

Compost, Healthy Soils, and California Water Resilience

Healthy soils act as distributed natural water infrastructure.

Legislative Brief Summary

California's Fourth Climate Change Assessment report, *Increasing Soil Organic Carbon to Mitigate Greenhouse Gases and Increase Climate Resiliency for California* (Flint et al., 2018), demonstrates that soil health is a water strategy. Commissioned under Governor Edmund G. Brown Jr., this report was part of a statewide scientific effort to inform resilience planning across major sectors including water, agriculture, public health, energy, and habitat.

The takeaway is straightforward: when California increases soil organic matter (SOM) on working lands, those lands hold more water, absorb storm flows, recharge groundwater, and better withstand wildfire and drought. The report positions compost and other soil-building practices not only as climate tools, but as practical, cost-effective investments in water resilience, agricultural productivity, and land stewardship.

Main Findings and Water Significance

Rising temperatures are projected to drive higher water demand across urban, agricultural, and rangeland systems, intensifying pressure on both surface and groundwater supplies. The report identifies a clear, natural solution: increase SOM to strengthen the land's capacity to retain and manage water.

Key benefits include:

- Higher aquifer recharge and baseflows
- Reduced flooding, erosion, and irrigation demand
- Improved forage and crop yields
- Lower climate-related water deficits

For policymakers, the concept is simple but powerful: healthy soils act as distributed natural water infrastructure. Compacted, degraded soils behave like bricks—water runs off instead of infiltrating. Healthy, carbon-rich soils high in SOM act like sponges, absorbing and holding moisture that infiltrates deep into the watershed.

The study found that **a single quarter-inch compost application** on California's rangelands would substantially increase SOM, soil carbon, and water retention. At the statewide scale, modeling a 3% increase in SOM produced measurable hydrologic benefits across 97% of California's working lands.

Most notably, that modeled 3% increase in SOM would improve soil water-holding capacity by up to 4.7 million acre-feet—equal to 1.53 trillion gallons, or roughly 9.5 million Olympic-sized swimming pools, **enough to supply about 14 million, or about 10% of all U.S. households for one year.**

Policy Implications

This report is highly relevant to the Legislature because it ties soil management directly to multiple state priorities:

- Drought and flood resilience
- Groundwater recharge and water conservation
- Climate mitigation and carbon sequestration
- Agricultural productivity
- Organic waste diversion and circular economy goals

Healthy soil strategies complement traditional built infrastructure by helping the land itself store, filter, and release water naturally. Water retained in the soil and recharged into aquifers sustains baseflows, protects riparian ecosystems, and stabilizes regional water supplies during low-flow periods.

The report also finds that the economic benefits increase over time, including returns from forage

productivity, carbon storage, and groundwater recharge—indicating that soil-building practices yield multiple dividends from a single public investment.

Barriers such as upfront costs, access to compost, and adoption challenges highlight the need for consistent funding, incentives, and technical assistance to support statewide implementation.

Conclusion

California's water challenges are not limited to reservoirs, conveyance systems, or groundwater basins—they also depend on the ability of soil to store and cycle water. Compost and other soil-building strategies offer the state a powerful, nature-based path to simultaneously improve water retention, groundwater recharge, and drought resilience while advancing climate, carbon reduction, and land management goals.

In essence: when California builds healthy soils, it builds water security. Compost is a key part of that system—**healthy soils are a natural sponge**.