

# CANYON ECHO

<http://sierraclub.org/arizona>

Grand Canyon Chapter

Spring 2023



## Hopi Tutskwa Permaculture Institute's answer to Climate Change.

by Stan Bindell

**H**opi Tutskwa Permaculture Institute (HTPI) is a nonprofit organization based in Kykotsmovi Village that focuses on community-based Indigenous-led solutions that empower culturally sustainable and healthy communities. Hopi Tutskwa translates from the Hopi language to

“lifeways and knowledge about land and soil.”

The organization was founded in 2004 by Lilian Hill and Jacobo Marcus, who continue to lead with Marcus as Operations Director and Hill on the advisory board. HTPI's mission is to help strengthen the relationships between the community and the land that sustains us, our “Earth mother.” Hopi Tutskwa's work encourages and values traditional knowledge skills and lifeways. Hopi Tutskwa raises its funds through donations and grants in order to offer workshops, training programs, internships, and other opportunities to Hopi and other communities they serve. Marcus said Hopi Tutskwa began when they heard the message and words of their elders, who expressed sorrow and concerns over the loss of Hopi culture and lifeways, and the encroachment of Western society on tribal lands and the community.

Marcus said Hopi Tutskwa began by creating spaces and places where elders, youth, and community members could reconnect in order for intergenerational knowledge, skills, and lifeways to be shared and transmitted to future generations. For this reason, a lot of their work has revolved around farming, rainwater harvesting, renewable energy, and natural and capacity building for community members.

Over the years, the program has offered internships, training, workshops, and programs with emphasis on our relationship to water, food production, energy, and building. One of the programs Jacobo is most proud of is the Sustainable Homeownership Program. Established in 2015, the program has been able to build four off-grid, passive solar, strawbale hybrid homes that are made of natural stone, cob, and lestavi (the Hopi word for vigas). The homes collect rainwater in cisterns and feed trees and gardens. Some of the homes utilize gray water to landscape systems, are solar powered, and stay warm in the winter and cooler in summer. Each home was built with the help of ten individuals who participated in an education program that involved them from foundation to finish. The homes have been built in Kykotsmovi, Bacavi, Hotevilla, and Shungopavi.

Marcus said he and Lilian are certified in permaculture design, and that permaculture is a tool and concept used to find and apply solutions

towards living systems that can meet the needs of individuals, families, and communities. It is geared toward solutions and practices that take care of the environment rather than degrade it. He said the term was coined in the 1980s in Australia and that the concepts and principles are actually based on native knowledge and wisdom as practiced throughout the world by all Indigenous people in every corner of the world.

Permaculture as a word is not as important as the concepts and principles which, at their core, encourage people to continue the knowledge, skills, and practices that have enabled them and their ancestors to live a good life. This work is tied to caring for each other as a community, and our knowledge, stewardship, and love of the environment, ecology, and the practices of sustainability. The organization was established to support and embellish the beauty that already exists here at Hopi. “Our work is about supporting what is already established and works, and those things that have sustained the community for thousands of years. Our work is about learning, retaining the old ways, and finding and complementing them with modern technology and



HTPI Summer Youth and Vista Program, photo courtesy of HTPI

contd. p5

Explore, enjoy, &



protect the planet

## Canyon Echo

Spring 2023

Vol. 59 No. 2

Canyon Echo © 2023. Canyon Echo (ISSN 0164-7024) is published quarterly for Sierra Club members by Sierra Club Grand Canyon Chapter, 514 W. Roosevelt St., Phoenix, AZ 85003. Phone: 602-253-8633.

Front page banner designed by Erika Gronek.

 Printed on 100% recycled paper with soy ink.

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**POSTMASTER:** Send address changes and postage due to Sierra Club Member Services, c/o Canyon Echo, P.O. Box 421041, Palm Coast, FL 32142-6417. Periodicals postage paid at Phoenix, AZ.

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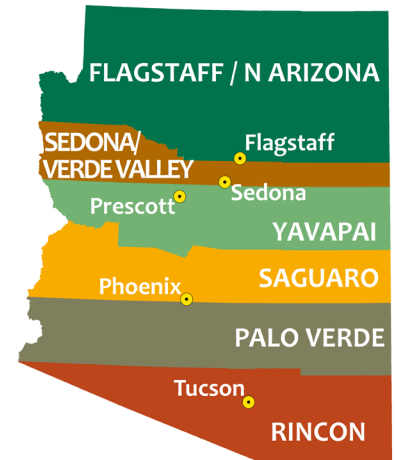
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**Flagstaff N. AZ. Group Rep.** Kay Bordwell  
**Saguaro Group Rep.** Jo Sylvester  
**Yavapai Group Rep.** Tom Slaback  
**Rincon Group Rep.** Anakarina Rodriguez

At-large members of the Ex Com are elected by the members statewide. Group representatives are elected in their group geographic area. Other positions are appointed by the Ex Com.



BIPOCC: Black Indigenous People of Color Committee

CCL: Council of Club Leaders

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## Happenings Around AZ & Chapter Announcements

Five groups and one regional conservation committee make up the Grand Canyon Chapter. All events and meetings listed below are open to those interested in learning more about Sierra Club. You can find out more at <http://www.sierraclub.org/arizona/events-activities>. Schedules are subject to change.

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<http://sierraclub.org/arizona/saguaro>

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<b>Membership:</b>	Sue Barsky		

**APR 1 (SAT) 8:00 Saguaro Group Social Hike at Granite Mt. Trailhead 31402 N. 136th St. Scottsdale, AZ 85262.** Meet in the area near the restrooms. An easy 3.5- mile hike. After the hike we will share snacks in the parking lot. Sally Howland leader email [sally\\_howland@yahoo.com](mailto:sally_howland@yahoo.com) or sign up on <https://www.meetup.com/Sierra-Club/Grand-Canyon-Chapter>

### Palo Verde Group (Phoenix)

<http://sierraclub.org/arizona/palo-verde>

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<b>Ex-Com (At-Large):</b>	Natalia De La Torre		

Palo Verde Group executive committee meetings are the **second Thursday of each month** and programs are the **fourth Thursday of each month**.

**Apr 27th (THUR)** Details to come!

**MAY 25 (THU) - Outdoor Stewardship with Rebecca Rodriguez**

For the May program we'll welcome Rebecca Rodriguez, an Arizona outdoors steward, avid hiker, and rock climber. Rebeca will be discussing her stewardship and outdoor adventures, and utilizing social media to inspire others to get involved. Follow @hikeswithrebeca on Instagram, get registered for this meeting, and join in to learn how we can get involved!

**JUN 22 (THU) - Native Plant Program with the director for Borderlands Restoration Network Francesca Claverie.**

For the June program, we will have a presentation by Francesca Claverie, Native Plant Program Director for Borderlands Restoration Network. This Network's mission is to promote and protect biodiversity by providing individuals, communities, and land managers access to restoration quality plant materials and guidance for effective use. Francesca will introduce the native plant restoration projects BRN has worked on as well as highlight the importance of regionally sourced native plants.

### Flagstaff-Northern AZ Group

<http://sierraclub.org/arizona/plateau>

<b>Contact</b>	Kay Bordwell	928-779-3517	<a href="mailto:kbordwell4@gmail.com">kbordwell4@gmail.com</a>
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Flagstaff group programs & Executive Committee meetings are held **on the second Thursday of the month**. Contact Kay Bordwell for more information about events in Northern AZ.

### Yavapai Group (Prescott)

<http://sierraclub.org/arizona/yavapai>

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Yavapai group programs & Executive Committee meetings are held on the **first Wednesday of the month**.

### Rincon Group (Tucson)

<http://sierraclub.org/arizona/rincon>

The Rincon Group is changing its name to the Nopales Group. We will let you know when that is finalized and also when we get our programs and events scheduled.

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## Chapter Announcements

### Wildlife Activist Group Meetings

**APR 10, MAY 8, JUN 12 (MON) 6pm.** Wildlife Activist Group meetings (virtual). Interested in making a difference for wildlife? Want to help protect habitat, gather important research data on wildlife, or watchdog the Arizona Game and Fish Commission? Please consider joining our Wildlife Activist Group. For more information, please contact [sandy.bahr@sierraclub.org](mailto:sandy.bahr@sierraclub.org)

### Renewable Energy & Climate Action Team Meetings

**APR 25, MAY 23, JUN 27 (TUE) 6:30pm:** Energy and Climate Action Team meetings (virtual). Discussions and programs encompass renewable energy and energy efficiency campaigns nationally and locally. Everyone is invited to participate, no matter how much or how little you know about energy issues. For more information, please contact [sandy.bahr@sierraclub.org](mailto:sandy.bahr@sierraclub.org).

### Arizona Sierra Club Conservation Meetings

**APR 6, MAY 4, JUN 1 (THU) 6:30pm:** This is the monthly conservation meeting (virtual) of the Arizona (Grand Canyon) Chapter and Palo Verde Group (Phoenix area), where we discuss a broad range of environmental issues. Come learn more about issues or bring an issue you care about and share what you know. For more information, please contact Don Steuter at [dsteuter@hotmail.com](mailto:dsteuter@hotmail.com).



**PLANT SWAP MIXER**  
APRIL 29TH 2023

**The Palo Verde Group of the Sierra Club is holding our first Plant Swap Mixer!**

**What:** a casual, fun gathering that we invite our members and supporters to attend and bring a plant or other item to swap.

**When:** Saturday, April 29 from 9–11am

**Where:** 514 W Roosevelt St, Phoenix

# Water Conservation and Rainwater Harvesting

• by Gary Beverly



Colorado River water shortages are big-time news these days, especially since the basin states cannot agree on “conservation” measures. To them, conservation means a temporary reduction in river withdrawals to prevent Lake Mead and Lake Powell water levels from falling to disastrous levels. The Arizona Department of Water Resources (ADWR) claims that we now use less water than decades ago, with a larger population, but the implication is that we’ve already exhausted the possible savings from demand control. That is far from the truth.

Let’s start with the largest water use sector. Agriculture uses about 75% of Arizona’s water supply to grow low-value high-water crops like cotton and alfalfa. There is huge potential for agriculture to use less water while generating more revenue, but change is difficult for farmers.

Despite the reluctance of officials and farmers to improve water use efficiency, the truth is that we have only scratched the surface!

Homeowners can show them how. Home water conservation is where citizens can help out a lot. For example, municipal water—residential and commercial—is over 75% of the total water use in the



Prescott RWH, photo by Gary Beverly

Prescott Active Management Area, which has little agricultural use. What should a homeowner do first?

Most homes are connected to municipal sewer systems, so water used inside the home is sent to the wastewater treatment plant, then used for aquifer recharge and other direct reuse. Water conserving fixtures are common in homes constructed after 1992. This is tremendously helpful, but since interior water use is recovered and recharged, this isn’t the highest priority.



Tucson Xeriscape, photo by Gary Beverly

Homeowners should instead focus on landscape water use. Water used outside the home on lawns, trees, car washing, etc. evaporates and cannot be recovered for recharge. The highest priority should be to reduce landscape water use, which accounts for 30–50% of municipal use. There are many “tools” you can use and there is abundant detailed information on how to do this (references are provided, so I won’t repeat them here). Instead, the most important thing is to have a sense of priorities for what actions to take.

To reduce landscape water use, you should first remove high water-use plants, especially lawns. Check your local city to find incentives: for example, Prescott and Tucson offer payments for turf removal. This does not mean that your yard becomes a rock moonscape! Convert your landscape to drought-tolerant native plants that are adapted to our arid environment and require less cost, maintenance, pest control, fertilizer,

or watering. This is a big win!

Large trees can provide shade and reduce summertime cooling costs. Irrigate the trees using passive rainwater harvesting, which involves guiding stormwater runoff from roof downspouts, driveways, etc. to basins surrounding the trees. Then install a thick layer of mulch under the canopy to reduce soil evaporation.

Another possibility is to collect gray water from home showers, laundry, and sinks using a customized drain pipe system, diverting it through a sand filter, and dispersing it onto plants. The Arizona Department of Environmental Quality permits gray water use without a permit if you follow a list of best practices available. Gray water use is a little tricky, requiring you to be selective with detergent use. It is limited to use on ornamental plants (not vegetable gardens), no spraying, etc. Some cities have prohibited gray water use, so you need to check the local rules. In general, this tool is best used in rural areas where sewers are not available to collect wastewater for reuse.

Finally, you can consider active rainwater harvesting, which involves collecting stormwater from rooftops in gutters and using downspouts to collect the water in a large storage tank. The idea is to store water during wet periods and use it in dry periods. This is particularly useful for home vegetable gardens using a drip irrigation system, and it is perfectly legal in Arizona. Basically, you are collecting rainwater that would normally evaporate and using it to replace wasteful irrigation with valuable city water.

Reducing landscape demand should precede efforts to use gray water, or passive or active rainwater harvesting!

Gary is Water Chair/Pub Com/At-large: for the Grand Canyon Chapter

Landscape Water References:

Watershed Management Group, <https://watershedmg.org>

Based in Tucson, WMG is a leader in efficient landscape water use.

Low water use plant lists: Arizona Department of Water Resources, <https://new.azwater.gov/ama/management-plans>

Gray water usage guidelines from Arizona Department of Environmental Quality: <https://azdeq.gov/GrayWater>

Home conservation: Citizens Water Advocacy Group, <https://cwagaz.org>

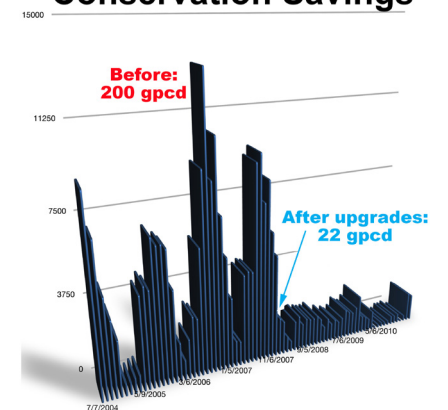
Brad Lancaster is the guru of home water harvesting. <https://www.harvestingrainwater.com>

Outdoor Watering and Landscape Tips, an excellent website from the City of Prescott: <https://www.prescott-az.gov/water-sewer/water-conservation/watersmart-landscaping/outdoor-watering-landscape-tips/>

Harvesting Rainwater, by Patricia Waterfall, UofA Extension. This is a downloadable 53-page booklet explaining how to calculate landscape water demand and collection potential. <https://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1344.pdf>

Basic Components of a Rainwater Storage System. This is a short overview. From UofA Extension: <https://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1565.pdf>

## Conservation Savings



Atkins Conservation Graph

## Agrivoltaics

• by Rep. Stephanie Stahl-Hamilton 

In the summer of 2019, I happened to have a conversation with a City of Tucson councilmember who introduced me to the practice of agrivoltaics. Even though I went into that meeting to establish a relationship and seek support for my candidacy as a first-time candidate for the AZ Legislature, what I walked away with was a vision of a commonsense tool that could move Arizona toward a more sustainable future. After that meeting, I went home and took to the web in order to learn more about agrivoltaics. The idea captured both my head and heart—so much so that I gained a reputation for it with my colleagues at the legislature, who have come to expect frequent impassioned speeches from me on how agrivoltaics is a smart option for conserving water and increasing food production while transitioning into a great use of solar energy.

Agrivoltaics is the practice of putting solar panels over farmlands. With agriculture using approximately 75% of allocated water in Arizona and our abundance of sunshine, agrivoltaics would seem a creative solution to conserving water, transitioning to a smart use of renewable, clean energy while potentially doubling crop yield. This, to me, is the type of stewardship that will enable our state to move in the direction of sustainability while caring for our environment. It's a simple concept that has been studied in great depth at the University of Arizona in order to understand the effects of placing solar panels over different types of crops in relation to growth and yield.

Now having served for a few sessions in the legislature, I know all too well that there is little agreement on how to best address the water shortage. But if anything is clear, it's that agriculture has to be part of the solution to our water problem, and agrivoltaics present an opportunity to provide farmers with much needed tools to reduce water consumption without sacrificing crop yield. Not to mention that as the climate crisis continues to threaten our water supplies, it's more important than ever that policymakers consider every option on the table to rapidly transition to renewables and conserve more water. Agrivoltaics happens to accomplish both—and with added benefits for our food producers!


*Rep. Stephanie Stahl-Hamilton serves in the Arizona House of Representatives and is the ranking member on the House Natural Resources, Energy, and Water Committee*



Agrivoltaics, photo courtesy of Research, Innovation & Impact, University of Arizona

## Arizona's Youth Leading the Way

### Native Plant Crisis

• by Griffin Raia 



Buffelgrass along the banks of the Rio Salado, photo by Toni Malcolm

The Sonoran Desert is the most biodiverse desert of the four deserts in the United States, but it may lose that title with the danger it's facing. Because of construction, the increasing human population, and pollution, plants not found anywhere else in the world are being lost. Our Sonoran desert covers 120,000 square miles of the Southwest, most of which is in Arizona.

Its rivers, canyons, mountains, and valleys provide a wide variety of places for many species to live. For example, this desert consists of more than 2000 native plant species that have existed in the desert ecosystem for thousands of years. All these life forms have thrived for centuries, but now finding a natural habitat is becoming more difficult. Recently, plants are getting seriously hurt by mining, deforestation, and construction. As more people move into the Sonoran Desert, its amazing plants and landscapes are getting torn up for roads and skyscrapers. Plant species that are already adapted to high desert heat and low water are suffering from further water restrictions, urban heat, and air pollution. Because these environmental changes are happening so quickly, some plants are not able to adapt fast enough to survive. Plants are responsible for putting the sun's energy into our ecosystem and providing oxygen for life. These plants also produce seeds and food for animal species, so loss of plants also means loss of animals. The strength of an ecosystem is its biodiversity. Without plants, other life cannot exist, which means that the Sonoran Desert stands to lose a lot if plant life is destroyed.

However, all hope is not yet lost. If people plant native species, and especially pollinator gardens, in their yards it will help maintain biodiversity since we all live in the Sonoran Desert. One suggestion is to buy seeds from Native Seeds (<https://www.nativeseeds.org>), which helps with reviving plant species that are endangered. Another idea is to help by picking up trash and litter if you are out hiking in the Sonoran Desert. Even just picking up a few pieces of trash you find on the side of a trail will help. You might even consider organizing a group of friends to go out just to clean up litter. Finally, saguaro cacti are a big part of the Sonoran Desert; this type of cacti even has its own National Park. Unfortunately, non-native, invasive plant species, such as buffelgrass, have threatened saguaro cacti. Thankfully, people are organizing to pull buffelgrass. You can support this effort; see <https://www.desertmuseum.org/buffelgrass>. Maintaining biodiversity in the Sonoran Desert doesn't happen overnight, but plants have been doing it for thousands of years and we can help them. It doesn't have to be something big; every little action counts.

*Griffin is a student at Arizona School for the Arts*

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The Grand Canyon Chapter is also thankful for the generous support from those who chose to remain anonymous.

## Musings of a Pedologist

### The Morning Stars Sing Together (\$500+)

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*I dig in, piercing her brown skin.  
The soft sand, rich loams, and sticky clays  
surrender to the intrusion of metal.*

*The blade shoves and cuts roots -  
Some thin and fibrous, others woody and gnarled.  
Dicot or monocot they are the protectors, transporters,  
absorbers and connectors to mycorrhizae and soil biota.  
Down I push into the life-sustaining substance of earthly  
inhabitants.*

*O what riches we can claim-organic and inorganic.  
Dark loams rich in humic acid  
remnants of thousands of cycles of life and death.  
The mother of all food webs below our feet  
Giving back-all that is received and more.*

*I prod onward wondering what surprise I will find-  
for soils are rarely the same.  
Color, structure and texture change with depth.  
The familiar clink or clunk of rock  
signal an end to my exploratory journey.*

*Does the earth feel this intrusion?  
Small as it is, small as I am,  
as vital and all encompassing as the Earth is  
I keep these wonderings alive  
when I pierce our skin.*

*Christine McDonald is a soil scientist by profession and she loves writing about the earth and nature. She has just come out with a new book of poems [Where Everything Wild Has a Home, Wild Poems](#).*

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from p1

ideas that are in line with ancestral skills, knowledge, and lifeways.”

Marcus said life is not possible without water and they try to take a water-wise approach in everything they do. This is especially important since Hopi land receives very little rainfall compared to other areas.

Marcus said when rainwater pours that most people are not ready for it and it causes flooding and erosion. So, we need to take a look at what was done historically when villages and clans were actively stewarding the land, directing the water from one field to the next, and directing rainwater runoff to fill naturally-occurring cisterns or those dug out in the rocks throughout the villages. “It would produce a lot of food. That knowledge is being lost, but now we need to create systems like that, which are taking inspiration from those practices.

“That means harvesting water from roofs into cisterns and directing it towards gardens and trees, or directing water runoff from washes and hardscapes into fields and areas where plants thrive. This can be done on a small-home scale, but if we dream big it can happen on a village scale as well.” Marcus said it is also important to care for the land by building rock structures in washes and other areas where water runs to slow down the water and help

it sink into the soil and eventually into the aquifer.” He said land stewardship includes storing water in the soil because “the biggest reservoir is in the soil.”

That’s why they encourage home gardens and creating landscapes that can absorb water when it rains. “In this way, we attract and support beneficial wildlife like pollinators, birds, and other life forms to come around.” He said it is important to mulch around trees, shrubs, and anything else you plant outside of the fields so that water stays in the soil longer. He said gray water systems are also important as water from showers and washing machines can be directed to plants and trees as long

as biodegradable soaps and other products are used. This all helps to build soils and healthy soil microorganisms.

Marcus said permaculture is a tool that can be utilized by the community to help create better livelihoods by encouraging folks to grow their own food. “This encourages the ancient lifeways that [have] helped communities survive since time immemorial,” he said.


Hopi Tutskwa has a number of learning centers throughout the Hopi reservation as well as ongoing efforts for ecological restoration. “It’s a decentralized model that is spread out,” he said.

It began at Hill’s home in Kykotsmovi, and has spread throughout the reservation through their workshops, plant and tree distributions, training, and summer programs, which place community members at different sites where food is grown. Hopi Tutskwa is constructing a learning center off of Highway 264 just outside of Kykotsmovi. They are fixing up a dilapidated garage that will become a community kitchen and learning center with a passive solar greenhouse and hoop house, and have plans of planting trees and growing food. This would be open to the public. A lot of the other sites are on family-owned land and impractical to open to the public.

Marcus said the permaculture program is important because they realize the Western model of food and energy production is not sustainable, and is very unhealthy to the people and the planet. He said the pandemic exemplified how fragile that system is.

contd. pg

## Seaweed Supplements: Reducing Methane Production by Cows

by Rebecca Hinton 

The livestock industry is a major contributor to climate change, with about one-third of methane emissions coming from beef and dairy cattle. Methane is produced as cows digest their food, and released when they belch. Methane is the second largest greenhouse gas contributor, after carbon dioxide, and about one-quarter of all methane emissions come from cow burps!



Lease cattle, courtesy of Bureau of Land Management

Dr. Ermias Kebreab and other scientists discovered that one way to dramatically reduce this source of methane is by supplementing cows’ diets with seaweed. Methane production from cows with the supplemented diet was reduced by 90% or more in some studies.

This innovative research spurred several start-up companies that are cultivating and scaling up commercial algae-growing operations. Bill Gates invested \$12 million in an Australian climate-tech company. Hawaii’s Blue Ocean Barns estimated that it can ramp up seaweed production to feed all 100 million US cows by the year 2030—“all on a plot of land that is smaller than Chicago’s O’Hare airport.” Companies like Straus Family Creamery, Clover Sonoma, and Ben & Jerry’s are using algae supplements to reduce methane as part of their clean energy goals.

Governments could use incentives and legislation to address climate change with supplements in livestock feed. California adopted regulations requiring dairy farmers to cut methane emissions 40% by 2030. New Zealand’s plan to make the country carbon neutral by 2050 includes cutting methane emissions from farm animals 10% by 2030, and 47% by 2050.

There are current health and climate solution conventions that claim that a mainly plant-based diet benefits humans and will greatly reduce greenhouse gasses generated by domestic animals. It seems apparent that proponents should encourage people to shift in both directions. However, the issue is more nuanced than that.

Experts have long touted both the health benefits and reduced climate implications of plant-based diets. So why discuss solutions like food supplements for cows and not simply ask people to eliminate beef and dairy entirely?

In high-income countries, food is readily available, and a plant-based diet meeting nutritional needs is not difficult. The challenge is greater for people in poorer countries, where beef and dairy are the only source of protein, vitamins, and minerals critical for vision, growth, and brain function. Researchers at Johns Hopkins Center for a Livable Future looked at nutrition and climate across 140 countries. They determined that for people in most low- and middle-income countries, achieving an adequate diet will require a substantial increase in greenhouse gas emissions and water use for food production. They wrote, “there is not a one-size-fits-all approach to addressing the climate crisis and global nutrition—the food industry in each county needs to be considered,” and “recommending a plant-based diet without taking into account the nutritional needs of vulnerable populations or the availability of certain foodstuffs is neither helpful nor appropriate.”

While changing cows’ diets seems like a solution to reducing methane, it doesn’t address other problems associated with livestock including water, land use, and waste.

Rebecca is Chair and head of Programs for the Palo Verde Group



## Cast of Characters

## Craig Johnson

*Craig is a documentary Filmmaker and Freelance Videographer*

• by Stan Bindell



Craig Johnson has won an Ansel Adams Award for environmental videos for the Sierra Club, and has established himself as one of the top environmental videographers in Arizona.

Johnson's most recent work for the Sierra Club is about how Pinto Creek's groundwater has been depleted by nearby mining. The Pinto Creek documentary will be aired April 27 at a location to be determined, and potentially at several film festivals. The Pinto Creek documentary highlights how water on public land is being controlled across the west by land managers and other water users.

"In Arizona, every drop of water is important," he said.

Johnson notes that one-third of the water for Phoenix comes from the Salt River. He began shooting video of Pinto Creek last spring when the water was flowing and continued to shoot several times in the past year.

The Pinto Creek documentary included interviews with former Arizona Gov. Bruce Babbitt, retired forest service hydrologists, and various stakeholders.

"I also showed why the forest service isn't protecting something that they have the right to protect," he said.

Pinto Creek is located near Miami, Arizona, next to the Pinto Valley Mine and Carletta Mine. Johnson said the Pinto Valley Mine alone uses five million gallons of water per day and many have concerns that the mines' toxic tailings could pollute the Salt River, which flows into Roosevelt Lake and other riparian systems.

The 14-minute documentary explores mining and water diversions on federal land, and Johnson feels it's timely as the mine just renewed its permits.

Johnson has also done four installments of the documentary series about the "Fight for Oak Flat," which is about how the San Carlos Apache and environmental groups oppose the

Resolution Copper Mine. The title of the film is **"Every Last Drop: The Demise of Pinto Creek."**

"I want to inform and educate people about environmental issues, and this video takes the same approach," he said.

Johnson said the decreasing flow of the water in the Colorado River shows the need to protect water throughout Arizona.

The viewings of the Oak Flat documentaries was limited because of COVID, so he is looking forward to the Pinto Creek documentary getting more widespread viewing. His documentaries focus on resource extraction and what groups are fighting to protect resources.

"Due to old and outdated mining laws, they have to allow mining, but that doesn't mean they have to allow them to just drain water," he said. "Mitigations could be enacted, but they are not being enacted."

Johnson said he is trying to bring awareness about water resources and what can be done to protect those water resources.

He also interviewed federal employees who fought to protect water, but feel that it isn't being protected today.

Johnson has been shooting videos since he was a teenager, learned to edit film in middle school, and earned honors as Student Filmmaker of the Year in high school.

Johnson graduated from Arizona State University's Walter Cronkite School of Journalism on a merit-based scholarship. His journalism adventures took him to Israel and Chile. He has also performed video work for a PBS science journalism show.

His freelance video service includes work for news outlets, schools, nonprofits, and corporations with the goal of supporting himself but focusing on the importance of environmental journalism.

"My films have helped educate people on issues such as the Oak Flat Resolution Copper Mine," he said. "It's just a way to show people what the struggle is all about. It's emblematic of what's going on all over the country. We should be stewards for wildlife and I want to show people how the process works."

Johnson said more than anything it's important to engage people with visual content in order to gain political and public support to protect public lands. He said people need to speak up because that's the only way the government will respond, but he said the public is often given little time to respond. "I want to give viewers information in an easy and understandable way," he said.

Johnson said having more

videographers trained on environmental issues would be helpful, but he said today's technology allows anyone to document what's happening.

"It's important for anyone to tell the story themselves," he said. Johnson won a 2020 Rocky Mountain Emmy for special event coverage for PBS about a NASA test in Yuma.

"I am grateful for people who have given me support and trust me to be a storyteller for real environmental issues. I want these issues to be informative and useful, and to protect great places," he said.

To contact Johnson, telephone 520-730-5962.



Craig at a Sierra Club function, photo courtesy of Craig Johnson

Stan is ex-com at large for the Yavapai Group

### Check Out Our Volunteer Opportunities

[bit.ly/SCGCvolunteer](https://bit.ly/SCGCvolunteer)



from p8

"Our work is not just for here, but for humanity," he said. "Our approach is focused on solutions that are available to us. We want to create systems where people and the environment can thrive at Hopi and, one day, globally."

Marcus said Hopi Tutskwa is different because it is localized and based on ancient practices. He also noted that most permaculture programs are in affluent communities and cater to affluent individuals who pay money for classes and already have a lot of resources.

Hopi Tutskwa employs over 13 individuals on the Hopi reservation, but Marcus remembers when they started with a couple of shovels, a pickup truck, and a vision. "We have gained a lot of support over the years," he said. "The folks who work with us are part of a team, and we understand this is important work that leads to a more hopeful and meaningful future."

For more information, go to: [Hopi Tutskwa Permaculture Institute](https://www.hopitutskwa.org/)

Stan is ex-com at large for the Yavapai Group



Craig at work in the field, photo courtesy of Craig Johnson

## What is the Whole Food Plant-Based Diet?

Your diet—the foods you eat – has a significant impact on climate change. As the graph shows, beef production creates over twice the greenhouse gas impacts as the other meats. Dairy also heats up the earth, but that's not all. Animal agriculture contaminates our water with nitrates, fertilizers, animal waste, and sediments. To combat climate change and not pollute, it makes sense to avoid foods based on animal agriculture.

Next, consider your personal health. Nutritional science is abundantly clear that meat and dairy products are not healthy. To stay healthy and live longer, it makes sense to avoid meat and dairy.

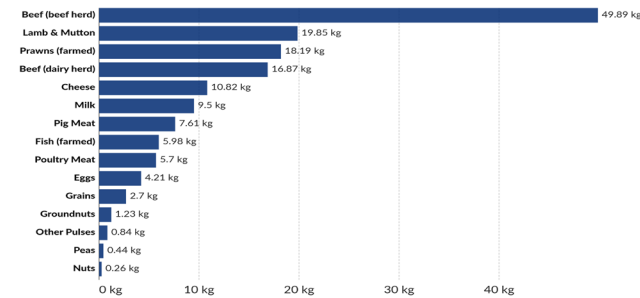
What...another diet? Diets are confusing. They change like the wind. One day it's low fat, then it's high fiber, macrobiotic, raw food, vegan, blood type, paleo, or keto. And the science is confusing. First of all, some scientific research is bought and paid for by big industries. I just read this: "The sugar association is the scientific voice of the US sugar industry." You can bet their research is biased. Second, all science is a moving target. Things change as new discoveries are made. Eggs good; eggs bad; eggs good again.

Confused? I found a solution. Dr. Michael Greger has taken on the challenge of presenting up-to-date science- "the best available balance of evidence published in the peer-reviewed literature shown right now" in a direct and understandable way. His staff reviews the 10,000 papers published annually in medical nutri-



Chef Molly in the Three Sisters Garden: corn, beans, and squash, photo courtesy of Chef Molly

Greenhouse gas emissions per 100 grams of protein  
Emissions are measured in carbon dioxide-equivalents<sup>1</sup>.



Source: Joseph Poore and Thomas Nemecek (2018). Additional calculations by Our World in Data. OurWorldInData.org/environmental-impacts-of-food • CC BY

tion and assembles videos based on peer-reviewed published scientific research. His website, nutritionfacts.org, features over 2000 short videos explaining practically every nutrition topic.

Greger delivers each video in person, sometimes while walking on his treadmill (demonstrating that we all need our daily exercise) with facts, graphs, and full scientific citations. You'll find 20 videos on oats, 154 on sugar (without research paid for by the Sugar Association), 566 on cancer, 208 on eggs, and science-based videos evaluating the other diets.

Two important points: Greger doesn't sell anything - no pills, potions, or miracle cures. In the interest of better public health, the website is free; the videos are based on peer-reviewed science, not a celebrity fad thing.

Greger's book "How Not To Die" is a summary of this research. It covers the 15 top causes of death in America - chronic diseases like heart disease, lung disease, diabetes, high blood pressure, and cancer. "How Not To Die" is available as an audiobook with the charming doctor himself narrating. It's an ominous title but Dr. Greger has a wonderfully quirky sense of humor to balance it out. His message is that only one diet has been proven to reverse heart disease, and the same diet prevents, treats, arrests, or reverses the 14 other leading killers: the Whole Food Plant-Based (WFPB) diet.

What is a WFPB diet? Basically, it is a plant-based, minimally processed diet without meat, fish, eggs, or dairy. For example, eat a whole apple

by Chef Molly Beverly



(full of vitamins, minerals, fiber, and antioxidants) instead of drinking apple juice. Eat the foods your great-great-grandparents ate. Whole foods contain disease-protective nutrients.

Greger has developed a traffic-light system to illustrate just what to eat. Green-light foods (eat as much as you want) are un-

processed plant foods - grains, beans, fruits, and vegetables. Yellow-light foods (eat occasionally) are processed plant foods and unprocessed meat, dairy, and eggs. Red-light foods (eat rarely or avoid) are sugary, or highly processed, or high fat like white flour, alcohol, soda, packaged mixes, butter, and bacon.

I can already hear your questions. How can I make the change? Do I have to dump all my favorites and relearn how to cook? Is this "healthy" food going to taste like cardboard? No!

First, realize that you don't have to be perfect. I confess: I love bacon but I don't eat it every morning or even once a week - just occasionally when the best tomatoes are fully ripe and I can get good sourdough bread, then I'll have a great BLT.

I cut out most meat, dairy, and eggs years ago. The biggest changes my husband and I have noticed are increased energy and no snack-attacks between meals. We mostly cut out sugar about a year ago. I restrict my sugar intake to something really, really worth the calories, like a chocolate croissant from the best French bakery in Paris.

Try the Whole Food Plant-Based Diet to improve your chances for a long and healthy life. Start slow, be persistent. The more consistent you are, the better you'll feel.

The Whole Food Plant Based Diet combats climate change because meat and dairy production extract a heavy toll on the environment.

To read more about this connection:

EAT-Lancet: <https://eatforum.org/eat-lancet-commission/>

Meatless Monday For The Environment ([meatlessmonday.com](http://meatlessmonday.com))

## KOREAN SOFT TOFU SOUP

Ingredients:

One BCD soft tofu soup packet  
Half of a Mexican Squash  
Korean chili powder paste (Gojuchang)  
Half of a golden brown potato  
4 cloves of garlic  
Sesame Oil  
Half of a yellow onion  
Enoki Mushrooms (optional, but my favorite)

Directions:

In a pot, add about 2 tablespoons of sesame oil. Once the oil is hot, add in your potatoes to brown. Once the potatoes are about half-way cooked, throw in the onion and garlic for about 2 more minutes. Add about 1.5 liters of water to pot. Add 1 tablespoon of gojuchang to water. Add 2 tablespoons of gochugaru. Add in BCD seasoning packet. Bring water to boil for about 10 minutes. Add in mexican squash, enoki mushroom, and tofu and let it boil for another 5 minutes.

Enjoy!



Thank you Vivian Kim!

Beans and Climate Change: <https://www.fao.org/3/i5426e/i5426e.pdf>  
Environmental Working Group: <https://www.ewg.org/consumer-guides/ewgs-quick-tips-reducing-your-diets-climate-footprint>.

Chef Molly Beverly is a food activist, teacher, caterer, food coach, chair of Slow Food Prescott, Governor of Slow Food Arizona, and former chef of Crossroads Café in Prescott.

# AZ CHALLENGES, AZ SOLUTIONS

## Making a difference at the Arizona Capitol

by Sandy Bahr



Students from Westwood & Brophy High Schools making their voices heard to protect their future, photo by Jordan Gorla

On February 7th, more than 250 people came to the Capitol from communities throughout Arizona to meet with legislators and hear from a great line-up of speakers, including Representative Stephanie Stahl-Hamilton, Senator Priya Sundareshan, and Nicole Horseherder, all of whom spoke about the need to address the climate crisis. Westwood High School Environmental Club members Nalani Spitzel and Leiny Vidal Diaz and Sergio Arvizu-Revera from Brophy High School joined the speaking line-up with compelling comments on the need to act to protect their future.

More than 40 groups participated in Environmental Day at the Capitol, our annual lobby day. Groups had informational tables and 15 individuals served as team leaders for the legislative teams.

There were more than 40 meetings with legislators that focused on **our environmental priorities**, including water, democracy, climate and clean and energy. Both participants and legislators committed to setting up additional meetings with legislators both inside and out the Legislature.

Thanks to everyone who participated. We look forward to seeing you again at the Capitol next year and many times in-between. If you missed this year's Environmental Day, please consider joining us another day at the Capitol. More people speaking up is always welcome and needed. You can also watch parts of this year's Environmental Day on Facebook.

*Sandy is the Director of The Grand Canyon Chapter of the Sierra Club*



Sandy Bahr addressing the gathering, photo by Jordan Gorla



Rep. Oscar De Los Santos focusing on water, democracy, climate and clean energy, photo by Jordan Gorla



Legislative District 4 event attendees meeting at the Capitol to meet with their district's representatives, photo by Karen Michaels



Vania Guevera from Chispa AZ speaking at the "Trees for Kids" press conference, photo by Jordan Gorla.



Sierra Club Grand Canyon Chapter team & volunteers, photo by Jordan Gorla



Chispa AZ team at their booth at Environmental Day, photo by Jordan Gorla

## Seed Libraries: Sowing Seeds in the Community

by Rebecca Hinton



Seed Library Offerings at The Copper Queen Library, Bisbee, photo by Rebecca Hinton

In the last couple of years you may have noticed neighborhood seed libraries similar to book libraries popping up or in your local public library. Seed libraries combine two things I love: seeds and libraries! And, what's better than a pack of seeds to spark hope of plants to come, fun digging in the dirt, and sharing the bounty? Seed libraries can benefit the community by providing seeds that grow well in that region, allowing folks to grow their own food, and encouraging learning centered around saving and sharing of seeds in our unique desert climate, a practice that's been around for more than 12,000 years.

Seed libraries' rules vary at each location. The seed library will allow anyone with a library card, or in some cases, a student id, to "check out" a certain number of packages of seeds each month just like a book or DVD. For Cochise County, library card holders can pick out up to 10 packages/per month at the Bisbee location. These were found organized and labeled, complete with instructions, in an old card catalog. With seed libraries, there is no expectation that the borrower return any seeds. However, the seeds are supplied and packaged up by volunteers and their donations, so sharing the bounty the plants may produce, from the healthiest of plants, is encouraged and welcomed to maintain the stock. The amount and type of seeds available depend on active volunteers, donations, growing successes,

and the time of the year.

To learn more about the Copper Queen Seed Library and Arizona native seeds visit Native Seeds. To see if your local library has a seed library and get further information about its rules, visit them online or in person.

*Rebecca is Chair and head of Programs for the Palo Verde Group*

## Nature

Mountains and valleys for as far as the eye can see  
 Lush and green with foliage  
 Rivers and streams flowing freely and swiftly  
 The water clean, clear and bright

White tailed deer running and jumping  
 Small furry animals scurrying about on the forest floor  
 The beautiful song of a blue jay singing off in the distance  
 While a hawk circles the sky in strategic patterns

The bright yellow rays of the morning sun streak down  
 As the damp mist of the night burns away  
 A man arises from a peaceful sleep  
 To appreciate nature and all its beauty

The oaks stand proud and tall among the trees of the forest  
 While the maples are loved by all  
 But it's the native white pines that are his favorites  
 Along with the perennial pitch pines of the south

These fragile environments are truly precious treasures  
 Yet threatened ecosystems one and all  
 The steward labors relentlessly in the preservation of what is  
 But the responsibility of what can be rests with us all

Grand Canyon National Park, photo by Alicyn Gitlin

Richard Puglisi is a retired IT professional that has returned to writing after a forty-year absence.

## Hiking Guidelines

The Sierra Club is a nationwide organization with active local outings for members and non-members. Please join us as we make friends and explore life-enriching interests. Simply find an outing by date and contact the leader for directions, reservations, time, and additional information. RESTRICTIONS: NO FIREARMS, RADIOS, OR PETS (unless noted otherwise). Outings are by reservation. Call early (group limit 20)

- Each hike is rated for degree of difficulty and risk by the leader.
- "A" >16 miles or >3,000 ft. elevation change (EC)
  - "B" 8-16 miles and 1,500-3,000 ft. EC      RT Round Trip
  - "C" 3-8 miles and 500-1,500 ft. EC      OW One Way
  - "D" <3 miles and 500 ft. EC

The trip leader has absolute authority to question trip participants as to their equipment, conditioning, and experience before and during the trip. All participants on Sierra Club outings are required to sign a standard liability waiver. If you would like to read the liability waiver before you choose to participate in an outing, please go to <http://content.sierraclub.org/outings/local-outdoors/resources> or contact the National Outings Dept. at 415-977-5528 for a printed version. Sierra Club liability covers leaders only. Each person is responsible for his/her own first aid equipment. If you are injured, notify the leader immediately. If you leave the trip, with or without the leader's permission, you are considered to be on your own until you rejoin the group. Hikers are encouraged to carpool and share the driver's fuel expense. Donations are accepted from all participants at \$1 (member) and \$3 (nonmember).

Money is collected by the leader and deposited with the group treasurer. For more information, contact the Sierra Club Grand Canyon office at 602-253-8633. Hikes and outings are also listed online at <https://www.sierraclub.org/arizona/events-activities>. CST 2087766-40. Registration as a seller of travel does not constitute approval by the State of California.

## Beyond the Slab

-- CELEBRATING OVER **30 YEARS** OF PUBLISHED ECO-AWARENESS !

By Greg Pentkowski

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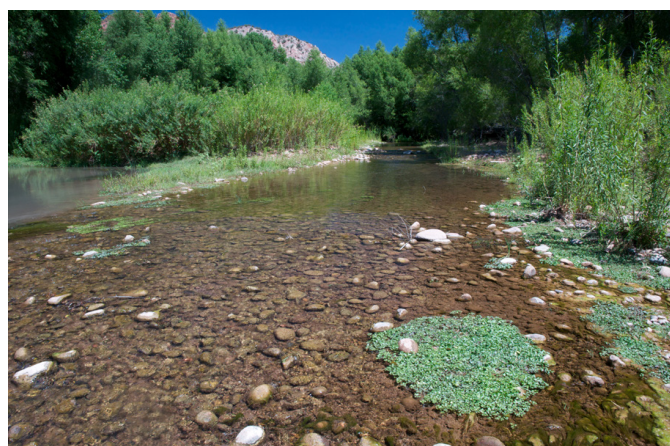
## Explore and Enjoy Arizona

**APR 23–28 (SUN–FRI) Green River Canoe.** It is time for a spring canoe trip down the Green River in Utah. Spend five days on the water paddling through the beautiful labyrinth canyons of the Green River. We start on April 23 with a night in Moab. On April 24, Monday, we get on the water and paddle until Friday the 28th. The outfitter brings us back to Moab. For further details as to price and what to bring please contact Jo Sylvester at [stitchinjo@yahoo.com](mailto:stitchinjo@yahoo.com). Or call. 602-292-6806. Limit 10 people.

**MAY 13 (SAT) “D”. White Spar Short Loop Day Hike (2.4 miles OW, 265 EC).** Walk under cool pines in this forest hike in the hills above White Spar Campground in Prescott National Forest. For reservations and more information contact outings leaders Jimmy Castro [jimmygordoo1@gmail.com](mailto:jimmygordoo1@gmail.com) 928-499-7396, or Jenny Cobb [cobbsrun@msn.com](mailto:cobbsrun@msn.com) 928-925-1320.



Green River, Utah. Photo by Bob Wick 2019



Sycamore Creek near the confluence with the upper Verde, photo by Gary Beverly

**MAY 20 (SAT) “B” Sycamore Creek to Railroad Draw (4 mi, 600 feet EC OW) 9 AM–5 PM.** We’ll hike up the Verde River 3 miles through the riparian forest, pausing for outstanding views of the red rock Verde Canyon, exploring a historic homestead, and search for osprey, bald eagles, blackhawks, and great blue herons. There is no trail but the walking is easy. Occasional shallow wading is required, and it’s fun to get your feet wet. Bring your camera. We’ll learn about the natural history of and the conservation issues surrounding the Verde River, which is particularly threatened by groundwater pumping that will eventually transform the upper Verde into a dry wash, destroying the riparian habitat of nine threatened and endangered species. You may ask for photos of the area. Reservation required at <https://www.sierraclub.org/arizona/events-activities>. 12 hiker limit. Contact Gary Beverly at [gbverde99@gmail.com](mailto:gbverde99@gmail.com) (email preferred) or call 928-308-1003. Prescott

**JUNE 17 (SAT) “B” Bear Siding to Perkinsville Bridge (7 mi, 100 feet EC OW) 8 AM–5 PM.** After shuttling vehicles (2WD, 12 mi), we’ll bushwhack down the Verde River 7 mi through a very pretty and wild part of the river. There is no trail: be prepared to push through the brush and wade the river. This will be a long day in the wilderness, but there is outstanding scenery, photography, and other remarkable features. Frequent shallow wading required. Bring your camera. We’ll learn about the natural history of and the conservation issues surrounding the Verde River, which is particularly threatened by groundwater pumping that will eventually transform the upper Verde into a dry wash, destroying the riparian habitat of nine threatened and endangered species. You may ask for photos of the area. Reservation required at <https://www.sierraclub.org/arizona/events-activities>. 12 hiker limit. Contact Gary Beverly at [gbverde99@gmail.com](mailto:gbverde99@gmail.com) (email preferred) or call 928-308-1003. Prescott

**JUN 24 (SAT) “C” Woodchute Wilderness Trail 102 (4.6 miles RT, 600 EC).** The name of this mountain and trail reflects the history of logging timber to shore the mines in nearby Jerome. They transported the logs by way of a chute extending down the north side of the mountain to loading platforms for the narrow-gauge railroad that served Jerome. There are magnificent views and an ancient juniper tree. Bring your lunch/snacks and cameras for photo ops. For reservations and more information contact outings leaders Jenny Cobb [cobbsrun@msn.com](mailto:cobbsrun@msn.com) 928-925-1320, or Jimmy Castro [jimmygordoo1@gmail.com](mailto:jimmygordoo1@gmail.com) 928-499-7396.



Bushwhacking and wading down the upper Verde River, near Sandtrap Tank, photo by Gary Beverly