

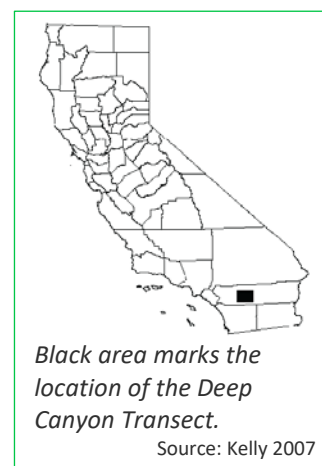
Vegetation distribution shifts

The distribution of vegetation across the north slope of Deep Canyon in Southern California's Santa Rosa Mountains has moved upward 213 feet over a 30-year period.



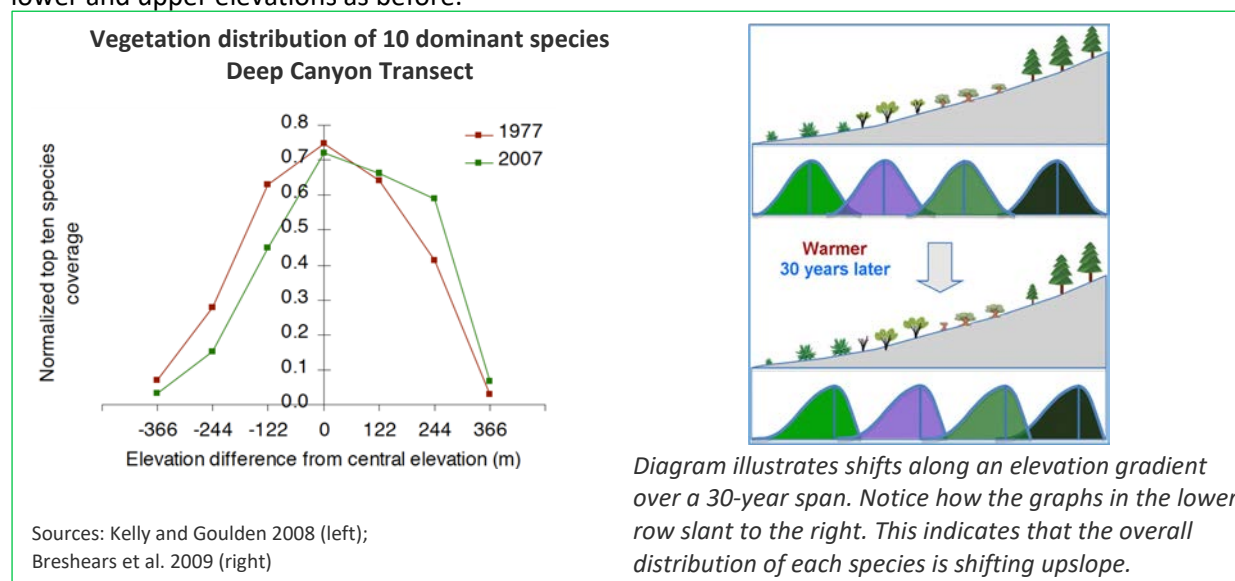
Plants often respond to changes in climate by thriving in sites where conditions are favorable and dying in areas where conditions are no longer favorable. Multiple plant species are shifting their distributions to higher elevations in the Deep Canyon transect in the Santa Rosa Mountains of southern California (see map, right). This transect climbs southward from sea level to a height of over 8700 feet (2650 meters), through desert scrub, pinyon-juniper woodland, chaparral, shrubland and conifer forest. Dominant plant species in this area include desert agave, brittlebush, creosote bush, scrub oak, canyon live oak, Jeffrey pine and white fir.

From 1977 to 2007, the region became warmer and drier, likely pushing many plant species to cooler, wetter conditions at higher elevations. Understanding local changes happening in this area may help to predict how vegetation throughout the state may respond to a warmer and drier climate in the future.



What does the indicator show?

The graph below shows that the percent of total ground surface covered by the ten most widely distributed or “dominant” plant species in the Deep Canyon Transect (including those species named above) has increased at higher elevations over the 30-year period between 1977 (red line) and 2007 (green line). At the lower half of their ranges, plants had pruned limbs or completely died, while at the upper half of their ranges, plants reproduced and grew in size. Nine of the ten species collectively shifted by an average of 213 feet (65 meters) higher in elevation. This upslope shift corresponded with the upward movement of cooler and wetter conditions by about 200 feet, as the climate of the region became warmer and drier over the same time period. Interestingly, the plants still occupy the same lower and upper elevations as before.





Why is this indicator important?

Plants grow best under certain environmental conditions. On a mountain slope, the climate is generally warmer and drier at the lower-elevation limits of a plant species' range, and cooler and wetter at the upper limits. A warming climate or drought can increase stress on plants at lower elevations, pushing them upward where conditions are more favorable.

Different types of plant responses to changes in climate have been observed, such as disappearance from lower elevations with or without establishment at higher elevations, decreases in abundance throughout the species' range, and increases in abundance at higher elevations, as reported here. At the Deep Canyon Transect, dominant plant species shifted their distributions upslope in a relatively short period. Changes in plant species distribution can disrupt ecological relationships, affecting the availability of food and habitat for other species.

The diverse climate and vegetation of Deep Canyon's slopes range from hot desert at the mountain base, stretching upward through warm chaparral, and finally into mild conifer forests at the mountain peak. These are analogous to the climate and vegetation gradients along the state of California, from the southern deserts, northward through chaparral-covered foothills and mountains, and into the evergreen forests of northern California. Thus, vegetative changes happening at Deep Canyon may be indicative of current or future changes throughout California in a warming, drying climate.



Temperatures in the Deep Canyon rose about 1°Celsius from 1977 to 2007, and droughts intensified.

Photo: Chris English, CC BY-SA-3.0



The desert agave is one of the ten dominant plant species in the Deep Canyon.

Photo: Boyd Canyon Research Center

For more information about this and other climate change indicators, visit:

<https://oehha.ca.gov/climate-change/report/2018-report-indicators-climate-change-california>

