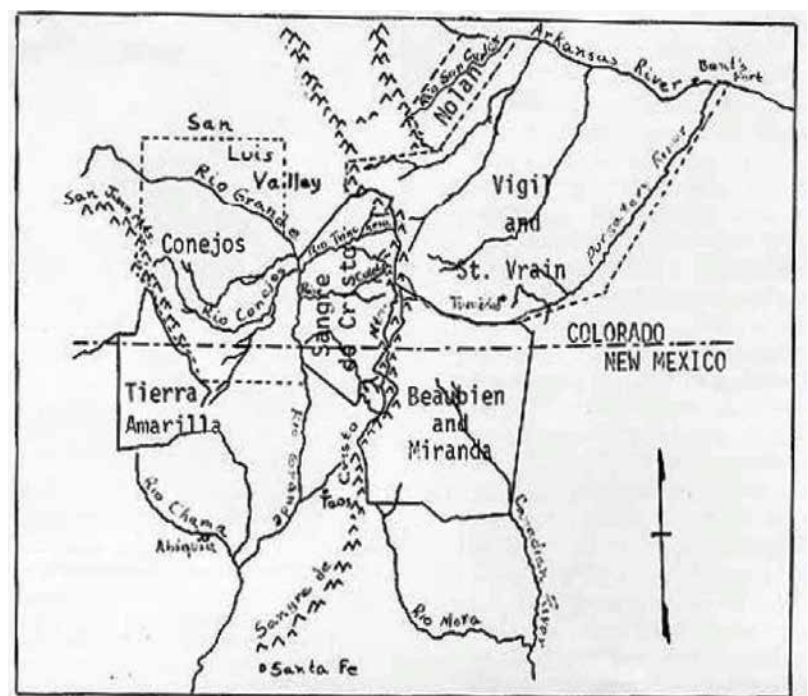
tributary water from the uplands to the lowlands. This immense landscape is situated in the southern Rocky Mountain province. Regardless of the location and differences in topography, changes in elevation, diversity of biomes and the variety of microclimates—all life zones in the province are unified by hydrology, human use and history.^[iii] The province is a complex ecological system with six life zones. Because the valley floor is an estimated 7,500 feet in elevation, life zones in the San Luis Valley are simplified to the lower- and upper-montane foothills, sub-alpine and arctic-alpine. As an example, the tundra ecosystem of the Río Culebra Watershed supports dwarf willows, grasses, sedges, and at the tree line, Engelmann spruce. On the foothills is forest of Douglas fir, lodgepole pine, Colorado blue spruce and aspen. Below 9,500 feet, conifer and ponderosa pine give way to piñon-juniper woodlands intermixed with grassland shrubs. The transition between upper and lower zones is defined by a cottonwood habitat, which grows alongside streams and rivers. Greasewood, rabbitbrush and drought-resistant grasses cover the drier desert-like flatlands to the west.^[iv] Ingress and egress routes between the Río Abajo, Río Arriba and the San Luis Valley took

place east or west of the rift or by following alongside the Río Grande. In contrast, Ice Age hunters tracking game arrived through passes in the Sangre de Cristo Mountains. Later, family bands that frequented the naturally endowed landscape of mountain peaks, rivers, great sand deposits and hot springs expanded trails to different life zones. Within the region circulation routes led to western and northern Colorado and eastward to the Great Plains. One important trail bifurcated at the northern end of the Costilla County and headed westward to Utah, Nevada and California.

As were original inhabitants of antiquity and the historic Ute and Jicarilla Apache, *Nuevomexicanos* were attracted to the San Luis Valley. An estimated 100 miles long by 60 miles wide, the high, elevated steppe possessed all of the physical characteristics necessary for settlement by agro-pastoralists: upland pastures, lowland meadows, lush wetlands, tall grasses and a nearly level valley floor surrounded by mountains. Cultural geographer Richard Nostrand described the process of population movement based on pursuit of pastoral land as “splinter diffusion.” This concept posits that stockmen from a parent village created an offspring village in a familiar area.^[v] The San Luis Valley was well-known to *Nuevomexicanos*, as they mapped and named the landscape, traversed through the region herding flocks to California, and during times of peaceful coexistence, hunted and sometimes grazed their herds. By the middle of the 19th century, population pressures in old plazas and the need for new pastures triggered movement upstream into the Ute and Jicarilla Apache frontier.

The Origins of Mexican Land Grants in Colorado

Six years after the American Army of the West occupied New Mexico, extended families moved eastward from the Taos Valley and westward from villages in the Río Arriba into the San Luis Valley. The incentive to advance was the previous issuance of two Mexican land grants: the Guadalupe or Conejos Land Grant (validated in 1842) and in Costilla County the Sangre de Cristo Land Grant (1843). Of the six Mexican Era (1821-1846) land grants in Colorado, only the Conejos Land Grant was originally made to communal applicants. The remaining five grants were private holdings obtained by French-Canadian applicants living in the Taos Valley. Between 1841 and 1843, over 9.7 million acres were granted by New Mexican Gov. Manuel Armijo, with an estimated eight million acres located in southern



Map 2. Mexican Period Land Grants in Colorado

After Hufen, 1927, 85

Figure 2 Mexican Period Land Grants

Colorado. The private land grants made during this era encompassed the entire San Lu s Valley, both sides of the Sangre de Cristo Mountain Range, and extended an estimated 100 miles beyond the region to present-day Pueblo, Colorado.^[vii] (Figure 2)

Understanding why foreigners received Mexican land grants in Colorado requires a preface. When the Republic of M xico overthrew Spanish rule in 1821, 10 percent of adult males died in rebellion. As a result, 25 percent of the land remained unsettled, and the Republic was plagued with overwhelming poverty. To stabilize the faltering economy, M xico City allowed the United States to forge a trail between New Mexico and Missouri. The Santa Fe Trail enabled M xico to collect tariffs, sell livestock and woolen products, and purchase goods from the U.S. Access to American products changed the culture and opened the bioregion to commercial trapping and the international pelt market. Ironically, trappers who arrived early in New Mexico via the Santa Fe Trail were French Qu b cois from St. Louis and Canada. Many operated out of the Taos Valley, as the area was designated a port of entry. When beaver habitats in the R o Arriba were decimated, many trappers left, while those who stayed behind married New Mexican women to inherit land and prosper by trading with locals.

The flow of goods into Taos realigned trails in the San Lu s Basin to accommodate American markets. The old Mexican road northeast into the San Lu s Valley became the Trapper's Trail. This was a northern route to Colorado and a pathway to Bent's Fort, a military-like fortress specializing in international trade in liquor, guns and pelts. Constructed by Charles Bent and Ceran St. Vrain, the fort was situated at the fork of the Arkansas and Purgatoire rivers to profit from trade between Plains Indians and foreign trappers and traders. Charles Bent operated a store in Taos, St. Vrain managed the Santa Fe outlet, and their brothers operated the fort. In an effort to enlarge the scale of their business, Bent and St. Vrain encouraged Missouri and Washington politicians to occupy New Mexico.^[viii] Expansion into M xico was a long-contemplated goal of the U.S., as the array of natural resources and prospect of mineral wealth would solidify America's "Manifest Destiny."^[ix]

To protect M xico against outright invasion, the Republic enacted five laws to control Americans living within its borders. Colonization Laws regulated where foreign settlement would take place and imposed taxes after four years of residency. Equally important, the laws limited private land grants to 11 leagues (71 square-miles). A requirement for all land grant applicants was Mexican citizenship. To maneuver around this restriction, foreigners became silent partners or included Nuevomexicanos in the application. In 1828, authorities denied a land grant for the R o Culebra Watershed, as two of three applicants were *estranjeros casados*, or foreign trappers.

Fifteen years later, the Sangre de Cristo Land Grant was awarded to a wealthy French-Quebec family headed by Charles (Carlos) Beaubien (Figure 3). Educated in Canada, Charles Beaubien arrived in New Mexico shortly after the opening of the Santa Fe Trail. Marrying

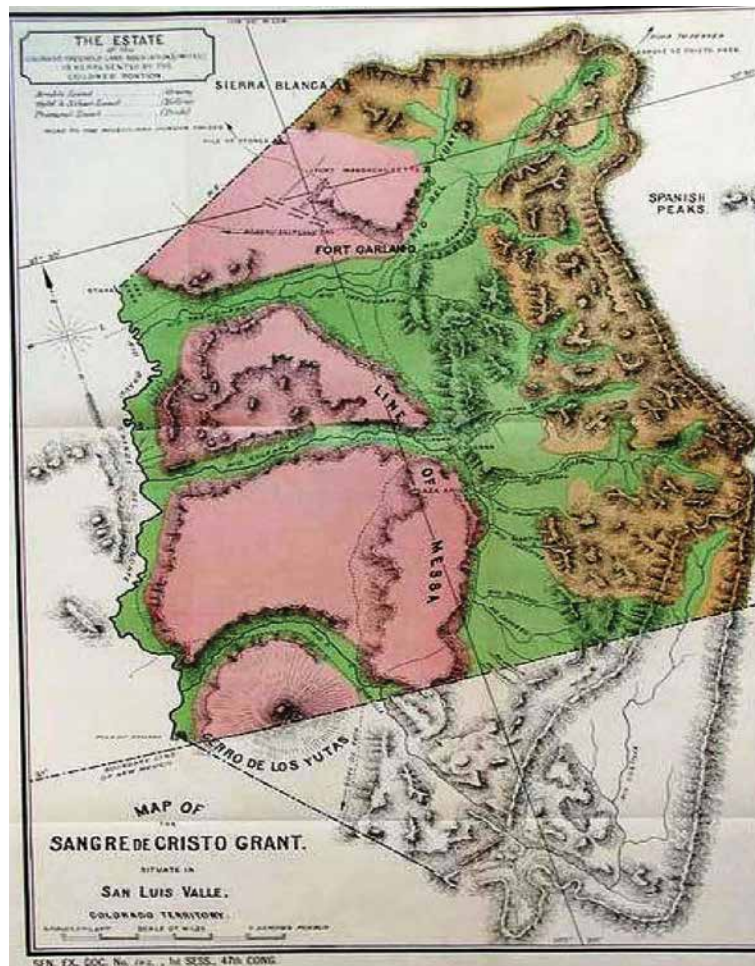


Figure 3 Sangre de Cristo Land Grant (Blackmore Collection, Santa Fe: State Records Center and Archives)

The Bent brothers were strategic to the occupation of New Mexico, as their fort was the designated rendezvous point for the American Army of the West. When General Stephen Kearny secured N.M. for the U.S., he appointed Charles Bent to be governor and Carlos Beaubien as Supreme Court justice. Overbearing military authority, the biased civil rule imposed by merchants, and the domination of land grants caused Taos Pueblo and Nuevomexicanos at Taos, Arroyo Hondo, Mora and Questa to rebel in January 1847. In the ensuing melee, Charles Bent, Narcisco Beaubien, Stephen Lu s Lee, Cornelio V gil and their sympathizers were assassinated. At Arroyo Hondo, American traders who brokered whiskey to Bent's Fort were killed and the distillery set on fire. In retaliation, the military indiscriminately killed New Mexicans, destroyed the church at Taos Pueblo and razed villages. Those captured were accused of treason and brought before Judge Beaubien for sentencing. Fifteen men were hanged and 50 imprisoned.^[x]

After the rebellion, Beaubien became the sole owner of the Sangre de Cristo Land Grant. To populate the grant, he offered long-lots for a minimal price, and to individuals with family or business ties he gave free tracts. In a few instances, the poorest could barter for their holdings and those who helped build plazas could obtain donated parcels. Relocation to unsettled frontier required multiple attempts, as after the Taos Rebellion, attacks in the R o Arriba were made not only by the Ute, Apache and Navajo but also by the Kiowa, Comanche and "other Indian marauders."^[xi] Even with the ever-present possibility of death or kidnapping in retaliatory raids, new plaza settlements emerged along the contemporary border between New Mexico and Colorado.

Hispano-Influenced Cultural Landscape in the R o Culebra Watershed

To highlight the kaleidoscope of influences that shaped settlement patterns and created Hispano-influenced cultural landscapes requires a basic understanding of *la Merced*, or land grants. Spanish and Mexican land grant traditions in New Mexico were premised on Roman custom, influenced by medieval tradition and codified by Spanish law. As a result of seven centuries of Roman occupation of Iberia, Spain adopted similar strategies to (re)conquer territory lost to the Moors. Like Roman citizen-farmers who engulfed agricultural regions in return for land, Spanish *pobladores*, or settlers, expanded into contested territory. Incrementally, settler-farmers built fortified cities, farmed, and protected the land from the Moors. The process allowed the Crown to systematically expel the Moors from Spain.^[xii]

In the New World, land granting became the means to expand the Spanish Empire throughout the Americas. When New Mexico was founded, the colony numbered 500 and included soldiers with families, servants and slaves. A small, powerful class of aristocrats who financed and participated in the conquest

into a prominent New Mexican family, Beaubien became a Mexican citizen and opened an outfitting business in Taos. Since Beaubien was also a successful trader, his enterprises were directly linked to Bent's Fort. Early in the 1840s, Beaubien, Charles Bent and Ceran St. Vrain collaborated with the powerful class of *politicos* to obtain massive land grants in south-central and south eastern Colorado. To ensure approval, Beaubien and his partners offered the governor of New Mexico a silent interest in their claims. In 1841, Beaubien received the 1,714,764-acre Beaubien/Miranda (aka Maxwell) Grant in partnership with Guadalupe Miranda (the provincial secretary of state). Because Beaubien already owned a grant, his teenage son, Narcisco, and Stephen Louis Lee (sheriff of Taos) applied for the 1,038,195-acre Sangre de Cristo Grant in 1843. The same year, Ceran St. Vrain and Cornelio V gil (Taos justice of the peace) obtained a four-million-acre grant, and Gervacio Noland, a wealthy Canadian, obtained one million acres.^[xiii]

Urban sprawl encroaches on Hispano enclaves throughout the bioregion.

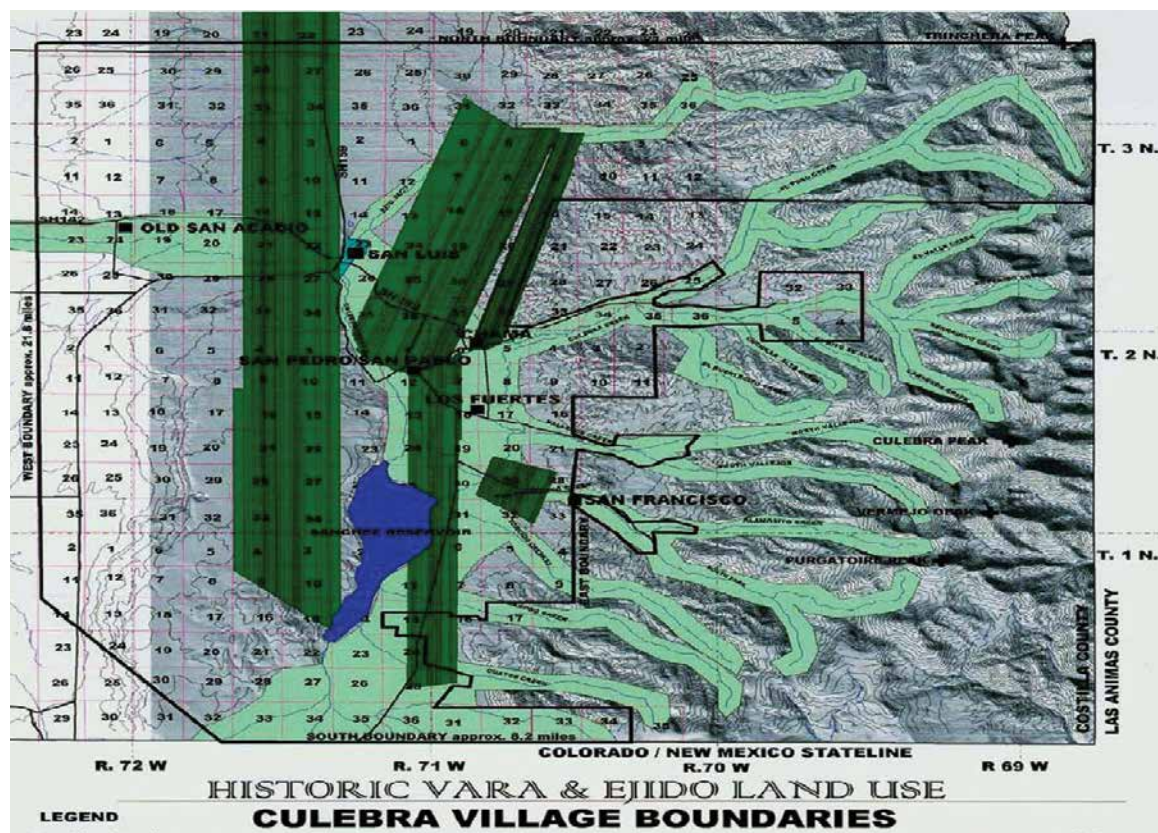
took control of the bioregion in the name of the Crown. Acting like feudal landlords, this class encroached on Pueblo holdings, exacted

tribute and enslaved the indigenous population. While some prospered, the colony was plagued by strife. Animosity of the Pueblos exploded into mass rebellion in 1680. Destruction of plazas, churches and ranches and the killing of over 400 colonists caused New Mexico to be abandoned for 13 years.^[xiii] Even though new settlers were recruited from central México, (re)conquest of New Mexico took years and was only ensured after a new land-use policy was enacted at the onset of the 18th century.

Twenty years after the Pueblo Revolt, colonial administrators in New Mexico started to redistribute land to municipalities and communal applicants. The change in policy allowed administrators to separate the colonists from the sedentary Pueblos by granting land away from their boundaries. Peace was not ensured, since 18th- and 19th- century land grants continued to encroach on the Indigenous frontier. This in turn solidified generational clashes between the *pobladores* (settlers) and the Comanche, Navajo, Ute and Jicarilla Apache, and shrouded the bioregion in endemic violence. Land grants made in New Mexico after 1700 fostered settlement patterns and a water delivery system, which were cultural dimensions of history and spatially influenced features determined by local environmental conditions. Adhering to Spanish custom, every merced in New Mexico was composed of four prototypes that evolved into cultural landscape features in Costilla County, Colorado: The *ejido* (common land), *suerte* (private agricultural long-lot), *solar de casa* (plaza residential lot) and the *acequia* (gravity-fed earthen irrigation system).^[xiv] Shared components of land grants during this period were complex systems that embodied these features necessary for a stable agro-pastoral society.

Spanish/Mexican land grants are typified by incorporation of trails forged from Indigenous pathways and circulation networks, proximity to riparian corridors that extended beyond the boundaries of the settlement, assigned spaces for villages and common-built environment and private agricultural plots and common grazing zones (Figure 4). In the medieval mode of residency, land grants throughout the Providence of New Mexico required reciprocal agreements from colonists. Foremost, settlers were required to build plazas, protect the land, and participate in road building. Residency allowed pobladores to view each other as *vecinos*, or citizens, and to replicate Iberian patterns that created affinity to place and self-identification with the landscape.

Figure 4 Historic Vara and Ejido Land Use in the Río Culebra (Valdez & Associates, 2004)



LAND GRANT-MERCEDES LEGISLATION

A measure to distribute a small percentage of state gross receipts tax revenue to eligible land grants passed both chambers in the 2022 New Mexico Legislature with little opposition. House Bill 8 will create the Land Grant-Merced Assistance Fund, to be administered by the Department of Finance and Administration. Annual distribution from the fund will begin in 2023. The legislation was sponsored by Rep. Matthew McQueen (D-Galisteo), Speaker Brian Egolf (D-Santa Fe), Rep. Roger E. Montoya (D-Velarde) and Rep. Andrea Romero (D-Santa Fe).

Land Grant-Mercedes are a cornerstone of New Mexico's history and culture. These communities have suffered social and economic hardships for more than a century. As the oldest non-Native American institutions in the nation, land grants-mercedes have long given voice and power to New Mexico's traditional communities.

This financial assistance will provide relief to families in rural land grant communities who still live largely traditional or agricultural lifestyles, relying on the land and acequias. "This assistance will help preserve traditional New Mexican culture for future generations and ensure these communities can continue their way of life," said Rep. McQueen.

Overbearing military authority, biased civil rule imposed by merchants, and the domination of land grants caused Taos Pueblo and Nuevomexicanos to rebel in 1847.

Like the Pre-Columbian people, present-day residents must contend with fragile ecosystems and dwindling natural resources.

The foundation for Spanish and Mexican-period land grants in New Mexico and in the San Luis Valley was the medieval notion of the commons. When Provincial governors in New Mexico authorized community grants, by custom they allocated an *ejido*, or common land, for pobladores to share. Because communal holdings encompassed water, pastures and wetlands, both the upland and lowlands were incorporated into settlement practices. High altitude pastures and meadows, resource niches and hunting areas were identified with place names, used as reference points and functioned as boundary lines. Ejido land was the mainstay of Spanish life in the Old World and in the New World because the upland and low-land differentials were required for raising surpluses of stock for meat and trade. It took decades for surplus stock raising to be established in colonial New Mexico.

After the reconquest it took another 30 years for livestock to recover to their former level. Once a land grant matured, sheep became the foundation for a barter economy that reached into the Mexican interior. Ejido land was interfaced with transhumance, a well-established grazing practice that was used throughout Europe, in Morocco, Turkey, India and in the United States. In New Mexico and in Costilla and Conejos County, Colorado transhumance allowed pobladores to drive sheep, cows and horses from the low-land ranches to the upland commons. Another byproduct of Roman policy and medieval custom, transhumance in Spain was regulated, boundaries were defined, and the annual movement commenced in mid-May and ended early in October.^[xvi] Though dates of seasonal movement are remarkably similar in Spain, N.M., and in southern Colorado, control over transhumance evolved in a less rigid mode in the Río Arriba until the ejido commons was privatized early in the 20th century.

The second cultural landscape prototype to develop as a result of Spanish/Mexican land grants was the *suerte*, also known as a *donación*, or donated land. After a trial period and residency on the grant, each poblador received a *suerte* and a *hijuela*, or deed, to prove ownership. *Suertes* were calculated by a colonial measurement known as a *vara*, which roughly equals three geometrical feet. Each of the riverine-oriented *suertes* was divided into narrow parallel strips called *extensiones*, or long-lots. The long ribbon-like configuration allowed owners of *suertes* a diversity of terrain from bottomland, to pastureland, woodlands and foothills. Because agro-pastoralists depended on access to water for crops and livestock, *extensiones* ran between and at right angles to rivers and streams. *Suertes* varied in length depending on geography, location of rivers and streams, boundaries of each land grant, and the size of the settlement. The benefits of long-lot divisions were equitable river frontage, a diversity of land and resources, and good soil. Equally important, the layout of long-lot promoted road building and supported the agricultural-based economy. Though some *suertes* were many miles in length, not

all of the *extensiones* were suitable for agriculture or pasturing, and thus the actual amount of usable land was reduced by local conditions.

To establish a land grant, settlers constructed fortified plazas at

different elevations along rivers and streams, near trails and close to resources. Plazas were not European inventions, as the Aztecs in México and the Pueblos in New Mexico used square and linear rectangular forms. Rather, the Crown mandated that Spanish administrators throughout the Americas follow the Laws of the Indies to organize development and maintain the continuity of the built environment in the New World. The Laws were composed of 148 ordinances which regulated where plazas should be sited, dictated orientation and placement of buildings, and mandated common space for cities and for villages. In New Mexico, The Roman-influenced laws were followed in urban context at Santa Fe and Albuquerque, whereas in the Río Arriba decrees were blurred by isolation. Regardless of topographical obstacles



Figure 5: Plaza de las Culebra and solar house lots (O.T. Davis Collection, courtesy Marcella Pacheco)

faced, all plazas were uniform. Because all settlements in the frontier faced fierce opposition, the plaza shell was initially fabricated from logs placed vertically in the *jacal* fashion or horizontally as a *fuerte*, or fort. Chinked and mudded with multiple coats of a thick mud-plaster on the inside and outside, the plaza was unified with a contiguous flat roof to create a fortress. Once the colony was secure from attack, families were given a *Solar de Casa*, or a private house lot.^[xvii] (Figure 5)

The final component of land grants was the *acequia*, or earthen irrigation system. Acequias were an important characteristic feature of land granting that continues to exist throughout N.M. and in southern Costilla and Conejos counties. Though the origins of acequia nomenclature and practices were embedded in the Moorish occupation of Iberia, the system was influenced by Roman rule of Spain and altered through interaction with the Pueblos. Once a colony was settled in New Mexico, all *suertes* and plazas were bisected by the acequia network of earthen ditches operating by gravity flow. To regulate water a *compuerta*, or headgate, was constructed. As water flowed through a system of ditches, *presas*, or permanent dams, and *atarques*, or temporary holding dams, were used to divert water throughout the watershed. Individual settlers used *regaderas*, or outlets, to allow water into their fields. The end point of each acequia was the *desague*, or channel, that funneled excess water back to the stream, to another ditch, or to pasture land. By custom, water was divided equally among all pobladores by a *mayordomo*, or overseer. Since the system served *suertes* in different locations, affiliated *parciantes*, or water users, were required to maintain their section of ditch according to the number of acres owned and to communally clean and repair their acequia every spring. Initially, irrigators used mud, logs, brush and rocks to control water. When milled lumber became available villagers favored wood to fabricate compuertas and regaderas.



Figure 6: Eldorado subdivision, Santa Fe County, 2002

CONTINUED ON PAGE 35



Galisteo Basin © Seth Roffman

SANTA FE CONSERVATION TRUST: CONNECTING AND PROTECTING

BY MELISSA HOUSER

Northern New Mexico has many profoundly beautiful, unique landscapes. For centuries, these lands and waterways have provided food and essential resources, as well as inspiring outdoor experiences that elevate physical and mental well-being. For 29 years, the Santa Fe Conservation Trust (SFCT), in partnership with private landowners, has established conservation easements to safeguard such places. To date, SFCT has helped protect more than 43,000 acres of scenic views, open spaces, cultural heritage sites, working lands and recreational access in perpetuity.

Climate change poses an existential threat to plants, animals and humans. Over the next century, the rise in average global temperatures is projected to be faster than anything experienced for at least 10,000 years. With the massive changes humans have made to lands, river basins and oceans, many species will be unable to adapt or move quickly enough to regions that suit their survival. Up to a million species of plants and animals are at risk of extinction, including 40 percent of insects,

The SFCT is working to implement the 30x30 Campaign in northern New Mexico.

according to a 2019 report by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.

This extinction crisis has implications for all of us. Human populations cannot exist without a global environment that is healthy and capable of supporting a diversity of life. Habitat fragmentation is thought to be the largest threat to biodiversity. As small populations of wildlife or plants become isolated from other populations of the same species, they are at risk of inbreeding and extinction. Genetic diversity promotes resistance and resilience to environmental stresses including pests and diseases of crops and livestock. The cost of replacing these (if possible) would be extremely expensive.

There are also major implications for people's livelihoods around the world. Price-waterhouseCoopers found that \$44 trillion of annual economic value is moderately or highly dependent on nature and the services it provides. That's roughly half of the global Gross Domestic Product (GDP).

As large tracts of open range, forest and agricultural lands are subdivided and developed, serious and permanent impacts to plant and animal species will become increasingly evident. Ecosystem services like water filtration, carbon sequestration and soil regeneration will also be imperiled. The next 10 years is a crucial window for tackling the loss of biodiversity and ecosystem services which sustain us all. The national 30x30 ("America the Beautiful") Campaign wants to conserve 30 percent of America's lands and waters by 2030 to fight climate change and reverse the destruc-

tion of wildlife, waters and natural places. Like many other conservation groups, SFCT is working to implement the 30x30 vision in northern New Mexico through land conservation work. To be successful, 30x30 efforts must embrace five core principles:

- Support locally led conservation
- Create a more equitable and inclusive vision for nature conservation
- Honor the sovereignty of tribal nations
- Support private land conservation
- Be guided by science

It makes economic and development sense to protect biodiversity.

Conservation easements donated by generous, conservation-minded landowners are a model. Conservation easements are agreements by which landowners voluntarily limit development on their properties in order to safeguard conservation values. But they can be complex and expensive, requiring considerable research, documentation, legal advice and financial investment. Both the state and the federal governments offer tax benefits, but not all landowners have the income to maximize tax benefits, nor can they afford the transaction costs of putting an easement in place. And some families simply aren't in a position to protect their land with a conservation easement unless they are fully compensated for the amount that the easement lowers their property value.

There are many properties throughout northern New Mexico worthy of protection where landowners are struggling to pay property taxes and retain ownership. Some struggle to hold onto land that has been in their family for generations, to preserve their traditional way of life and pass the land on to their heirs. SFCT is committed to expanding



Coyote in snow on a conservation property
© Charles Hertz

its business model by raising sufficient funds to assist with or fully cover easement transaction costs, buy all or some of a landowner's development rights, and, if needed, purchase lands in priority areas.

To bring more equity into its conservation work, SFCT has designed a 10-year Strategic Conservation Plan (SCP) focused on areas where existing easements are clustered. SFCT will work with surrounding landowners and conservation groups on creating larger, connected areas of conserved land to make communities more resilient to climate change, protect and expand migration corridors, create buffer zones in areas of high development, tie water rights to the land, and offer opportunities to expand and create trails for public access. A guiding principle is SFCT's commitment to include a wider diversity of landowners in the implementation of the SCP.

SFCT has focused its conservation work in Río Arriba, Santa Fe and San Miguel counties. The trust currently stewards 96 conservation easements and owns four properties. To achieve its goal of creating larger, connected conservation corridors, the SCP is particularly focused on proactive conservation in three areas:

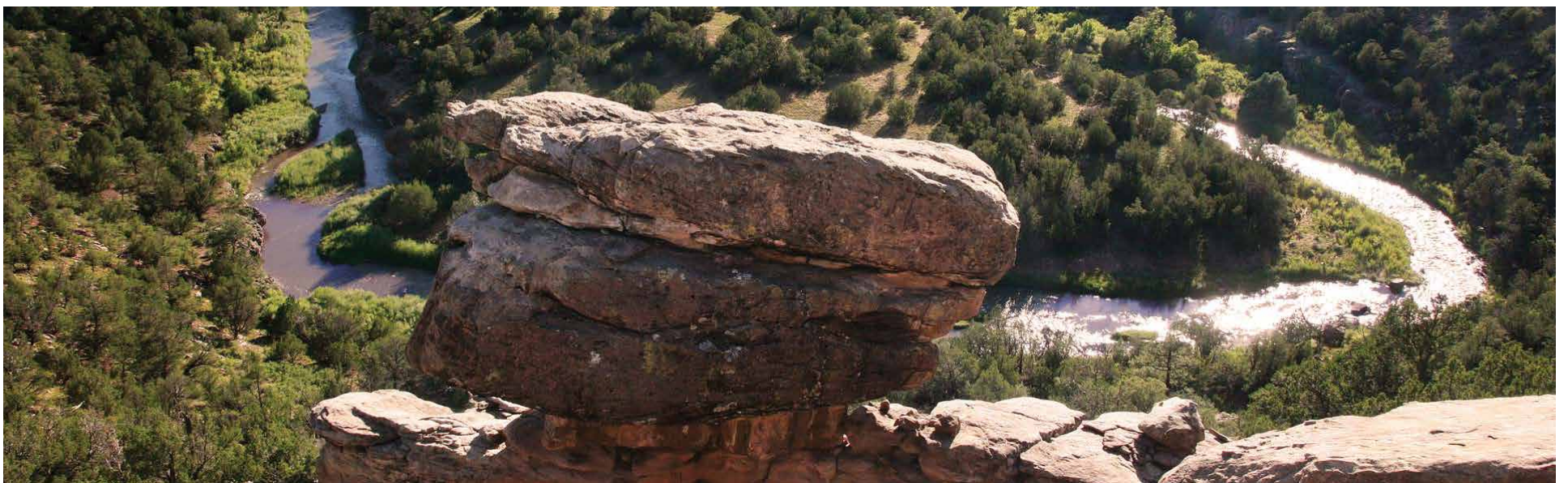
1. Santa Fe / Tesuque—An area with great development pressures along with increasing usage of trails and open space

Conservation easements in the foothills of the Sangre de Cristos—from Tesuque to Pecos—protect the viewsheds that can be seen from miles around and recreational opportunities that connect urban areas to the national forest. Just as humans need better access to the forest, so do many animals, so protecting the foothills as scenic open space with trails improves the quality of life for all species.

2. The Galisteo Basin Watershed—Growing residential development threatens important wildlife corridors, cultural resources and public access for outdoor recreation.

SFCT already protects more than 14,000 acres in the Galisteo Basin Watershed that include viewsheds, wildlife habitat and thousands of historically important landscapes and sites. These lower elevation lands also provide unmatched trail recreation opportunities. The watershed serves as a wildlife linkage area for cougar, black bear, mule deer and elk between the Sandia Mountains, the Ortiz, and Sangre de Cristo Mountains. However, most of the land in this area is privately owned and development pressure threatens to cut off migration corridors and threatens biodiversity.

3. Pecos River Valley —Threatened by energy development and the loss of working lands, this critical water corridor provides essential wildlife habitat.



Pecos River Open Spaces conservation property
© Billy Johnson



Pecos River on a conservation property

SFCT has several conservation easements along the Pecos River that protect riparian habitat, wild canyons, upland grasslands and woodlands. Farther south, toward Las Vegas, N.M., large conservation easements in the Piedra Lumbre and Las Vegas Watershed preserve historic structures and historic Santa Fe Trail ruts, vast grasslands, species diversity, unspoiled view lines and working lands. More than 20,000 acres are preserved by SFCT in San Miguel County, so this area is ripe for connecting and expanding conservation corridors.

One of the first steps for SFCT to effectively utilize scarce funding and identify lands worthy of conserving was to create a GIS mapping tool that could rank

properties based on a variety of conservation criteria. Nickolas Viau and Deb Grieco of Allpoints GIS and Breece Robertson Consulting generously donated essential GIS mapping components required for completing a conservation analysis.

You can join SFCT's efforts by volunteering, sharing ideas or joining a committee. Please consider protecting your land, becoming a sustaining donor, or including SFCT in your

will or estate plans. ■



Melissa Houser, an avid outdoorswoman and researcher, is land program manager for the Santa Fe Conservation Trust. SFCT.ORG



*Youthworks volunteers building erosion structures on a conservation homestead
Photos courtesy Santa Fe Conservation Trust*

NM FOREST AND WATERSHED RESTORATION INSTITUTE

An institute housed at Highlands University in Las Vegas, N.M., will utilize \$20 million in federal funds to oversee the creation of a national database to evaluate methods that improve the health of state and federal forests. The five-year funding is part of the \$5.3-billion infrastructure package for wildfire mitigation and forest restoration. Efforts such as prescribed burns and tree thinning will be tracked to see which treatments are effective under particular conditions. Data will be collected nationwide on vegetation, soil, size and hardness of trees and management approaches.

The New Mexico Forest and Watershed Restoration Institute (NMF-WRI) provides technical assistance and practical knowledge on biophysical, socio-cultural and economic dimensions of forest and watershed restoration. Its mission is to reduce the threat of catastrophic wildfire and restore healthy and sustainable forested ecosystems and restoration-based economies. It is one of three institutes under Southwest Ecological Restoration Institutes. SWERI's other institutes—the Ecological Restoration Institute (ERI) in Arizona and the Colorado Forest Restoration Institute (CFRO)—will also participate in the research. The database is currently mapping more than 50,000 treatment projects across New Mexico and Colorado. Federal and state agencies, cities and tribes contribute information. For more information, visit [HTTPS://NMFWRI.ORG](https://nmfwri.org)

FIRST-OF-ITS-KIND REFORESTATION CENTER IN NEW MEXICO

Collaboration Will Invest in Climate-Smart Tree Seedling Production

A Memorandum of Agreement was signed in January between three state universities—Highlands, New Mexico State University and UNM—and the New Mexico's Energy, Minerals and Natural Resources Department (EMNRD) to address the reforestation needs of areas burned by severe wildfires. Filling the current backlog of burned areas requires more than 300 million seedlings, but the current tree nursery capacity can only grow 300,000 per year. The New Mexico Reforestation Center (NMRC) will coordinate, develop and invest in climate-smart tree seedling production of up to five million trees per year, along with workforce training and research to ensure the trees planted will survive in the future climate.

The NMRC builds on two decades of work at the John T. Harrington Forestry Research Center in Mora. NMSU is leading the nursery operations and seedling research. UNM is developing predictive models to increase planted seedling survival in warmer and drier conditions. Highlands University students and faculty will be training the next generation of tree planters and foresters.

EMNRD's Forestry Division will coordinate seed collection and storage and tree planting logistics. "The new Reforestation Center will increase the number of acres planted each year, which in turn contributes to healthy watersheds and climate change resiliency," said EMNRD Secretary Sarah Cottrell Propst. "The center will allow us to scale up our work to meet the needs of our state."

State Senator Pat Woods (R-Curry, Quay, Union) filed an act that would have appropriated \$4.6 million to kickstart operations at the forestation center and nursery. However, the bill failed to pass in the 2022 legislative session, prompting calls to access other available funding and to revisit the request next year.



28TH ANNUAL NEW MEXICO WATER DIALOGUE

“An Unprecedented Water Crisis: A Time to Act”

BY LUCY MOORE

Déjà Vu All Over Again: The last paragraph of my article about last year’s New Mexico Water Dialogue (NMWD) looked forward to the January 2022 meeting and anticipated a hybrid event, where those lusting for Indian Pueblo Cultural Center enchiladas and chatting around the coffee urn could attend in person. However, with the arrival of a new COVID-19 variant, by mid-year it was clear that our 28th annual would once again be virtual. As the Dialogue’s board began planning the agenda, it was also clear that our water crisis was still with us, and that action was needed now more than ever.

I’m happy to report that, in spite of being relegated to our Zoom boxes, the Dialogue’s founding passion for bringing water users and managers together in respectful, honest dialogue prevailed. Over 165 registered and participated. A poll revealed that one-third were attending for the first time; half were between 40 and 60 years old, with the remaining split between 25-40 and over 60; the majority were from Albuquerque-Santa Fe, but there was representation from all quadrants of the state. The agenda offered plenty of opportunities for both informative presentations by key voices in the current water world and questions, comments and contributions by attendees.

2022: A Timely Partnership: With the state’s 50-Year Water Plan in development, this year’s meeting was a great opportunity to both educate the public and hear their ideas for a more secure and equitable water future. The Dialogue board partnered with the N.M. Interstate Stream Commission (ISC) and the Bureau of Geology and Mineral Resources for maximum benefit to the state effort. Rolf Schmidt-Petersen, Hannah Risely-White and Andrew Erdmann of the ISC, and Nelia Dunbar of the Bureau, helped with the planning and presentations.

Virtual Lunch: A highlight of the in-person Dialogue is the lunch hour, a chance to chat with old and new friends. As a facilitator, it is hard tearing people away from those conversations...and the bread pudding. It’s clear that when people have a chance to spend unstructured time together, especially over food, they know what to do. They seize on an issue, a question, and take off. All, of course, are concerned about water, but each comes with a particular angle, a personal experience, a proposal to try out on others. It is important to give time and space for those conversations. So, this year we added a networking lunch on day one. Participants grabbed whatever lunch was at hand in their office or home and spent an hour at a “table” with others. The tables, of course, were Zoom

breakout rooms of six-to-eight randomly assigned participants. There were no instructions, no report-outs. You could spend it however you wished. Those who participated (about 75) gave rave reviews.

Keynote: Aaron Chávez, president of the NMWD board, introduced Mike Hamman, a fortuitous keynote choice for many reasons. As the governor’s senior water adviser, and recent director of the Middle Río Grande Conservancy District, he could offer the latest thinking on short- and long-term actions being considered to combat the impacts of climate change on the state’s diverse interests. And although no one knew it at the time, we were also hearing from the next state engineer. Later in the month, Hamman received that appointment.

Equity, Justice and Legislative Action: Our next speakers focused on “Equity, Justice and Legislative Action in Times of Climate Change.” Dr. Karletta Chief, associate professor, Environmental Science at the University of Arizona, opened our eyes to climate impacts on tribal communities and the lack of infrastructure capacity to handle changes in quantity, quality and the timing of precipitation. Her photographs powerfully illustrated her remarks. Andrea Romero, N.M. state representative from District 46, Santa Fe County, previewed bills she planned to sponsor, including funding support for the Office of the State Engineer for water planning, administration and management, as well as support for the Acequia and Community Ditch Fund.

The N.M. State 50-Year Water Plan: ISC Director Rolf Schmidt-Petersen shared the governor’s goals for the plan as well as her vision for building water resilience through sustainability and equity. Both are committed to helping all citizens understand the impacts of climate change by making the plan relevant and accessible to all. Nelia Dunbar, state geologist and director of the Bureau of Geology and Mineral Resources, explained how research experts informed the planning process. Their tall order was to “assess and synthesize recent scientific literature on climate, hydrology and the impacts of these changes” on N.M., projecting 50 years into the future. The science, she said, is conclusive: the atmosphere is storing more heat and driving up the temperature. The outcome is up to us. N.M. State Sen. Liz Stefanics urged everyone to take action in whatever way they can. A cornerstone of democracy, she said, is citizen participation. If we want to see change, now is the time to start talking, talking to our family, friends, community and legislators.

For Native communities, Water—with a capital “W”—is a family member, and should be valued and treated as such. — Kai-T Blue Sky (Cochiti Pueblo)

Water Survey Overview: Nina Carranco and Patrick McCarthy, speaking for the Water Foundation and the Thornburg Foundation, gave hot-off-the-press results of a statewide water survey of 706 people, representing a diverse cross-section—private-public, urban-rural, tribal, etc. Respondents were also across the political spectrum. Results reflect strong bi-partisan support for adequate river flows; safe, affordable drinking water; water for agriculture and wildlife; water recycling; infrastructure; sustainability; and public access to water data.

Day Two: Day two began with an inspiring welcome from Jeffrey Samson, vice president of the NMWD board. Samson reminded us of a message from last year’s panelist, Kai-T Blue Sky from Cochiti Pueblo, who said Water—with a capital “W”—is a family member, and should be valued and

*Photo above: The Río Grande flows by Sandia Mountain at Siphon Beach, Corrales, N.M.
© Kimberly Caputo-Heath*



Top (l-r): NMWD President Aaron Chávez, Karletta Chief, Jason John, N.M. State Engineer Mike Hamman, Neila Dunbar; Bottom (l-r): N.M. Rep. Andrea Romero, Grace Haggerty, Sen. Liz Stefanics, Rolf Schmidt-Petersen

Photos courtesy New Mexico Water Dialogue

Shortage-sharing agreements are good adaptation tools, but call for serious cooperation among neighboring water interests. — Frank Scott, Pecos River bureau chief, ISC

treated as such. Samson noted that our values are expressed through our actions, and that all the critical issues we face are symptomatic of our actions. He quoted the late local hip-hop artist and activist Andrew “Wake Self” Martínez: “We forget that our bodies are water, while we pollute bodies of water.” But change is on the horizon, he concluded, “with conversations like ours happening all over the world.”

The first speaker, professor Sam Fernald, director, N.M. Water Resources Research Institute, Zoomed in from London to give us highlights from the recent 66th annual WRI conference.

Communities’ Resilience: The panel that followed offered lessons learned about communities’ resilience, or as speaker Jason John said, “the ability to bounce back into shape.” John, director of the Navajo Department of Water Resources, used the response to COVID to illustrate that Navajo resiliency is rooted in family, yet dependent on external support. Grace Haggerty, senior hydrologist/program manager at the ISC, illustrated resiliency with a cycle schemata based on experiences throughout N.M. communities. Mary Kelley, partner with Culp and Kelly, gave highlights of strategies for forest management restoration, including adaptation, reduction, mitigation and strengthening. Kevin Moran, senior director, Water Policy and State Affairs, Environmental Defense Fund, described Water for Arizona Coalition efforts to develop strategies to manage groundwater for a water-scarce future. The coalition depends on a common agenda, organizations that can support the work, good communication and regular evaluations.

Adaptation Strategies: The last panel featured Aron Balok, superintendent, Pecos Valley Artesian Conservancy District; Carolyn Donnelly, Water Management and Operations manager, Bureau of Reclamation (BOR); and Frank Scott, Pecos River bureau chief, ISC. Balok shared the challenges of meeting the delivery requirements of the Pecos Compact and the benefits coming from the settlement agreement, which administers rights in the basin, an alternative preferable to the potential economic devastation of a priority call. The agreement also limits pumping from wells and tests the condition of the aquifer on a daily basis. Scott highlighted the value of shortage-sharing agreements, which are good adaptation tools, but call for serious

cooperation among neighboring water interests. The good conversations that ensue are important, he added. Donnelly spoke of BOR’s predictions for serious shortfalls in the Río Grande in coming months and potential strategies to increase storage capacity in reservoirs.

Participants Take the Stage: Eileen Dodds, NMWD secretary-treasurer, kicked off a Dialogue tradition, “Table Talks,” or in this case, Zoom breakout rooms. Attendees could use their own experience and expertise to look at climate change impacts and adaptation strategies, while providing valuable feedback to the ISC on the seven topics drawn from the state’s 50-year water plan. For each topic the assignment was to identify impacts from climate change and offer strategies to deal with those impacts. Many of the impacts, they noted, may not be directly the result of climate change (now and in the future) but will be worsened by it if action is not taken. Highlights from the report-outs follow:

Ecological Impacts and Strategies: (2 groups)

Threat to instream flows from competing demands

- Inventory streams to prioritize restoration efforts on public and private lands
- Consider ecological offsets for water leases/rights for ecologically harmful uses
- Change the N.M. Constitution to omit “unappropriated” from “all unappropriated waters belong to the people of N.M.”
- Develop policies to keep water in-stream for environmental flows.

Aridification of air and soil on high elevation forests

- Focus on climate change and sustainability in restoration project plans
- Access new federal funding and state tech support for ecologically based projects (Forest Action Plan).
- Reintroduce fire to open the canopy for more snow on forest floor; reduce risk of large high-severity fires; help trees resist beetles and fire (“keystone disturbance”).

Lack of awareness among public and policy makers

- Support and utilize local protection and restoration knowledge; increase local technical capacity
- Educate students throughout the state on natural and water resources stewardship.
- Create N.M. Water Resources Department to centralize water-related state offices.

Dry Rivers

- Educate legislators on water issues
- Bring all voices to collaborate on river management.
- Reduce consumption across the board.

Depleted aquifers

- Allocate permanent funding for state Water Data Act.
- Coordinate use of surface and groundwater (conjunctive use).
- Recharge aquifers with treated water.
- Find lessons, ideas in other states.

Agricultural Impacts and Strategies (2 groups)

Competition between agricultural and domestic uses

- Allow fields to go dry (water fallowing).
- Understand the ecological values of agriculture: urban green space, carbon suppression, wildlife habitat, ecosystem

Depletion—mining water

- Support conservation easements and lease agreements.
- Plant dryland crops.
- Monitor and care for soil health and moisture containment.

Watershed and rangeland management—assess old management systems

- Learn from farmers and ranchers what works on the ground.
- Increase water infiltration in soil and aquifers.
- Design a process for all stakeholders to contribute, listen (leave their egos at home).

The Collective Good—inability of many to listen and compromise

- One-size and top-down doesn't work; the top needs to know what's happening on the ground.

- Set up stakeholder working groups by regions, use water budgets, integrate with state socio-economic management goals

Water Quality Impacts and Strategies

Funding—There is a need to ensure that quality gets its share.

- Secure federal funding for water-quality initiatives.
- Make regulatory changes to connect water quantity and quality agencies and promote collaboration, with linked funding.

Salinity

- Coordinate surface and groundwater use (conjunctive use)
- Regulate potash mines
- More comprehensive monitoring of water resources and groundwater pumping
- Colorado Salinity Forum is a good model.

Culture and Tradition Impacts and Strategies

Lack of recognition of the Indigenous perspective on climate change and water.

- More space for community-to-community conversations
- More recognition and inclusion of community perspectives in wide variety of forums, not just with government agencies

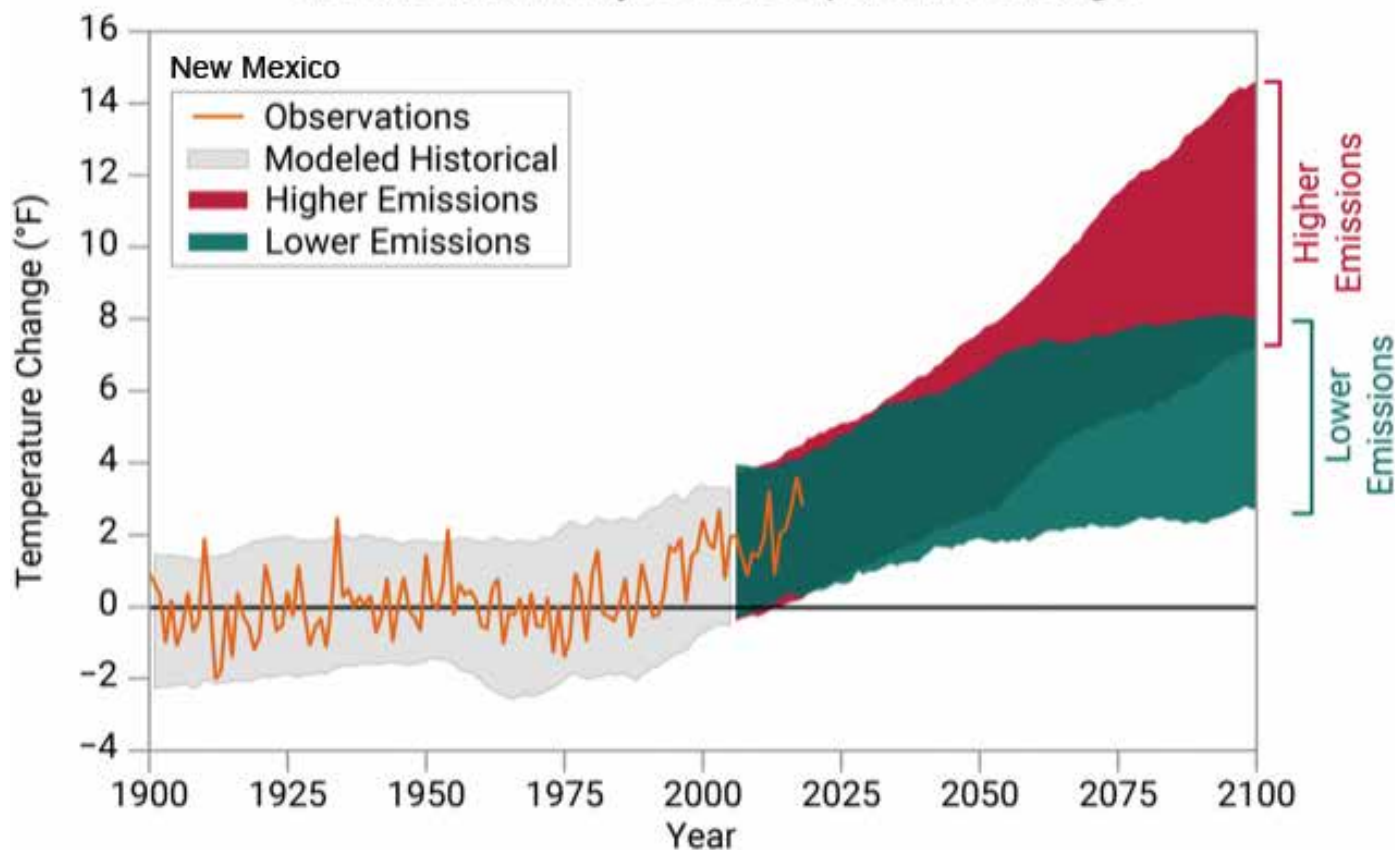
Growing need to recognize the rivers as living beings, in ecological and spiritual contexts

- Promote rights for rivers
- Respect what rivers need to promote and sustain future generations

Broken relationships between communities around water issues

- Build relationships and trust with conversations that include all perspectives.

Observed and Projected Temperature Change



Public Water Systems (PWS) Impacts and Strategies

Financial capacity—The vast majority of community systems serve fewer than 5,000.

- Prioritize capacity-building for operational and maintenance needs of smaller water systems to give them equal weight with large systems.
- Work to provide long term federal or state funding for local and tribal systems.

Technical capacity—not enough certified public water operators

- Make water operator careers attractive and accessible for young people.
- Use “Help N.M.” (Workforce Solutions) to fund operators.
- Highlight the need for water operators in the 50-Year Water Plan.
- Highlight success stories—Navajo Nation Department Water Resources investment in incentivizing water operations

careers for youth

Managerial capacity—how to make sure we have water where we need it

- PWSs can share resources and equipment (bookkeeper, backhoe operators, etc.).
- PWSs can do creative water rights sharing.
- Outreach for reuse can work on very small scale—gray water to landscape, etc.

Our values are expressed through our actions, and all the critical issues we face are symptomatic of our actions. — Jeffrey Sampson (NMWD Vice-President)

Economic and Recreational Impacts and Strategies

Influx of funding—need to be sure it's equitably distributed

- Create process for all interests to meet, discuss intrinsic values of water, including non-market
- All water needs are intertwined—agriculture, wildlife, recreation, urban, rural, commercial

Rural and natural areas “loved to death” lose their value as an asset for recreation.

- Advocate for adequate agency funding to address impacts of overuse.
- Encourage planning from below.
- Prioritize data gathering; good decisions need good data.

Competition with other water uses

- Create “Roundtable” based on the Colorado model, where people can listen, find solutions together and break down silos of interests.
- Advocate for policies that help communities protect and manage their resources.

Hydrologic Processes Impacts and Strategies

Soil condition—damage from fire, drought, temperature, pollution, erosion

- Improve herbaceous and shrub layer ground cover, statewide.
- Help ranchers and agricultural community improve soil condition.

Stream and headwaters degradation—need to restore and protect

- Minimize red tape for restoration projects.

- Bank storage; floodplain as a sponge; aquifer monitoring; reconnect streams

- Sustainable rangeland management

Lack of awareness, concern, political will—education and outreach

- Clear messaging (fact-based and heartfelt), authentic delivery
- Engaging communication strategies (advertising, campaigns, etc)
- Build community

Wrapping It Up: We wish to thank the volunteer facilitators and note-takers from agencies, organizations and just plain people who shepherded the groups through the discussions. Their rich summaries were passed on to the ISC for consideration as they develop the 50-Year Water Plan. Speaking of which, dare we look ahead to January 2023 and invite you to join us at the Pueblo Cultural Center? Let's hold that vision and hope for the best. ■

Lucy Moore facilitates the NMWD's annual statewide meetings and many other events.

[HTTPS://NMWATERDIALOGUE.ORG](https://nmwaterdialogue.org)



JICARILLA APACHE, NMISC AND THE NATURE CONSERVANCY AGREEMENT WILL HELP ADDRESS WATER SECURITY

As the western United States is facing critical drought, and water shortages are occurring throughout the Colorado River Basin, many across the basin are working to develop projects and solutions.

In January, the Jicarilla Apache Nation, the New Mexico Interstate Stream Commission (NMISC) and The Nature Conservancy (TNC) announced an agreement for the Nation to lease up to 20,000 acre-feet of water per year to the NMISC. The agreement will benefit threatened, endangered and sensitive fish and increase New Mexico's water security.

“This first-of-its-kind project demonstrates how meaningful sovereign-to-sovereign cooperation, with support from environmental organizations, can lead to creative solutions,” said Daryl Vigil, water administrator for the Jicarilla Apache Nation. “This project should serve as a model for effective tribal collaboration and arms-length negotiations among sovereigns throughout the Colorado River Basin.”

The Jicarilla's water rights provide drinking water for the northern New Mexico tribal community and support the tribe's cultural practices. To help build economic self-sufficiency, for the last several decades, the Nation leased water to coal-fired power plants that are now facing closure. This presented a new opportunity for the Nation, the NMISC and TNC to work together.

“The Colorado River Basin's tribal nations are among the most important leaders and partners in efforts to find lasting solutions to the water scarcity and ecological challenges that face millions of people who rely on this incredible river,” said Celene Hawkins, Colorado and Colorado River tribal engagement program director for The Nature Conservancy. This innovative water-sharing project may serve as an example for other states and tribal nations that have settled water rights to find collaborative solutions that benefit multiple interests and users of the San Juan and Colorado Rivers,” said Rolf Schmidt-Petersen, director of the New Mexico Interstate Stream Commission.

INTEL PAYS WATER AUTHORITY \$32M TO BUILD 6-MILE PIPELINE

To make computer chips, millions of gallons of water are needed each day to rinse chemicals that polish layers of tiny silicon wafer semiconductors. To support the demand from a \$3.5-billion retrofit of its facility, Intel is paying the Albuquerque Bernalillo County Water Utility Authority \$32 million to build a 60-mile pipeline that will deliver water from two arsenic-laden wells west of Universe Boulevard to the company's Río Rancho manufacturing hub. Intel will filter the non-potable water into “ultrapure water” to clean the semiconductors.

An Intel spokesman told the *Río Rancho Observer* that “Most of our water is used and recycled, and used again, treated and then discharged. A portion of the water we use is lost to irrigation or other processes, so our restoration efforts are focused on closing that gap.” Intel's goal is to restore more water than it uses by 2030. In 2020, the company pumped more than 756 million gallons of groundwater for its New Mexico plant, and treated and discharged about 705 million gallons, or 93 percent, back into the municipal system. The city-county water utility treats Intel's wastewater again before discharging it into the Río Grande.

In New Mexico, Intel has funded watershed restoration projects with Audubon, Trout Unlimited and the National Forest Foundation and is pursuing more water and habitat projects with conservation groups to balance its increase in groundwater pumping. The new pipeline is expected to be delivering water by December.

BUREAU OF RECLAMATION APPROVES DROUGHT RESILIENCY PROJECTS

The U.S. Bureau of Reclamation has selected 13 projects to build long-term drought resiliency. More than \$66.7 million in non-federal funding will be used to complete projects in five states. Most are in California. The Navajo-Gallup Water Supply Project in New Mexico will receive \$2 million. The Bureau will fund the projects through supplemental appropriations included in the first fiscal year 2022 continuing resolution. Reclamation may select additional drought resiliency projects once the regular fiscal year 2022 appropriations have been received.

Chief Engineer David Raff said, “This Water-Smart funding (www.usbr.gov/watersmart) will help communities be more resilient and diversify their water supplies as climate change makes droughts worse.” The Bureau works cooperatively with states, tribes and local entities to plan and implement actions to increase water supply reliability through investments that modernize existing infrastructure and address local water conflicts.

Reclamation’s efforts will be boosted by Bipartisan Infrastructure Law’s investments (<https://www.usbr.gov/bil/>) in water-efficiency and recycling programs, water storage, rural water projects, watershed projects, dam safety and other projects that ensure that Western communities have an opportunity to leverage federal funding.

UNM-LED NETWORK ENGAGING COMMUNITIES IN ADDRESSING CLIMATE

Researchers at The University of New Mexico are leading a \$15-million, five-year project funded by the National Science Foundation (NSF) to engage Intermountain West communities in collaboratively addressing impacts of climate change, including drought, wildfires and community well-being. The Transformation Network is co-funded by the Established Program to Stimulate Competitive Research (EPSCoR) and NSF INCLUDES (Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science). Seven other universities are participating, including New Mexico Tech and New Mexico State University, along with 50 partner organizations.

Interdependent human and ecological systems interact at multiple levels in rural and urban settings. The Transformation Network is investigating headwaters and headwater-dependent systems, food-energy-water systems and options for oversight and management that can create a more sustainable future for people and ecosystems. The network’s focus is on three regions—the upper Río Grande/San Juan River watersheds, the Colorado Front Range corridor, and the inland Pacific Northwest—that share challenges of population growth, wildfires and shrinking water supplies.

“We depend on complicated regional systems for food, water and other goods and services. For these systems to thrive in a changing climate, amidst new demands and while serving and benefiting everyone, communities need to reimagine and redesign themselves. The networks will bring together diverse experts, community members and multidisciplinary methods to answer critical questions that will help make vital regional systems sustainable, resilient and equitable,” said Susan Margulies, NSF assistant director for engineering.

Professor Mark Stone, director of UNM’s Resilience Institute, said, “We want the network to be a resource in developing innovative and equitable solutions to adapt to the impacts of climate change. To achieve our goal, we must also work towards racial and environmental justice. “Our approach, involving collaborators from a variety of institutions, disciplines and organizations, relies heavily on grassroots knowledge, especially in tribal and rural communities. Indigenous and local knowledge systems are often ignored in resource management decisions. We’re eager to develop solutions that respect Indigenous and local practices in combination with multi-disciplinary research to become disruptors in this area. That’s how things change—from the bottom up.”

Another goal is to train a new cohort of scientists and leaders with expertise in convergent, complex systems thinking. The research network also includes an extensive educational outreach component funded by the Hispanic-Serving Institutions (HSI) Program, which seeks to enhance participation in STEM education.

More information about the Sustainable Regional Systems Research Networks program can be found at [HTTPS://WWW.NSF.GOV/FUNDING/PGM_SUMM.JSP?PIMS_ID=505707](https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505707).

NEW MEXICO RAINWATER & GREYWATER

BY DAN ANTONIOLI

New Mexico is an iconic Southwestern desert state that is smack dab in the middle of a severe and lengthy drought. In the context of global warming, the region has been hit hard and is having to adapt to less water, warmer water, hotter temperatures and increasing development. What does the future look like, and can we shape the future?

New Mexico gets most of its water from underground aquifers. Its multiple ecosystems are ancient, powerful and resilient, but vulnerable to the impacts of industrial development. Four hundred years of colonization, ranching and farming, water diversions, nuclear bombs and suburban sprawl have taken their toll. And now, an intense, multi-year drought that by most estimates is only beginning. So, what do we do?

One piece of the water puzzle is to make our buildings and landscapes waterwise, efficient and resilient. From small adobe *casitas* to large commercial buildings and everything in-between, buildings and landscapes can be designed or retrofitted to be water-smart and allow us to have all the water we need. Does it really matter if you flush a toilet with 3.6 gallons of water or one gallon? Does doing a load of laundry make a difference if the water drains into the municipal sewer or through

We can create a New Mexico desert oasis.

a sensible greywater line into a thirsty landscape? With no lifestyle changes at all, you can implement basic plumbing and landscaping strategies that will save water, save money, and help replenish New Mexico’s increasingly dry landscape.

The good news is that a lot can be done. Even if we get a robust year of winter moisture, followed by summer monsoons, don’t go back to life as normal because there is no more “normal” to be had. Water is a scarce and precious resource, and we should be treating it that way now and forever into the future. Instead of watching water evaporate into hot, dry air or go down the drain, we can

learn how to use it in ways that deliver more bang for the buck, or more drops per gallon. And it's simple—we just need to do it.

History of New Mexico Water Conservation

Long before global warming and the current drought set in, New Mexico began a series of intelligent waterwise measures that reduced building water usage, allowed for sensible greywater diversions and encouraged rainwater catchment. Today, the state has a robust set of incentives, rebates and water-smart community professionals who can help implement an adaptive drought strategy. And the really exciting news is that we can go beyond these adaptations to envision and create a New Mexico desert oasis.

Beyond Adaptation

In permaculture we often say that “the problem is the solution.” With severe drought and global warming creating a desert moonscape and catastrophic environmental conditions, how can this problem be turned on its head and become the solution? Rather than “adapting,” which is a well-intentioned but worn-out Industrial Revolution

This is a time for enlightened engineering and a revolutionary perspective on what it means to live with global warming.

strategy, what if we took it a step further into envisioning and manifesting a “net-positive” water solution? To quote Santa Fe permaculture designer Reese Baker (Nov.-Dec. 2021 *GFT*), “Humans could literally

be the secret to the restoration of the Earth, instead of a virus.” In other words, we got ourselves into this problem and we can get ourselves out of it.

Adapting often means making minor changes but continuing on with business as usual. With a regenerative permaculture approach, the water problem can be turned on its head to transform a city like Santa Fe into a thriving desert eco-urban oasis that demonstrates a model of cultural and technological possibilities and inspires other communities to do the same. This isn't a time for merely conserving water—it's a time for enlightened engineering and a revolutionary perspective on what it means to live with global warming. Even without global warming and drought we would still be short on water; human population continues to rise, it's development as usual, and it's time for a change.

With no lifestyle changes at all, you can help replenish New Mexico's increasingly dry landscape.

The problem with “conservation” is that even though it's practical and something we can do now, it's navigating the future through an antiquated industrial lens. What we need is an ecological approach, a permaculture paradigm, and a willingness to listen to the wisdom of the people who lived here before colonization. The solution forward is a vision backed by science and Indigenous wisdom and it's a solution that is well underway.

Let's give that vision some momentum. In the next issues of *GFT*, we'll take a nuanced look at some working examples here in New Mexico and offer details that homeowners and renters can utilize, including how to harvest and re-use water, and some of the nuts and bolts and nitty gritty of plumbing, codes and policies being implemented for a waterwise future. ■

Dan Antonioli is a green developer, licensed general building contractor and permaculture designer. His company, Going Green, provides assistance for green building projects. Visit GOING-GREEN.CO

BUILDING WITH ADOBE AND HEMP-INFUSED COMPRESSED EARTH BLOCKS

BY **ARNOLD VALDEZ**

Sanctioned by the experimental clause of the 2014 Farm Bill, Rezolana Farm in San Luis, Colorado, started growing industrial hemp that year with the support of Fibershed, a regional network of textile artists, fiber farmers, processing mills and businesses. Through 2018, small acreages were harvested. Hemp stalks were cured and used for experiments in manufacturing compressed earth blocks (CEBs). A small decorticator was built to separate the fiber from the hurd, the stalk's inner layer. Traditional adobe bricks were infused with fiber and hurd.

In 2017, a series of test CEBs was produced with a hand-operated press, using various combinations of hurd, clay, sand, lime and cement. The process was documented in a paper submitted to the Earth USA Conference in Santa Fe and read by many scholars, which led to increasing interest in how the blocks can be utilized.

In 2020, Fibershed sponsored two workshops where a 100-sq.-ft. traditional adobe structure-utilizing hemp-infused CEBs for a vaulted roof—was built. Earth plasters and wood for window and door frames and beams were also used. The goal was to illustrate that locally available materials can create sustainable, low-embodied-energy, culturally relevant structures.

FOUNDATION AND SITE PREPARATION

An existing 10-foot-square by 10-foot-deep concrete slab base of a defunct windmill was used for the building's foundation. Otherwise, a perimeter poured-concrete foundation would have been required.

ADOBE WALLS

The basic shell or walls required about 500 adobes or CEBs. About 400 were needed for the vaulted roof. A local rancher had a stockpile of adobes left over from an old project. They were eroding, and he offered them for 25 cents each. Normally, they would cost upwards of a dollar. About 600 adobes were hauled in a trailer about 10 miles to the building site. Traditional adobes are composed of about 75 percent sand and a 25 percent clay-straw mix, which is poured into wooden forms and sun dried. Some of the old adobes were crushed and screened to provide a fine mortar mix. Using adobe mortar ensures that the mortar and blocks are compatible. A 10-inch wall thickness, the minimum recommended by the N.M. Adobe Building Code, was used.

VAULTED ROOF SYSTEM

A vaulted roof system with a catenary curve was selected to illustrate that the building was built mostly of earth. The roof's construction followed the best practices of traditional Middle Eastern techniques. A chain was lowered to three feet, the height of the span. When it was hanging at the desired curve, it was traced on a sheet of plywood. The curve was then cut with a jigsaw. Two sections were required, one for each end of the gables. The ends of the curves were connected with two-by-fours and covered with one-eighth-inch Masonite sheets. The form was also used as a guide for laying the CEBs (Figure 5).

A dry mix of sand, clay, hemp hurd and, sometimes, small amounts of lime and Portland cement were prepared (Figure 6). The mix was poured into the press hopper and compressed using a long-lever handle. The CEBs, stacked on pallets, cured for about a week. As the blocks cured, observations were made to detect crumbling, cracks and overall integrity.

Laying hemp-infused adobes for the roof



Locally available materials were used to create sustainable, low-embodied-energy, culturally relevant structures.

to four courses were laid daily. This allowed the walls to set up before adding layers the next day. The door frame was set in place and braced so that adobes could be laid to the wood frame (Figure 8).

At the third course, a wooden block (“gringo block”) was laid next to the frame so that the frame could be attached to the wall. Three of these blocks were used on each side of the frame. Window frames were also attached to the wall with gringo blocks. Once the walls were raised to the height of the door and window frames, the next step was to pour a concrete ring beam around the wall’s perimeter. A ring beam or bond beam is required, as per code, to be six inches thick and reinforced with half-inch rebar. The wooden forms attached to the walls contained the concrete mix until it set. Sand and gravel for the concrete came from a local gravel pit and was mixed in a wheelbarrow.



Arnold Valdez with hand-powered decorticator

The bond beam was cantilevered four inches beyond the north and south sides. This allows water from the roof to drain away from the wall. The base of the concrete bond beam serves as a ledge to support the CEB vault roof. On the interior side of the bond beam, half-inch bolts were embedded on the sides supporting the vault. The bolts secure two 4-by-6-inch wood beams that stabilize and counteract horizon-

CONSTRUCTION PROCESS –

Walls and Bond Beam

Four-by-four wood columns were erected at each corner. They were set plumb and served as guides for a string to keep the courses aligned and for building the corners. The corners were erected first, to several layers, using 10-by-14-inch adobes. Once the corners were laid, the walls were infilled. Three



Adobe blocks and mortar

tal thrust exerted on the support walls. The vault weighs about 4,000 pounds. That’s about a ton pushing down on 10-inch adobe walls. After the bond beam is poured and cured, two wood beams were bolted to the walls with angled brackets (Figure 9).

VAULTED ROOF CONSTRUCTION

The manufacture of the CEBs began concurrently with the wall construction. The manufacturing site was about 500 feet from the building site. A typical CEB mix consists of water, two parts sand, one part clay (purchased from a supplier 40 miles away), one-half part hemp hurd and one-half type-S lime, as a stabilizer. Manufacturing 400 CEBs required a considerable amount of labor. The block-making process is rather tedious, since the sand and clay have to be screened to fine particles for use in preparing the mix for the Cinva Ram Press. Two people working for six hours can make 50 to 75 blocks daily.

The participants in the workshops exchanged their labor in order to learn basic adobe and roof vault construction (Figure 10). The second workshop group was mostly women who were working on projects in agriculture, youth and textiles (Figure 11). My enthusiastic adobe apprentice, Jonah Jenkins, also contributed a lot to the project.

The roof was built with 12-by-6-inch CEBs, laid sideways, providing a six-inch-thick system. The process involved laying blocks while working on scaffolds. The mortar was a commercial mix of lime, cement and sand. The blocks were infused with hemp hurd. Construction took place over several weeks. A typical day was about six hours, laying three courses of blocks on each side of the vault on top of the concrete bond beam (Figure 12). This provides greater strength in bonding the blocks and provides a layer that resists water infiltration. Construction continued from the bottom to the peak. Once completed, the vault was coated with a layer of cement-based stucco embedded in a fiberglass mesh (Figure 13). A final layer of colored stucco completed the roof vault. The interior support forms were then dismantled, exposing the CEBs.

The roof's construction followed the best practices of traditional Middle Eastern techniques.

At the top of the east end of the vault roof there is a 12-inch-square window for light and ventilation. The doorway was fitted with a site-built door made from 1-inch rough lumber and hung with large strap hinges.

Interior walls and vault were plastered with a base coat of mud plaster, followed by a thin coat to seal cracks. The final finish was a slurry made of dry milk, rice flour and fine clay. A two-inch slab of mud and hemp hurd was poured on the floor to cover the concrete surface.

Manufacturing 400 compressed earth blocks required a considerable amount of labor.

The exterior walls were coated with a mud plaster base coat, followed by additional layers of plaster to seal cracks and the wall's surface. Mud plaster is not impervious to water, so the walls have to be re-plastered annually (Figure 14).

Yet to be completed are an earth floor slab, final interior and exterior finishes, photovoltaic panel connection and a rainwater catchment gutter. ■

INTERIOR AND EXTERIOR FINISHES

The next step was to finish enclosing the space and protect it from the elements of nature. The south and north window frames were fitted with double-pane units made at a local glass company. The east window is a double-hung awning



*The completed casita with solar photovoltaic panel
© Arnold Valdez*

Arnold Valdez, of Valdez & Associates and Rezolana Farm, San Luis, Colo., has an M.A. from the University of New Mexico. In 1999-2000 Valdez was the recipient of Harvard Loeb Fellowship. In 2008 he was recognized as a George Pearl Fellow for work with the UNM Historic Preservation and Regionalism Graduate Certificate Program. As an adjunct associate professor at the UNM School of Architecture and Planning, he taught courses in alternative materials and methods of construction, cultural landscape planning, preservation technologies and adaptive reuse.

HEMPCRETE SUBMITTED FOR US BUILDING CODE CERTIFICATION

New generation of building materials actively pull carbon out of the air


Hempcrete is a non-structural insulation made of hemp hurd and lime binder. It provides superior insulation properties when installed up to one foot thick in wall assemblies. The material is vapor-permeable, thermally regulating, fire resistant, and repels mold and pests. Hempcrete insulation is also carbon-negative, due to the large amounts of carbon sequestered by the hemp plant via photosynthesis. The drought-resistant plant can grow rapidly in nutrient-poor soils and can be used as a cover crop in rotation to support soil health.

Industrial hemp has been used in construction since Roman times, but in the mid-20th century it was associated with its psychoactive relative, marijuana, and fell on hard times. Hempcrete has been employed as insulation for 30 years as an insulating construction material for large department stores in the United Kingdom and in multistory residential buildings and public facilities in France.

Currently in the U.S., builders, engineers and architects who want to use hempcrete must gain approval project by project in the absence of an overarching national code. In January, the U.S. Hemp Building Foundation, the non-profit arm of the 200-member U.S. Hemp Building Association, moved to have hempcrete insulation certified in U.S. building codes. The foundation submitted hempcrete as an appendix in the International Residential Codes. The group wants to familiarize permitting departments with the material, which was legalized under the 2018 U.S. Farm Bill. "The goal is to allow you to build with hempcrete without needing an alternative material variance," said USHBA President Jacob Waddel.

Similarly, an international committee of hemp building experts and advocates has prepared paperwork to submit to the International Code Council so it can consider approving hemp and lime as a natural building material. The low-cost, environmentally sustainable material still needs to pass various fire tests as well as tests for structural bracing. The next application process begins in 2024.

Everything hemp-related—from hempcrete to hemp-adobe blocks, hemp-wood, insulation, wall panels, flooring, nutritional products and clothing—can already be found or is in the final stages of development. HEMPBUILD.MAG.COM is an online resource for information and inspiration about the emerging hemp building and design industry.



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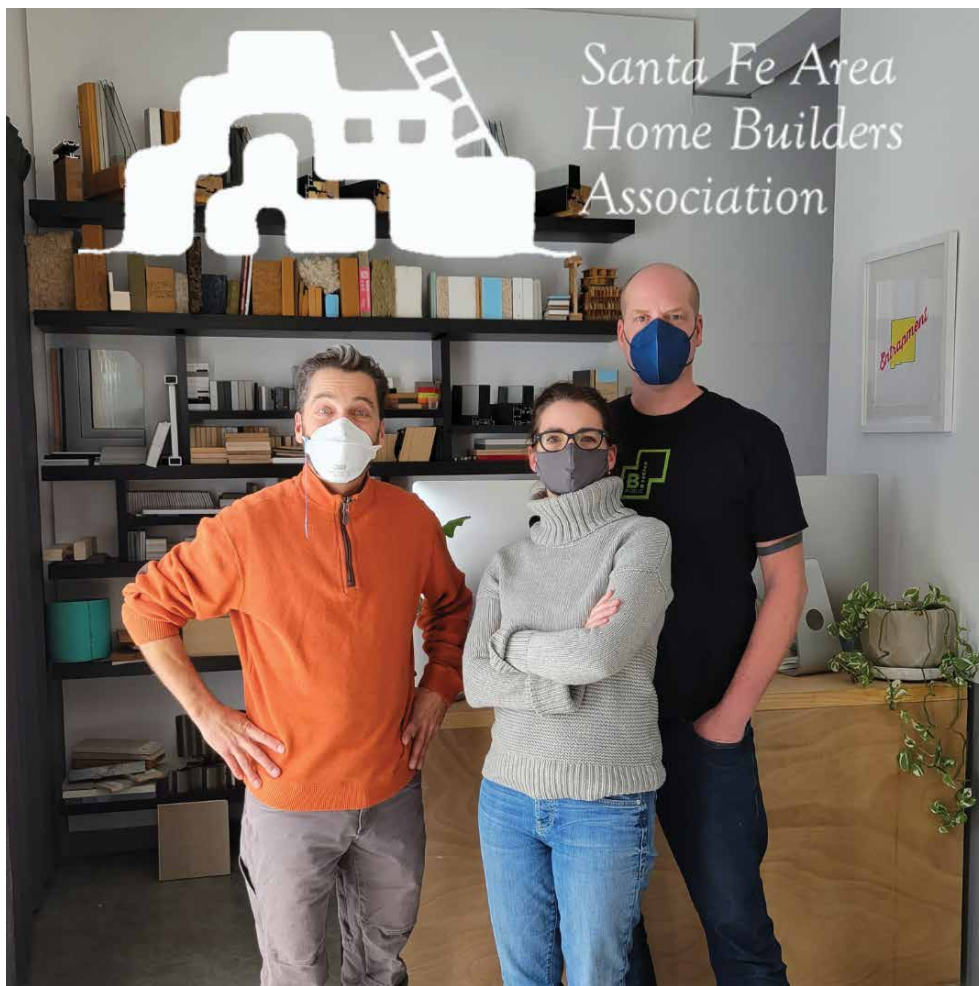
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B.PublicPrefab – Helping Local Builders Build More Projects to a Higher Performance

Excerpts from “Build Together,” the Santa Fe Home Builders Association’s Radio Hour

Miles Conway: My guests are from B.PublicPrefab: **Edie Dillman, Jonah Stanford** and **J.D. Scott**. B.Public is a woman-owned public benefit (B) corporation with the purposes of housing, environmental responsibility, providing communities with building systems that prioritize sustainability, reduced carbon footprint and resilience for equitable development.

Edie Dillman: We’re incorporated around offering ways for builders, architects and individuals to build new homes to a higher level of performance and comfort. For us that means low-energy building. We achieve that through craftsmanship and materials that are healthy for the environment and for humans; and looking at sustainability, buildings that last for 100-plus years. We do that through a system that is Lego-like construction for the building’s envelope. We concentrate on the shell, on what’s hidden in the building, which can make a huge difference in performance.

Because of the air-tightness and weather barrier, the performance is consistent

Jonah Stanford: It’s just an optimization of existing standards and available materials. It’s about selecting materials to meet

the highest levels of building science, thermal performance and structural stability. We’re trying to expand access to that knowledge and understanding. Our focus is creating accessibility to a quality product for offsite construction and being able to leverage standards for smaller residential projects.

We need to meet very high performance levels in order to reduce energy use in buildings in order to be sustainable on the planet. There is also a dramatic demand for housing. In order to supply both of those demands, it’s clear that we need to build primarily with carbon-sequestering materials and create buildings that use a fraction of the typical energy of most buildings. Our buildings use 80 to 90 percent less energy right off the bat—not through photovoltaics; just by significantly reducing the demand.

We call it craftsman pre-fab, but you’re really looking at modern building science.

E.D.: It’s a Passive House approach. I often use the analogy of the stainless steel thermos. In the morning, you put hot coffee in, and we’re delighted at 4 o’clock, when you take a sip and it’s still hot. That’s passive because throughout the day, you haven’t added additional energy for it to stay warm. And so, when we talk about the thermal envelope of a building, it’s the same premise—that what you put in, stays in. For us, that is heating or cooling. Importantly, this works just as well for air-conditioning during the summer as it does in the middle of winter. When you build to that standard, systems for staying warm or cool get really small and efficient. That’s how we save energy.

J.D.: And it’s done using familiar materials that are foam-free, primarily natural wood—standard construction for builders, so it’s really intuitive to work with.

Often, a homeowner will pick one of the standard designs from our website as a starting point, and then we quickly go through an early schematic design process and then into more detailed construction documents. With an architect, often, teams come to us with fully fleshed-out projects, wanting to get our panels into their plans. In that case, we act more as an adviser to get them onboard with the system and make sure it’s implemented correctly.

M.C.: Let’s talk more about the difference in the process of building a B.Public panelized home versus some of the traditional techniques.

E.D.: Our components can be thought of like you think about windows and doors. You’re not going to build windows and doors on-site, whether you’re working in adobe or stick-framing or with insulated concrete forms. When we’re panelizing a building envelope, we’re framing, insulating and wrapping it in the weather and air barriers in a workshop, a controlled environment where we can look at the shop drawings for each panel, so it’s really specifying an element for construction.

You can imagine building with Legos, but our Legos are lifted by a crane. It takes the place of all of those stages in a traditional site-build, where the framing goes up, the sheathing goes up and then the insulators come around. We do it in a matter of days rather than months on-site, so it’s controlled, and we’re able to watch the craftsmanship and the quality for the install.

M.C.: This is not your grandmother’s prefabricated home. Your home is going to arrive ready to assemble with a crane, on-site. These panels can be incredibly creative and adaptable to what the clients desire in terms of what they’re building.

J.D.: Our standard panel lends itself well to different scales and project types. It’s easy to pick and choose from those panels to get to a good vision for a project. And we offer customization. There are always cases where someone

Photo above: SFAHBA’s Miles D. Conway with B.PublicPrefab’s Edie Dillman and Jonah Stanford

wants a pitched roof or something new or different, and we're able to quickly accommodate that.

M.C.: This construction is also so responsive to our climate crisis and the need for a very sustainable home for people living in it. That's really important. Santa Fe has always been a leader in green building codes. And now the nation has caught up with us. In many ways, the B.Public panel is sort of the next step in this evolution.

J.D.: The efficiency of the off-site approach starts in the estimating process. A client is able to hand us a floor plan, and in a week-and-a-half we provide a full quote for that thermal envelope, installed right on their site. Because of the air-tightness and weather barrier, the performance is going to be consistent. That amount of predictability early in a project is really empowering to the client, the designer and builder.

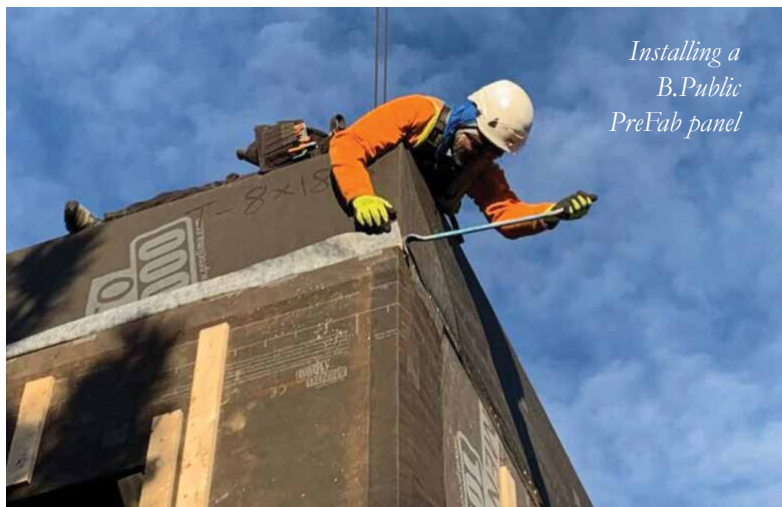
E.D.: The thermal envelope is hidden. What's really creative is how you dress it up. The ultimate shape of the building is still in the hands of the architect/designer/client. It's very flexible in that way, like playing with Legos—what one person does, following the rules, vs. making a masterwork. But the performance of the structure is predictable. That is handled by us.

M.C.: This technique is so responsive to what builders are mandated to do right now across our nation. There are a lot of challenges to abide by what we must do to build incredibly efficient homes. Builders using traditional techniques are running into trouble. They have to put so much insulation in a home that the plasters start to buckle. B.Public Prefab is one of the answers.

Structures are now being built with the prefab panel, including a joint effort between the City of Santa Fe, B.Public and Habitat for Humanity, to build five or six affordable, sustainable, green, multifamily dwellings on Alto Street near downtown.

J.D.: This system lends itself to different scales. We have five projects on the boards for single-family homes. Most of our clients are interested in compact building footprints and more efficient use of space. A lot of those projects are in the 1,200-to-2,000 sq.-ft. range. We're even working on some Accessory Dwelling Units (ADU) in the 400-to-800 square-foot range. That's becoming increasingly popular. We also have a few multi-family projects on the horizon. The team is excited to partner with Santa Fe Habitat for Humanity. We're a national company working all over the place. It's really nice to have something anchored to New Mexico. It's going to

Facilitating infill is what the system is really made for.



*Installing a
B.Public
PreFab panel*

Leveraging the predictability of the offsite pre-manufactured process.

be a great opportunity for builders, community members and the city to see what's possible with this type of construction.

M.C.: In Santa Fe, we have a limited amount of land. We need to be very creative about how we're using it. How is the B.Public panel responsive to housing affordability, the versatility of density and labor sustainability? That's a big issue right now.

J.S.: If you're trying to optimize your residence to maintain high quality of life, and especially when we want to facilitate higher density or increased infill [adapting vacant, underutilized lots within existing neighborhoods], orientation of a building is critical. B.Public's Lego-like components provide flexibility on where the heights of doors and windows and things like that are. It's leveraging the predictability of the offsite, pre-manufactured process. In terms of being able to facilitate infill, that's what the system is really made for.

E.D.: The classic, simplest form of infill would be putting a casita in a backyard. That's sort of traditional family building in New Mexico. As your need grows for housing, you add to the family compound or community compound. That's perfect infill, whether you're going to add a mother-in-law's unit in the front of the house or... Leveraging property that already has infrastructure is a great way to build. You can build a very small unit and have it be high-performance and low-impact on the earth, as well as labor and energy.

A lot of folks come to us wanting to do two or three units together. That could be seen as cohousing or a condo development, but it's friends and families. One person wants something really small and others want a three-bedroom, but they all want to put them on the same piece of land. That's exciting because those people are intentionally wanting to live in community and together, and to have a light touch. They're finding B.Public because of all of the benefits for design and build, and also for long-term maintenance and comfort. All sizes can all be in one infill project.

M.C.: I think in Santa Fe, some of our traditional, green-minded builders are now ready to say, "Okay, show me what this is all about. What is that experience like for the builder that is transitioning to this new material?"

J.D.: For most builders, it's pretty intuitive and not a big leap because it is just wood framing and all kinds of off-the-shelf materials. Where there is a bit of a learning curve has to do with air sealing and things like that, but we do a good job of prepping builders and we have good standard details and procedures. Builders have ambitions to do more. This is a great way to do that quickly and to a higher level of craftsmanship. We're about building more homes to a higher performance without having to retool and retrain.

M.C.: One of the things the Santa Fe Housing Action Coalition is focused on is zoning. What is allowable in Santa Fe and in the region?

J.D.: Our approach for permitting, working with jurisdictions, the building inspectors or building department, is to reach out to them early and be clear about what the B.Public assemblies are.

J.S.: The assemblies meet the ICC (International body of building codes) offsite construction code that came out in April 2021. The City of Santa Fe, Santa Fe County, the State of New Mexico, all rely on ICC guidelines. The assemblies align with what's considered the right wood-frame construction. They are fairly traditional in that way. It's consistent in its structural sheathing or plywood on the exterior and typical framing layout. It's just that it's been optimized to go together in a consistent way.

Thermal bridging within the assembly—how much energy can move through the wall in one place or another—is a primary aspect to the overall performance. Imagine a steel beam penetrating a wall. Heat or cold passes through that beam quickly. That's one aspect. That's usually responsible for about 30 percent of energy loss. Another 30 percent is lost to lack of air tightness. All of the assemblies are optimized to maximize energy conservation.

M.C.: Air tightness, it's really all about that. With the code that we anticipate the State of New Mexico will adopt, probably in the next year, they're going to even check duct leakage. There's going to be a huge demand placed on a home to be airtight. The B.Public panel system

certainly addresses that in an elegant way.

J.S.: And it's healthy. From a building science perspective, there is airtightness. Vapor escapes but it's still breathable. That's important.

M.C.: Our region and our entire country are dealing with shortages of housing, housing affordability issues, and first and foremost, sustainable, energy-efficient homes to give the homeowner a great experience and an affordable experience when it comes to paying utility bills.

E.D.: I spend a lot of time talking about sustainability in the context of all the doom and gloom about the environment. What's wonderful to share is that there is good news. There is a lot of innovation and B.Public is a part of that.

It's a different approach. It is a nice way to shift our thinking. We design for conservation first. We're looking at conserving as much energy and materials as we can in the design, and part of that is offsite. All that is cut off from the framing is used. There is no loss. When we're doing an install, there isn't a dumpster onsite. We really look at the impacts of the materials. It's a wood frame panel, fully insulated with dense-packed cellulose that is 86 percent recycled newspaper. When you talk about carbon sequestering, what does that mean? Well, we're taking post-consumer newspaper and putting it into a house, permanently sequestering that raw material.

The building itself will be nearly net-zero before adding solar. We love talking about solar but first we reduce what that system has to be. That is really great, amazing news. It's not a head-scratcher. We're thinking about what we really can reduce, say, concrete or steel, and the value of those materials, from day one.

M.C.: These homes are not only sustainable in terms of the overall carbon cycle of the product. They're formidable too, right? Fire, wind. These homes stand up. You said you're building for a 100-year-longevity cycle.

E.D.: We call it craftsman pre-fab for that reason. Think of "This Old House" with modern building science and high-performance. That's what we represent.

M.C.: A growing family in Santa Fe... Maybe they bought a one-bedroom adobe and now their family's growing. B.PublicPrefab is also an application for an addition or a second story, right? It can tie in with adobe, with block or even lumber construction.

J.S.: B.Public manufactures several series of different R-value wall and roof assemblies similar to an ADU or an addition or a whole single-family residence, so that they can choose among those without changing the design. The process scales uniformly across those. They're all line-item prices, so everybody can see exactly where the costs are and utilize that for budget and project management.

E.D.: Seeing architects' designs come back and what they're doing with the panels is really inspirational. It feels like the world is ready to move on to both honoring labor and the trades and getting back to craftsmanship, but also looking for innovation. A lot of folks are looking at how they live and realizing that they are fine in smaller spaces. They would rather travel or go camping than have an enormous home. And we're happy to support in any way. ■

ALBUQUERQUE ADDS CLIMATE & GEOGRAPHY AS CONSIDERATIONS FOR BUILDING DESIGN

As part of its effort to advance sustainability, the City of Albuquerque has updated its Integrated Development Ordinance (IDO) to ask architects and developers to consider geography and climate when planning a new building's design and placement. The city worked with four architects to develop this update.

When planning a building, designers and developers will now fill out an online form to show they have considered things such as sun, shade, view and position of the site. They will also report on the ability to capture views from windows, balconies and patios.

City planners say these considerations will help achieve a built environment that is both beautiful and stands the test of time; that over a building's life cycle, it will cost less to heat and cool, and provide a more pleasant environment.

A Geographic and Climatic Responsive Evaluation is required for all site plans for commercial projects and multi-family residential greater than 25 units. It does not apply to industrial or low-density buildings.

"People didn't have heating and cooling systems, so they had to do this," said Bill Sabatini, retired architect and principal at Dekker/Perich/Sabatini. "I think this will influence developers, buildings and designers to do this more frequently."

The principles have been implemented in the design of the Blue Cross Blue Shield of New Mexico Building on Balloon Fiesta Parkway. To view a video on how the Geographic and Climate consideration works, visit: [HTTPS://WWW.YOUTUBE.COM/WATCH?V=WO_VQGMD2VU](https://www.youtube.com/watch?v=wo_vqgmd2vu)

REGENERATIVE ARCHITECTURE MIMICS NATURE TO COOL THE PLANET

There's a new climate push in the building industry: regenerative architecture. For years, the industry has been trying to cut its carbon footprint, which was responsible for 38 percent of the world's energy-related greenhouse gases in 2019. But developers need to go beyond preventing pollution if they want to help avoid catastrophic climate change, according to Sarah Ichioka and Michael Pawlyn, co-authors of a new book titled *Flourish: Design Paradigms for Our Planetary Emergency*.

"More than half of humanity's total historic greenhouse-gas emissions have occurred since the concept of 'sustainability' entered the mainstream," they write. "It is now time to embrace a new regenerative approach to design and development. Nature has a great capacity for regenerative growth under the right conditions, in this case created by human design."

Ichioka and Pawlyn argue that buildings should go further than sustainable design, which seeks to reduce harm to the environment and use only essential materials. They advocate for finding ways for buildings to be designed in a regenerative way—a process that mimics nature by restoring its own construction materials and sources of energy. Regenerative architecture also restores natural habitats.

The book highlights examples of regenerative design from China to Japan and the Democratic Republic of the Congo. Such projects are still rare, but are a glimpse of what the future of rural and urban architecture could be.



OFF-THE-GRID EARTHSHIP HOMES MADE OF RECYCLED MATERIALS BECOME CLIMATE-CRISIS "ARKS"

Earthships are homes made out of recycled materials like tires, cans and bottles, and they are totally off the power grid. Mike Reynolds, 76, started building them in Taos more than 50 years ago. Most people thought he was nuts. "Why is this idiot using garbage to build with, and why is he trying to make buildings that don't need utility companies?" was commonly heard.

Climate change, COVID-19 and people spending more time at home have precipitated a shift in attitudes. Now Reynolds' ideas have become more accepted. Increasing numbers of people are buying in, including some who have created upscale, luxury earthships. They are now in nearly every state, ranging from \$200 to \$400 per square foot to build.

Reynolds' premise is to give people "six points of sustenance" that they need to stay alive: comfortable shelter without fossil fuels, electricity, water, food, sewage treatment, and treatment and use of garbage. The climate-resilient dwellings follow guidelines from the Earthship Academy, a course which explains water systems, solar and indoor farming. They use about one-sixth the power of a regular house and are

made from at least 40 percent recycled materials. The same water used for drinking and bathing goes to a garden and flushes toilets.

Reflecting on the ice storm in Texas in 2021, when the state's electrical grid failed and many people died of hypothermia, Reynolds said, "I'm walking down my hallway, barefoot, picking bananas and spinach, and I'm seeing on TV people waiting in lines in cars for a sack of food, and mothers taking their kids out to their cars to turn the heater on to keep them warm. And I'm thinking, we need to get people to know that this is possible and available. It's not just a concept." In response to tornado devastation in Kentucky, he announced that he was seeking a half-acre of land there and support for building "a fully sustainable, affordable, storm-shelter demonstration home."

Reynolds offers Zoom lectures on sustainability and Earthship-related topics. The [WORLD ECOLOGIES.COM](https://www.worldecologies.com) website provides updates on the evolution of the Earthship concept.

"Truchas Global Model"

Courtesy Earthship Bioteecture ([HTTPS://EARTHSHIPBIOTEECTURE](https://earthshipbioteecture.com))

Cohousing ABQ

An Innovative Way of Living Together

BY **PENINA BALLEEN**

Marlies Metodi and her husband dreamed of raising their children, a nursing toddler and a preschooler, in a supportive and sustainable multigenerational community, like the one in Austria where she had been raised. Both extended families were far away, and the isolation of parenting has many challenges. Marlies wanted her children to have playmates who live nearby to cut down on time spent making playdates and driving children around. And she yearned for her children to grow up with freedom of movement and not need to have hawk-eyed vigilance at every moment for their safety. She also wanted neighbors to share items they only used occasionally, like a truck for hauling, a flour mill for baking fabulous bread and a chipper for the garden. She was familiar with a net-zero carbon construction method called Passive House, which is so highly insulated that it requires very



Cohousing kids play at the beach, walking distance from the land.

little energy to heat and cool. These dreams of living lightly on the planet with a community of close neighbors motivated Marlies to create Cohousing ABQ in 2017 and find like-

There are currently over 170 cohousing communities in the U.S. and just as many in formation.

Community members have private homes fully equipped with a kitchen, bathrooms, bedrooms and some private outdoor space, but they also share plenty of common space with their neighbors. The Common House has guest rooms, a play room, living room and a dining room and kitchen built to host weekly shared meals—an important aspect of cohousing. Members come home from work to prepared meals and sit down to dine with family and friends without having to lift a finger. Everyone takes their turn as a cook or cleaner, and the common meals act as a glue that binds the community together.



Cohousing ABQ members preparing a common meal

Unsurprisingly, the inspiration for cohousing comes from the roots of human society—the village, where community members share tasks, resources, traditions and celebrations. In modern times, the craving for connection has gotten lost in houses that emphasize privacy and security rather than connection. In cohousing, all homes face common outdoor areas, and with kitchen windows looking out, the best possible security system is also in place: eyes on the common. Another crucial safety and esthetic feature is keeping cars on the periphery. Kids are free to roam and the common outdoor spaces such as a grassy knoll, gardens, orchards and playgrounds remain serene.

Cohousing is an inherently more sustainable way of living as people end up driving less and buying less when they share resources and social activities centered around their homes. There are also plenty of opportunities for carpooling, car-sharing and other practices with positive environmental impacts. Cohousing ABQ will take ecological goals further by building green and forgoing gas. The project will be all electric for kitchen appliances, heating and cooling. The community hopes to generate the energy needed on site with solar panels and will include electric vehicle charging stations.

There are currently over 170 cohousing communities in the U.S. and just as many in formation. Cohousing ABQ will be only the second cohousing community in Albuquerque, the first multigenerational one, and one of only

minded people to build it from the ground up.

Cohousing is based on the Danish model and came to the U.S. about 30 years ago.

a handful in New Mexico. With a background in landscape architecture and project management, Marlies began the project by seeking experts. She created an LLC (limited liability company) and recruited new members. Recruiting took place with the website, info sessions at community centers and parks and events like Earth Day.

The inspiration comes from the village, where community members share tasks, resources, traditions and celebrations.

Architects with expertise in the Passive House and green building were hired and the members took part in designing the project. The design progressed over many months with a collaboration between RMKM Architects in Albuquerque and Needbased in Santa Fe. There is no developer involved. According to Marlies, who also serves as project manager of Cohousing ABQ, “Cohousing communities don’t just get built by developers as a finished off-the-shelf product. It’s a unique product created through the grassroots efforts of potential and committed community members. It requires lots of community building.” Building community has taken the form of work days on the land, bowling, potlucks, camping trips, bread baking, tours of sustainable buildings in the area, hiking, book groups and more. A Fall Lantern Walk has taken place in four Novembers, with homemade candle lanterns made by the children and special songs for the occasion. This tradition from Waldorf Education was introduced by an early member.



Lantern Walk 2021

In summer of 2018, Marlies and her team found and purchased a 3.8-acre plot along the bosque between Central Avenue and Bridge Boulevard. The land is bordered by the Río Grande. Migrating sandhill cranes can be seen flying overhead in the spring and fall. Ducks and geese serenade any visitor. The land is rich in history. The previous owner, Valentin Sais, has deep roots and a long history in the Atrisco neighborhood, and he and his extended family will be the community’s neighbors. Sais’ grandfather donated land on the east side of the river for the Albuquerque Zoo and Sais believes he is following the same community mission by selecting Cohousing ABQ as the next owner of this parcel. He sees the project serving the area by bringing in young families and he is excited that the land will be tended and farmed again. Ranching and

farming ceased on the property in the 1930s. Broken glass and goatheads are scattered among four-winged saltbush and tumbleweeds. Water rights to the acequia no longer exist but drilling a well for irrigation was one of the first projects Cohousing ABQ took on, along with building compost bins. The one magnificent cottonwood tree that remains is already being well cared for. Revitalization of the land is one of the community’s highest goals.

The community hopes to generate the energy needed on site with solar panels and will include electric vehicle charging stations.

Albuquerque's South Valley is a historically agricultural area and Cohousing ABQ wanted to cluster their homes rather than subdivide the property in order to retain the greatest amount of open space. To do this, a Special Use Permit for zoning was required by Bernalillo County. Cohousing ABQ members canvassed the neighborhood to gain support for the permit. More than 130 Vecinos del Bosque neighbors signed petitions in support of the project and the permit was granted by the County Commission. The project was met with opposition by a few plaintiffs, but with overwhelming support from the majority of neighbors, the courts sided in favor of the project moving forward.

Originally slated for 30 units, the project voluntarily scaled back to 27 units. The buildings are designed with shared walls that help with a smaller building footprint, insulation and cost, as well as reserving 62 percent of the land as open space, including gardens, orchards, a chicken coop, bicycle shed and adventure playground. The plan includes casitas, one-two-three-and-four bedroom units. Six buildings will surround a central courtyard and other than the grassy knoll there and the edible gardens, the grounds will consist of water-wise landscaping.

In the 1960s and 70s, New Mexico was a haven for communes formed by young people intent on living close to the land. Their endurance, however, was scant. Cohousing, on the other hand, has proven to be stable, likely because of the structures in place for governance and land ownership by the residents. Although some of the same values remain, cohousing communities are more likely to contain members with employment in a variety of fields, and income is generated outside the community. Cohousing communities are self-managed by the residents. The purpose of making major group decisions based on consent is to cement community agreements with the strongest available glue: the will and desire for community relationship. If you honor



Cohousing ABQ land celebration

energy-efficiency and zero emissions, became a serious hurdle, and the community recently decided to abandon the dream of Passive House construction and use a site-built and N.M. GreenBuilt-certified construction model instead. The contractor's projected budget was high enough to raise eyebrows for all members, so some of the amenities were scaled down to keep it affordable. Even so, the price increase resulted in several households leaving the project.



Rendering of Cohousing ABQ's central courtyard

your relationship to the group, you're likely to respect and follow any agreements you made. To ensure every member's voice is heard, there are various committees called circles, which operate under a system called sociocracy. Some of Cohousing ABQ's current circles are: Governance, Finance and Legal, Socialhood, Development and Membership. But circles change and evolve along with the needs of the group and members can choose which to join and how they can best serve the community.

Building a cohousing community from the ground up is a difficult task, and COVID-19 presented added challenges. Because of the prohibitive cost of the prefab panels, due to supply chain snafus, skilled labor shortages and soaring construction costs, the community had to adapt in order to move forward. The original plan of using Passive House construction, with its super

But Cohousing ABQ has shown great resilience in the face of these challenges, taking the steps necessary to get construction started in the coming months. Members will soon sign purchase agreements, and a construction loan will precipitate breaking ground in mid-2022. The community already has 12 children and many "aunties" and "grandparents," who've created a culture of trust, fun and care. Members include computer engineers, physicists, a physical therapist, woodworker, mechanical engineer, massage therapist, hair salon owner, occupational therapist, social worker, writer

and nurse. They bring their interests in music-making, permaculture, cooking, and playing in nature, among other things. Cohousing ABQ is currently accepting new members who will contribute their own skills, perspectives and interests.

How does one join Cohousing ABQ? The initial step is to attend an info session online, which you can sign up for at www.cohousingabq.org. You can also sign up for a land tour where you'll learn more about construction plans and meet some community members. With a modest fee, interested folks can explore further and get to know the community through events and orientations, until they may be invited to join the LLC and invest money that will go into ownership. A few units in various sizes are still available. Inquiries can be made through the website or by calling Cohousing ABQ member, Cindy, at (505) 226-2802. ■



Penina Ballen is a New Mexican Jew and a member of Cohousing ABQ. She is a veteran massage therapist, former Early Childhood teacher and Spanish Medical Interpreter.

CHASING THE ELUSIVE EXPLORATIONS IN ACHIEVING SUSTAINABILITY

A CONVERSATION ON SUSTAINABLE REAL ESTATE DEVELOPMENT

BY **KATHERINE MORTIMER**

Sustainability and resiliency have been seen as being within the domain of a few industries like the energy sector, the fuels sector, energy and water efficiency buildings, and a few others. It is becoming clear, however, that most businesses can be part of moving us toward a more sustainable and resilient future.

Real estate development: Beyond the building itself there are a number of things that can be done to direct development in such a way that helps support sustainability and increase the resiliency of a community. Jennifer Jenkins is the co-owner of JenkinsGavin, Inc., a development management firm that specializes in planning, facilitating and managing development and construction projects in Santa Fe. Jenkins shared her views on advancing sustainability and resiliency in real estate development:

KM: In what ways can real estate development support efforts to become more sustainable and resilient?

Mixed-use neighborhoods attract younger people which our local economy is dependent on.

JJ: One of the biggest ways is by ensuring walkability and easy access to transit. Both also lower the cost of living, but both are dependent on building at higher

densities than have traditionally been built in Santa Fe. Higher density projects create concern, often related to traffic impacts, but they allow for preservation of open space with clustered buildings. Mixed-use is also more sustainable, but the commercial uses need adequate population to be viable, and higher densities ensure a reliable customer base. The location of commercial uses is important as well. When mixed-use is tucked into the middle of a subdivision it doesn't usually work. It needs people to drive by and be reminded that they can stop and

pick something up they need.

Mixed-use neighborhoods attract younger people, which our local economy is dependent on. Sus-



New housing in Santa Fe © Seth Roffman

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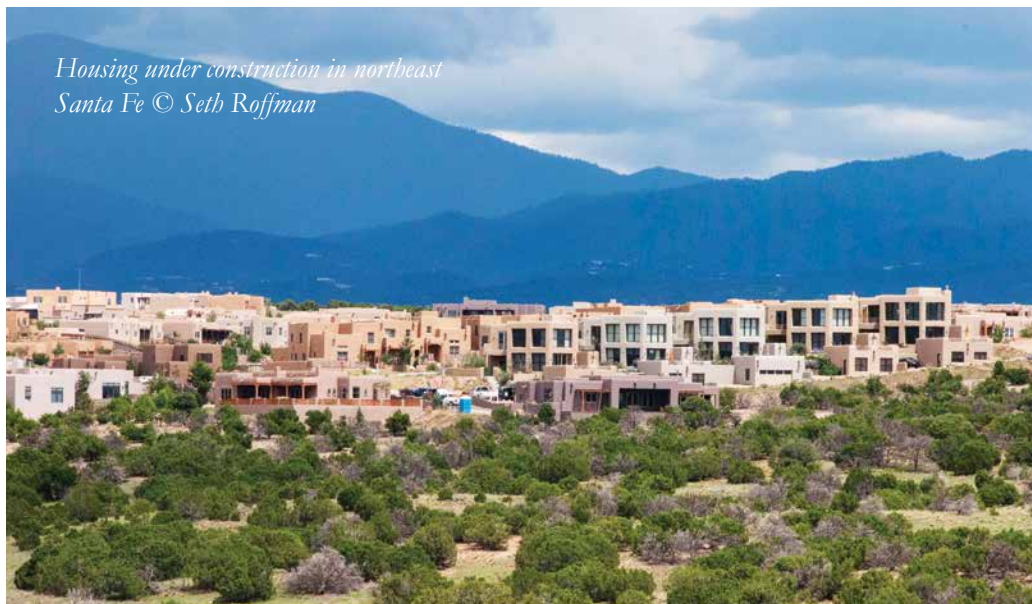
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Rio Embudo, Northern New Mexico

tainability depends upon a healthy economy, which in turn requires young, working-age people, so we have to think about what kind of a community younger people want to live in, and design communities that are attractive to them.

Construction standards that reduce energy and water use are also important. However, given that construction costs are increasing at an accelerated rate, mandates can result in projects not penciling out, which in turn contributes to our current housing shortage. Incentives can be used to both drive building to be more resource efficient and allow developers to design a project that works financially. Right now, the margins for development are extremely thin. It takes the combination of market demand, jurisdictional regulation and incentives to create the conditions where we can continue to move toward sustainability goals. Choosing what to require and what incentives to provide to drive construction to be evermore sustainable is critical. Selecting those things that provide the most bang for



Resiliency is improved when the design fosters and supports connections between neighbors.

the buck, giving the fastest return on the investment, is critical to ensuring success. We just can't throw everything at it because if we go too far, we'll create too much risk and drive investments elsewhere and find ourselves with an even greater housing crisis. We need to be clear what our priorities are around sustainability and ensure that the requirements and incentives work together to achieve them.

KM: Higher density developments reduce the impacts per person, but there has been some resistance to building at higher densities in Santa Fe. This seems to be a common concern in New Mexico and elsewhere. What are the pros and cons of higher-density development?



Jenifer Jenkins of JenkinsGavin, Inc.

JJ: There are many pros, from sustainability and environmental impacts, to water and energy conservation, and support for public transit and local-serving businesses. Creating opportunities for infill at higher densities helps with efficient use of existing infrastructure. Higher density residential developments set the framework for adding commercial services and employment into the mix.

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People need to feel heard and that what they think and feel matters.

The biggest downside of higher density developments is when they are poorly designed. There are some great examples of well-designed projects here in Santa Fe, but there are some not-well-designed examples as well. Those tend to be the ones that people think of when they hear “higher density” and fear that that is what is meant by the term. The architectural and landscape design has to be pleasing and inviting. Good design is not necessarily more expensive. It doesn't just create housing but also can create community. People often fear that a project will increase traffic or that the height will feel imposing. The traffic absolutely needs to work. Building where there is good access to transit and the roadway network serves to mitigate traffic impacts. Most places in Santa Fe, you can't build higher than three stories, which isn't really a very tall building. There are great examples of taller buildings downtown that are designed to avoid feeling imposing on the street, like the La Fonda Hotel, which is five stories, but doesn't feel imposing. Taller buildings that are well-designed offer many benefits, especially affordability. It comes down to good design, always.

KM: Resiliency is the ability of a system to withstand shocks like climate change. Can developments be designed to be more resilient, and if so, how?

JJ: Things like having on-site energy production designed to be used directly when the grid is down. Also, having aggressive water conservation measures, which reduces the demand for water. Resiliency is also improved when the design fosters and supports connections between neighbors. That reduces isolation and increases the quality of life in neighborhoods and within multi-family developments. Those relationships are then in place when a disaster strikes and neighbors feel more comfortable helping each other through the crisis.

KM: I understand there is a relationship between density of development and the cost to provide public services like public transportation, streets, parks and such. What is that relationship?

JJ: For infill projects, where the infrastructure is already in place reducing the offsite expenses, projects can be more moderately priced. Conversely, when projects are built on the edge of the city without existing infrastructure, all of the infrastructure cost is borne by the project, increasing the overall costs. Some jurisdictions decide where they want development to go and build the infrastructure to attract and support new development. The infrastructure costs can easily kill a project.

Local governments are always balancing amenities that improve the quality of life with the cost to maintain them, so higher densities provide more funds to maintain things like parks, roads, public utilities, recreation facilities, open space and more.

KM: Is there anything else we should know?

JJ: Something that I don't think most people understand is that developers are an intrinsic part of how almost everything gets built. Not just the building you live in but when you go shopping, to the doctor's office, to your job, or pretty much anywhere else, there was a developer involved in getting that building constructed. It is a symbiotic relationship and it can be a very healthy relationship. But more and more the meme of the greedy developer and their demonization has eroded any trust there once was. If people understood that there is a service being provided and that there are enormous risks being taken, they may see things differently. Communities benefit from that assumption of risk and the capital and financing being brought into the community to create the places for us to live, work and shop. However, not all development is done well, and that creates reticence when something new is being proposed. When it is done well, it creates a place that fosters community interactions.

I would like to see more place-making. That requires effective collaboration among the community, the jurisdiction and their regulations, and the developers. Sometimes the regulations are antithetical to place-making and don't allow for the creativity in design that we might like to have. Sometimes developers are uncomfortable changing the way they do things to allow for that creativity as well. I think there's room for everyone to give a little bit in the influence they have to create projects that are more sustainable, desirable and marketable. We can get something where everybody does better, but that only happens when we really listen to each other and when we have trust. People need to feel heard and that what they think and feel matters. ■



Katherine Mortimer is the founder and principal of Pax Consulting, LLC, a New Mexico business providing government and businesses with tools they need to achieve the interconnected pillars of sustainability: environmental stewardship, economic vitality, and most importantly, social justice. WWW.PAXCONSULTING.BIZ

NEW MEXICO FOOD, FARM AND HUNGER INITIATIVE

Creating a Sustainable Regional Agricultural System

After six months of development and input from a diverse group of farmers, local food advocates, tribal representatives, food policy experts and others, a \$24-million bill was passed by the 2022 state Legislature. Gov. Michelle Lujan Grisham's Food, Farm and Hunger Initiative is the largest investment ever focused on in-state small farm business opportunities, coordination and expansion of sales to institutions, and development of the agriculture workforce.

The bill supports small farms and ranches and will make healthy food more widely available. It will increase efforts to relieve hunger among food-insecure New Mexicans and improve the supply chain by keeping more crops in the state to be sold and consumed locally. It will fund meals for homebound seniors, pay for vouchers to strengthen a fruit and vegetable prescription program, support summer- and after-school nutrition and provide millions to food banks. It will also support the Double Up Food Bucks program, which incentivizes more than 46,000 participants to buy New Mexico-grown fruit and vegetables, and the Farm-to-Food Bank program, which connects communities in need with local growers.

The bill makes low-interest loans available to local farmers, food hubs and grocery stores. Priorities also include cold storage, kitchen equipment and transportation. Funding will be spread across state agencies. It will fund the Department of Agriculture's Healthy Soils Program and an internship program intended to grow the workforce.

At the same time, major funding will be provided for water infrastructure projects across the state, including \$15 million for drought mitigation projects, \$5 million for construction and repairs of acequias and community ditches, \$3 million for soil and water conservation districts, and \$32 million to the Indian Water Rights Settlement Fund to implement the state's portion of settlements. A chile pepper labor incentive program will receive \$1 million.

KEY LEGISLATIVE BILLS PASSED IMPACTING NATIVE AMERICAN COMMUNITIES

New Mexico lawmakers passed three key bills impacting Native American communities: a response to the crisis of missing and murdered Indigenous women; the Indian Family Protection Act; and a bill that extends respect and a pay raise for Native language instructors. All three are examples of pushing back on the long history of institutional racism, according to policy analyst and Leadership Institute co-director, Regis Pecos (Cochiti Pueblo). “This is really an extraordinary story of resilience, wisdom and vision of tribal leaders and advocates, and the influence of Native legislators,” Pecos said.

The response to missing and murdered Indigenous women was led by Sen. Shannon Pinto (D-McKinley, San Juan) and young women attorneys in N.M.’s Indian Affairs Department, who held many hearings to develop recommendations that resulted in legislation that will create a new office in the state Attorney General’s Office and engage district attorneys throughout the state. The bill appropriates \$1 million to support the work.

HB135, the Indian Family Protection Act, ensures Native American families in New Mexico have better rights within the child welfare system. The legislation was led by Rep. Georgene Louis (D-Bernalillo) with support from tribal leaders, tribal child welfare workers, advocates and impacted families. It recognizes the sovereign rights of 23 tribes of N.M. and their self-determination in preserving cultural lineage through their children. The Act complements the 1978 Indian Child Welfare Act and counters the Brackeen vs. Haaland lawsuit brought by Texas, Indiana,

Louisiana and individual plaintiffs, alleging that provisions of the ICWA are unconstitutional and discriminate against non-Native parents. The U.S. Supreme Court has yet to decide if it will hear an appeal of the case.

HB 60, led by Rep. Derek Lente (D-Río Arriba, Sandoval, San Juan), gives Pueblo and tribal nations the lead in developing traditional language criteria and in determining who qualifies to lead instruction. It represents a watershed moment. Pecos said it is “the heart of the tribal remedy framework” in response to the landmark Martínez-Yazzie decision—a judgment that holds the state accountable for developing, among other things, greater support for traditional language programs in public schools. “HB60 allows Native language teachers to be treated as our elders, able to define our own Ph.D.s,” Pecos said. “It allows language to become the heart of a new vision in creating balance between Western ways and the maintenance of Indigenous ways.”

RÍO CHAMA CONGRESO APRIL 29-30

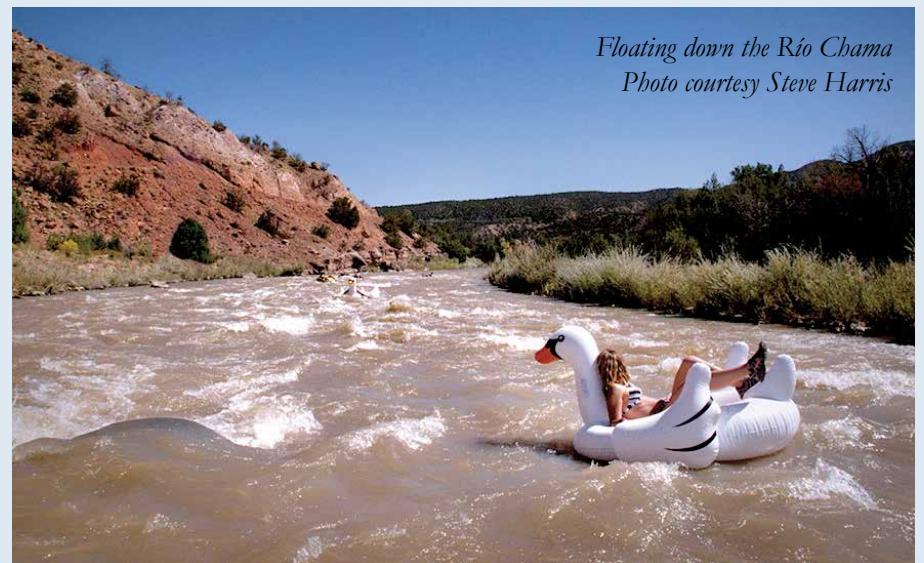
El Vado Dam Update

In-person and online sessions of the Río Chama Congreso will take place on April 29 and 30. “Whether you’re a boater, camper, fisher or hunter, you will probably learn something,” said Carolyn Donnelly, water operations supervisor for the Bureau of Reclamation (BOR) in Albuquerque. “The congreso is put on by people who care about the Río Chama, and the same is true for the speakers and attendees. It is a way for people to discuss the Río Chama watershed with the diverse group of folks who live there. Besides learning about what’s happening on the river, there will be discussions about what to expect this year.”

Donnelly and Cord Everetts, a BOR project manager with more than 30 years of experience, will also provide an update on El Vado Dam. Donnelly said, “Reclamation works with our San Juan-Chama contractors—particularly the Albuquerque Bernalillo County Water Utility Authority and the City of Santa Fe—to release water that must be moved to Abiquiu in a way that enhances recreation and benefits the ecology. During construction at El Vado, Reclamation will continue to strive to meet multiple needs as best we can.”

In response to minimal snowpack and the changing climate, last fall, Reclamation was obligated to release a fairly large volume of water retained for the Middle Río Grande Pueblos—to Elephant Butte Reservoir. “We spent a lot of time and effort coordinating and were able to release it in a pulse from El Vado to Abiquiu,” Donnelly said. “It was intended to move fine sediment that deposits within gravels in the riverbed. Hopefully, this improved the brown trout habitat.”

To learn more about the Congreso and BOR’s work at El Vado Dam, you can register for the free Río Chama Congreso event at WWW.SANJUANCHAMA.ORG/EVENTS.



*Floating down the Río Chama
Photo courtesy Steve Harris*

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Unlike the accelerated change in the landscape experienced in maritime New England and in New France, the villages and surrounding countryside was preserved by the overwhelming poverty of the residents, the lack of technology, low population growth and isolation. Colonial encounters and relationships with Native people ordered the way in which New Mexico's ecosystem changed and reorganized the landscape into a byzantine tapestry. The intricate patterns that imprinted the land with cultural identity continue to exist in rural areas in northern New Mexico and in southern Costilla and Conejos counties to the present time, albeit in a time-modified, fragile form.

Contemporary Threats to the Cultural Landscapes

Three thousand years ago, the Archaic populations residing in the San Luís Valley exceeded the carrying capacity of the land, causing out-migration to the Four Corners region of New Mexico. Like the Pre-Columbian people, present-day residents must contend with fragile ecosystems and dwindling natural resources. Unlike Archaic people who left the region and made it possible for the environment to regenerate and to recover, the devastating effects of unsustainable land use has destabilized the dynamics of the ecosystem in a way that will take generations to resolve. In the context of temperature increases and lower moisture rates experienced over the past decade, some of the damage may be irreversible.

The nucleus of land grant landscapes—the *ejido*, *vegas*, *suretes*, plazas, villages and acequias—are no longer protected by isolation. The quaintness of a region with pueblos, old villages and small-scale ranches and farmsteads has attracted newcomers to the Río Arriba throughout the 20th century. Population increases over the past 50 years continues to fuel the process of over-development, as urban sprawl encroaches on Hispano enclaves throughout the bioregion. When the real estate market superimposed itself over the historic fabric of the bioregion, facades in the old plazas were reoriented toward cultural and recreational tourism and not to the local economy, which traditionally supported businesses. This trend has not gone unnoticed as gentrification of Taos Valley is a well-documented phenomenon. ^[xvii]

Farms, outlying fields and ranches are no longer immune to what occurred in commercialized plaza centers. At risk are agricultural landscapes and open spaces surrounding Albuquerque, Santa Fe and the Española Valley. Many fringe rural areas near cities are functioning as bedroom communities for newly arriving urbanites who prefer New Mexico's foothills, mesas and scrubland to life along the East and West coasts.

As an example, there are 20 subdivisions located west of Santa Fe near the small communities of Galisteo and Lamy. They are situated within old land grants. The leading residential development, the upscale Eldorado, was purchased in 1972 by the American Petroleum Corporation. The subdivision is



Figure 6 Eldorado Subdivision south of Santa Fe (Santa Fe County, 2002)

situated within 20.7 square miles platted with 2,780 home sites with individual wells. Complete with all of the amenities, including a shopping complex, the subdivision is sited on a mesa surrounded by protected open space and environmental covenants. Regardless of its progressive, green-oriented components, Eldorado's extensive system of dirt roads and the density of home sites equaling 2,803 people per square-mile has inundated the terrain and over-taxed water supplies (Figure 6).

Drastic changes which transform working landscapes into a sprawling suburb are not limited to urban areas. An outstanding case of the predominance of rural residential subdivisions is Costilla County. Because the Sangre de Cristo Land Grant was owned by one individual, the land was privatized. After the grant was sold, the county had the distinction of being the most subdivided county in Colorado. Just after the turn of the 20th century, large residential subdivisions and new towns were laid out in the drier western and northern end of the county. In the aftermath of the Great Depression, the subdivision and company towns were largely abandoned.

Beginning in the 1950s, a second generation of subdivisions appeared in the western flatlands, eastern foothills and northern Sangre de Cristo Mountains. As of this writing, there are 40 corporate-owned subdivisions in Costilla County, with over 65,000 parcels. While some of the subdivisions are not in close proximity to seven historic plazas and villages, a large subdivision on a mesa overlooking the enclaves is encouraging ridgetop development. Most problematic is the fact that some who live in the mesa subdivision are using clandestinely pumped water from artesian springs located in the plaza of San Luís because the developer owns all water rights. Located near the vega commons and wetlands, the artesian flow has slowed over the past year. Clearly, locating residential subdivisions in urban and rural areas has encouraged land-use incompatibilities and water disputes, and damaged the ecological relationships between *suretes*, family farms and ranches.

Subdivisions are not the sole contemporary threat to the cultural landscape. While the Sangre de Cristo mountain range may be breathtakingly beautiful at sunset, in the light of day one can see that the land is scarred by over-logging and mining. Irresponsible degradation of mountain landscapes in Costilla County is typical of what has occurred in many land grant communities in the Río Arriba. Now the bioregion is at the cusp of 21st-century extractive trends. Of special concern are cultural landscapes in high elevations with maximum solar radiation. The San Luís Valley is one of Colorado's solar zones. Several multinational corporations are planning to lease public land and have purchased ranches and farms to site centralized infrastructure for utility-scale solar plants. To market solar electricity from the San Luís Valley to urban consumers requires a high-powered transmission line and corridor, which will traverse through the uplands and lowlands in northern Costilla County and will be in proximity of a historic military fort, rail-era community and old company town.

The Future of Hispano Cultural Landscapes

The uncertainty of the future of Hispano cultural landscapes presents a challenge to local communities which must develop strategies for protecting the history that their ancestors embedded in nature. Since landscapes do not exist in a vacuum, communities should seek ways to promote resilience to change. This strategy entails identifying priorities; proactive intervention in certain highly valued landscapes, planning for solutions that adapt to climate change, ^[xviii] mitigating impacts to the built environment through sustainable land use practices, and finally, cultural landscape preservation planning. ■

María Mondragón-Valdez's family have been multi-generational residents of the Sangre de Cristo Land Grant, though some of her ancestral roots stem from the Taos and Chama valleys. Mondragón-Valdez earned a Ph.D. from the University of New Mexico's Department of



American Studies. With her husband, Arnold, she co-authored "The Río Culebra River Villages of Costilla, County, Colorado," a decade-long study of historic adobe architecture. She served on the boards of the Land Rights Council and the Regional Development Planning Group. Her activism was acknowledged in "500 Years of Chicana Women's History." Mondragón-Valdez and her husband live on a family farmstead in the Río Culebra Basin.

Footnotes

^[i] For the purpose of this discussion, the Río Arriba is limited to Costilla and Conejos County in Colorado and Taos, Río Arriba, Santa Fe, Sandoval, Mora, San Miguel and Colfax counties in New Mexico.

^[ii] For details on villages in the transition point between bioregions see, Arnold Valdez “La Bajada Community Ditch and Water System,” *Quarterly Journal of El Camino Real de Tierra Adentro*, Vol. 7, No. 3 (2011).

^[iii] James Byrkit’s maps and contemporary analysis is a useful introduction to understanding the bioregion.

^[iv] Hoefler, 10-11.

^[v] Norstrad, 361-386.

^[vi] For an expanded introduction to Mexican Era land grants in Colorado, see Marianne Stoller’s “Grants of Desperation.”

^[vii] Comer’s research on Bent’s Fort details the role of the trading post in the history of the American West and New Mexico.

^[viii] The U.S. controlled Spanish claims to the Pacific Northwest and to Florida when the Republic of México was formed in 1821. See Weber’s 1982 analysis to understand the story behind the American occupation of Texas, California and New Mexico.

^[ix] Stoller, 26.

^[x] For an alternative analysis of the Taos Rebellion see, E. A. Mares, “The Many Faces of Padre Antonio José Martínez: A Historiographic Essay.” *Padre Martínez: New Perspectives from Taos*. Taos: Millicent Rogers Museum, 1988.

^[xi] Simmons, 84.

^[xii] Weber, 1992: 14-23.

^[xiii] *Ibid.*, 81; 122-137.

^[xiv] Mondragón-Valdez and Valdez, 2009:43-59.

^[xv] See, Baxter’s “The Origins of New Mexico’s Sheep Industry, 1540-1700.”

^[xvi] See, Mondragón-Valdez and Valdez.

¹⁹ Dr. Sylvia Rodríguez has extensively documented the role of cultural tourism in Taos. As an example, see, “The Tourist Gaze, Gentrification, and the Commodification of Subjectivity in Taos,” in R. Francuiglia, ed., *Essays on Changing Images of the Southwest*. Texas: A & M University Press, 1994.

²⁰ See Robert Z. Melnick “Climate Change and Landscape Preservation: A Twenty-First-Century,” *Association for Preservation Technology International PT Bulletin*, Vol. 40, No. 3/4, 2009: pp. 35-42.

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COALITION WORKING TO INCREASE INTERNSHIPS & WORK-BASED LEARNING OPPORTUNITIES

The Northern New Mexico Coalition for Work-Based Learning is developing a network of paid internships, registered apprenticeship programs and other high-quality, work-based learning opportunities. In fostering “pipeline talent,” the coalition is helping ensure that youth and adult learners “are better able to forge strong relationships across sectors and strengthen the region’s workforce,” according to a news release.

Coalition co-chair Rebecca Estrada, Higher Education & Workforce Development specialist at Los Alamos National Laboratory, said, “We know that these experiences help people develop broad, transferable skills for success in high school, college and the workplace and enable them to access better jobs.”

The coalition serves Taos, Río Arriba, Mora, San Miguel, Los Alamos, Santa Fe and Sandoval counties, including the region’s pueblos, tribes and Native American nations. Members include 28 employers, non-profit organizations, workforce training entities, foundations, secondary and post-secondary educational institutions, tribal and state governments:

- Anchor St. Vincent
- Association of General Contractors of New Mexico
- CHRISTUS St. Vincent
- College and Career Plaza
- Communities in Schools of New Mexico
- Community Learning Network
- Eight Northern Indian Pueblos Council, Inc.
- Falling Colors
- Future Focused Education
- HELP NM, Inc.
- Kit Carson Electric Cooperative
- LANL Community Partnerships Office
- LANL Foundation
- MAKE Santa Fe
- Meow Wolf
- National Center for Genome Resources
- New Mexico Department of Workforce Solutions
- North Central N.M. Economic Development District
- Northern Area Local Workforce Development Board
- Northern New Mexico College
- Presbyterian Española Hospital
- Regional Development Corporation
- Santa Clara Development Corporation
- Santa Fe Community College
- Santa Fe Indian School
- STEM Santa Fe
- Taos Pueblo Education and Training Program
- Taos Ski Valley, Inc.
- UA Local 412 Plumbers & Pipefitters Union

“We welcome others to join our coalition to support work-based learning placements that benefit both small and large employers,” said co-chair Faith Rosetta, Santa Fe Indian School’s high school principal.

The coalition formed in April 2021 to take action on recommendations of the 2020 “Northern New Mexico Perkins V Consortium B Work-Based Learning Strategic Plan.” The plan said that the region did not have enough work-based learning programs and opportunities, especially paid work experience and registered apprenticeship programs in high-demand careers.

WHAT'S GOING ON

ALBUQUERQUE / ONLINE

MARCH 2-4

2022 LAND AND WATER SUMMIT

IPCC, 2401 12th St. NW, and Online

22 speakers. Planners, policy makers, engineers, landscape architects, designers and others will discuss green stormwater infrastructure, low-impact development ideas and best practices. [HTTPS://WWW.LANDANDWATERSUMMITNM.ORG](https://www.landandwatersummitnm.org)

MARCH 4-6

33RD NATIONAL FIERY FOODS SHOW

Sandia Resort & Casino

General admission: \$15.50 advance and at the gate / children 11-18: \$5 day of show. [HTTPS://WWW.FIERYFOODSSHOW.COM](https://www.fieryyfoodsshow.com)

MARCH 11 – JAN. 8, 2023

FRONTERAS DEL FUTURO

National Hispanic Cultural Center, 1701 4th St.

“Art in NM and Beyond.” Works that explore intersections of art, science, technologies, cosmic musings and future-oriented visions. [HTTPS://WWW.NHCCNM.ORG](https://www.nhccnm.org)

APRIL 23, 8:30 AM

EARTH DAY BIKE RIDE

Meet at NHCC, 1701 4th St.

Paved, 13-mile bike ride through the Río Grande bosque. Ride to R.G. Nature Center and return for snacks. Children 14 & over welcome. Register by 4/20: [RIOGRANDESIERRACLUB.ORG/CALENDAR/](http://riograndesierraclub.org/calendar/)

APRIL 23, 5-11:30 PM

ROTARY CHARITY BALL

Albuquerque Convention Center

Dinner, dancing, entertainment, silent and live auction to benefit Locker#505 clothing bank and NM Child First Network. [HTTPS://ROTARYCHARITYBALL.COM/](https://rotarycharityball.com/)

MAY 17-19

AGRIFUTURE EDUCATIONAL INSTITUTE

Embassy Suites

Conference for people interested in connecting with and learning from NM agricultural producers. Hosted by the NMDA and 12 organizations and agencies. 575-646-1864, [WWW.NMDA.NMSU.EDU](http://www.nmda.nmsu.edu)

JUNE 21-24

ENERGY TRANSITION WITH ECONOMIC JUSTICE

UNM, Albuquerque

Annual ASES Solar Conference hosted locally by the N.M. Solar Energy Association. [INFO@NMSOLAR.ORG](mailto:info@nmsolar.org)

THROUGH JULY 10

JOURNEY OF AFRICAN AMERICAN HOMESTEADERS IN NM

Albuquerque Museum

High-tech exhibit tells the story and honors the legacy. Presented by the African American Museum & Cultural Center on NM and the City of ABQ Dept. of Arts & Culture.

THROUGH JULY 10

TEMPO Y TIEMPO: 4 PHOTOGRAPHERS IN N.M.

National Hispanic Cultural Center

Photos by Frank Blazquez, Bobby Gutiérrez, Pico del Hierro-Villa and Ximena Montez tell stories about what it is to live in N.M. Masks required indoors. Tues.–Sun., 10 am–4 pm. 505-246-2613, [HTTPS://WWW.NHCCNM.ORG/](https://www.nhccnm.org/)

TUESDAY-SUNDAY, 9 AM-4 PM

INDIAN PUEBLO CULTURAL CENTER

2401 12th St. NW

“Gateway to the 19 Pueblos of N.M.” Museum galleries, exhibits, restaurant. Tickets \$10/\$8/\$7. 505-843-7270, www.indianpueblo.org

SUNDAYS, 10 AM-2 PM

RAIL YARDS MARKET

777 1st St.

In-person and online shopping, curbside and delivery available.

SANTA FE / ONLINE

MARCH 10-11, 7 PM

BANFF FILM FESTIVAL WORLD TOUR

Lenic Performing Arts Center

Different outdoor adventure and mountain culture films each night. \$20 one night, \$38 both nights. Presented by the SF Conservation Trust. [HTTPS://LENSIC.ORG/EVENTS/BANFF-CENTRE-MOUNTAIN-FILM-FESTIVAL/](https://lensic.org/events/banff-centre-mountain-film-festival/)

MARCH 12, 10-11:45 AM

350 SANTA FE MONTHLY MEETING

Climate crisis fighters. [HTTPS://350SANTAFE.ORG](https://350santafe.org)

MARCH 19-20

SF HOME SHOW & REMODELERS SHOWCASE

SANTA FE CONVENTION CENTER

Presented by the SF Area Homebuilders Association. 505-982-1774, [HTTPS://SFAHBA.COM](https://sfaahba.com)

MARCH 20 APPLICATION DEADLINE

WILDERNESS ADVOCACY LEADERSHIP TRAINING

Hands-on, experiential sessions (April 25–29) for women who want to become grassroots leaders in preserving threatened wilderness and public lands. Free. 970-385-9577, [HTTPS://WWW.GREATOLDBROADS.ORG](https://www.greatoldbroads.org)

MARCH 25-27

CREATIVE EXPERIENCE SANTA FE

Railyard District

A gathering for leaders in the experience and immersive economy. Inventors, investors, educators, experts, creators, designers, writers, thinkers, scientists, engineers, musicians, entrepreneurs. General Admission: \$1,500. [HTTPS://WWW.CREATIVE-STARTUPS.ORG/CXSF/#ABOUT](https://www.creative-startups.org/cxsf/#about)

APRIL 10 APPLICATION DEADLINE

CHANGING CLIMATE RESIDENCY PROGRAM

SF Art Institute

SFAI seeks to support artistic exploration, creative activism and community art actions related to global warming that inspire individual transformation and inform collective action. [HTTPS://SFAI.ORG/RESIDENCY/THEMATIC-RESIDENCIES/CHANGING-CLIMATE/](https://sfaif.org/residency/thematic-residencies/changing-climate/)

THROUGH APRIL 13

CLIMATE MASTERS COURSE

10-session course on climate change-related topics. Weekly, in-depth presentations, three field trips. Students are required to engage in climate-related community service. \$25. Presented by the SF Watershed Association and the City of SF. [WWW.SANTAFEWATERSHED.ORG](http://www.santafewatershed.org)

APRIL 18

SLOW FOOD SANTA FE ZOOM & A BOOK

Discussion about *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants* by Robin Wall Kimmerer. [SLOWFOODSANTAFE.ORG](http://slowfoodsantafe.org)

APRIL 21

BUSINESS EXPO & CAREER RESOURCE FAIR

SF Convention Center

130 local businesses and booths with products, information and resources. Presentations, workshops, networking. 505-988-3279, WWW.SANTAFECHAMBER.COM

THROUGH MAY 16

KATHLEEN WALL “A PLACE IN CLAY”

Museum of Indian Arts and Culture, 710 Cam. Lejo

The Jemez Pueblo artist is MIAC’s 2020-2021 Native Treasures Living Treasure. 505-476-1269, INDIANARTSANDCULTURE.ORG/

JUNE 7–10

TERRA 2022

SF Convention Center

13th World Congress on Earthen Architectural Heritage. Looking back, moving forward. Advances in Conservation. Podium presentations, poster sessions, speaker meet & greet, tours, workshops, earthen architecture inspired art.

WWW.TERRA2022.ORG/WEBSITE/8033/

THROUGH JUNE 16

CLEARLY INDIGENOUS: NATIVE VISIONS REIMAGINED IN GLASS

Museum of Indian Arts and Culture, 710 Cam. Lejo

Works by 30-plus artists, including Ramson Lomatewama, Preston Singletary and Adrian Wall. 505-476-1269, INDIANARTSANDCULTURE.ORG/

THROUGH JULY 10

EXPOSURE: NATIVE ART AND POLITICAL ECOLOGY

LALA Museum of Contemporary Native Arts, 108 Cathedral Pl.

International Indigenous artists’ responses to impacts of nuclear testing, accidents and uranium mining on Native peoples and the environment.

[HTTPS://IAIA.EDU/EVENT/EXPOSURE-NATIVE-ART-AND-POLITICAL-ECOLOGY/](https://IAIA.EDU/EVENT/EXPOSURE-NATIVE-ART-AND-POLITICAL-ECOLOGY/)

THROUGH OCT. 2

ABEYTA/TO’HAJILEE KÉ

Wheelwright Museum, 704 Cam. Lejo

Paintings, sculpture and jewelry by Narciso Abeyta (1918-1998), Elizabeth Abeyta (1915-2006), Pablita Abeyta (1953-2007) and Tony Abeyta. 505-982-4636

THROUGH JAN. 15, 2023, 10 AM–5 PM

#MASK: CREATIVE RESPONSES TO THE GLOBAL PANDEMIC

Museum of International Folk Art, 706 Museum Hill

\$7/\$12. 505-476-1200, INTERNATIONALFOLKART.ORG

TUES., SAT., 8 AM–1 PM

SANTA FE FARMERS’ MARKET

1607 Paseo de Peralta

505-983-4098, SANTAFEFARMERSMARKET.COM

WEDS.–SAT., 10 AM–6 PM; FRI.–SAT., 10 AM–6:30 PM

SANTA FE CHILDREN’S MUSEUM

Interactive exhibits, play areas, weekly programs. Masks required for ages 2 and older. \$10/\$8/\$7/\$3/one & under free. 505-989-8359, SANTAFECHILDRENSMUSEUM.ORG

THURS.–SAT., 1–4 PM, THROUGH AUG.

TRAILS, RAILS AND HIGHWAYS

Museum of Spanish Colonial Art, 750 Camino Lejo

How trade transformed the art of Spanish New Mexico. \$12/\$5/under 12 free. 505-982-2226, RESERVATIONS@SPANISHCOLONIAL.ORG, SPANISHCOLONIAL.ORG

DOWN PAYMENT ASSISTANCE FOR EDUCATORS

Local nonprofit Homewise, in partnership with SFPS, is offering up to \$40,000 to eligible district educators looking to buy homes in the city. 505-983-9473,

[HTTPS://HOMEWISE.ORG](https://HOMEWISE.ORG)

EL RANCHO DE LAS GOLONDRINAS

334 Los Pinos Rd., La Ciénega, N.M.

Living history museum. 200 acres, 34 historic buildings. 505-471-2261, GOLONDRINAS.ORG

MUSEUM OF INDIAN ARTS AND CULTURE

710 Camino Lejo

“Here, Now and Always.” A new, reimagined exhibit opens in June. 505-476-1269

SF HABITAT FOR HUMANITY

Seeking land, donated or for sale, to build affordable housing. Low-income homeowners help build homes and make mortgage payments to the nonprofit HFH. Property owners can qualify for 50% Affordable Housing tax credit through the NM Mortgage Finance Authority. 505-986-5880, ext. 109

STATE MUSEUMS

Museum of International Folk Art (10 am–4 pm), Museum of Indian Arts and Culture (10 am–4 pm), NM History Museum (10 am–4:30 pm), N.M. Museum of Art (Tues.–Sun., 10 am–4 pm). NEWMEXICOCULTURE.ORG/VISIT

YOUTHBUILD / YOUTHWORKS!

Paid training for Youth 16–24. Construction, Culinary, GED. 505-989-1855,

WWW.SANTAFEYOUTHWORKS.ORG/SANTA-FE-YOUTHBUILD/

TAOS / ONLINE

BEGINS IN MARCH. MON., WEDS.

ANCESTRAL, FOLK & HERBAL MEDICINE PROGRAM

6-month online and 9-month in-person program. Food as medicine, field trips. Info/Registration: [HTTPS://NATIVEROOTSSHEALING.COM](https://NATIVEROOTSSHEALING.COM)

HERE & THERE / ONLINE

MARCH – APPLICATIONS OPEN

NMDA’S HEALTHY SOIL PROGRAM

Grants provided for projects in N.M. aiming to improve soil. 575-646-2542, [HTTPS://WWW.NMDA.NMSU.EDU/NMDA-HOMEPAGE/DIVISIONS/APR/HEALTHY-SOIL-PROGRAM/](https://WWW.NMDA.NMSU.EDU/NMDA-HOMEPAGE/DIVISIONS/APR/HEALTHY-SOIL-PROGRAM/)

THROUGH MARCH, 9 AM–4 PM

NATIVE AMERICAN OUTDOOR MARKETPLACE

Skyway Travel Center Parking Lot

Acoma Pueblo artists display pottery, jewelry, paintings, textiles and more. 505-228-8853

MARCH 9–JUNE 30, 5–6:30 PM

CON NUESTROS CORAZONES, PARA NUESTRA GENTE

Online events for middle- and high-school youth & families to learn how to help care for acequia communities, land and water. 3/9: *Con Nuestras Manos*: adobe, wood, weaving and herbal medicine-making; 3/24: Acequia Culture: Artists, musicians & poets; 4/7: *El Agua No Se Vende*: Law & Policy Advocacy; 5/4: Acequia history, storytelling & documentation; 6/15: Soil, water, forest and climate science; 6/30: Using tech to protect traditions: infrastructure, engineering and mapping. 505-995-9644, WWW.LASACEQUIAS.ORG/CAREER-LIVE-LIHOOD/

MARCH 12 DEADLINE

WILDLIFE CORRIDORS PUBLIC COMMENT PERIOD

505-470-3656, CORRIDORS@STATE.NM.US, WILDLIFEACTIONPLAN.NMDOTPROJECTS.ORG

MARCH 13–15

BIONEERS CONFERENCE

San Francisco, Calif. and Online

“A Window through.” [HTTPS://CONFERENCE.BIONEERS.ORG/](https://CONFERENCE.BIONEERS.ORG/)

MARCH 14 APPLICATION DEADLINE

ARTISTS SOUGHT FOR COLORING BOOK

NM Arts in Public Places is seeking NM artists to create page illustrations for a multicultural, multilingual NM-themed alphabet book geared toward children ages 2–5 to encourage early childhood literacy. \$1,000 per illustration. [HTTPS://ARTIST.CALLFORENTRY.ORG/FESTIVALS_UNIQUE_INFO.PHP?ID=9571](https://ARTIST.CALLFORENTRY.ORG/FESTIVALS_UNIQUE_INFO.PHP?ID=9571)

MARCH 19 OPENING

ESPIRITU DE LA TIERRA EXHIBIT

City of Las Vegas Museum, 727 Grand Ave., Las Vegas, NM

“La Morada de los Enmascadoras Gorras Blancas en los montes de Sangre de Cristo.” Collaboration of wetFuture, Penitente brothers and scholars from NM-SU’s Native American Hispano Studies program. WETFUTURESTUDIO@GMAIL.COM

MARCH 21 APPLICATION DEADLINE

ACEQUIA CULTURE YOUTH LEADERSHIP INSTITUTE

“Con Fuerza y Querencia.” Ten acequia youth, ages 10–19 from across NM will be chosen for this paid in-person/online learning program (May–Oct.). Presentations, field trips, skill-building workshops and youth-led projects. WWW.LASACEQUIAS.ORG/YOUTH-LEADERSHIP

MARCH 24–25

THE GREEN SUMMIT

San Diego, Calif. and Online

Leaders in renewable energy, cleantech and sustainability. Presented by WWW.GREEN.ORG

MARCH 29, 7 PM

CLIMATE REALITY OF NORTHERN NM MEETING

[HTTPS://WWW.CLIMATEACTN.ORG](https://www.climateactn.org)

Monthly meetings, usually the last Tuesday of the month.

MARCH 30, 10 AM–4 PM

CLIMATE & JUSTICE TEACH-IN

WWW.WORLDWIDETEACHIN.ORG

Indigenous insight on climate justice, climate policy & planning, climate science, climate and food systems, energy, water, forests and more.

MARCH 31 APPLICATION DEADLINE

NM WRITERS’ ANNUAL GRANTS

Grants between \$1,000 and \$2,000 to support projects in fiction, nonfiction, poetry, journalism, playwriting and screenwriting. Grants will be awarded at the NM Writers annual dinner on April 28 in Santa Fe. 505-469-5273, INFO@NMWRITERS.ORG, NMWRITERS.ORG

MARCH 31, NOON APPLICATION DEADLINE

PERMACULTURE FUND

NM Foundation grants support innovative ecological, community building and sustainable living projects that strengthen cultural connections to the land. WWW.NEWMEXICOFUNDATION.ORG/PERMACULTURE-FUND/

APRIL 5 PUBLIC COMMENT DEADLINE

U.S. DEPT. OF INTERIOR PROPOSAL

To Protect Greater Chaco Canyon Region lands. [HTTPS://P2A.CO/LNTGPKW](https://p2a.co/lntgpkw)

APRIL 29–30

RÍO CHAMA CONGRESO

“The Future of Snow in a Changing Climate.” Open to everyone, including land-owners, agency managers, nonprofit organizations, students and residents. Presented by the San Juan-Chama Partnership. WWW.SANJUANCHAMA.ORG/EVENTS

JUNE 13–JULY 1, M,W,F

GLOBAL LEADERSHIP FORUM

Online

United World College-USA’s program for youth 13–16 provides leadership skills necessary to plan and execute a project that addresses a social justice challenge in the youths’ home communities. \$295. [HTTPS://WWW.UWC-USA.ORG/PROGRAMS-AND-WORKSHOPS/SUMMER-YOUTH-PROGRAM-GLF/](https://www.uwc-usa.org/programs-and-workshops/summer-youth-program-glf/)

MON.–SAT., 9 AM–4 PM; SUN. CALL FIRST OR AFTER 3 PM

N.M. WILDLIFE CENTER

19 Wheat St., Española, NM

Self-guided tours, 505-753-9505, JESSICA@NEWMEXICOWILDLIFECENTER.ORG

THURS.–SUN, 10 AM–4 PM

BOSQUE REDONDO MEMORIAL

Fort Sumner, NM

“A place of suffering, a place of survival.” New exhibit examines the history of the Long Walk in the 1860s, when Diné and Mescalero Apache were forcibly marched to barren reservation in eastern NM. Free. 575-355-2573, WWW.BOSQUEREDONDOMEMORIAL.COM

CITIZEN SCIENCE VOLUNTEERS

Río Chama

Boaters running the Wild and Scenic section of the river are needed to collect insect samples. Training and sampling kits provided. RHETT@NMWILD.ORG

INDIGIEXCHANGE MARKETPLACE

www.indigexchange.com

Online marketplace for Indigenous artists and entrepreneurs across Indian Country who have graduated from NM Community Capital’s programs.

NM ACEQUIA ASSOCIATION PRESENTATIONS

Online or Onsite

Youth educators are available for presentations and coordination of special projects with classroom and community educators on topics such as acequia history, ecology and culture; local farming and ranching traditions, water, land and climate change. 505-995-9644, EMILY@LASACEQUIAS.ORG, WWW.LASACEQUIAS.ORG/YOUTH-EDUCATION

NM 5-ACTIONS PROGRAM

[HTTPS://NM5ACTIONS.COM](https://nm5actions.com)

Community training on addressing trauma. A self-guided roadmap for those struggling with addiction. Free. NM Crisis Line: 1-855-662-7474

RURAL PATHWAY TOURISM INCUBATOR

Free service provides NM communities comprehensive technical assistance to create tourism products, and matching funding for implementation. Applications Accepted through May 1. Projects must be completed by June 30. [HTTPS://WWW.NEWMEXICO.ORG/INDUSTRY/WORK-TOGETHER/GRANTS/RURAL-PATHWAY-PROGRAM/](https://www.newmexico.org/industry/work-together/grants/rural-pathway-program/)

GREEN FIRE TIMES

News & Views from the Sustainable Southwest

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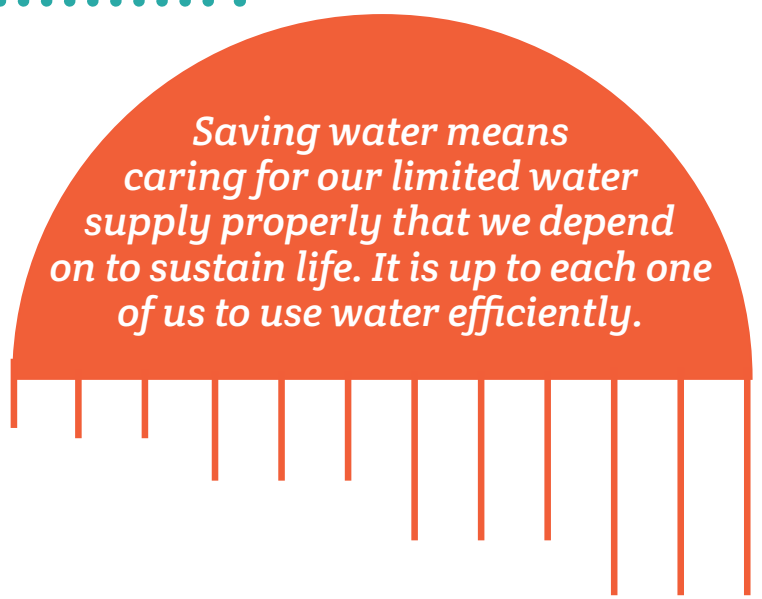
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or visit GREENFIRETIMES.COM*

THANK YOU!

Saving water is always in season!



#ValueWater



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Set up leak alerts

✓ Don't wait for an unexpected high water bill before you realize you have a leak. **EyeOnWater** will let you know when there's ongoing continuous flow through your meter.

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- Check your irrigation system for cracked hoses, missing sprinkler heads, or broken timers.
- Check the toilets to see if water is leaking out of the tank through a bad flapper.
- Still no luck? Call the Water Conservation Office (WCO) at 505-955-4222

Is your leak an expensive fix?

✓ We understand that fixing leaks can sometimes be expensive to fix. Please call the WCO at 505-955-4222 and we will work with you to find solutions to fix leaks and save water.

santafem.eyeonwater.com/signup

Bees Trees Water

The City of Santa Fe is proud to be a Bee City USA affiliate. As such, the City is committed to supporting our pollinators and you can too! Visit savewatersantafe.com/urban-forest to get started on your waterwise pollinator garden.



Make a Reservation to Save Water!

We encourage locals and visitors alike to dine at Santa Fe's **Certified Waterwise** establishments. These restaurants are committed to reducing their water footprint in The City Different.

EyeOnWater is a free water use monitoring app for City of Santa Fe water customers.

Visit savewatersantafe.com/waterwise-dining to see a list of restaurants that are **Certified Waterwise**.

savewatersantafe.com