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Cultivating Community

A New Century of Patriotism

If you were in Fremont this past Fourth of July, you might have unexpectedly taken a brief trip back in time — a whole century, in fact. Members of LWV Fremont, Newark, and Union City marched in the city's parade dressed as suffragists, commemorating those visionaries who fought to ratify the 19th Amendment that granted women the right to vote in 1920.

That was the year the League was founded, and on the cusp of our centennial, we remain committed to creating access to the democratic process. *Monitor* writer Cecily O'Connor affirmed this with a special message in our July 3 *Monitor Notes* email newsletter. She explained how that weekly digital supplement to this magazine provides readers with information for helping them participate in policy development and decision making. Expressing hope they use this information to stay civically engaged, Cecily offered that "with July 4 patriotic spirit in the air, it's a good time to think about the role you're carving (or would like to carve) in the community."

In this first edition of our 45th publication year, we continue to focus on the roles people can take in building community, starting with Cecily's article about cohousing on the next page. The photos that accompany it, as well as this edition's front cover, come from Pleasant Hill Cohousing, and we're grateful to Marian Shostrom for allowing the *Monitor* to visit and take pictures. Thanks also goes to Canopy, a Palo Alto nonprofit that contributed the tree-planting photo on the back cover, and that is featured in Aleta George's page 6 article about how residents can work with each other to incorporate ecosystem services in their neighborhoods to counteract climate change. Active neighbors feature prominently in Leslie Stewart's page 7 article covering the Port of Oakland's new air quality plan and how it has been shaped by stakeholders. And on page 10, the need to consider stakeholder input is on display as Robin Meadows looks at potential systems for cleaning urban stormwater.

We hope this particularly community-oriented edition inspires you to get involved. One way to do so is by attending the League of Women Voters of the Bay Area's upcoming free event, "Women's Equity: Global, National, & Local Perspectives," to be held in the Latino Room of the San Francisco Library at 100 Larkin Street on Saturday, August 17 from 10 a.m. to 1:30 p.m. It will be a good chance to meet League leaders, who can share with you the organization's intentions for carrying our commitment to public participation into a second century.

Members of LWV Fremont, Newark, and Union City donned suffragist outfits in celebration of Independence Day.

photo courtesy LWV Fremont, Newark, and Union City

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Share and Share Alike: Cohousing Gains Interest

By Cecily O'Connor

In addition to 32 individual and varied housing units, Pleasant Hill Cohousing includes a shared Common House (the large white building) with a kitchen, dining room, sitting room, laundry, kids room, teens room, crafts room, guest rooms, and bathrooms. photo by Alec MacDonald

The Bay Area housing affordability crisis is changing single-family home ownership as residents explore variations on the dream, turning to creative solutions like cohousing that offer community and cost-of-living advantages.

Cohousing is an arrangement in which people live in a group of private homes and benefit from shared spaces like workshops, gardens, and a common house that threads people together with a kitchen and dining area. The design emphasizes collaborative settings where people get to know and support each other, a stimulating environment gaining traction even though it can be challenging to develop.

The concept was born in Denmark in the 1970s and has spread steadily across the U.S., with the established cohousing community tally at 165, according to the U.S. Cohousing Association. Kathryn McCamant and Charles Durrett coined the word "cohousing" in the late '80s after they spent time in Denmark. Their firm McCamant & Durrett Architects has helped design more than 50 of these high-functioning neighborhoods in the U.S., both senior and intergenerational.

A number of its projects are in the Bay Area in places like Cotati, Benicia, Berkeley, Oakland, Emeryville, Santa Rosa, Pleasant Hill, Mountain View, and the upcoming C Street Village in Novato.

"I would argue that community is part and parcel to having a viable society," said Durrett, who has lived in cohousing himself for 25 years.

"Personally, I enjoy it a lot," he said. "I seem to have so much more free time. When it's my turn to cook, it takes me three to four hours but then I don't have to do that for the rest of the month."

Cohousing communities typically form among like-minded groups of people with common values and a clear vision toward creating an "intentional community," a term that includes cohousing in addition to other shared arrangements.

Homebuyers may be more willing to consider such arrangements these days, as many single-family homes are priced out of reach. Families and empty nesters can find added value in intentional communities, with activities and social support to help them cope with all the pressures — economic and otherwise — of raising kids and aging.

The single-family home is "not stepping up and meeting the needs we have over the life of a family," said Loni Gray, an accessory dwelling unit (ADU) expert and housing consultant.

Awareness about these shortcomings is seen at the public engagement level. East Bay Cohousing, which provides

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cohousing information and support for people seeking opportunities, recently crossed the 4,900-member mark.

"There's a hunger out there," said Raines Cohen, a Berkeley Cohousing resident who runs the group. Raines also serves as Northern California regional organizer with Cohousing California, an umbrella group aimed at creating green intentional neighborhoods.

Cohousing is distinctive because its residents bear the responsibility for the community's creation and long-term health. Cohousing communities are self-managed, operate by consensus, and employ their collective energies and wisdom, Cohen said. They rely on committees to cover all the financial, maintenance, landscaping, and other needs. The legal structure is typically a homeowners association in which everyone contributes dues that pay for meals, utilities, and other expenses.

What most people discover is that several years of sweat equity are often necessary to build new attached or detached homes together (although sometimes cohousing is born through redevelopment of an existing structure).

Many groups employ consultants who walk them through design, development costs, financing obstacles for getting loans, and regulatory challenges related to zoning.

"To make it happen requires a lot of focus," said John Caye, co-founder of C Street Village, where he and his family will live when it opens in 2021.

Location plays a big role in the early decision making, especially as it relates to the potential to walk, bike, and take public transit.

"When I put together a site location with a group… I generate the criteria with them," Durrett said. "They come up with eight to a dozen criteria. If they don't bring up transportation, then I challenge them to consider those options, too."

Homeowners in C Street Village settled on a 2.7-acre site near the Hamilton Sonoma Marin Area Rail Transit (SMART) station. The site will feature 40 condominiums (including three- and four-bedroom townhomes and two- and three-bedroom flats) and eight "carriage" homes that are one bedroom or studio size.

The project will include 20 percent of the homes at affordable pricing. The exact units and mix are subject to City of Novato approval.

Home prices will range from $550,000 to $950,000, a spread that's similar to the listed price of single-family residences in the area. Those prices, which include common amenities and shared spaces, are subject to change based on current market and building conditions, according to the group's website.

C Street Village's hub will be its 3,700 square-foot club house. It will include a catering kitchen, a great room with dining tables for sharing meals, an all-purpose room for classes or yoga, a kids room, an outdoor terrace with a barbecue, a sauna, and a hot tub. Residents will have private kitchens and other facilities in their own homes. But they'll also share five or six meals a week, taking turns cooking and cleaning.

Splitting these responsibilities can save time and money over the long term, as does trading childcare and sharing resources like bikes, lawnmowers, and cars.

Cohousing is "a great alternative for folks looking for community," said Caye, who previously lived in Blueberry Hill Cohousing near Washington, D.C.

Studies show that people living in cohousing — families with children, singles, couples, and retirees — benefit physically and mentally from the social inclusion of communal living.

"We've got a variety of ages, from negative six months to over 80," said Michael Coleman, an original owner in Swan's Market Cohousing, a 20-unit community created in the retrofitted 1917 Swan's Market building in the historic Old Oakland neighborhood.

At Pleasant Hill Cohousing, all the front doors open to each other by design and homes are connected by a pathway that is pedestrian friendly and safe for kids, according to Marian Shostrom, whose family was the first to move in 18 years ago and now lives among 31 other households.

Still, the togetherness might not feel right for everyone, especially people who place a premium on privacy or have a hard time compromising. Inevitably sources of conflict come up. Not everyone is going to have the same tastes, routines, or even parenting styles.

"We do have values and vision statements that we do go back to when controversial issues come up," Shostrom said.

Individuals on Pleasant Hill Cohousing's interest list are "encouraged to come to a meal, social event, or meeting and get to know people so they aren't surprised about who we are and what it might be like to live here," Shostrom said.

Along with a garden, other amenities at Pleasant Hill Cohousing include a swimming pool, hot tub, patio arbor, workshop, bike sheds, and play structure. photo by Alec MacDonald

Regional policy aimed at housing production could result in a greater variety of housing types down the road. Last year, the Metropolitan Transportation Commission and the Association of Bay Area Governments outlined recommendations for housing development that's affordable, near public transit, and allows for more density. These changes could help boost supply of duplexes, triplexes, and other "missing middle" housing types.

The agencies' recommendations don't call out alternatives like cohousing specifically. But the challenge before many communities is to consider the shifting role of the single-family home and whether existing codes and regulations are preventing creative solutions to housing formation, said Erika Sklar, operations manager with the City of St. Helena. She wrote a white paper last year for St. Helena officials that included discussion of zoning amendments aimed at cohousing and clustered development.

"Let's not wait for a community of people to come to us and say, 'We want to do something creative,'" Sklar said. "Let's write the zoning code so it allows for that creativity to flow through."

There is some recent movement toward development with intentional community aims. Start-up housing provider Starcity plans to build 803 private, furnished coliving high-rise units in San Jose that will be connected by a common hallway and other shared space. A separate San Francisco development will have 270 coliving units. Both are coming to the Bay Area in 2021 and targeting professionals seeking affordable rent.

ADUs, commonly known as "granny flats," are increasingly being placed in the backyard of single-family residences to cost-effectively create more space to house aging parents or grown kids. In Healdsburg, a small community with an aging population, the city council recently increased the maximum size of ADUs to 1,200 square feet to increase affordable housing options.

City officials are taking the approach of "everything is on the table when it comes to housing," said Mayor David Hagale.

"Cohousing is part of the discussion, but not the focal point," Hagale said. "Like most cities, we are dealing with zoning ordinances done before cohousing was around."

Cecily O'Connor covers transportation for the Monitor.

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A Resilient Day in the Neighborhood

By Aleta George

Resiliency has become a buzzword in recent years, and with good reason — it's a useful term to describe the ability of a person or a place to confront, and even thrive in, the environmental swings of climate change. Open space and parks provide this vital kind of resiliency through ecosystem services, the wide range of ways that nature benefits humans. Such ecosystem services can be cultivated on landscapes of a smaller scale as well: Homes, schools, and neighborhoods can also help to build healthy soil, grow food, sequester carbon, capture water, support biodiversity, and provide shade and moisture.

Several cities and organizations across the Bay Area are working to help communities become more resilient by applying this logic. In one example, the nonprofit Sustainable Solano has recently launched a new program called Resilient Neighborhoods. The launch started with three homeowners in Vallejo who made simple, low-cost changes to their homes and yards to create a "resilient hub." The three homes are adjacent to one another on a street that, until now, had only one shade tree. Four educational installation days earlier this summer served as public workshops to teach participants and volunteers how to capture rainwater, build bioswales, install graywater systems, sheet-mulch lawns, and incorporate edible landscaping.

Carla Koop is the unofficial leader of the three homeowners, who have dubbed themselves Morningside Botanical Bounty. In her backyard, Koop is combining her passion for California native plants with food production. Working with a plan she developed with permaculture designer Ojan Mobedshahi, Koop and workday volunteers installed a simple system to direct rainwater from the roof's eaves to bioswales that they dug in the ground. They planted a Pacific wax myrtle, and mandarin, apple, apricot, and lemon trees. They sheet-mulched a small lawn and replaced it with an herb spiral, a popular permaculture feature that accommodates plants with different needs.

Jessica Sanchez and her son Dominic work on a lawn conversion with the Resilient Neighborhoods program. photo courtesy Sustainable Solano

The next-door neighbors on either side of Koop didn't go quite as big. Joanna Palmer and Chris Grant wanted to honor the mature garden established by the previous homeowner, while filling in bare spots with a few California natives and several fruit trees. The highlighted feature of their backyard improvement is a hügelkultur, a natural raised bed used to grow vegetables. The volunteer work crew dug a shallow ditch about six-by-four feet. They filled it tightly with logs, branches, and waste from the yard, and then filled the spaces between the yard waste with soil. Voila! They had an instant raised bed for vegetables with built in nutrients.

Koop's other next-door neighbors, Jessica Sanchez and Dominic Sinot, added resilient features to their front yard, leaving their backyard alone to remain a play space for their kids. In one day, with help from volunteers, they sheet-mulched the front lawn, and dug holes and swales for an elderberry, plum tree, coast live oak, and redbud. For the understory they planted bush lupine and wild strawberries.

"For me, they had to choose plants that I couldn't kill," said Sanchez, "because I'm not a gardener."

Sustainable Solano supported these homeowners with finances, expert advice, and the people power to get it done.

The nonprofit envisions a time when the efforts started by these three homeowners will build, and the whole street will become a resilient neighborhood. The Resilient Neighborhood launch is funded by a grant from PG&E.

Another example can be found in Petaluma, where Nancy and Jim Hage met more neighbors in the three months after they transformed their front yard than they had in the previous 30 years they lived in the house. With design and implementation support from two Sonoma County nonprofits, the Weaving Earth Center for Relational Education and Daily Acts, the Hages sheet-mulched their lawn and planted California natives to support pollinators and wildlife. The changes cut their water use by 16,000 gallons per month. They also made it easy for neighbors to rest and meet by installing three benches that face each other across the sidewalk.

Daily Acts is working with the City of Petaluma to support a "Mulch Madness" program. To promote more resilient neighborhoods, the city is providing free mulching materials (compost, cardboard, and mulch) for people who want to sheet-mulch their existing lawns. Daily Acts is offering free workshops to any homeowners (from anywhere) who want to convert their lawns to a more resilient landscape.

Planting trees is a particularly effective way to build resiliency and community. Michael Hawkins, the program director for Canopy, an organization in the Midpeninsula, got into the business of planting trees specifically to help reconnect people. "We are so disconnected. We don't know our neighbors, and we used to," said Hawkins.

Canopy is the fruit of a task force started by the City of Palo Alto in 1996 to improve on the city's urban forest. Since becoming a nonprofit in 2002, Canopy has planted thousands of trees in neighborhoods and schools in Mountain View and East Palo Alto (*as in the photo on the back cover of this edition*). Their current Branching Out program is funded by CALFIRE and offers free trees to East Palo Alto residents.

You don't have to own a home or go all-in to be resilient or improve the resiliency of your neighborhood. You can volunteer with a resiliency project or plant a tree. "Planting a tree is a symbolic act, and a gateway drug to a better environment," said Hawkins.

If increasing resiliency is as simple as adding shade, growing food, and capturing water in neighborhood hubs, it seems a doable goal and an attractive vision in response to the pressures of the climate crisis.

Aleta George covers open space for the Monitor.

A Big Lift: Cleaner Air at the Port

By Leslie Stewart

Retrofitted gantry cranes are the first step toward a zero-emission future at the Port of Oakland. photo courtesy the Port of Oakland

In 2018, the Port of Oakland handled over 2.5 million cargo containers, making it the eighth-busiest port in the U.S. All that activity gives the Bay Area an enormous economic boost — the Port and its business partners provide 84,000 jobs in Northern California — but at a significant environmental cost. "The traditional source of power for Port of Oakland operations is diesel," said Port Community Affairs Manager Laura Arreola, and the resulting high levels of air pollution have affected the neighboring West Oakland community for decades.

However, advances in technology offer the opportunity to improve that unhealthy situation. As Arreola observed, "The seaport industry is a microcosm of the energy choices that are also happening in the wider community, including looking at renewable energy sources." The Board of Port Commissioners endorsed such cleaner choices in June by adopting the Seaport Air Quality 2020 and Beyond Plan, which puts the facility on

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a pathway to zero emissions over the course of the next 30 years, shifting it completely off fossil fuels.

A first step toward this zero-emissions future is already on display in the form of three low-emission rubber-tired gantry cranes, which exert a 50-ton lift capacity to move containers onto trucks. Installed recently by terminal operator SSA, the retrofitted gantries use battery-powered hybrid engines that consume about a half-gallon of fuel per hour, as compared to 10-12 gallons per hour for their all-diesel counterparts. "There's no smokestack," Arreola said about the cleaner-running machines, which are also "so quiet!"

SSA plans to retrofit ten more cranes by next June. The Port estimates that the 13 retrofitted cranes will eliminate 45 tons per year of diesel-related pollutants.

Since 2009, the Port has had a Maritime Air Quality Improvement Plan aimed at reducing diesel particulate matter, and emissions inventories show a steep decrease from the 2005 base year. However, that plan assumed the ongoing use of fossil fuels and relied on gradual improvements in engine technology to reduce diesel particulate matter. Despite the progress over the past decade, community and environmental groups working on local air monitoring plans have continued to voice concerns about particulates from Port-related activities, and the Bay Area Air Quality Management District has determined that there are significant and unacceptable health inequities in West Oakland.

Where the earlier plan dealt with known factors — fuel, infrastructure, regulations — to reach a specified decrease in emissions by a specified date, the new plan stretches into a less predictable future. It assumes that new technologies now coming into use will mature into reliable and durable equipment, that infrastructure can be designed and implemented to meet a significant new power demand, and that future regulations and compliance deadlines will not be incompatible with the plan's projected targets and schedules.

To accommodate some of the uncertainty, the plan is divided into phases that will end in 2023, 2030, and 2050. In the first two phases, programs and projects to reduce emissions will include measures such as switching to renewable diesel or converting vehicles to electric battery power, and retrofits for rubber-tired gantries like those already in use, as well as reducing emissions from vessels and harbor craft.

The shift to zero-emissions equipment and operations will begin quickly as well, and will initially stress actions that provide larger reductions in toxic air contaminants, take effect sooner, or can be targeted locally. Some early measures — for example, developing battery-powered equipment demonstration projects — will help to define how to best meet the zero-emissions goal in later phases.

The plan assumes that the predominant Port power source in the future will be electricity, and this shift will require upgrading and adding infrastructure, and increasing resiliency with back-up systems. It will be implemented in partnership with terminal operators and tenants as well as in coordination with PG&E, which supplies power to part of the Port area.

There are three critical factors for the plan's success: technology, funding, and partnerships. While the technology might seem the most daunting issue, advances are already

being made around the globe in port equipment and facility operations, and battery storage for renewable energy is becoming easily available. Likewise, tighter state regulations have been accompanied by increased agency funding that can assist the Port and associated businesses to meet those regulations, with grants aimed at upgrades for heavy-duty equipment like trucks, terminal vehicles, and gantries to cleaner hybrid or all-electric models. SSA's gantries are being purchased with the help of a grant from the Air District.

Perhaps the biggest challenge will be creating strong partnerships and continuing extensive stakeholder engagement. The Port is not a monolithic entity. It functions as the nexus of a diverse group of stakeholders: terminal operators, other tenants, maritime trade associations, truckers, neighborhood businesses and residents, and the broader Bay Area community which is affected by transportation and environmental impacts of Port operations.

Activist Margaret Gordon has advocated for cleaner air in West Oakland for many years.

photo courtesy West Oakland Environmental Indicators Project

All of these stakeholders have their own often conflicting expectations and concerns about the plan. The Port reactivated a stakeholder task force that worked on the 2009 plan, convening six task force meetings between February 2018 and April 2019. And in total, almost 350 comments on the initial and revised drafts of the 2020 plan were cataloged for response.

The Pacific Merchant Shipping Association and other Port-related businesses strongly criticized the first draft over the potential burden of specific proposed changes and deadlines, but John Berge, a PMSA vice president, said recently, "Nothing has been adopted that has been set in stone." In his view, "It's a very aggressive and ambitious plan that puts a lot of pressure on our industry. The state and the Air Quality District have already set a timeline of regulations, and the Port is trying to meet that and provide funding assistance. Our industry is ready to work with it."

Margaret Gordon, a longtime activist with the West Oakland Environmental Indicators Project, considers the new plan to be the next achievement in an incremental process of building improved relationships among the West Oakland community, the Air District, and the Port. "WOEIP collectively developed allies to get the Port to develop the plan, to create the pathway to zero emissions," she said. Her organization used air monitoring and modeling provided by the Air District for ongoing West Oakland community air quality improvement planning to help shape the Port plan.

The Environmental Defense Fund provided extensive comments on the first draft of the plan, but although changes were made in the stakeholder engagement strategy, EDF's Fern Uennatornwaranggoon reported that her organization felt the Port was "insufficiently responsive" to their request for more specific goals and objectives. "They didn't budge," she said, and EDF didn't comment on the final draft. EDF is still active in West Oakland community air quality monitoring planning and intends to participate in ongoing Port stakeholder opportunities.

Before the plan was adopted, Uennatornwaranggoon felt that, while there is a valid argument that the Port needs to remain competitive, "They don't see themselves as industry leaders — they could be pushing the market. Instead, there's a lot of 'we need to do studies', a lot of 'wait and see'."

The Board of Port Commissioners did respond when stakeholders criticized the plan as comparing unfavorably to efforts at the ports of Los Angeles and Long Beach. Commission amendments added six-month feasibility reports on putting all 300 pieces of cargo-handling equipment and all 8,000 Port-servicing trucks on a full conversion path — matching plans for the southern ports — and on electric capacity needs.

Commissioners also agreed with the request for more specifics earlier in the implementation process. Instead of the original 5-year evaluation point, the Port now plans 6-month and 1-year lookbacks. Arreola said, "We'll look at what measures actually got the green light in our screening process — which ones proved themselves."

For Berge, the schedule for ongoing assessment provides both checkpoints and the flexibility to make changes based on experience. He noted this will be an open process, and expects good stakeholder involvement. Stakeholders will also have a role in the screening of proposed implementation measures as the plan is implemented.

"We're just at the beginning, but we have a lot of details to keep moving ahead, to move the needle," Gordon stated. "We have enough allies who are on board with the plan, who understand it, to see it through in the next stages."

Leslie Stewart covers air quality and energy for the Monitor.

Overcoming Technical and Social Barriers to Stormwater Use

By Robin Meadows

Last winter was so wet for so long that we could hardly get rid of all that water fast enough, as jaw-dropping volumes of stormwater rushed along gutters, into stormdrains, and ultimately out to sea. Even so, people were hard-hit in flood-prone regions, particularly central Sonoma County. In late February, the Russian River ran high enough to turn the towns of Guerneville and Monte Vista into islands. Now that we're deep into the dry season, though, it would be great to have some of that water back. The need to use stormwater as a resource will likely intensify with climate change, which is projected to trigger droughts that hit more often and last longer.

Postdoctoral researcher Stephanie Spahr uses test columns at Stanford University to evaluate how biochar and other amendments perform as filters for removing contaminants from urban runoff.

photo by Richard Luthy

A major barrier to using urban stormwater is that it's dirty. Rain starts picking up contaminants the moment it hits rooftops, streets, and other hard surfaces, as well as landscapes laden with fertilizer and herbicides. Pollutants include nutrients, heavy metals such as copper and lead, and a host of pesticides, flame retardants, and other toxicants collectively known as trace organic compounds. Stormwater typically gushes directly down drains with little treatment, apart from grates that help block trash and debris.

New research shows that a cost-effective, low-tech approach can go a long way toward cleaning up urban stormwater. Researchers collected runoff from Fryer Creek, which drains the City of Sonoma, and treated it with a combination of woodchips and biochar. "The system worked really well," said Richard Luthy, a Stanford environmental engineer who led the study, which was recently published in the journal *Water Research*, in partnership with the Sonoma County Water Agency. "It removed all the nitrates and trace organics," Luthy said. With the exception of zinc, the system also did a good job removing heavy metals from stormwater.

Woodchips clean up nutrient pollution by serving as a carbon source for bacteria that consume nitrate. Similarly, woodchips remove heavy metals, presumably by promoting the growth of another type of bacteria. Specifically, these microbes turn heavy metals that are dissolved in water into solids, which then precipitate out of the water. In turn, biochar removes pesticides, flame retardants, and other trace organic compounds. Like the activated carbon common in home water filters, biochar collects these compounds on its surface.

Biochar has the advantage of being far cheaper than activated carbon, at about one-tenth the cost. Moreover, biochar can be environmentally friendly. Luthy used biochar made of bark and other waste from lumber mills. "The plant waste would otherwise decompose and return carbon dioxide to the atmosphere," he explained. "Biochar is a green material that doesn't decompose — it sequesters carbon."

The Sonoma biochar treatment project arose from a federal research center that Luthy directs. The center, called Re-inventing the Nation's Urban Water Infrastructure (ReNUWIt), fosters collaboration between university researchers and water agencies. "We're interested in more sustainable solutions to our urban water supply," he said.

Stormwater in cities could be captured, treated, and used to replenish aquifers in areas with sandy soil. "You can't be on top of rock and you can't have a lot of clay soil," Luthy said. "The edge of the San Francisco Bay is primarily clay, so you need to go further out for soil that can infiltrate." Suitable soil is found in parts of Alameda, Santa Clara, and Sonoma counties.

Now Luthy wants to test his biochar treatment in an urban setting. In Sonoma County, he estimates that it would take about half a percent of a city's land to capture and clean stormwater. He envisions a distributed stormwater treatment system that repurposes existing green spaces like athletic fields, power line easements, and sidewalk strips.

The push to transform stormwater from a flood threat to a resource comes partly from recent state requirements. Projects funded by Proposition 1 — the $7.545 billion water bond that California voters passed in 2014 — must provide multiple benefits. In addition, the 2014 Sustainable Groundwater Management Act mandates that depleted aquifers reach sustainability by 2042, and two decades is not enough time for them to recharge naturally. "We're looking for projects that can capture stormwater to reduce flooding and recharge groundwater," said Kent Gylfe, a Sonoma County Water Agency (SCWA) engineer.

That said, finding a place to test Luthy's biochar treatment in a stormwater capture system is easier said than done. "The public loves it in concept," said Susan Haydon, an SCWA planner and lead on Sonoma County's stormwater resource plans, which agencies must submit to the state to be eligible for Proposition 1 funding. "But there's pushback when you get down to the property level."

Another ReNUWIt researcher is helping Haydon and Gylfe zero in on sites that the public won't oppose. "Neighbors generally object to the appearance of systems, potential nuisances like breeding mosquitoes and collecting trash, and fears that children will wander into stormwater capture basins and hurt themselves," said William Eisenstein, executive director of the UC Berkeley Center for Resource Efficient Communities. "We're identifying hotspots for these non-technical issues."

His team recently developed a way to find sites that are acceptable from both technical and non-technical standpoints. The method takes a map of technical feasibility — based on soil suitability and groundwater recharge potential — and overlays it with a map of community land-use values based on stakeholder interviews. A pilot test in the Petaluma area revealed that the best sites were concentrated at mid-elevations, along the transition between urban and rural lands. "This makes sense," Eisenstein said. "It's not in the dense urban core at low elevations, or in the grazing lands at upper elevations."

This finding fits with Haydon's and Gylfe's experiences. Many rural residents are farmers who consider themselves to be environmental stewards. In contrast, retrofitting urban sites can be challenging because "people already have preconceived ideas of what the land use should be," Gylfe said. The story could be different, however, in communities that are not yet established.

Next Eisenstein, Haydon, and Gylfe plan to proactively identify hotspots of public acceptance for stormwater capture and treatment sites. Their goal is to incorporate these systems into a new development in Sonoma County. "By doing this in the context of a development proposal, we can put systems in to minimize objections," Eisenstein said.

Robin Meadows covers water for the Monitor.

This soccer field at Stanford University serves as a stormwater catch basin for high flows during winter storms.

photo by Richard Luthy

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