



CALIFORNIA STATE SCIENCE FAIR 2013 PROJECT SUMMARY

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Project Title Are We Killing Our Creeks? How Land Use Affects Water Quality in the Permanente Creek Watershed	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals We wanted to understand the impact of human land use on the health of a local watershed. This was motivated in part by news that a cement plant was polluting our local creek, Permanente Creek. Because the creek travels from a large county park through residential and commercial areas before it gets to the Bay, we believed that we would observe increasing levels of pollution as you moved further downstream.</p> <p>Methods/Materials Our project methodology included (1) identifying 5 sites, 4 of which were used by the Santa Clara Valley Urban Runoff Prevention Program (SCVURPPP) to monitor water quality; and (2) testing three indicators of watershed health: water chemistry, macroinvertebrate life, and metals in the soil and water. One site, at the headwaters of the Creek (a pristine location in the forest) was our control site. We tested water quality at each site on 5 days, at the same time of day. We measured pH, fecal coliform, dissolved oxygen, nitrates, phosphate, turbidity, along with water and air temperature, and water height levels. We used dead leaf debris bags at 3 sites to collect and analyze bottom-dwelling bugs. Finally, we collected soil sediment/water samples from 2 sites and had a laboratory measure a range of metals typically in watershed studies, including mercury and selenium.</p> <p>Results Water chemistry data showed that pollution increases with increasing human land use. As we moved downstream from Site 5 (our Control) to Site 1, turbidity, pH, nitrates, and phosphates increased and dissolved oxygen decreased. The macroinvertebrate study was inconclusive due to difficulty identifying bugs. Metals testing showed lead, nickel and zinc levels were higher in site 2 (residential and commercial area) and mercury and selenium were not detectable in the soil sediment.</p> <p>Conclusions/Discussion Based on literature research, we expected to find increased levels of pollutants as we moved downstream, more pollution-tolerant bugs, and high levels of mercury and selenium in the soil/water from the cement plant. Our hypothesis is partially correct. Higher turbidity, phosphates and nitrates in sites further down from our control site indicate human use of land from pesticides, fertilizers, detergents and animal waste are polluting the watershed. More study is needed on macroinvertebrates and metals. We would suggest repeating the experiment on a seasonal basis and with more sensitive test equipment.</p>	
Summary Statement Our project shows the impacts of land use on the health of Permanente Creek watershed in Santa Clara County, as measured by water chemistry, macroinvertebrate life, and the presence of metals.	
Help Received Our parents helped: Identify Acterra to train with, GreenTown Los Altos Creek meetings to attend, narrow list of sites to test (due to site access) from SCVURPPP study, purchase test kit and materials, drive to sites, identify laboratory and deliver lab jars, and advise on data analysis.	