UC SANTA BARBARA

North Campus Open Space Restoration Project

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NCOS NEWS *January 2018*

Oblique aerial image of NCOS captured by Bill Dewey on the morning of January 10, 2018.

UPDATES

Happy New Year! It's a wet start to 2018 at NCOS:

At least 1.5 inches of rain fell around the UCSB Campus area between midnight Monday and Tuesday afternoon on January 9th. This increased the water surface elevation of Devereux Slough/NCOS from 4.5 to above 6.5 feet (NAVD), which equates to an influx of approximately 80 acre feet of water, according to the hypsometric curve. This curve is based on the capacity of the restored system, which is derived from the bathymetry that the site was graded to.

One of the goals of the NCOS restoration project is to reduce localized flooding in the residential neighborhoods adjacent to the open space. We are happy to report that drainage systems worked well in areas around Phelps Creek and Scripps Crescent, which often flooded in previous years.

Photos of the upper main and eastern arms of Devereux Slough (top image), and the new Scripps Crescent storm drain outflow (bottom image) after the first major rain at the restoration project on the afternoon of January 9.

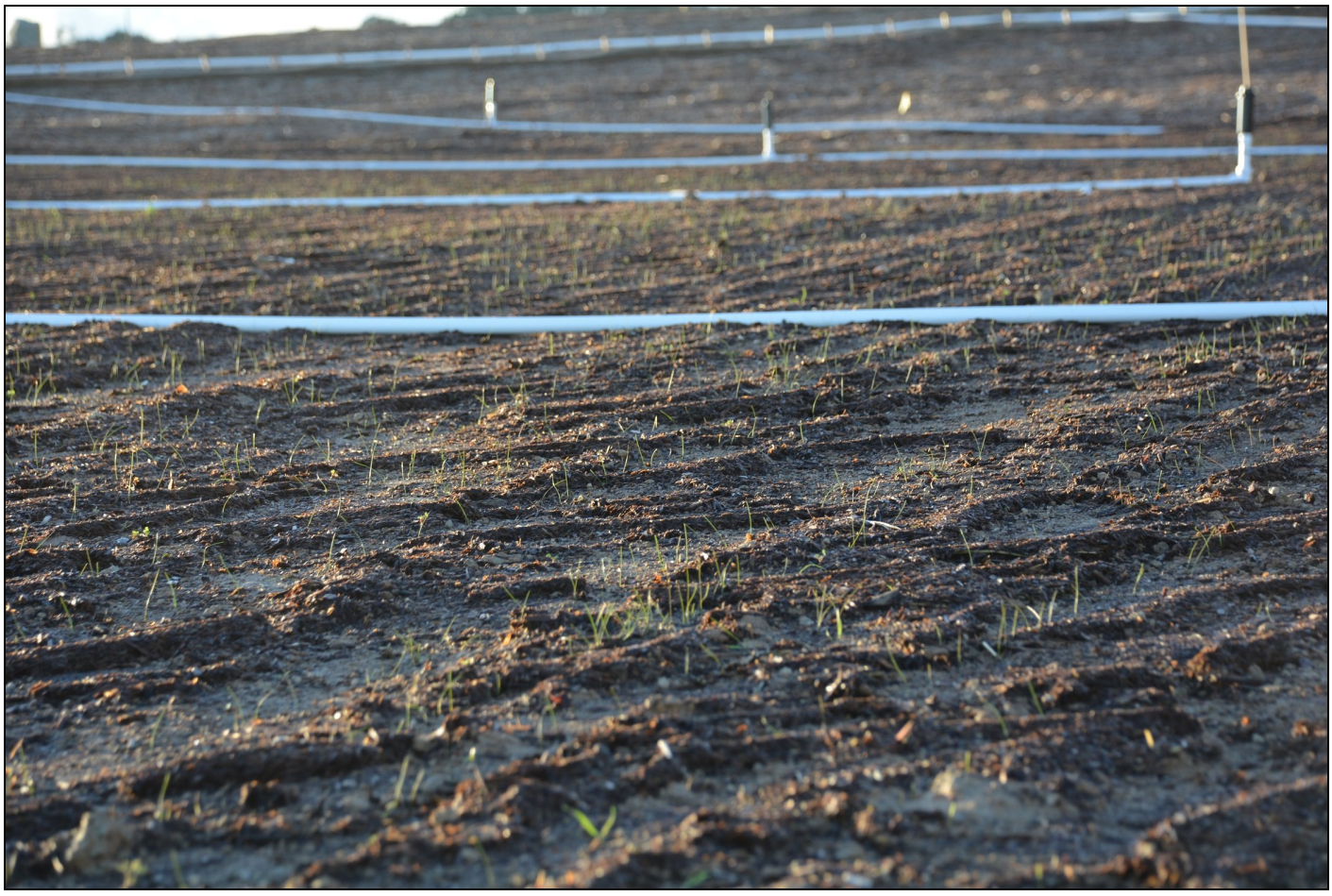
Vernal pool update:

The rain also partly filled all of the nine vernal pools on the mesa. Just last week the pools were inoculated with approximately 80 gallons of dried inoculum obtained from vernal pools at nearby Storke Ranch, Manzanita Village and Camino Corto and Camino Del Sol. We are looking forward to seeing what species germinate and how the new pools function for the unique invertebrates and plants associated with these ecosystems. We expect to see *Eryngium vaseyi* (Coyote thistle), *Psilocarphus brevissimus* (Dwarf woollyhead), *Grindelia camporum* (Gumplant), and *Eleocharis acicularis* (Needle spikerush) among other plant species, as well as a variety of ostracods and larvae of dragonflies.

The rain water in the nine vernal pools on the NCOS mesa can be seen in a portion of this aerial image captured by Bill Dewey on January 10th.

Native grasses are growing:

Seedlings of the California state grass, *Stipa pulchra* (Purple needle grass) are now visible on the areas that were drill seeded in October (and have been irrigated).



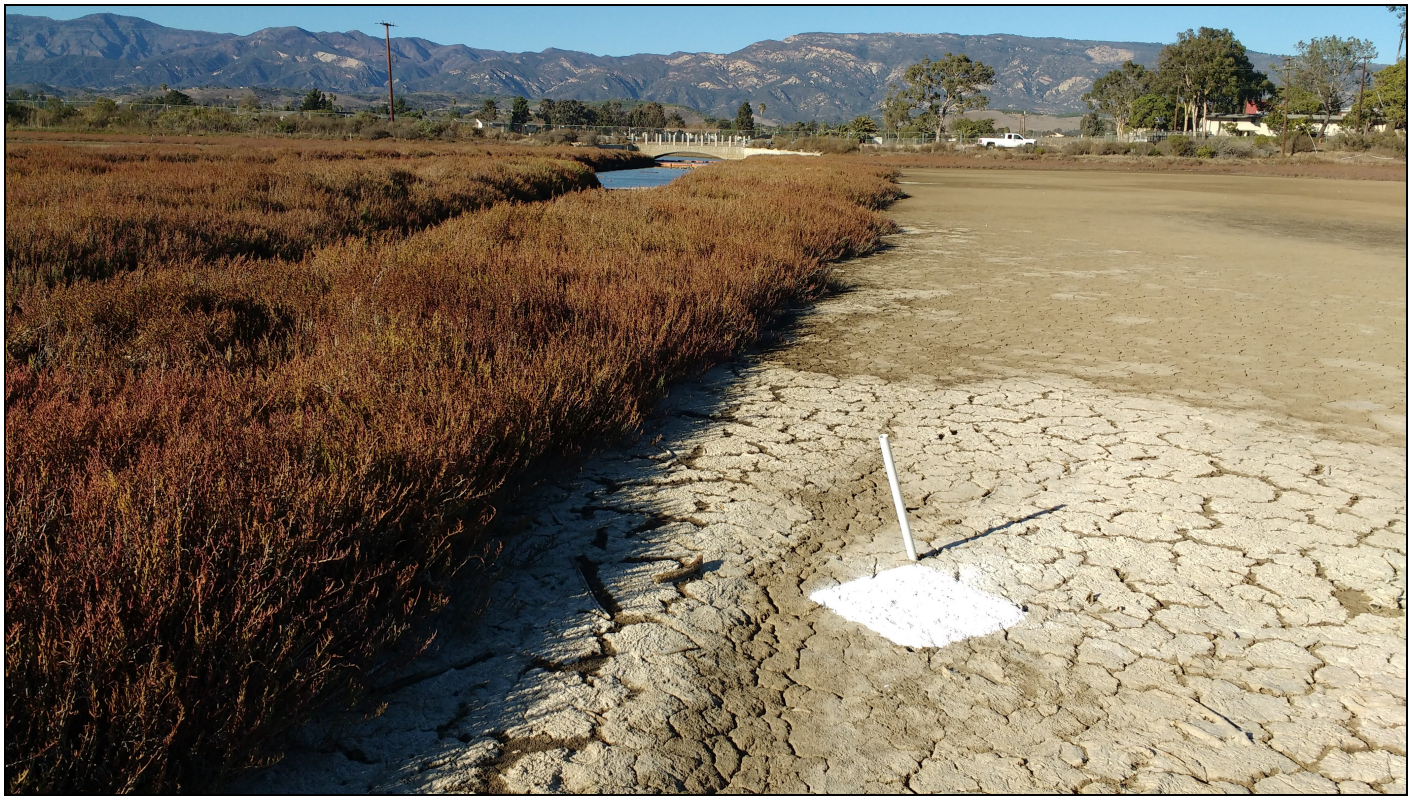
Purple needle grass (*Stipa pulchra*) seedlings at NCOS.

Bridges and Trails:
As with most of our work, Granite construction was also slowed by the ash and poor air quality issues associated with the Thomas Fire in December. Nevertheless, they continue to stay on schedule and make good progress. They have installed the 50-foot deep piers associated with the large free-span bridges over Phelps Creek and the eastern channel. Once the site dries out they will drill the 20 small piers for the board walk over the Whittier pond drainage. They have started building the 'abutments' - large cement blocks on top of the 50-foot piers that will support the prefabricated steel bridges, which they aim to install in February.

Rain water flowing into NCOS from Phelps Creek (center of image), and from Devereux Creek to the west, near where one of the footbridges is under construction.

FEATURE STORY

Carbon Sequestration: An Ecosystem Service Provided by NCOS



A feldspar monitoring plot next to salt marsh vegetation.

The North Campus Open Space project (NCOS) is helping to reduce our local carbon footprint through a number of mechanisms: growing perennial plants such as salt marsh species and perennial grasses; integrating stable forms of carbon into the soil profile; providing for non-vehicular access to open space areas; and creating a self-sustaining habitat that does not require irrigation or mechanized maintenance.

This feature story is continued on page 9.

VOLUNTEER OPPORTUNITIES

Second Saturday Planting at NCOS

Come to the first Saturday Planting of the year tomorrow, January 13 - meet at 6925 Whittier Drive at 9:30 to walk over to the planting site. Bring water and wear a hat and good shoes!

Tree planting with Your Children's Trees - in January!

Your Children's Trees will be back at NCOS in January to continue planting oaks, sycamores and willows. Come give them a hand on Saturdays in January. Please contact yourchildrenstrees@gmail.com to RSVP.

Group Volunteer Opportunities

We gladly welcome local business, non-profit, school and other community groups to come out to NCOS to help with planting and other activities. For more information, please send an email to ncos@ccber.ucsb.edu.

Thursdays - CCBER Greenhouse Associates

Come help transplant seedlings of native plants with the CCBER team from 9:00 - 12:00. To join, please send an email to ncos@ccber.ucsb.edu.

COMMUNITY FORUM & PHOTOS

With the rain and rise in the water level at NCOS, we anticipate that bird activity on the site should increase. Killdeer is one species that has been regularly observed on site since we started monthly bird surveys last September. We have been counting at least 50 individuals each survey, but there are likely more than that as they can be hard to spot - their plumage blends in quite well with the bare ground. See how many killdeer you can spot in the photo below, taken in the afternoon on Tuesday, January 9.

Spot the Killdeer - how many can you see in this photo?

Have a plant, wildlife, or other photo of the NCOS project site you'd like to share? We welcome submissions of photos of the project site and/or the adjacent Ellwood-Devereux area to share with NCOS News readers. Please email a photo you would like to share along with a brief description to ncos@ccber.ucsb.edu.

For more information on the
North Coast Open Space Restoration Project, Click here**, or email** ncos@ccber.ucsb.edu

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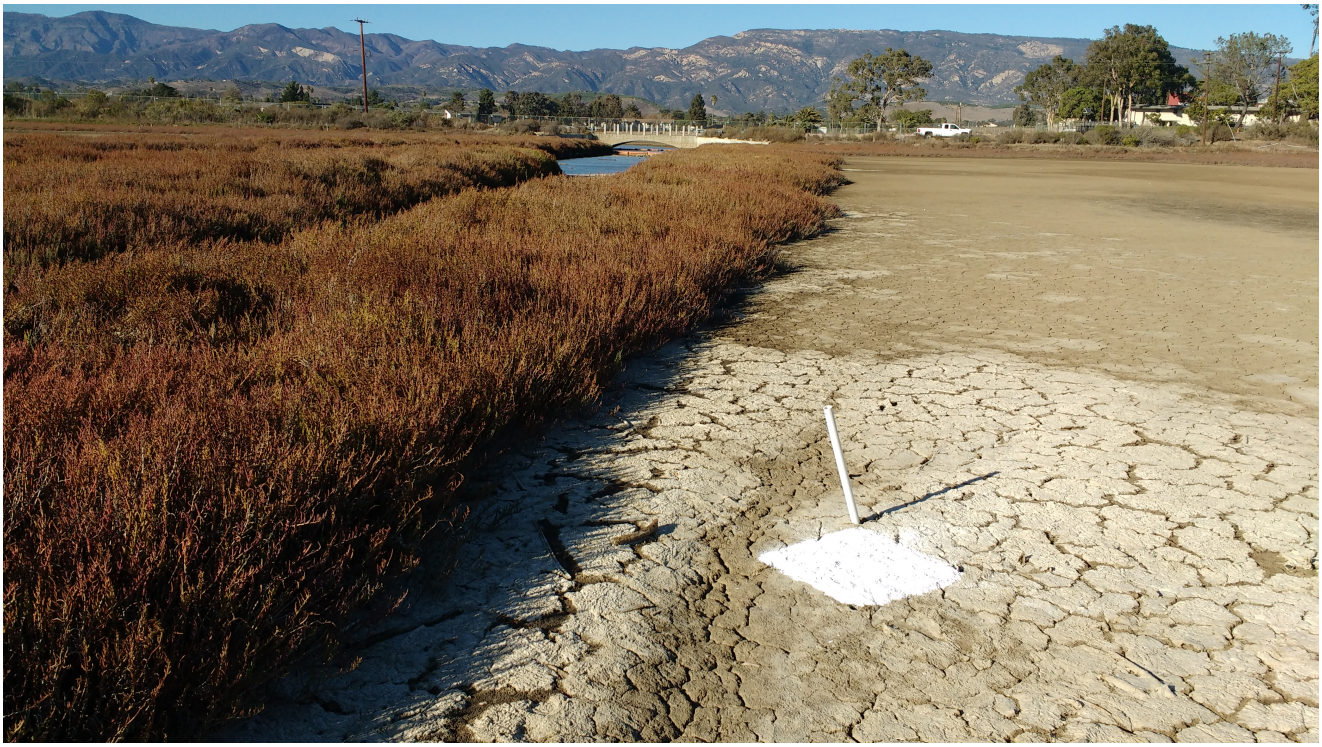
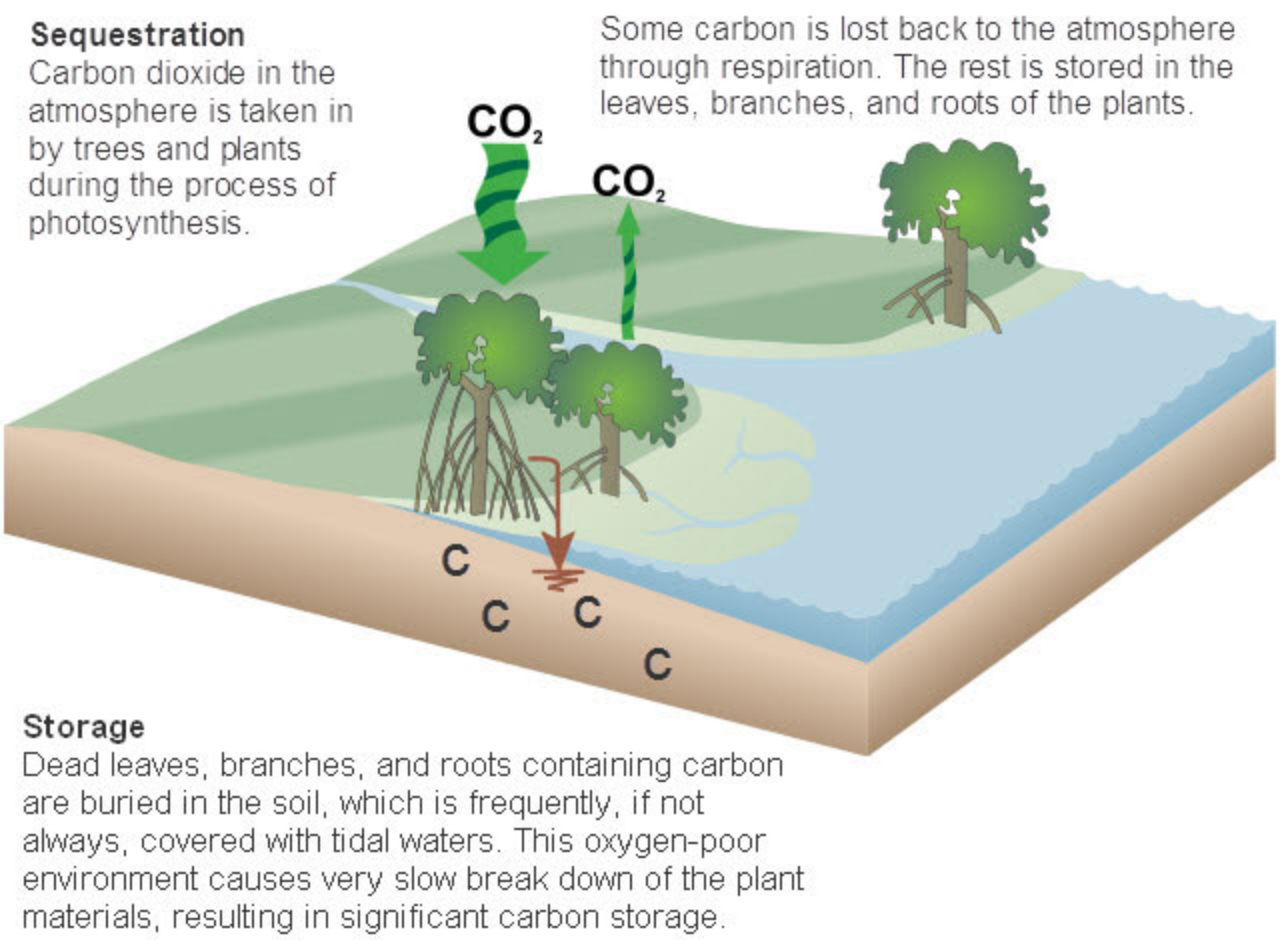
Carbon Sequestration : An Ecosystem Service Provided by NCOS

ccber.ucsb.edu/news-events/carbon-sequestration-ecosystem-service-provided-ncos



Recent months in our area have been dominated by dramatic events, notably the Thomas fire in December and the torrential downpours this month. These events are possibly the result of human induced climate change associated with the increase in carbon dioxide in the atmosphere from the burning of fossil fuels. The North Campus Open Space project (NCOS) helps reduce our local carbon footprint through a number of mechanisms: growing perennial plants such as salt marsh species and perennial grasses; integrating stable forms of carbon into the soil profile; providing for non-vehicular access to open space areas; and creating a self-sustaining habitat that does not require irrigation or mechanized maintenance (e.g. mowing). Click here for an explanation of the carbon cycle.



Salt marsh carbon sequestration

Plants grow by pulling carbon dioxide from the air through photosynthesis and converting it to leaves, stems and roots. Salt marsh plants such as pickleweed, jaumea, alkali heath and salt grass are adapted to growing in intermittently flooded wetlands where natural sediment flows interact with plant growth to incrementally increase the elevation of the ground in line with slowly rising sea levels. Consequently, the carbon-rich roots form part of the soil and remain in the wet, anoxic (low oxygen) environment where decomposition rates are slow, so carbon is preserved and taken out of the atmosphere long term. Although trees also sequester carbon, when they die the wood is often burned or decomposes on the surface to re-release the carbon to the air, but wetland soils generally stay buried and moist and thus hold that carbon into the future.

With funding from the California Climate Initiative Cap and Trade funds managed by the California Department of Fish and Wildlife (CDFW), CCBER and Geography professor, Jennifer King, are studying how fast the soil/plant horizon in Devereux Slough has been accreting (growing) over the past several decades in order to make predictions about the rate of salt marsh carbon storage in NCOS. This work is based on careful coring of the soils in the existing Devereux Slough and analysis of the carbon content of two-centimeter slices of those cores. These soil samples are dated by depth using signals from Cesium 137 isotopes that were deposited during bomb tests in the early 1960s. Initial results are just in, and it appears that this unique, intermittently open estuary, has been accreting, or rising, at rates similar to tidal marshes studied in San Francisco Bay and elsewhere in California. On-going work using Lead isotopes and assessments of the carbon content of those slices will allow us to determine the rate of carbon sequestration of the system and to make some

predictions about future sequestration. We will be able to test those predictions using the ‘feldspar’ plots that have been established at multiple elevations in the salt marsh. These small squares of white clay (feldspar) create a time marker for 2017 allowing us to measure the rate of accretion as the soils develop on top of the marker over time. We will measure by taking small soil cores in 5 or 10 years hence and measuring the depth of soil above the white marker.

Figure 1. Feldspar plots at NCOS (left) and Devereux Slough (right).

CCBER has planted more than 50,000 salt marsh plants that will grow rhizomotously (e.g. spread out) to form the new salt marsh while simultaneously sequestering carbon and creating a system that can keep up with baseline levels of sea level rise. We have designed the project with a range of elevations for salt marsh plants, providing a buffer in case the rates of accretion cannot keep pace with actual levels of sea level rise associated with human-induced climate change. Stay tuned as we develop more accurate estimates for the tons of carbon we anticipate that the 22 acres of NCOS salt marsh will sequester over the next 100 years!

Integrating carbon into the soils

Because the soils excavated from the filled wetland were relatively low in nutrients and organic matter, we incorporated short and long-lived carbon into the newly created upland soil profile in the restored mesa. The short-lived carbon inputs were in the form of compost, and the long-lived input is known as Biochar (Figure 2). Biochar is created by burning slash wood from logging operations at high temperatures and low oxygen levels to create a very stable form of carbon that can persist for as long as 1000 years without breaking down. For more information about how biochar is produced and how it functions in the soil, see the Biocharproject website. At NCOS, 200 tons of purchased biochar were buried one foot below the soil surface, resulting in the storage of at least 175 metric tons of carbon equivalent according to estimates from carbon-accounting agencies. There is some loss associated with water weight and decomposition.

Figure 2. Biochar piles ready to be spread at NCOS (left), and varying combinations of biochar and compost being spread at different depths in experimental plots (right).

Soil carbon can increase plant growth

The physical structure of the carbon compounds created through the biochar creation process are complex and provide important functions in newly developing soils that support micro-organisms, nutrient storage and porosity which all support long-term plant growth which, in turn, increases the carbon sequestration potential of the site through carbon taken up by perennial plants and stored in roots. CCBER plans to establish more than 12 acres of perennial grasslands dominated by California's state grass: *Stipa pulchra* or Purple needle grass (Figure 3). The deep, filamentous roots of this species help store carbon deep in the soil over the long term. Students are helping with the baseline analysis of soil carbon and measurements of plant growth to document the beginning of this long term process.

Figure 3. *Stipa pulchra* (purple needle grass) grassland.

Supporting vehicle-free recreation and sustainable land management

The NCOS project includes more than 2.5 miles of trails that will provide connections from the neighborhood, and bus and bike routes which will link people to the full 652 acres of Ellwood Mesa and Devereux Slough open space area. This resource encourages and facilitates non-vehicular travel, exercise, and nourishing experiences in nature. Finally, the goal of NCOS is to restore native plant communities that are adapted to the local coastal environment without need for irrigation or regular mechanical maintenance. These aspects are in contrast to the site's previous function as a heavily irrigated golf course used by motorized golf carts and maintained by regular mowing and trimming.

Through all these mechanisms, NCOS will help sequester carbon into the future. The restoration project construction component, required to undo the impacts of the wetland destruction that happened in the 1960's, has contributed carbon to the atmosphere, and

CCBER is quantifying that by documenting fuel use and hours of operation by heavy equipment and will produce a report summarizing the carbon balance of the project compared to a no-project alternative.
Date:

Thursday, January 11, 2018 - 13:15

Tags:

NCOS

Elaine Tan's blog