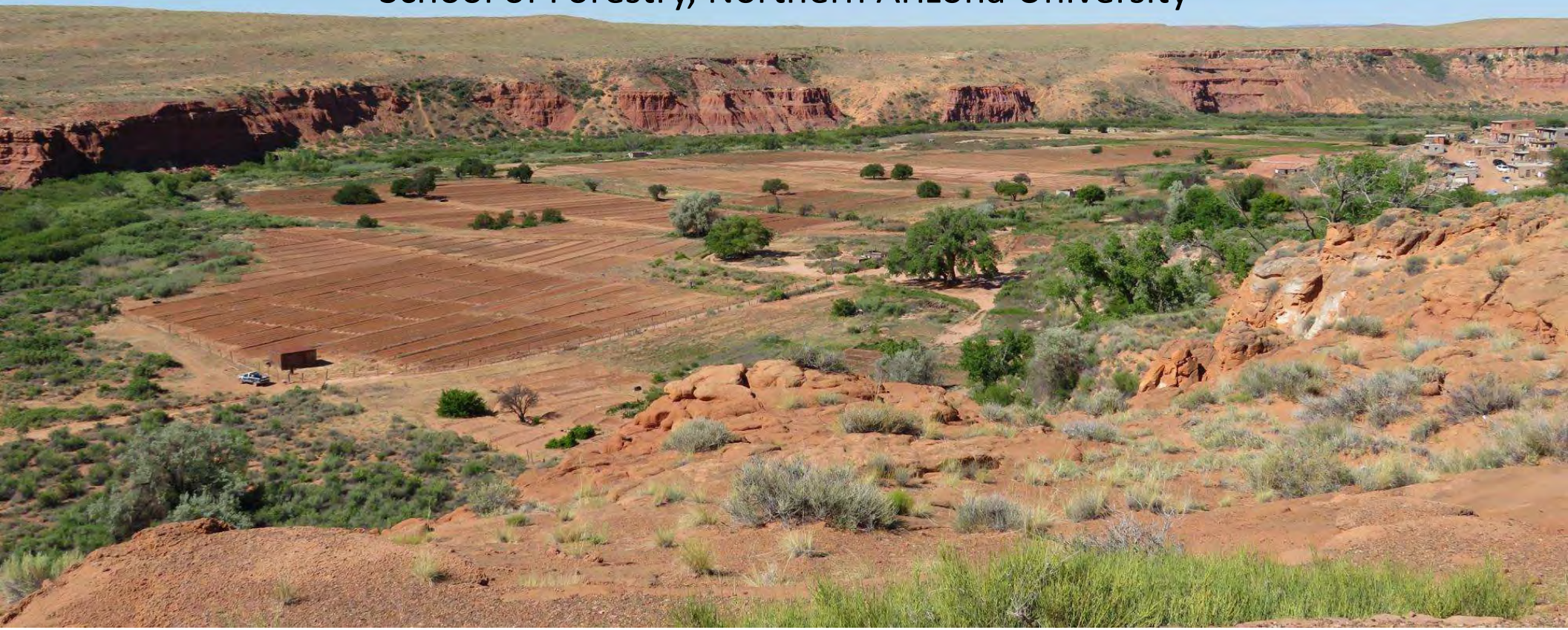
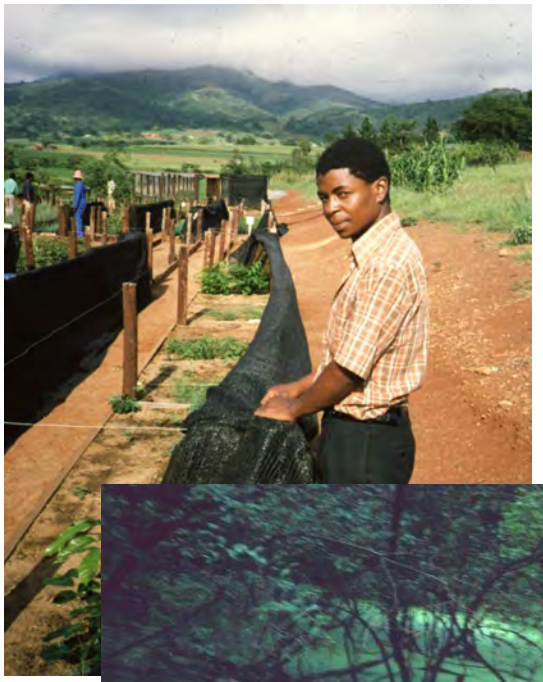
Dryland Agroforestry in the Southwest: Some Current Practices and Prospects for the Future

Jim Allen
School of Forestry, Northern Arizona University





Peace Corps

Outline

- Agroforestry on the Reservations
- Agroforestry in Urban and Suburban Settings
- Agroforestry on Farms and Ranches
- Agroforestry in the Forest
- Future Directions?

Agroforestry on the Reservations

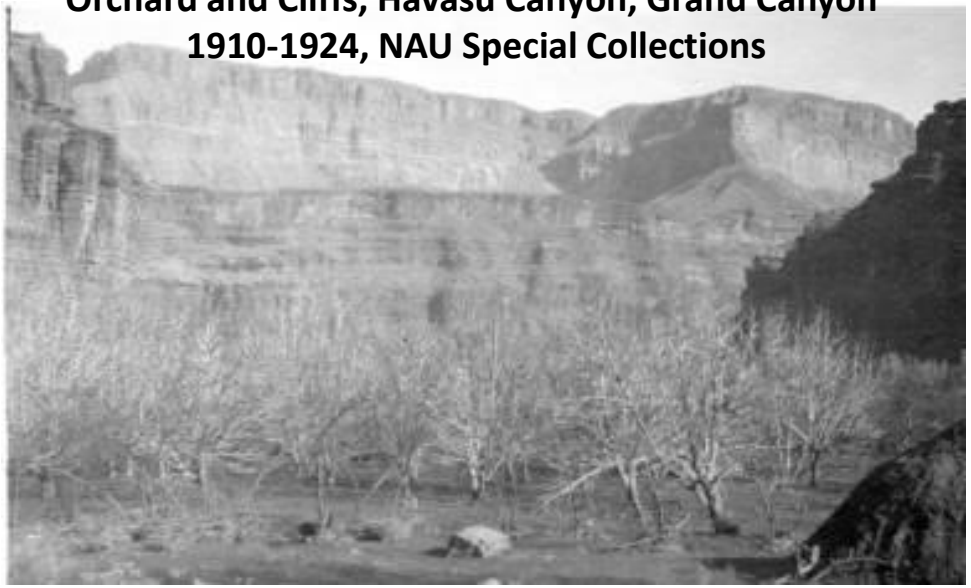
http://www2.palomar.edu/users/scrouthamel/ais100/SW%20Indians.gif

Hopi farming is in a constant state of adaptation.

Michael Kotutwa Johnson

https://cals.arizona.edu/michael-kotutwa-johnson-receives-1st-place-overall-2016-fall-fest-poster-competition

Orchard and Cliffs, Havasu Canyon, Grand Canyon
1910-1924, NAU Special Collections



https://www.flickr.com/photos/seansinglish/6913343530/in/photostream/

Tribal Forestry Programs: Potential Agroforestry Partners?

January 11, 2018

Reservation Schools and Colleges: Potential Agroforestry Partners?

http://www.csgn.org/photo/12046/photo-post-steven-lomadafkiefri-01302015-320pm

Reservation Schools and Colleges: Potential Agroforestry Partners?

FIELD GUIDE

STEVEN LOMADAFKIE THINKS IT'S IMPERATIVE THAT CHILDREN LEARN ABOUT THE ENVIRONMENT. THAT'S WHY HIS STUDENTS AT MOENCOPI DAY SCHOOL SPEND THEIR TIME PLANTING TOMATOES IN THE GREENHOUSE, NURTURING COTTONWOOD SEEDLINGS FOR RESTORATION PROJECTS ON HOPI TRIBAL LAND AND RECYCLING PAPER AS AN ALTERNATIVE FUEL SOURCE FOR ELDERS.

BY KATHY RITCHIE • PHOTOGRAPH BY PAUL MARKOW

IT'S A HOT AUGUST AFTERNOON at the Moencopi Day School, just outside Tuba City, as 10 giggling first-graders huddle around Steven Lomadafkie beneath two large cottonwood trees.

"Hi, Mr. Lomadafkie," says one student. Lomadafkie takes attendance, and one after another, tiny voices shout, "Here!" It's the second week of school, and even though Lomadafkie taught some of the same students last year as kindergartners, he's still learning names and remembering faces.

"They've grown up since I last saw them," he says.

The students are participating in one of the school's "specials" — extracurricular classes intended to enhance the learning experience. In this case, the students are literally learning how to play in the dirt. As the school's greenhouse manager and resident gardener, Lomadafkie oversees an acre of land that, since his arrival some seven years ago, has evolved into a place of learning and bounty.

Today's lesson plan revolves around recycling.

"It was something the principal brought to our attention," Lomadafkie says. "There was all of this paper being thrown out into dumpsters on a daily basis, and he asked, 'Why can't we recycle it and possibly take it to the elders as an alternative fuel source?' For the kids, it's something tangible — they can actually touch and feel it, and we can have a discussion about that."

Lomadafkie leads his students to a covered area near the greenhouse, where they swarm two aluminum bins filled with pink-tinged water and shredded paper. After what must feel like an eternity, the first-graders are finally given the green light to plunge their arms into the water and scoop out handfuls of soaking-wet paper. "Look at this," shouts one little boy. "Mr. Lomadafkie! I'm wet," hollers another.

The students carry their soggy masses to the table and fill the metal briquette presses. Lomadafkie carefully watches and guides his students as they operate the manual presses. Water pours from the presses, and once a brick is made and removed, the students hurry back for more wet paper. At another table, three students struggle with their press — the handles won't budge. A little boy comes over to help, and together, eight little hands move the levers.

"OK, we did it," says the boy. "Bring it up."

Lomadafkie watches the vignette play out. He laughs, pleased with the teamwork. After unloading a total of 32 paper bricks onto a wooden pallet to dry, Lomadafkie walks the students back to the cottonwood trees, where he wraps things up.

"I want you to remember this word," he says. "The word is 'recycle.'"

Steven Lomadafkie

STEVEN LOMADAFKIE, 50, grew up in Moenkopi and Tuba City. His mother was a teacher, and the desire to pay his knowledge forward runs in his blood. So does farming.

"Since I can remember, my relatives who lived in the village were farmers," he says. "As a young boy, my grandfather and uncles would take me to the fields, and they'd give me a hoe or I would help them plant."

After graduating with a degree in forestry from Northern Arizona University in 1999, Lomadafkie eventually became a rangeland technician for the Hopi Tribe. Soon after that, the U.S. Forest Service began asking tribes across the country, including the Hopi, whether they needed assistance developing their natural-resource programs through nurseries and greenhouses. It was an opportunity Lomadafkie's division jumped at, and it forged a partnership between the tribe, the Forest Service and the school. Construction on the greenhouse was completed in 2005, and in 2007, Lomadafkie was hired as the school's greenhouse manager.

He also oversees the garden and the orchard, where 80 fruit trees grow. And then there's the job of teaching more than 200 students in kindergarten through sixth grade.

EVEN BEFORE class starts, Lomadafkie is in the fields, tending his own 10 acres of land like his uncles and grandfather before him. He'll return later in the evening and farm under moonlight — or headlamp, depending on the lunar phase. Lomadafkie's connection to the Earth is palpable.

"I wouldn't know how to describe it, but I always know that I am a part of it," he says. "Now, I work the land and I want to work it. I'm driven to work in the fields and grow corn and bring the corn home to my family."

By 8 a.m., his first group of students arrives. Lessons vary from week to week, and there's no shortage of subjects. Lomadafkie covers everything from invasive plant species and native seeds to plant and seed identification and climate change.

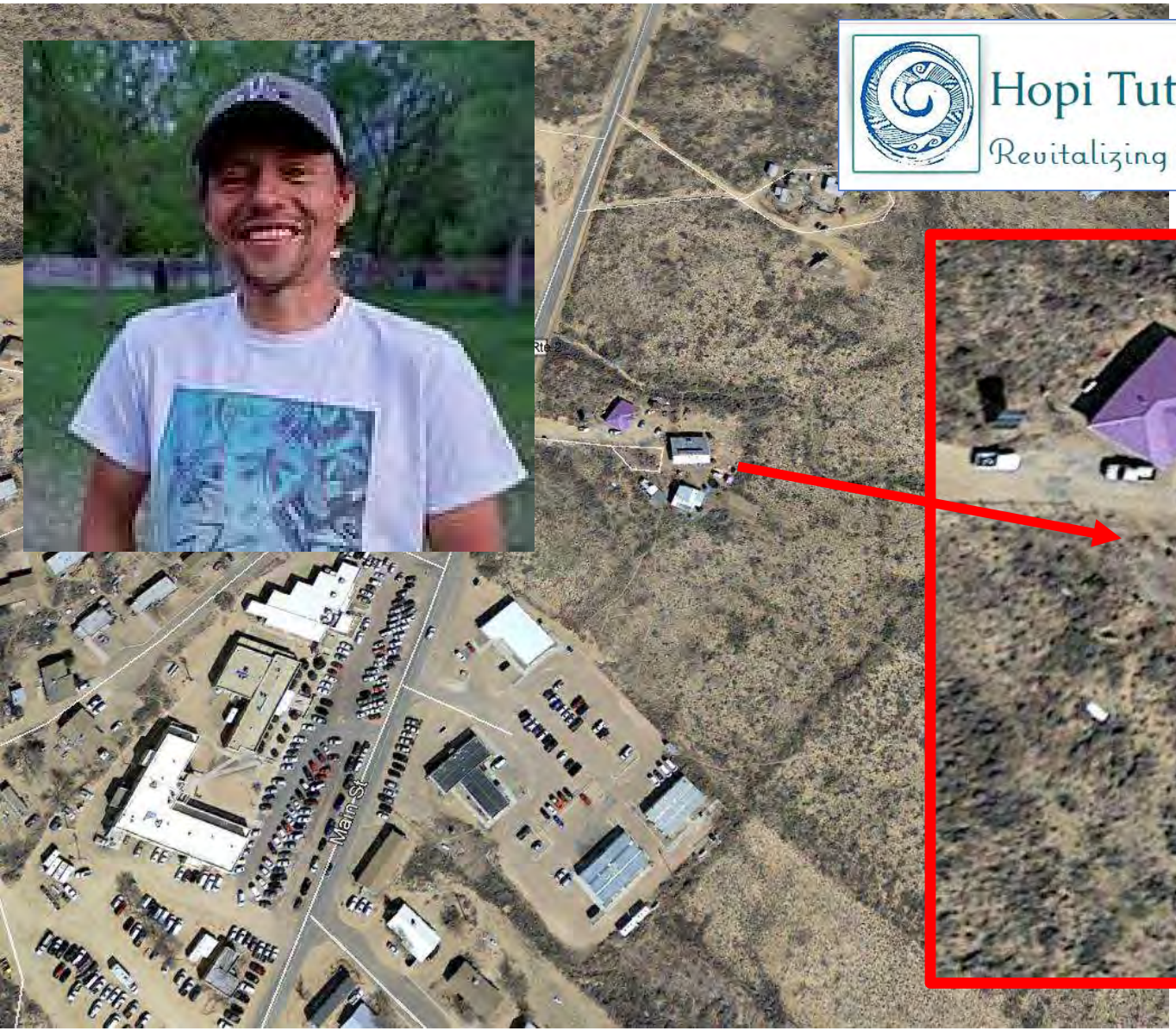
"I want to make them aware of what's going on with our environment," he says. "Not only here, but in the community, regionally and, if they can grasp it, globally. Things are changing, and I want them to see how it affects us in this small community. And it is affecting us."

There is no traditional classroom. No desks. No pencils. Instead, Lomadafkie takes a hands-on approach to learning. If his students aren't planting tomatoes in the greenhouse or nurturing pinon and cottonwood seedlings for restoration projects on Hopi land, they're in the garden, transplanting slips, harvesting the fruits of their labor or, when necessary, pulling weeds — a lesson in itself.

"It seems so natural to be outdoors and have this knowledge of plants and soil, or simply putting your toes in the sand and wiggling them around," he says. "It's something new to some of these students, and you see it in their eyes — the joy they get out of something as simple as digging out an earthworm and showing everyone. They're happy and learning at the same time."

Lomadafkie has only 30 minutes with his students before another group arrives. It's precious time. Still, he has high hopes for his kids: "What I'd like to see, when they go off to school, is that they study something that will help the environment — maybe environmental engineering, natural resources or renewable energy — so wherever they go, they take that traditional knowledge to help the Earth."

Steven Lomadafkie, BSF 1999



Hopi Tutskwa Permaculture Institute

Revitalizing & Strengthening Community

Hopi Tutskwa Permaculture Institute

Revitalizing & Strengthening Community

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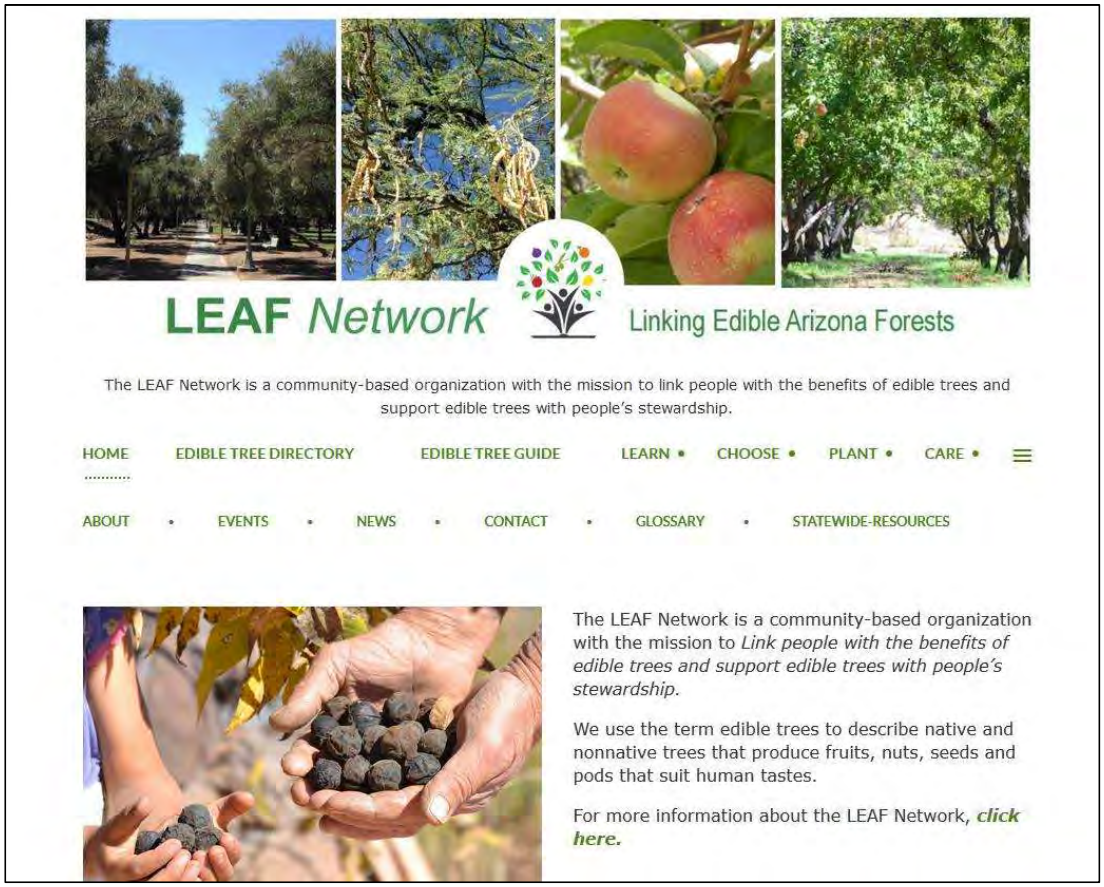
Revitalizing & Strengthening Community

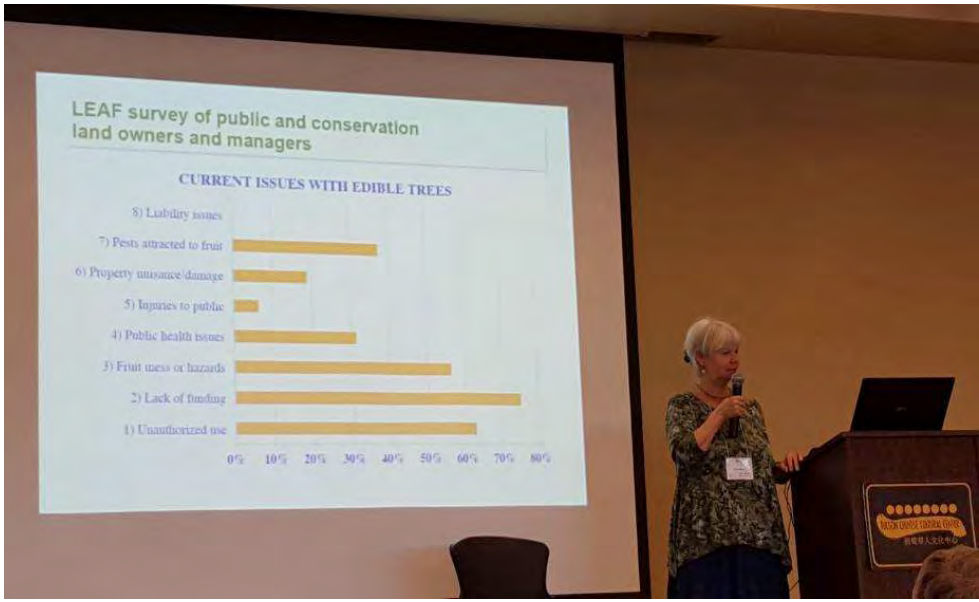
Hopi Tutskwa Permaculture Institute

Revitalizing & Strengthening Community

What About in Higher-Density Housing Areas?

Urban and Suburban “Food Forests”





canopy/ tall tree layer

siberian elm
lacebark elm
schumard oak
burr oak
ash
common hackberry
netleaf hackberry
mulberry
arizona walnut
black locust Robinia sp
honey locust Gleditsia sp
maple
cottonwood

sub-canopy/ smaller tree layer

japanese apricot
northern prairie apricot
moorpark apricot
brianna apricot
hunza apricot
chinese sweet pit apricot
anna apple
granny smith apple
black tartarian cherry
royal ann cherry
van cherry
north star cherry
stella cherry
stanley prune plum
french prune plum
italian prune plum
hale haven peach
belle of georgia peach
hardi-red nectarine
goldmine nectarine
all-in-one almond
non pareil almond
sweet green applecrab
strawberry applecrab

Dunbar/Spring Neighborhood, Tucson
Brad Lancaster

https://www.harvestingrainwater.com/2016/12/08/brad-lancaster-guided-home-and-neighborhood-tour-showcasing-integrated-harvests-of-water-sun-wind-shade-fertility-carbon-and-community-december-22-2016-tucson-az/

Curb Core

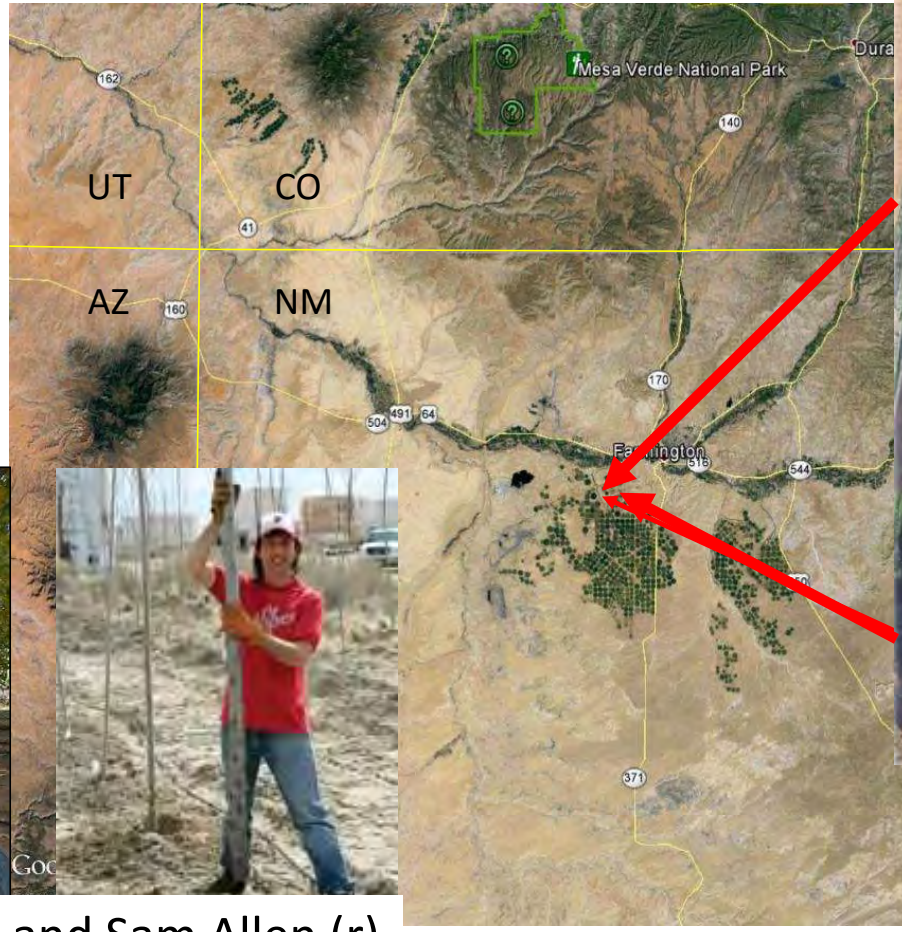
Curb Cut

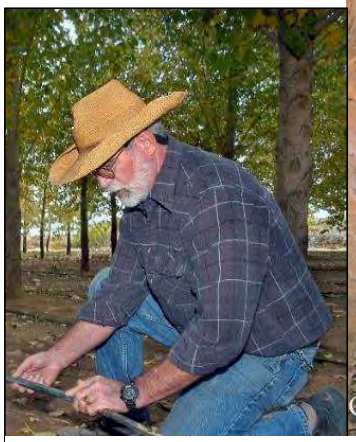
Agroforestry Practices

https://www.pinterest.com/pin/562457440933756539/

Frank Geminden's Farm, Camp Verde, AZ

Hybrid Poplar Research
NMSU Agricultural Science Center





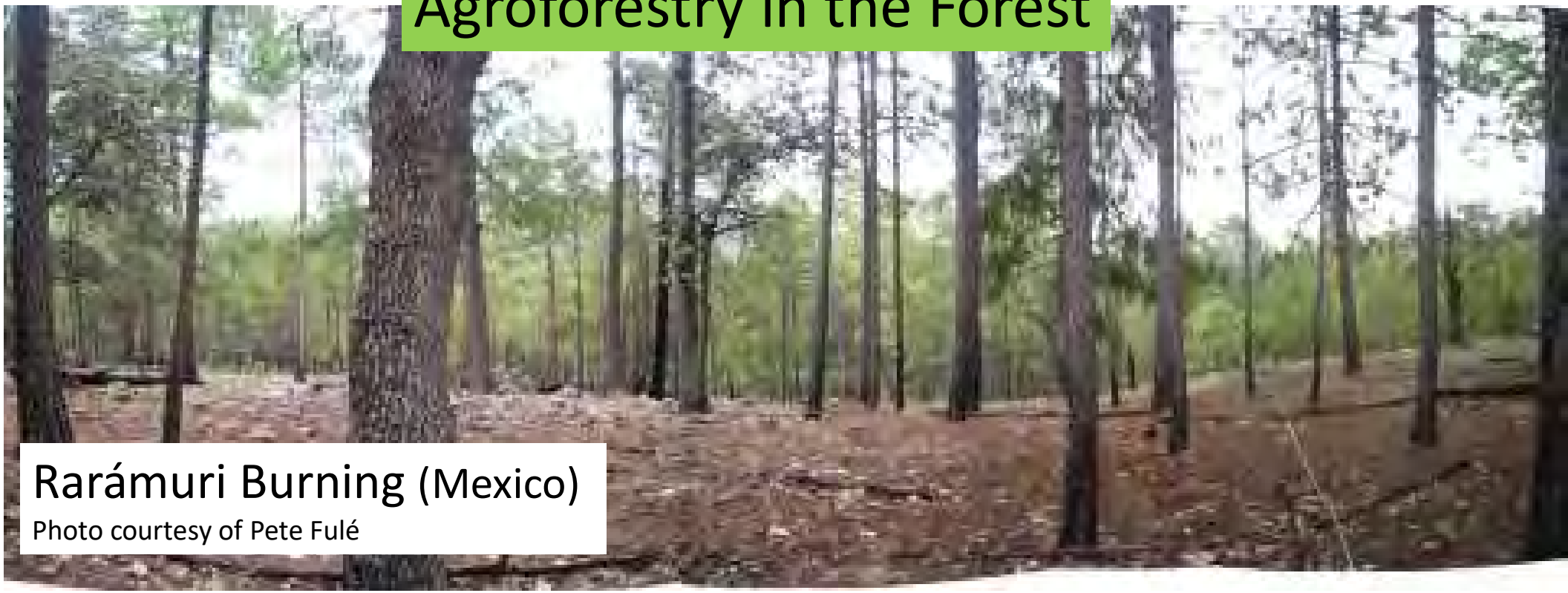
Mick O'Neill (l) and Sam Allen (r)

NMSU Farmington

NMSU Alcalde

Stone Container Species Trial with Alley Cropping
Zeniff, AZ

Agroforestry in the Forest

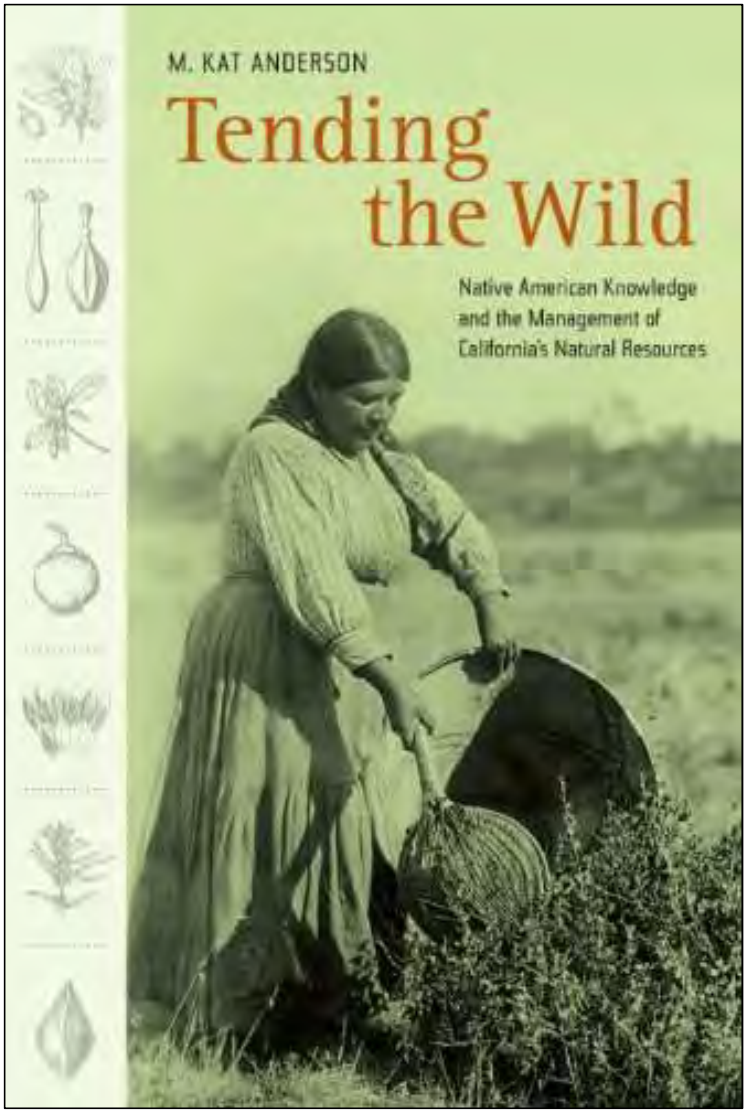


Rarámuri Burning (Mexico)

Photo courtesy of Pete Fulé

"The understory of oak groves is burned to retard new growth of oak and other trees and plants that would compete with the existing oaks. This results in higher yields of acorns and also in some fruit-producing shrubs"

- E. Salmon. 2000. Ecological Applications 10(5): 1327-1332.



PRACTICE OF FORESTRY

J. For. 115(5):426–434
https://doi.org/10.5849/jof.16-033

Managing California Black Oak for Tribal Ecocultural Restoration

Jonathan W. Long, Ron W. Goode, Raymond J. Gutteriez, Jessica J. Lackey, and M. Kat Anderson

Many tribes in California and Oregon value California black oak (*Quercus kelloggii*) as a traditional source of food and other values. Over centuries or millennia, Native Americans learned that they could enhance production of desired resources by regularly igniting low-intensity surface fires in stands of black oak. Although black oak is likely to remain widespread in the future, a warming climate, increasingly dense forests, and altered fire regimes threaten the large, full-crowned mature trees that produce crops of high-quality acorns and provide cavities for many wildlife species. To examine the effects of different kinds of burns on tribal values including associated plants, fungi, and wildlife of special cultural significance, we reviewed and synthesized scientific studies of black oak in conjunction with interviews and workshops with tribal members who use the species and recall burning by their ancestors. We conducted two exploratory analyses to understand trends in large black oaks and potential tradeoffs regarding black oak restoration. Our findings identify opportunities for reintroducing low-intensity fire, in conjunction with thinning, to restore stands that are favorable for acorn gathering. We present examples of such projects and discuss how to overcome challenges in restoring the socioecological benefits of black oak ecosystems for tribes.

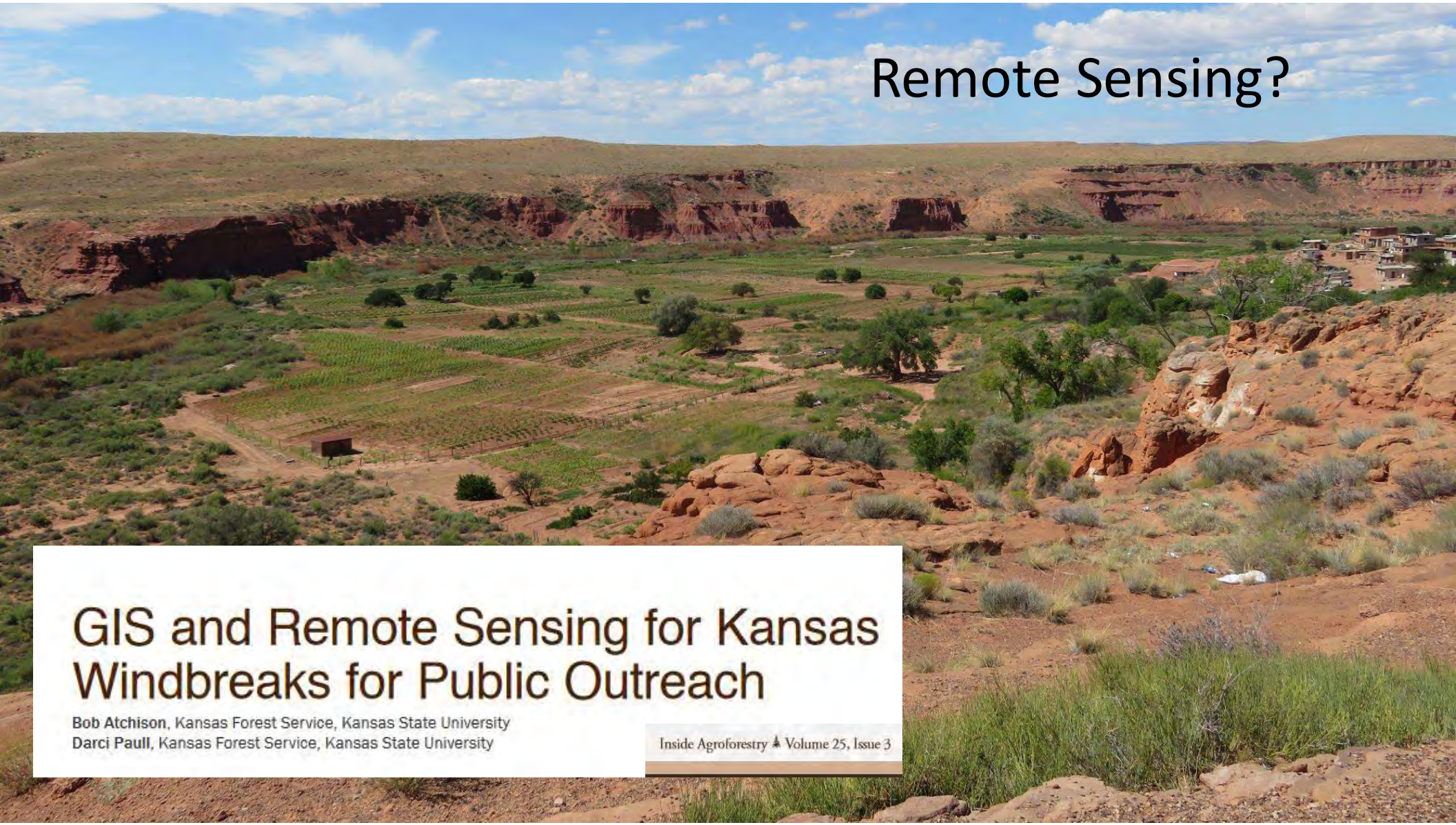
Keywords: ecosystem services, forest planning, cultural burning, traditional ecological knowledge, landscape restoration

(*Patagioenas fasciata*) (Gleeson et al. 2012); and many predators that consumed acorn-eating birds and small mammals, including fisher (*Pekania pennanti*, an omnivorous mammal in the weasel family) and spotted owl (*Strix occidentalis*) (Long et al. 2016).

Native Americans actively managed oak stands for centuries or millennia, with families gathering and storing thousands of pounds of acorns (Anderson 2005). These oak stands occurred both within open oak woodlands and within conifer-dominated forests. Indigenous people had learned that igniting low-intensity fires regularly within oak stands not only facilitated acorn collection but also stimulated production of

Future Directions: Homestead and Farm Surveys

Remote Sensing?



GIS and Remote Sensing for Kansas Windbreaks for Public Outreach

Bob Atchison, Kansas Forest Service, Kansas State University
Darci Paull, Kansas Forest Service, Kansas State University

Inside Agroforestry ♣ Volume 25, Issue 3

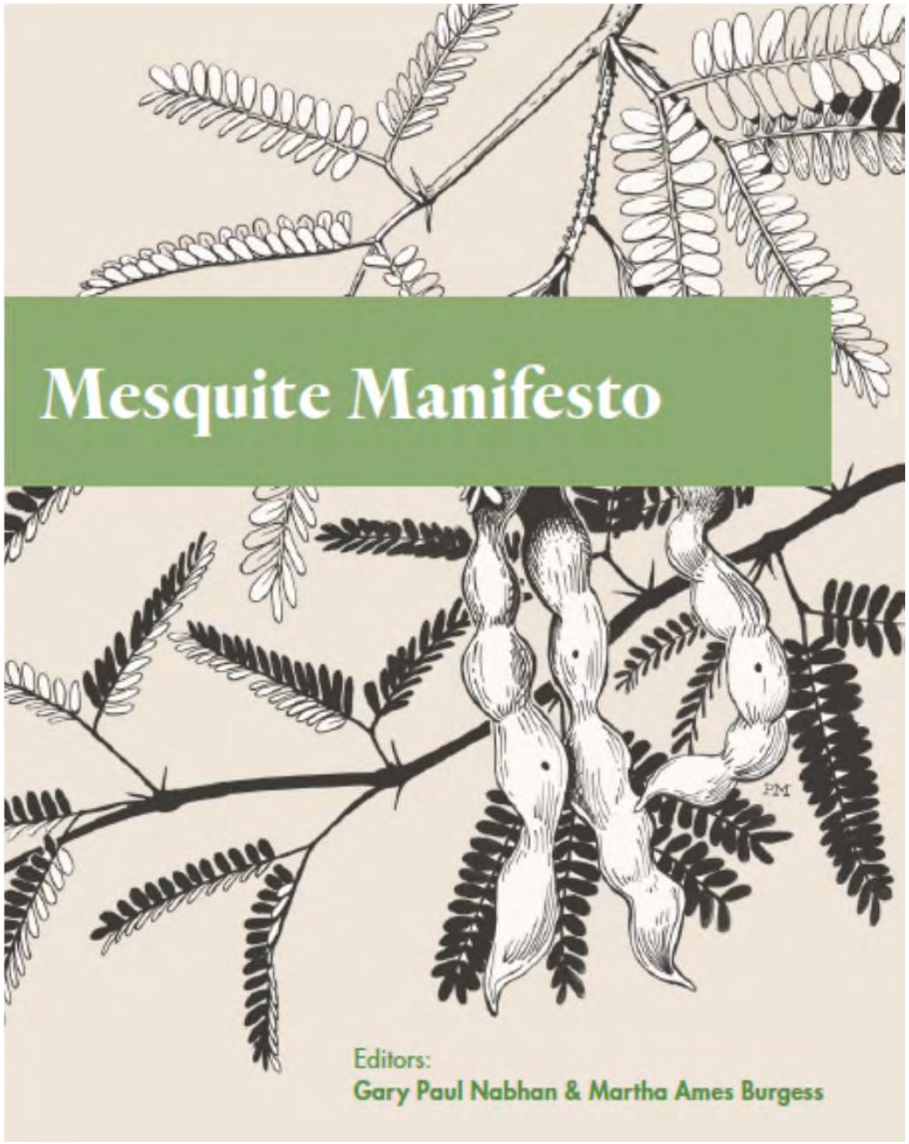
Future Directions: Research Trials, Demonstration Sites and Extension

Species/Irrigation Demonstration at NMSU Farmington Facility

https://www.nrcs.usda.gov/wps/portal/nrcs/main/plantmaterials/pmc/areamap/

Honey Locust

"With proper handling on the mesas, honey locust requires but a small amount of irrigation, while in cultivated, alluvial soils it does fairly well without watering." (*Arizona Station, Hints for Farmers No. 83, 1910. From Tree Crops: A Permanent Agriculture*)



Mesquite

"When one considers the ancient use of the mesquite, it present use, and its remarkably useful and promising qualities, it becomes difficult to understand why it has also been so greatly neglected by the scientific world." *Tree Crops: A Permanent Agric.*