How Land Cover Impacts Water quality in the Russian River watershed

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Introduction

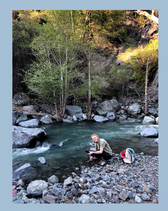
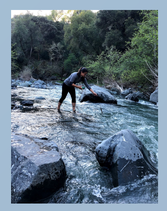
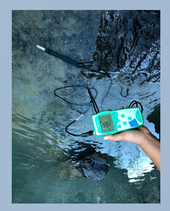
Water Quality Index (WQI) is a method of quantifying aquatic habitat health using biochemical oxygen demand, dissolved oxygen, fecal coliform, nitrate, PH, temperature, total dissolved solids, phosphate, and turbidity. We evaluated two creeks in the Russian River watershed to analyze how land cover affected water health; Pieta Creek, in a rural forested area, and Copeland Creek which runs through Sonoma State. We hypothesized that Pieta Creek would have a higher WQI because it was less exposed to urbanization and pollution. This data can be used to support more effective land management and resource conservation. Additionally, another SCI120 group studied macroinvertebrate populations in the same locations to provide more information about the biological impact of water quality in the streams.

Materials & Methods

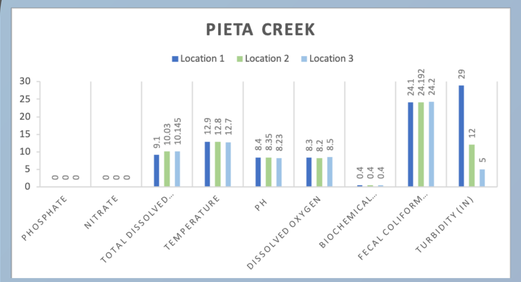
We measured nine parameters of water quality at both locations.

- For biochemical oxygen demand we used a modified five day USGS procedure
- For dissolved oxygen we used an Apera probe.
- To measure fecal coliform we used a qualitative test from LaMotte (gives +/- result) Sonoma State WATERS database provided a quantitative value as a control for both locations.
- For nitrate we used a Vernier sensor and LabQuest data logger.
- To measure PH, temperature change, and total dissolved solids we used a YSI probe.
- To measure phosphate we used a Hach sampling kit.
- Finally, for turbidity, we used a Secchi disk.

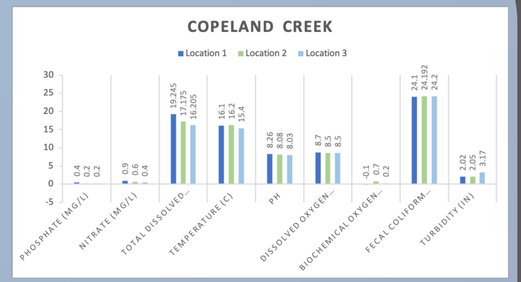
Each parameter had a corresponding Q-Value chart to obtain a Q-Value score. These numbers were then multiplied by the weigh factor and then added to find a final score out of 100.


Results

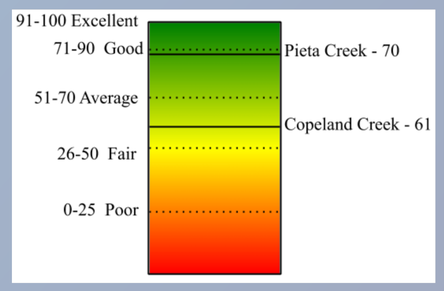


This chart corresponds to the data collected at Pieta Creek and shows the different measurements taken at each of the three locations.



This chart corresponds to the data collected at Copeland Creek and shows the different measurements taken at each of the three locations.

We can see that on average Copeland Creek had higher temperatures, lower pH, greater dissolved solids, and higher phosphate and nitrate levels. Pieta Creek measured at 0 for both phosphate and nitrate, while Copeland Creek measured at 0.3 mg/L for phosphate and 0.6 mg/L for nitrate. The mean temperature for Copeland Creek was 15.9°C, while the mean temperature for Pieta Creek was 12.8°C. The mean pH at Copeland Creek was lower at 8.12 than Pieta Creek's pH at 8.3. The mean dissolved oxygen at Copeland Creek was 8.6 while the mean at Pieta was 8.3. The final resulting WQI of Copeland Creek was 61 which was lower than the WQI of Pieta Creek which was 70.

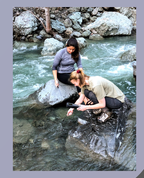


Discussion

We can infer that Pieta Creek has a slightly healthier aquatic ecosystem because the WQI score for Copeland Creek was lower at 61 than Pieta Creek at 70. While the two site's nine parameter values differed, their specific weight in the overall score calculations varied, causing scores to be similar. We assume from our results that Pieta Creek had lower exposure to agricultural runoff and urbanization.

We collaborated with another group focused on macroinvertebrate populations in the same locations to see the biological impact of water quality. Their findings did not align with our results, which we believe may have been impacted by external environmental factors.





Acknowledgements

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