

## Restoring the Native Live Oak Forest in 1,000 Acres of Alameda County, California

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THE MASONIC HOME IN UNION CITY IS A RETIREMENT AND RESIDENT CARE COMMUNITY that occupies 267 acres in the East Bay Hills (San Francisco Bay area). The land was purchased by the Masons in 1893, and was devoid of native trees and shrubs. The land had been denuded of its oak forest by the early Spaniards (for wood) prior to Mexican independence in 1821. The hillsides were used mainly for cattle grazing by the Mexican rancheros, even after California independence in 1846. That practice continues even today. Prior to the rancheros, the native Ohlone used the oak forest as a source of food (acorns), and the habitat was rich with other birds and mammals for hunting. The origin of the oak forest goes back to 3–4 million years. Fossil evidence suggests that during the Ice Age a large oak savannah occupied this land.

Presently in the state of California there are only 100,000 acres of oak woodland, with 80% of it being privately owned. Coast live oak (*Quercus agrifolia*) woodland is only about 4% of this total (Figure 1). Live oak woodlands in the San Francisco East Bay (Diablo Range) that are under 50 years old are rare. Grazers (cattle) are mainly responsible for the lack of new growth. Much of the hillside in the East Bay has been devoid of nutrients that would promote growth. The natural vegetation successional processes do not occur, so cannot contribute the nitrates and other nutrients that are needed for long-term sustainability.

Solving this problem will require innovative ways to produce enough compost to replace nutrients missing from this ecosystem. Large institutions, like the Masonic Home for the Elderly in Union City, produce between one and two tons of food waste per week. Instead of hauling out this food waste, three non-profits organizations have banded together to look for a solution. This would be the largest project in the San Francisco Bay area that uses food waste to accomplish oak woodland restoration, while training youth in the science behind the project.

The Masonic Home is now using food waste and horse manure to produce compost to improve the native soil to restore native oak forest on 200 acres. This project requires many volunteers. Starting in the fall of 2014, three professors on the nearby Hayward campus of the California State University, East Bay (CSUEB) are leading about 120 of their students each year in providing various services, from caring for native plants at the California Nursery to digging holes at the Masonic Home. Students in an environmental science laboratory course are also collecting

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Figure 1: Coast live oak (*Quercus agrifolia*).



Figure 2. The Earth Flow.

data for a research study. Students in a recreation course are focused on the preparation of plants at the California Nursery.

In California there are many oak management groups, including the University of California's Integrated Hardwood Range Management Program (IHRMP), the California Oak Foundation, the U.S. Forest Service Pacific Southwest Research Station (PSW), the California Department of Forestry and Fire Protection (CAL FIRE), and the California Department of Fish and Wildlife, to name a few. A goal of the current project is to work with these groups so they are aware of what we are doing and to incorporate any best management research that they may offer to our project. These groups can best inform our group on ecology, regeneration, range and livestock relations, development of wildlife habitat corridors, long-term monitoring, and diseases that oak woodlands may be susceptible to. The project is also collecting data to determine the carbon cycle as the grassland is changed into an oak forest. The project is currently funded by CSUEB and project leads have applied to the Environmental Protection Agency for additional funds to recruit and prepare volunteers.

Tri-CED, a local recycling non-profit organization, has been working with the Masons (of the Masonic Home) to reduce their food waste (which totals about 2 tons per week) and keep it onsite. Green Mountain Technologies has developed "The Earth Flow," which is an in-vessel system that converts up to two tons of daily organic waste into compost (Figure 2). Shredded woody, green waste and horse manure will be added to the system so decomposition will produce rich compost ready to be used in restoration. The design incorporates a fully enclosed vessel and odor control system with an inclined auger for mixing, shredding, and discharging the organic waste. The typical process time for the waste to flow through the vessel is 14 to 21 days.

The Math Science Nucleus (MSN), a non-profit organization that incorporates high school and college students to participate in restoration projects, will assist greatly in youth training. The MSN has worked on many local restoration projects over the last 15 years using youth to maintain and in some cases design the restoration. MSN has developed strategies that help educate students on the science behind restoration. For a complete look at those projects, see <http://msnucleus.org/watersheds/index.html>.

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MSN has a contract from the City of Fremont to use the California Nursery Historical Park (the oldest, and at one time the largest, nursery on the Pacific Coast) to grow and maintain plants that will be used in this project (and other projects that MSN coordinates throughout the city). The 20-acre site is also used to teach the youth and volunteers about trees and their requirements (Figure 3). The plants are from local seed, and represent a variety of trees in shrubs found in oak woodland.

In a recent symposium on oak woodland management, scientists outlined some of the knowledge that is still needed to understand and better manage oak woodlands. One thing they pointed out is that oak woodlands often do not respond the way we think they should. The current project is collecting data about the local restoration of the forest. Science-based knowledge that provides better explanations of how oak woodland ecosystems function is especially needed. An important

tool is a continuously updated, statewide geographic information system accessible to local planners and the public. Documenting the types of trees and use of food waste composting and the techniques we use would help other large restoration projects.

An extremely important feature of oak trees is their canopies; these have a major impact on the local environment. They affect nutrient cycling, seedling establishment and survival, understory species, forage production and growth, organic matter (on and in the soil), and possibly soil texture. Reports of preliminary work indicate that soil texture under a mixed stand of coast live oaks was coarser and higher in organic matter. Other work reported confirms past evidence that nutrient level under oak is several times greater than that of adjacent grassland. Part of the higher nutrient concentration is undoubtedly due to leaf litter.

Cattle currently graze the land to keep the grass cut to prevent grass fires. We will slowly remove the cattle from the land, or we may decide on developing corridors as the trees mature and cattle can still come on and off the land depending on the surrounding landowners (East Bay Regional Park) which use cattle to graze the area.

The project will coordinate current knowledge and make it easier for the residents of the Masonic Home to understand what is going on and to get them actively engaged. Part of the Restoration project is building a demonstration area open to the residents of the home and eventually to school groups in the community. The professors involved in the project will publish scientific articles and educational material to inform scholars and the public. The current professors of the project are Dr. David Stronck, Dept. of Teacher Education, Dr. Mary Fortune, Department of Hospitality, Recreation and Tourism, and Dr. Michael Massey, Department of Earth and Environmental Science.

Progress will be measured by having in place a data collection protocol for monitoring the site for decades. This project will have benchmarks at 5, 10, 20 and 30 years before there is a full oak forest canopy. CSUEB has established several courses that focus on this project and will provide volunteers for many years. Since the in-vessel technology of composting is relatively new for use in restoration projects, the data collected will help to determine the merit of such technology, and whether it is appropriate for the expense.

CSUEB, in collaboration with MSN, TriCED Recycling, and Masonic Home for the Elderly, is reforesting 200 acres in the East Bay Hills using food waste and other organics. The long-range plan is to use experiences from the current work at the Masonic Home to provide forest restoration on the 200 undeveloped acres of the Hayward campus of CSUEB. Between the undeveloped land on Hayward campus and the undeveloped land at the Masonic Home are Garin Regional Park and Dry Creek Pioneer Regional Park. These parks are almost entirely undeveloped land. The ultimate plan is to cooperate with these Parks in providing a contiguous and continuous oak forest on about 1,000 acres along a hilly ridge from the southern end of Hayward to the northern side of Union City.

## Summary

The goals of the project include the following:

- The project will document reforestation techniques for conversion of barren hillside to



Figure 3. Youth working on plants at nursery.

live oak woodland community using an in-vessel composter. The project will use an on-line format for easy updating, including onsite monitoring of the experimental grove. This would include a white paper and process of our findings using food waste. This is important for replication at other sites where there is large amounts of food waste (i.e. schools, nursing homes).

- Faculty of CSUEB will work with oak reforestation experts to help develop strategies for planting and long-term monitoring program of this area. Long-term and short-term projects will be outlined to help direct work at Masonic Home land for 10–20 years. Weed management, reintroduction of native animals, reintroduction of plant understory, how to reduce cattle population, and other considerations will be considered for a successful project. The plan is to provide the knowledge for maintaining this reforestation.
- Courses at the CSUEB now attract students to volunteer at the Masonic Home Oak Woodland Restoration Project. Future plans include recruiting and involving high-school students. Teachers and administrators in the five high schools in Fremont have already indicated their support of and interest in participating in the restoration project. A requirement for graduation from these high schools is to do community service.
- The hands-on experiences will probably inspire many participating students to seek employment in related areas, ranging from growing plants in a nursery to doing scientific research. Work experience using green technologies (e.g., composting) may motivate students to continue their education in environmental science.

Live oak woodlands in the San Francisco East Bay (Diablo Range) that are under 50 years old are rare. Grazers (cattle) are mainly responsible for the lack of new growth. Much of the hillside in the East Bay have been devoid of nutrients that would promote growth. The correct vegetation (successional flora) cannot add the nitrates and other nutrients that are needed for long-term sustainability. Solving this problem requires innovative ways to produce enough compost. Large institutions like the Masonic Home for the Elderly in Union City produce between 1-2 tons of food waste per week. Instead of hauling out this food waste, three nonprofits have banded together to look for a solution.

The cooperating groups of this project include the following:

- The Masonic Home owns 270 acres of land, of which 200 is rented to ranchers for cattle grazing. They also have access to vast amount of manure that has been accumulating on part of their land from a nearby horse ranch. The vegetation from the other 70 acres is also available. Food waste available from two communities on site (Masonic Home and Aracia Creek). Historically the food waste has been trucked to a Milpitas composting site for conversion into compost. The carbon footprint for this operation has been high.
- TriCed Recycling has been responsible for the food waste transportation. As the state's largest non-profit recycling business, they felt that there should be another way to reduce emissions and help green the hillside. TriCed is also part of a multiyear grant to train students (12 each year) to learn about greening jobs. This involves cooperation with Chabot College in Hayward. Dr. Michael Massey of Environmental Science at CSUEB has submitted a funding proposal for money to conduct a feasibility study on composting at the CSUEB Hayward campus.
- MSN uses science, community service and service learning at restoration sites in Fremont. A 15-year project at Tule Ponds at Tyson Lagoon has transformed a fallow area to an urban forest with over 300 trees. It is presently used as an education center to teach students about the environment and to train university and high school students on res-

toration techniques. Long-term composting with wood chips has proven very successful. The techniques used at Tule Ponds will be modified in this project.

Project benefits include the following:

- We will develop a process to incorporate food waste and other on-site organics to reforest 200 acres to a Live Oak Woodland Community. This improves “greening” in an innovative way.
- We will create a process for the three non-profits to develop reforestation best practice management practices. This will especially benefit the Masonic Home maintenance crew and staff at CSUEB that will be trained on ecosystem management approach to urban forestry. Currently they are unaware of such options in managing land.
- Documenting this process of reforestation will advance the practice of urban forestry and will help to arrest the decline of the urban forest through community education. It will also provide a way for replication through online information.
- A hands-on job training will teach students how science is important in restoration and the greening of an area. Through classroom presentations, this will reach a highly diverse audience, particularly at CSUEB and the local high schools.
- Collaboration among very different non-profits will benefit the environment and community. This encourages organizations to think outside the box, so they can focus on multiple benefits of urban forestry, even in low income area. Outreach to low income areas brings the information to the community through schools.

## References

- McCreary, Douglas D. 2009. *Regenerating Rangeland Oaks in California*. University of California Agriculture and Natural Resources Pub. No. 21601e. Oakland, CA: University of California Press. Online at [http://ucanr.edu/sites/oak\\_range/files/59453.pdf](http://ucanr.edu/sites/oak_range/files/59453.pdf).
- Dagit, Rosi, and Downer, A. James. 2002. *To Prune or Not to Prune*. U.S. Forest Service Gen. Tech. Rep. PSW-GTR-184. Albany, CA: U.S. Department of Agriculture–Forest Service Pacific Southwest Research Station.