



# CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

<b>Name(s)</b> <b>Sahand Adibnia</b>	<b>Project Number</b> <b>S0901</b>
<b>Project Title</b> <b>The Effect of Rainfall on the Water Quality of South San Ramon Creek</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives</b> Eutrophication, the excessive richness of nutrients in a body of water, is a growing problem in lakes, rivers, creeks, and coastlines. It is caused by the runoff of nitrates and phosphates, and often leads to algal blooms that create dead zones and produce neurotoxins that can be harmful to humans. Rainfall could potentially cause this runoff, as it may pour agricultural fertilizers from surrounding soils into a body of water. The objective of this project was to determine how the water quality and trophic state of South San Ramon Creek, a creek located in the suburb of Dublin, California, is affected by increases in rainfall.</p> <p><b>Methods</b> Eight parameters of water quality that indicate trophic state were measured over a two-month period from November 2018 to January 2019. The parameters were dissolved oxygen, temperature, pH, nitrates, nitrites, free and total ammonia, and inorganic phosphates. Ten different measurements of each parameter were taken. Measurements taken within 72 hours before a significant rain (any day with greater than 5 millimeters of rainfall) were part of the control group, and measurements taken within 72 hours after a significant rain were part of the experimental group. Average percent changes between the experimental and control data were calculated, and each parameter was compared with daily rainfall levels on a graph.</p> <p><b>Results</b> Rainfall caused the creek to stray from its original oligotrophic state to a more eutrophic state. Dissolved oxygen levels decreased by an average of 9.183%. Creek temperatures increased by an average of 36.9%, and correlated with daily median air temperatures. Nitrates increased by 22.6% on average and nitrites increased by 116.74% on average. pH decreased by an average of 2.16%. Free ammonia, total ammonia, and phosphate results were inconclusive.</p> <p><b>Conclusions</b> Since the creek became more eutrophic, the environment became more suitable for algal blooms. The increase in creek temperatures could have been a result of El Nino and global warming raising air temperatures. Nitrates may have increased due to nitrifying bacteria flourishing at higher temperatures, or from increased agricultural runoff when rainfall levels exceeded 30 millimeters. The massive nitrite increase indicates that industrial runoff occurred as well. In conclusion, the water quality of the creek was impacted by both runoff and weather patterns that were agitated by global warming.</p>	
<b>Summary Statement</b> By measuring eight different parameters of water quality, it was discovered that South San Ramon Creek becomes more eutrophic with an increase in rainfall, indicating that agricultural runoff increased as well.	
<b>Help Received</b> My mother provided transportation to the creek and supervised me while I took measurements. My biology teacher provided me with the Vernier Dissolved Oxygen probe that I used to accurately measure dissolved oxygen.	