

SERCAL



Ecesis

California Society for Ecological Restoration Quarterly News Journal

Increasing the Diversity of People and Ecosystems through Restoration *by Joanna Tang¹*

An overarching goal of ecological restoration is to increase diversity (Brudvig 2011; Gann & Lamb 2006; Ruiz-Jean & Aide 2005). Why is diversity important? Diversity brings more complexity to a system. Just think of a tropical forest ecosystem, with its multilayered vegetation canopies, lush undergrowth, and fungus communities teeming with microbes, food webs comprised of suites of endemic species, and particolored birds of paradise (both floral and avian!). Constructing these complex systems is the Holy Grail of restoration, but also presents a quandary: How do we successfully restore every aspect of such a complex system? This is the great challenge of restoration, but it is an exciting challenge that can bring the best out of us.

We know from theory and empirical evidence that biodiversity is beneficial for ecological outcomes. Fundamental ecological theory posits that increased biodiversity results in higher ecosystem functioning due to niche complementarity (Loreau & Hector 2001; Figure 1).

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Many thanks to the contributors of this issue — a roundup of some of the most popular presentations at SERCAL 2021.

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Above: Diversity planting diversity: Interns Alma Topete and Eva Schoenholz (from left to right) sowing native seed into an urban vernal pool restoration site, 2019. *Photo courtesy Joanna Tang*

Increasing the Diversity of People and Ecosystems through Restoration *continued*

Niche complementarity is the idea that species with different traits occupy different niches, which allows each species to use different resources in different ways. This niche differentiation decreases competition and allows the community to sequester resources more completely (Loreau & Hector 2001). For example, polycultures of grassland plant species with varying rooting depths can sequester water throughout the soil profile and thus achieve higher primary productivity than monocultures (O’Keefe, Nippert, & McCulloch 2019). Increased diversity also increases the probability of facilitative symbioses wherein one species benefits another species (Loreau & Hector 2001). This allows the community to perform at a higher level than expected based on individual species’ performance (Loreau & Hector 2001). For example, a diverse grassland including nitrogen-fixing species can increase the productivity of the entire community (Wright et al. 2017).

Diversity is valuable because it can benefit the functioning and productivity of a system. Can the same principles be applied to the human dimension of ecological restoration (Figure 1)? Is stakeholder diversity beneficial to restoration management outcomes? Stakeholder diversity, or the variety of people who are actively involved in conservation and restoration, has historically been very low. A report on The State of Diversity in Environmental Organizations by the Green 2.0 Working Group surveyed 191 non-governmental conservation and preservation organizations to find that 88% of paid staff were White (Taylor 2014). Moreover, 62.9% of board members were male. Even in terms of outside paid staff, only 7 of the 191 organizations reported working with minority volunteers. Furthermore, minoritized communities are not equitably served by nature spaces. For example, Weber & Sultana (2013) reported that 93.4% of National Park visitors identified as White. Historical redlining has also resulted in minoritized communities living in areas with minimal greenspaces and disproportionately exposed to environmental hazards (Nardone et al. 2021). Thus, lack of diversity and inclusion in ecosystem management has negatively affected societal outcomes, and the human-nature relationship has been broken in many communities. Can embracing diversity heal these relationships, and even improve ecological restoration outcomes?

The opportunities presented by embracing diversity beg further inquiry. For example, doing restoration in urban areas provides

opportunity to increase both biodiversity and the diversity of the people involved in restoration. Cities are often seen as spaces depleted of biodiversity, but cities are hubs for stakeholder diversity. The 2010 Census of the City of Los Angeles revealed that only 28% of the population identified as White (U.S. Census Bureau 2010). Doing restoration in cities allows us to tap into this hub of diversity. National Parks and other traditional “wilderness areas” are inherently less accessible, being separated from dense human populations, and thus become places of privilege. In contrast, urban restoration projects provide a more equitable and accessible opportunity for a greater diversity of people to both benefit from and contribute to biodiversity.

Vernal pool ecosystems present a unique opportunity for urban restoration. Vernal pools are seasonally-flooded, isolated wetlands. In California, water pools atop a subsurface impermeable soil layer during cool, wet winter months. As the pools dry up throughout the spring, a suite of endemic flora and fauna grow and reproduce quickly before the pools dry out completely during warm, dry summer months. Over 95% of California’s vernal pool ecosystems have been lost, largely due to urbanization (Barry 1998). Vernal pools often exist within flat landscapes such as grasslands, which are also prime areas for urban development. Paradoxically, remnant vernal pools in grassland ecosystems face invasion pressure from exotic annual grasses that have overrun California’s grasslands. So, if vernal pools historically existed where our cities are today, and face the threat of invasion when restored in grassland ecosystems, can they be restored within our cities?

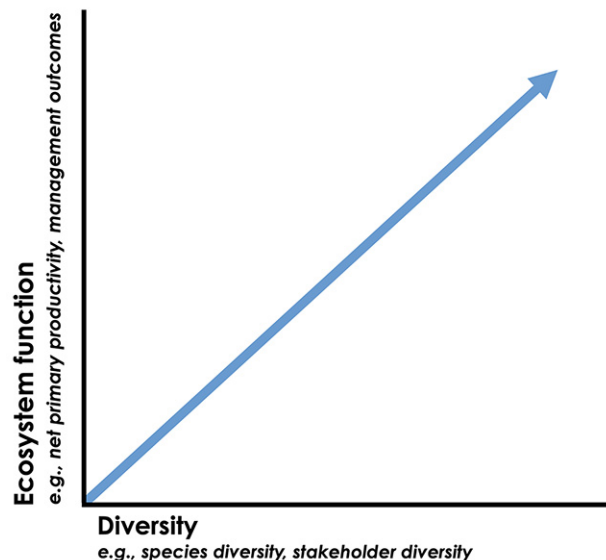


Figure 1: Biodiversity-Ecosystem Function theory predicts a positive relationship between species diversity and primary productivity. I hypothesize that the same conceptual framework can be applied to the human dimension of ecological restoration, which would suggest a positive relationship between stakeholder diversity and management outcomes. (Joanna Tang 2021)

My dissertation research investigates the diversity of urban vernal pool restoration projects at the University of California, Santa Barbara (UCSB). UCSB’s campus is built atop historical vernal pool habitat, and scientists at UCSB have been restoring vernal pools for the past 35 years. I began my research by assessing the plant diversity of restored vernal pools, which has led me to collaborate with staff at UCSB’s Cheadle Center for Biodiversity & Ecological Restoration and to involve over 25 interns in my restoration work. It is such a joy to introduce my interns to these endangered, charismatic ecosystems that are being restored in their own backyards. I am able to offer flexible hours, thorough training and mentorship, and stipends funded by campus fees to accommodate interns

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“It is such a joy to introduce my interns to these endangered, charismatic ecosystems that are being restored in their own backyards. I am able to offer flexible hours, thorough training and mentorship, and stipends funded by campus fees to accommodate interns from different backgrounds, levels of experiences, and circumstances.”



Figure 2: My interns, Patty Park, Emily Chu, and Alyssa Jain (from left to right), sowing native seed into an urban vernal pool restoration site, 2021. Photo courtesy Joanna Tang

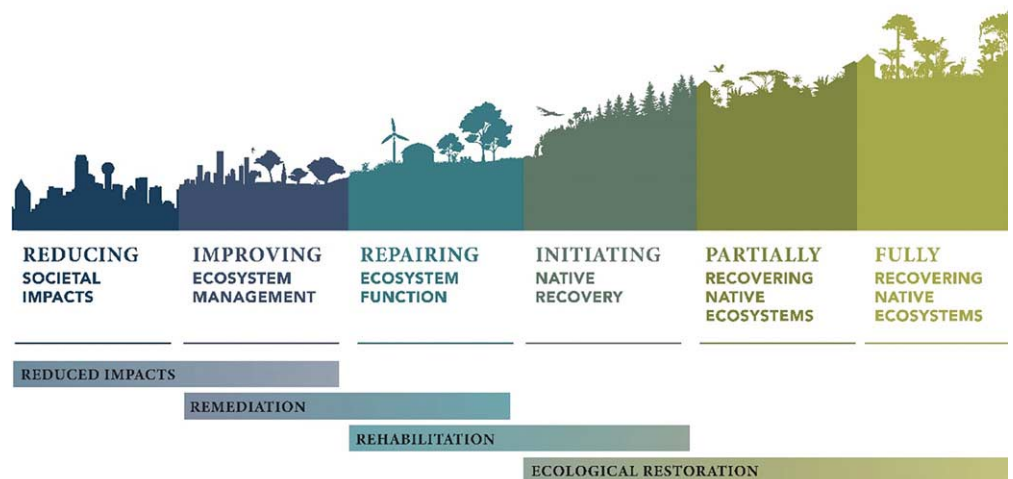
Increasing the Diversity of People and Ecosystems through Restoration *continued*

from different backgrounds, levels of experiences, and circumstances. UCSB is also a Hispanic-Serving Institution, providing me the opportunity to involve a greater diversity of students in research and restoration work. While my other colleagues have to organize camping trips to perform their fieldwork, my interns and I can easily walk or bike to urban field sites after class. I love watching their appreciation for their surrounding environment grow as my interns learn more about the unique biodiversity of vernal pools. I captured the moment when my interns sowed native seeds in a restoration site (Figure 2), which perfectly highlights the reciprocal relationship between people and nature: diversity planting diversity. What a beautiful picture of the socioecological system.

Unfortunately, the social and the ecological systems are often separated, and urban restoration is often spurned as a challenge or relegated to “remediation projects,” on the “lower end” of the SER continuum of restoration activities (Gann et al. 2019; Figure 3). However, this contrast between urban projects and “fully recovering native ecosystems”, on the “higher end” of the

continuum, is a false dichotomy. Urban ecosystems are different, but these differences may not be inhibitive challenges for full-ecosystem restoration.

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The Restorative Continuum includes a range of activities and interventions that can improve environmental conditions and reverse ecosystem degradation and landscape fragmentation. The continuum highlights interconnections among these different activities, and recognizes that the specific characteristics of the locality slated for restorative actions dictates the activities best suited for different landscape units. As one moves from left to right on the continuum, both ecological health and biodiversity outcomes, and quality and quantity of ecosystem services increase. Note that ecological restoration can occur in urban, suburban, agricultural, and industrial landscapes.

Figure 3: SER’s continuum of restorative activities (Gann et al. 2019). Iconography shows urban cityscapes relegated to reducing impacts and remediation activities, in contrast to “fully recovering native ecosystems.” This presents a false dichotomy between urban ecosystems and fully-functioning ecosystems.

Increasing the Diversity of People and Ecosystems through Restoration *continued*

For example, the urban matrix presents a host of unique site conditions, such as small parcel size. These small sites may not seem to have much ecological potential. Some studies have shown that small sites are unable to host high biodiversity, but these studies were based off of forest ecosystems (Echeverría 2007). Small sites may not be suitable for forest restoration, but there is a diversity of other ecosystems ripe for restoration. I performed a vegetation survey of vernal pool ecosystems of varying sizes and found that vernal pools in smaller parcels actually maintained the highest native cover (Figure 4).

The unique conditions of the urban matrix may not necessarily be constraining challenges; indeed, they may provide opportunities. Vernal pools may be the perfect match for capitalizing upon these opportunities because vernal pools can benefit from small parcel sizes. Because vernal pools are isolated wetlands, they are essentially self-contained “mini-ecosystems” that can be imported into the urban matrix. Although swathes of interconnected pools do provide landscape connectivity, a single pool does not necessarily require landscape connectivity to function in its own. This means that a small 10m-diameter vernal pool can be constructed in a backyard. Although urban backyards often suffer from heavily compacted substrate, this compacted substrate actually provides the impermeable layer needed for a vernal pool to pool up. Vernal pool plant seeds and invertebrate eggs can be sprinkled on some topsoil; just add water, and they begin to germinate! Vernal pools are charismatic ecosystems that can greatly enhance the native biodiversity of cityscapes due to their associated endemic species. In this way, UCSB has constructed vernal pools within

dormitory complexes and faculty housing (Figure 5). Moreover, these constructed vernal pools maintain high native cover *because* they are surrounded by an urban matrix, in lieu of an invaded grassland matrix that threatens native populations. Contrary to the urban matrix inhibiting restoration, characteristics of the urban matrix can benefit vernal pool restoration projects.

Moreover, vernal pool restoration projects can benefit the urban matrix. Wetland ecosystem services, such as stormwater management and carbon sequestration, can directly benefit neighbors of urban vernal pool sites.

Vernal pools within housing complexes can reduce flood risk and the urban heat island effect. This also highlights the reciprocal relationship between humans and nature. UCSB’s restoration sites are stewarded by a diverse local workforce, including students, local practitioners, scientists, and community volunteers, and all of these people get to both take part in ecosystem management and enjoy the ecosystem services. SER even recognizes that principles underpinning ecological restoration include engaging with

stakeholders and drawing upon many types of knowledge (Gann et al. 2019). After all, drawing from different perspectives and pools of knowledge can lead to greater resource sequestration: Working with a variety of people and collaborators has allowed me to expand the scope, scale, and impact of my restoration projects. Community members harbor local ecological knowledge and traditional ecological knowledge that are crucial for understanding how to restore local sites, and I am constantly inspired by learning

different ecological customs and environmental values of different cultures. I have learned that indigenous tribes even took advantage of exotic grass monocultures, harvesting wild oats to make flour.

I was born in California, but as a Chinese-American, I am not “indigenous” to California. Am I an invasive species? Do I belong in restoration projects? Do restoration projects belong in cities? Do humans only belong in cities? Like everything in ecology, I do not

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Although urban backyards often suffer from heavily compacted substrate, this actually provides the impermeable layer needed for a vernal pool to pool up. Vernal pool plant seeds and invertebrate eggs can be sprinkled on some topsoil; just add water, and they begin to germinate!

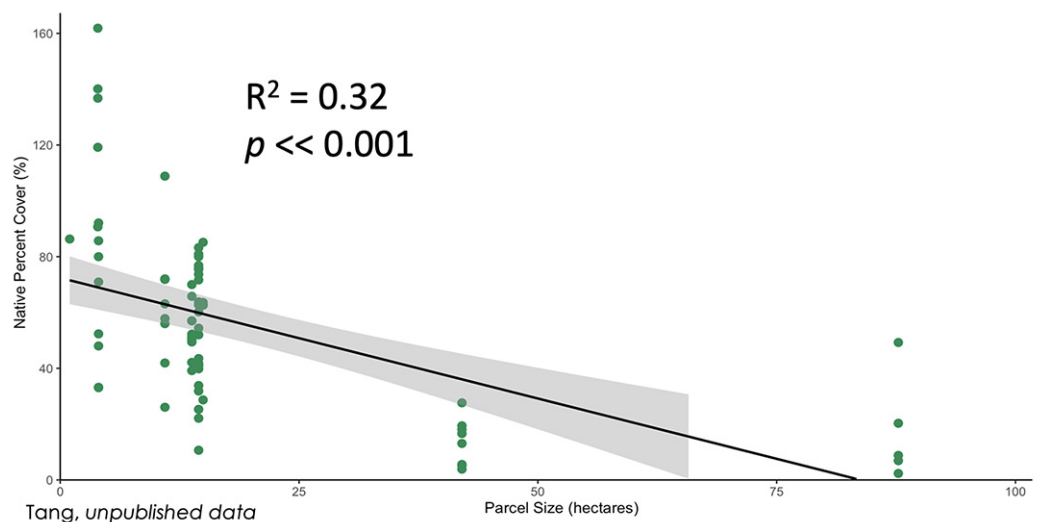


Figure 4: Total native plant cover of UCSB’s restored urban vernal pools. Shown with a linear regression and 95% confidence intervals. (Joanna Tang 2019)



Figure 5: Restored urban vernal pool in the “backyard” of a UCSB dormitory. The surrounding urban hardscape minimizes exotic annual grasses and allows native cover to remain high within the small pool, 2019. Photo courtesy Joanna Tang

Increasing the Diversity of People and Ecosystems through Restoration *continued*

believe that the answers to these questions are black-and-white. Yet, I believe that a mindset of inclusivity can help us answer these questions. After all, including diversity and complexity in systems can benefit functioning and productivity and foster facilitative relationships. A diversity of species and ecosystems call Earth their home. Including a diversity of people and perspectives in restoration work gives them a sense of belonging in the biodiverse ecosystems they restore and live in. Perhaps we cannot restore a forest in every city, and perhaps I do not belong in the middle of a California desert, but if we listen to the landscape and listen to each other, then perhaps we can find more opportunities, like urban vernal pools, where we do belong. My appeal to us all is to see this work not just as a challenge, but as an opportunity.

Acknowledgements

I would like to thank my advisor Dr. Carla D’Antonio and my colleagues in the D’Antonio VEG Lab, as well as Dr. Lisa Stratton and her restoration staff at the Cheadle Center for Biodiversity and Ecological Restoration, for showing by example the power of diversity in restoration work, for their mentorship and support, and for their help conducting vegetation surveys of vernal pools referenced in this article. I would like to thank UCSB, the Associated Students Coastal Fund, the Undergraduate Research & Creative

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Meet the Contributing Member: **Joanna Tang**

Occupation: Doctoral student, University of California, Santa Barbara.

County of residence or work: Santa Barbara County.

How long have you been a member of SERCAL? 3 years.

What is the biggest benefit of your membership? The community is wonderful. It's so inspiring to learn from and network with people who love nature and science, and who are on the ground saving the world one plant at a time.

What do you like best about the SERCAL conferences?

Networking with academics, practitioners, and students and learning from their successes and failures is so helpful.

What is your specific discipline (or underlying education)?

I study urban restoration ecology. I'm a plant ecologist by training, and I research strategies to restore self-sustaining native plants in the face of exotic invasion and climate change. Currently, I focus on restoring vernal pool ecosystems.

What services do you provide for restoration in California, or what is your restoration passion? My motto is, I want every experiment I do to be an active restoration project, and my hope is that every



restoration project is designed with scientific methodology so that experimental conclusions can be drawn from each project. Currently, I'm doing an experimental restoration of South Coast urban vernal pool habitat. I'm passionate about empowering the next

generation to restore nature and to restore the human-nature relationship.

How did you get into the field of ecological restoration? I grew up in the Bay Area with weekend family bike rides being the staple of my childhood memories. I've always felt called to steward the beautiful nature surrounding us, and restoration is an empowering and gratifying way to help solve the major environmental issues the world is facing today.

What is your favorite California native species? *Castilleja densiflora*.

Any advice for others in the field of restoration? Collaboration is

the key to success. We understand that complex ecological networks create healthy ecosystems, so complex social networks can create healthy socioecological systems. Scientists, practitioners, local community, indigenous tribes, private and public sectors, young and old, we are all bound together by our love for nature and our love for each other.

Increasing the Diversity of People and Ecosystems through Restoration *continued*

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Student Co-Coordinator recruits interns and leads their peers for a full academic year or more.

Bringing Habitat Home through Leadership and Mentorship

by Rachel Davis¹ Photos courtesy the author.

Land stewardship is a unifying ambition across cultures throughout the world. Restoration work in California is reaching new levels of innovation and collaboration through partnerships across organizations. Students, community members, practitioners, and researchers bring their skill sets to the field and achieve landscape-level change. While these skill sets are diverse, cultivating opportunities for leadership and mentorship will only enhance our ability to achieve sustainable land management.

Looking back on my early career, my goals in habitat restoration focused on efficiency, perseverance, and getting the science “right.” When I started supervising student and staff employees, I was more aware of the impact of shared knowledge and training. My goals evolved into: 1) Linking the ecological and cultural values of natural

systems, 2) Valuing an individual’s ability to make positive change, and 3) The importance of co-creation.

At the UC Davis Arboretum and Public Garden, I have opportunities to apply these new goals. Our landscapes feature California native plants and drought-tolerant, climate-ready plants from around the world. There are no gates or admission fees so students and visitors get free access to the Arboretum and the Putah Creek Riparian Reserve. Our programs encourage the community to engage with our open spaces and transform their neighborhoods into sustainable gardens that function as habitat corridors. Our **Learning by Leading™ internship program** offers opportunities for students to join teams and partner with staff mentors to gain leadership skills and real-world experience to address the earth’s most important environmental issues like sustainability, restoration, and literacy issues. Experienced student co-coordinators lead a team of interns

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Figure 1. Learning by Leading™ students learning plant identification while weeding and seed collecting.



Figure 2. Research to Retail: Annual Wildflower seed packets curated from UC Davis research trials for pollinator attractiveness.

Bringing Habitat Home through Leadership and Mentorship *continued*

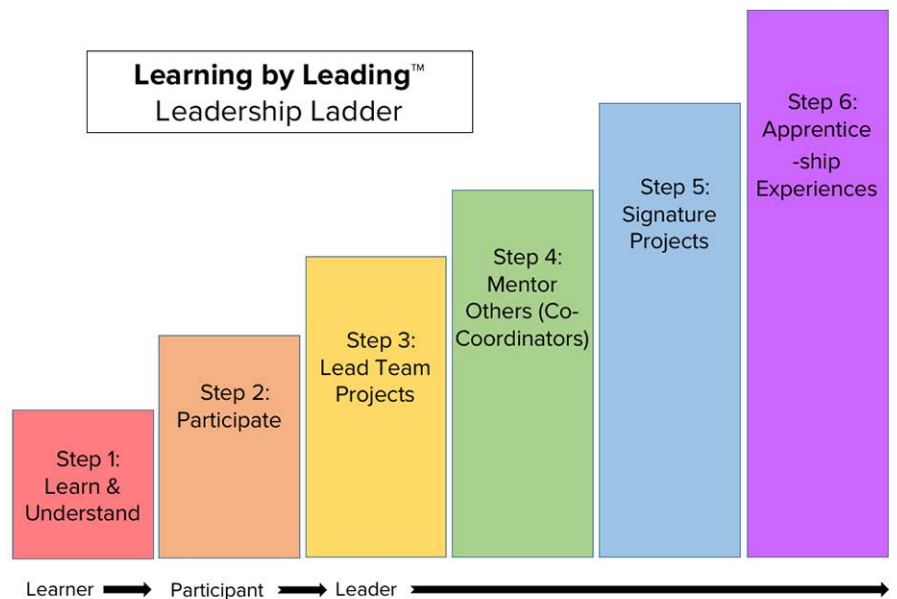
while staff mentors oversee and advise the internship program. As students gain experience, they can move up the leadership ladder towards apprenticeships and signature projects that cater to their future career goals. Our organization is a strengths-based team that is guided by Gallup StrengthsFinder. Staff mentors are aware of each other's strengths, so if a student from one team might gain insights from a different staff mentor, we actively connect them to build a stronger network of support.

On the **Habitat Horticulture** Learning by Leading™ team, interns learn about native plants and local pollinators to investigate each species' role in the ecosystem. We consider agricultural and urban influences and problem-solve ways to resolve negative impacts. Interns apply these findings by planning and maintaining the habitat gardens accordingly (Figure 1). Students gain hands-on skills in site stewardship and learn how to communicate project goals to the public. While students have access to innovative faculty research, the data may be hard to translate to the public. The Habitat Horticulture team

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By linking the ecological and cultural values of natural systems, programs like ours are creating habitat for local pollinators like this male sunflower bee sleeping on *Encelia californica*.



Bringing Habitat Home through Leadership and Mentorship *continued*

developed a “Research to Retail” initiative to make this critical research accessible and practical to a broader audience. One of our “Research to Retail” projects collaborates with the pollination ecology Williams Lab (Figure 2). The lab produced a paper on **Identifying native plants for coordinated habitat management of arthropod pollinators, herbivores, and natural enemies**. Students analyzed the numbers, selected species with high biodiversity attractiveness, designed a wildflower meadow, and sowed the seeds in a high visibility area in the habitat gardens. We also curated select species from this list with wholesale seed availability to sell at our seasonal plant sales. Students spoke to customers about the research project, the benefits of biodiversity, and sustainable landscaping. (photo with native wildflower seeds banner)

Additionally, we constantly observe the plant selection patterns of our customers. New gardeners and customers who rent or have limited yards only buy one plant or just succulents. Many of these customers go straight for the indoor plants from our Botanical Conservatory. To help ease these limitations, interns were excited to introduce Potted Plants for Pollinators. The Habitat Horticulture team curates planting designs for 14-17” diameter pots that included thriller, filler, and spiller plant species. Each plant supports local pollinators and the designs focus on biodiversity attractiveness and seasonality of bloom. Interns speak to customers about habitat corridors within the urban environment, garden accessibility for all, and how anyone can support habitat at home (Figure 3).

While the above examples showcase a campus setting, the workplace is an even greater opportunity for learning and growth. Career and project mentorship ranges from plant identification, skill demonstrations, and establishing a work ethic to communicating well with your team, valuing input, and distributing leadership opportunities. As a mentee grows, a mentor’s role could point them to a bigger network, or find a new or additional mentor. Sometimes this role is seasonal, while long-term mentorship might depend on the right fit. Investing in community building through mentorship provides perspective and ownership and functions as a strategic recruitment tool to usher in the next generation of practitioners and researchers.

Let’s keep the momentum going from the recent SERCAL conference! It is such a great place for students, community members, practitioners, and researchers to learn and network. I found my first job through the SERCAL job list and I encourage you to seek out enthusiastic “field-tested” recruits through programs like **UC Davis’ Learning by Leading™ program** and **UC Santa Barbara’s Cheadle Center for Biodiversity and Ecological Restoration**.



Figure 3. Potted Plants for Pollinators: Learning by Leading™ students offering insights on container gardening that support local biodiversity.

A Tale of Two Co-Coordinator

Recruiting my first Learning by Leading™ student co-coordinators was a really fun endeavor. I tried to approach interviews without biases, make sure the students knew basic content and were motivated. My top four candidates all ended up knowing each other and I allowed my number one choice (Alpha) to weigh in on who they thought would be the best fit. Their preferred co-coordinator (Bravo) was very quiet and nervous during the interview, despite their stellar qualifications. Alpha had recently completed a group project with Bravo, and Alpha's input solidified a good choice. After both of them were selected for the positions, we got to know each other better and discovered that we were all introverts, transfer students, had several overlapping top 5 Gallup StrengthsFinder strengths, and had birthdays in early March! Again, I TRIED not to have any biases!!

I hired these students early in the year, with the expectation that they would recruit and have a full team by October. We worked side by side in the field, I sent them to Learning by Leading™ program trainings and had them practice their communication skills at outreach events like the California Honey Festival. We found a good balance.

However, once we had our intern team in the Fall, Alpha struggled with the weight of leadership. They were intimidated by the responsibilities and not confident that they could perform their duties well. They also had some hard things happening in their personal life and admitted that our

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Meet the Contributing Member: Rachel Davis

Occupation: GATEways Horticulturist/Museum Scientist for UC Davis Arboretum and Public Garden.

County of residence or work: Yolo County.

How long have you been a member of SERCAL? 10 years (but not a member the whole time).

What is the biggest benefit of your membership? SERCAL has been a great source of shared knowledge.

What do you like best about the SERCAL conferences? I like to hear from practitioners and researchers alike. Hearing all the different perspectives is helpful when I'm planning projects and directing/mentoring students in their careers.

What is your specific discipline (or underlying education)? Working in coastal ecosystems was the focus of my early career but I have transitioned into the wild to urban interface and how we can plan and integrate natural systems.



What services do you provide for restoration in California, or what is your restoration passion? Practitioner and Educator.

How did you get into the field of ecological restoration? I grew up having access to the natural world and valuing its role in our lives. I recognized plants as a great foundation for habitat and loved observing

biodiversity and species interactions. I majored in horticulture with an emphasis in biodiversity and restoration since it was multidisciplinary, had more field studies, and not primarily in the lab. I was able to intern with the National Park Service and US Fish and Wildlife before starting my career within the University of California.

What is your favorite California native species? Always a hard question. Today, it is *Chilopsis linearis*.

Any advice for others in the field of restoration? Be a mentor! Seek out a mentor!.

A Tale of Two Co-Coordinator's *continued from page 11*

shared cultural background made them anxious about sharing feedback and giving input that may challenge an elder or supervisor. Alpha gave it another month after their initial desire to resign. I had check-ins with them and pointed them to campus resources that could support them. I made sure they talked it through with Bravo but they eventually decided to leave the program. I kept in touch and wrote Bravo letters of recommendation after graduation. It was a hard loss for the team.

Thankfully, our remaining co-coordinator was flourishing in their position, using their strengths to lead our team in an exciting, brand-new program. Bravo and I co-created several planting designs that piloted the idea of "building

blocks for biodiversity" in the home garden. They were also involved in initiating Potted Plants for Pollinators and the annual wildflower project. They learned real-world expectations of presenting a project idea to upper management and having to edit and re-edit and eventually not bring a project to fruition. There were lots of lessons learned. We eventually found a new co-coordinator who complimented the team dynamic and we finished out the year. I still collaborate with this premiere team mentee all the time. I've written grad school and reference letters, we compare plant and pollinator notes, we serve on city committees together, and support each other's work. Bravo has guest-lectured for my new crop of interns and we plan to co-create together for future projects in our area.

Restoration and Cultural Fire

by Laura Cunningham¹ Photos courtesy the author.

Downriver on the Klamath, I met a group of locals, Indigenous and non-native, who in the 1990s formed a tribal community-based management plan to restore salmon by gradually reconstructing the ecosystem once managed by the Yurok and Karuk people. “We want to reconstruct the forest,” they told me, and fire was going to play a large role as they moved forward.

Cultural fires shaped the landscape and water along the Klamath River. For thousands of years, tribal fire knowledge kept forests open with large trees, medicinal plants, healthy shrub stands and oak groves, and prairies. After 1911, tribal cultural fire management was banned by the federal government. There is a living oral tradition memory of this exact date. After, forests grew overly thick, oak groves became “buggy,” and many medicinal and basket plants failed to thrive or grow at all. Catastrophic wildfires resulted from fuel build-up. With increased transpiration from thickets of forest saplings, the hydrology of the canyons changed — springs dried up and rivers ran lower.

Historically, Klamath River tribes regularly burned selected areas for many reasons — to ease travel through the forests, to clean up the excess debris, to prevent parasites and insects from building up in the tan oak groves, to burn off the grasses after the wild seed harvest to help next year’s yield, to produce long straight shoots on hazel bushes for basketry material, to stimulate growth of beargrass, to increase berry and hazelnut crops, to build the health of the soil with fertilizing ashes, and to funnel deer and rabbits in game drives. People concentrated in villages along the rivers, going up into the forested ridges to burn, a process that helped open up patches of prairie and early successional shrubs such as ceanothus that deer sought out to browse. Grizzlies and black bears would have used these habitat patches as well (Salter 2004).

Historically, the western Klamath Mountains experienced fires every three to ten years. Fire suppression over the last 100 years, including the prohibition of traditional tribal burning, resulted in a huge fire deficit for the region. Prescribed broadcast burning is a cost-efficient tool for reducing hazardous fuels on pre-treated private lands, and for maintaining these treated areas over time. The Mid Klamath Watershed Council (<https://www.mkwc.org/home>) facilitates strategic restoration planning and hazardous fuels reduction throughout local communities.

continued next page



A young woman on the Klamath TREX 2019 fire crew.

“The ecosystem encountered by Euro-Americans in the mid-19th century had been created by tribal people, largely through the use of controlled, cool burns. This knowledge was derived through close observation of the processes of nature, e. g., fires started by lightning toward the top of a ridge burned down slope cooler than fires which were burning up a ridge. Such observations were then applied to the intentional and purposive management of the land and were fine-tuned over a period of time to include additional considerations such as time of year, humidity, wind and temperature.” — Hillman and Salter 1997

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Restoration and Cultural Fire *continued*

Returning fire to public lands is even more critical, says the Council, since this comprises 95% of the region. The Council is a key member of the collaborative Western Klamath Restoration Partnership (WGRP) which seeks to return fire to the wider landscape. WGRP is a community-based partnership working towards building trust and a shared vision to create fire-adapted communities, and to use traditional ecological knowledge and western science to restore fire regimes and re-create resilient, biodiverse forests.

The Real World of Cultural Fire: Klamath TREX

In October of 2019, I returned to the Klamath River watershed in northwestern California, invited to a special the Klamath Training Exchange (Klamath TREX) for nature journalists — thanks to Nature Journal’s Jack Laws and fire specialist Miriam Morrill. Trained and then outfitted in Personal Protective Equipment, our role was to accompany a fire crew and observe — taking notes and sketching in a journal — how the cultural fire unfolded. The experience was eye-opening.

Cultural fire takes the long view, that fire is a normal part of living in the ecosystem, to be used over time, in regular intervals, to slowly, gradually, take down fuels from dense saplings and downed debris. This was not the mechanized, short-term management view; they did not need chain-saws. I watched from within a few feet as crews used drip torches to light cool, slow-moving surface fires through an overly-dense Douglas fir-tan oak forest. Gray smoke drifted slowly upwards as yellow-orange flames a few inches tall flickered across dead twigs and leaf litter. Fire crews raked the duff away from large, old-growth trees in order to make sure they were unharmed.

Our cultural fire event was carefully planned for the cold fall, when humidity and fuel moisture was high, in order to keep flames under control. In fact, the cultural burn crew had spent a week before we arrived trying to light the prescribed fire to no avail—humidity was too high. Just before we arrived, the air became dry enough and weather perfect to get the flames working.

Margo Robbins, Yurok tribal member and executive director of the Cultural Fire Management Council, led us on a special field trip to see how a prescribed fire from the previous spring had renewed the basketry plants in the understory. Hazelnut shrubs (*Corylus cornuta*) sprouted long shoots, perfect for basketry. Maidenhair ferns (*Adiantum jordanii*), giant chain fern (*Woodwardia fimbriata*), and beargrass (*Xerophyllum tenax*) also sprouted new leaves and shoots after the cultural burn. I learned with interest as I sketched this living example of how California native plant communities benefited from cool-burning Good Fire.



Margo Robbins showing us basketry plant materials collected from a cultural burn.

The tribes encouraged us to use the term “Good Fire” as a counterpoint to the destructive megafires caused by the mismanagement of California’s fire-adapted vegetation communities. Good fire means prescribed cultural fire that is well-planned and controlled.

Research ecologist Frank Lake, with the Yurok and Karok Tribes, then showed us his collection of cultural items. Fire is needed to produce many of the roots, shoots, and dye plants used to make basket items. His beautiful collection of basket bowls, trays, hats, and carriers were all made from fire-dependent plant materials. Lake explained to us, pointing across the Klamath River, how he led a long-term research study reported in 2018 by the US Forest Service Pacific Southwest Research Station, where he found that smoke generated by wildfires can cool river and stream water temperatures by reducing solar radiation and cooling air temperatures.

Lake’s paper, “Wildfire Smoke Cools Summer River and Stream Water Temperatures,” published in the journal *Water Resources Research*, suggests that smoke-induced cooling has the potential to benefit aquatic species that require cool water to survive because high summer water temperatures are a major factor contributing to population declines, and wildfires are more likely to occur during the warmest and driest time of year.

Bill Tripp’s talk with our fire journaling observer group was very illuminating and humbling. The Ecological-Cultural

Restoration Specialist for the Karuk Tribe, Bill explained to us how traditional ecological knowledge is used to focus a refined view under the western scientific framework and better understand the specific functions these traditional processes provide. He pointed to Offield Mountain and down to the River and told us of cultural burning practices thousands of years old associated with the Karuk World Renewal Ceremonies to call the salmon. Being out on the land with tribal experts and seeing these connections profoundly influenced me.

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Meet the Contributing Member: Laura Cunningham

Occupation: California Director at Western Watersheds Project.

County of residence or work: I work in every county in California, and live in the Death Valley National Park region.

How long have you been a member of SERCAL? 2 years.

What is the biggest benefit of your membership? I get to participate in the interesting conference, help mentor students, and participate in an interesting newsletter.

What do you like best about the SERCAL conferences? I've only been to one, on Zoom, but it was diverse, varied, and I learned a lot.

What is your specific discipline (or underlying education)? Native grassland ecological history is my specialty, although I have worked as a wildlife biologist in California, and have a degree in paleontology from UC Berkeley. I am also a self-taught scientific illustrator and author.

What services do you provide for restoration in California, or what is your restoration passion? My passion is to find native grassland remnants, survey them, and try to conserve and restore them. I enjoy using these as reference sites to further understand how to restore California native plant communities.

How did you get into the field of ecological restoration? My long interest in history, cultural Indigenous management of California vegetation, and a desire to conserve the last healthy plants and habitats led me to restoration science.

What is your favorite California native species? Nodding needle grass (*Stipa cernua*) and tufted hair grass (*Deschampsia cespitosa*).

Any advice for others in the field of restoration? Volunteer a lot, read a lot, but most importantly get out into the field and observe, take notes, don't forget the joys of natural history



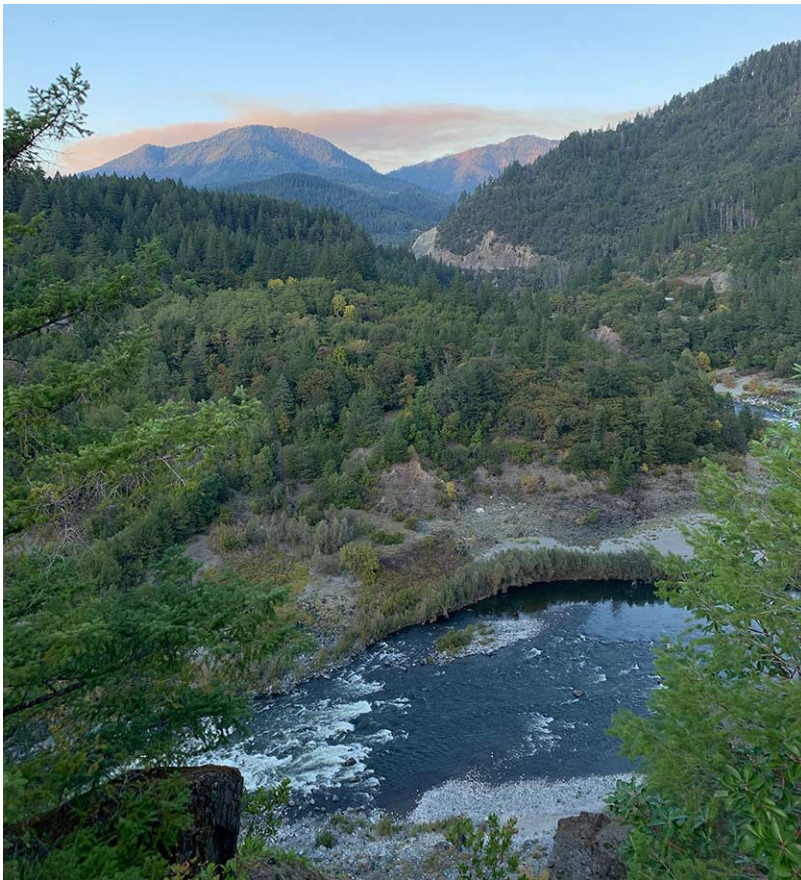
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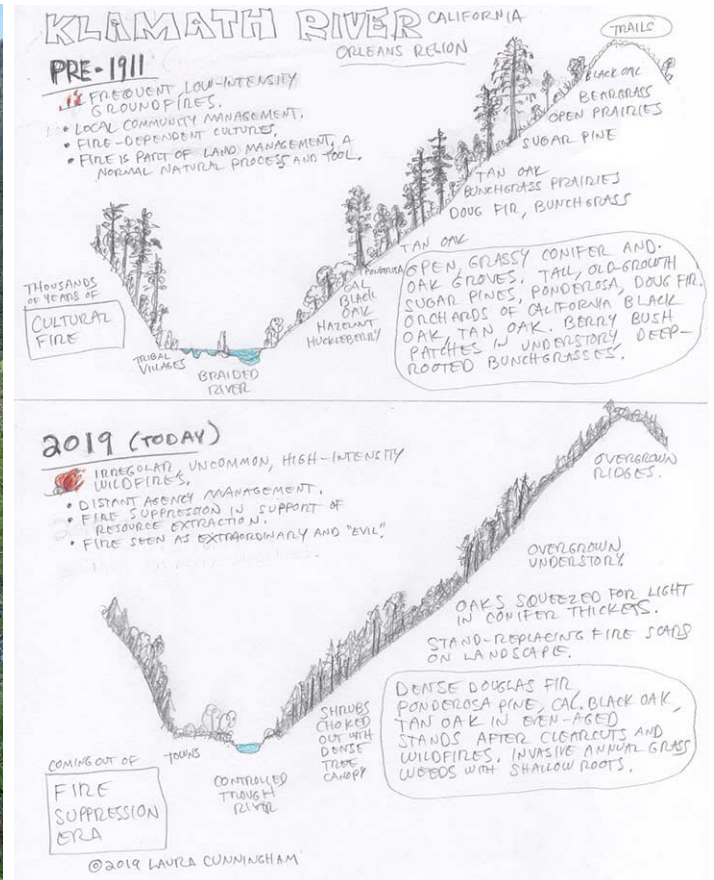
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Smoke from a cultural burn drifting from Offield Mountain over the Klamath River.



Laura's illustration of the current Klamath River watershed and goals of cultural restoration using Good Fire.

Restoration and Cultural Fire *continued from page 15*

I saw that tribal cultural fire management, in cooperation with local communities and agencies, could be the better, more ecological and climate-friendly answer to make healthy soils, reduce wildfire fuels, sequester Carbon, and restore salmonid streams and watersheds. We should look towards working with tribal partners to restore coastal prairies and other fire-adapted native plant communities, and salmon and trout habitat, including at Point Reyes National Seashore, in order to bring back #GoodFire, and lessen the need for ubiquitous livestock grazing.

The Karuk Tribe reviewed our field notes and sketches to approve them to share with the world, in order to better educate people about #GoodFire, and make sure culturally sensitive resources were still protected. We learned so much and now seek to help the tribes further their cultural fire program for California's fire-adapted communities—plant, animal, and human.

Restoring the traditional fire management can help the forests, the prairies, the rivers, and the salmon. A major goal of the tribes is to return indigenous land management practices to areas now under

the control of government agencies such as the U.S. Forest Service. I support their goals.

For more detail and illustrations go to Laura's California Coastal Prairie Blog: <https://coastalprairie.wordpress.com/salmon-and-trout/>.



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At the Klamath TREC that day, I watched the smoke from a cultural burn near the sacred Offield Mountain, as, caught by the winds, it drifted laterally and began to shade the Klamath River. Seeing is believing.

The Last Word: *Listening*

Listening well is about giving up control. It's releasing your perspective, holding back your impulse to speak or prove yourself. It's living in the moment with the person you are listening to and truly feeling their world. — Brendon Burchard

Did you get enough rest this holiday season? I did, and that is why this issue is late-December-ish. ;-)

Although I'm back in the saddle, in deference to my post-hibernation state, I have changed my routine to *listening to* (reading aloud) one poem from Wendell Berry's *The Peace of Wild Things* every morning (thank you, Sarah Phillips!). Just five minutes and I find myself grounded and ready to meet the day.

The intention of actively listening is such a powerful gift. Over four meetings this Fall, the SERCAL Leadership Team was incredibly blessed to gather under the leadership of Nailah Pope-Harden, moving from listening to each other's perspectives about Diversity, Equity, and Inclusion, to conversations addressing how we can create a safe and welcoming space within our community, where:

Everyone's opinions, ideas, and emotions are valued...

Everyone feels that they can speak up to address uncomfortable situations, to create clarity and resolution...

Where the opportunity to participate is accessible for all...

We are unified in our intent and we also realize that our vision is largely limited by our privilege... who are *we* to transform our community into one that is truly #RestorationForAll without humbly asking for and actively listening to the guidance of those who have not had the same opportunities made available to them?

So, on this 37th day of December, I challenge each of you to make 2022 the Year of Listening! Get involved in the Mentorship Program and learn about your mentor's or mentee's journeys and passions — each of us has gifts to share. Join us this May at SERCAL 2022 — immersing yourself in new perspectives and ideas will broaden and deepen your vision of your own work. Contribute to *Ecesis!* — tell us about your favorite project in an under-represented/under-served community, the use of Traditional Ecological Knowledge on tribal lands, or the challenges you faced as a person who didn't come from privilege.

Together we are stronger — the vibrancy of our connections will empower our work, our lives, our communities, and the Next Generations to come. — *Julie*

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You are crucial to the resilience of California's native habitats

Just like our floral first responders, SERCAL members make California's ecological systems healthy and whole again. In the three decades since SERCAL was founded (let alone, last year) so much — almost everything — has changed. Yet one thing remains constant: *The exceptional power we have when we work together.* We are grateful for all our members and want to recognize these individuals and businesses for their generous support in 2021:

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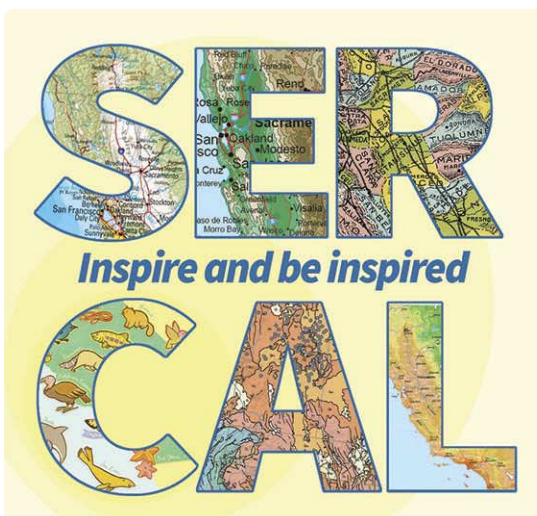
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*Thinking Big? Starting Small? Restoring Now? And how have you been **Planting Diversity, Equity, & Inclusion** in your workplace, your projects, or your communities?*



The first round of abstracts is due 15 January 2022. We'll create sub-themes from there and then send out a call for specific topics midway through February. Get your abstract in ASAP to secure a spot!