The Socioeconomic Impact on Quality of Local Water Bodies

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Abstract

This study has a set focus on finding a correlation of land value and therefore overall socioeconomic status to the water quality of bodies of water near said real estate. To do this there have been several locations chosen based on the average value of the houses surrounding the body of water. Where using a water quality index scale that accounts for several standard water measurements, we can determine the overall quality of the water with consistent results.

Introduction

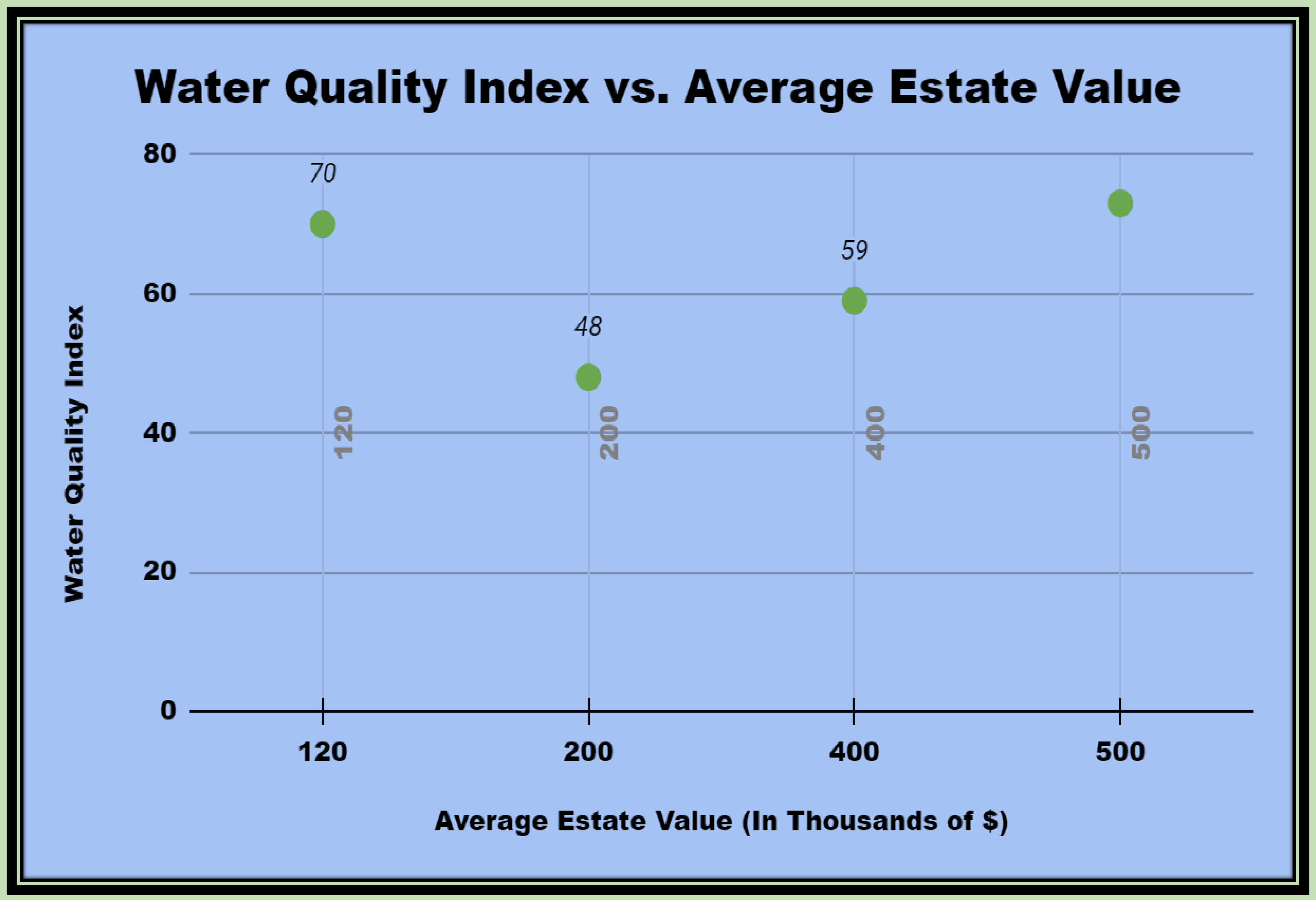
Prior research has made it clear, in most cases, that yes, the water quality of lower-income neighborhoods and areas is often of worse quality than higher-income areas. Although this is common in many areas and is likely fair to believe in the situation of local Tallahassee water bodies, we simply could not infer, and with the chance of finding samples below the Florida water quality standard, it seemed like a worthwhile endeavor to let locals know of possible dangers. With all this, we aimed to demonstrate that bodies of water near lower-income areas were of lesser and potentially more dangerous quality than bodies of water near higher-income areas in Tallahassee.

Methods

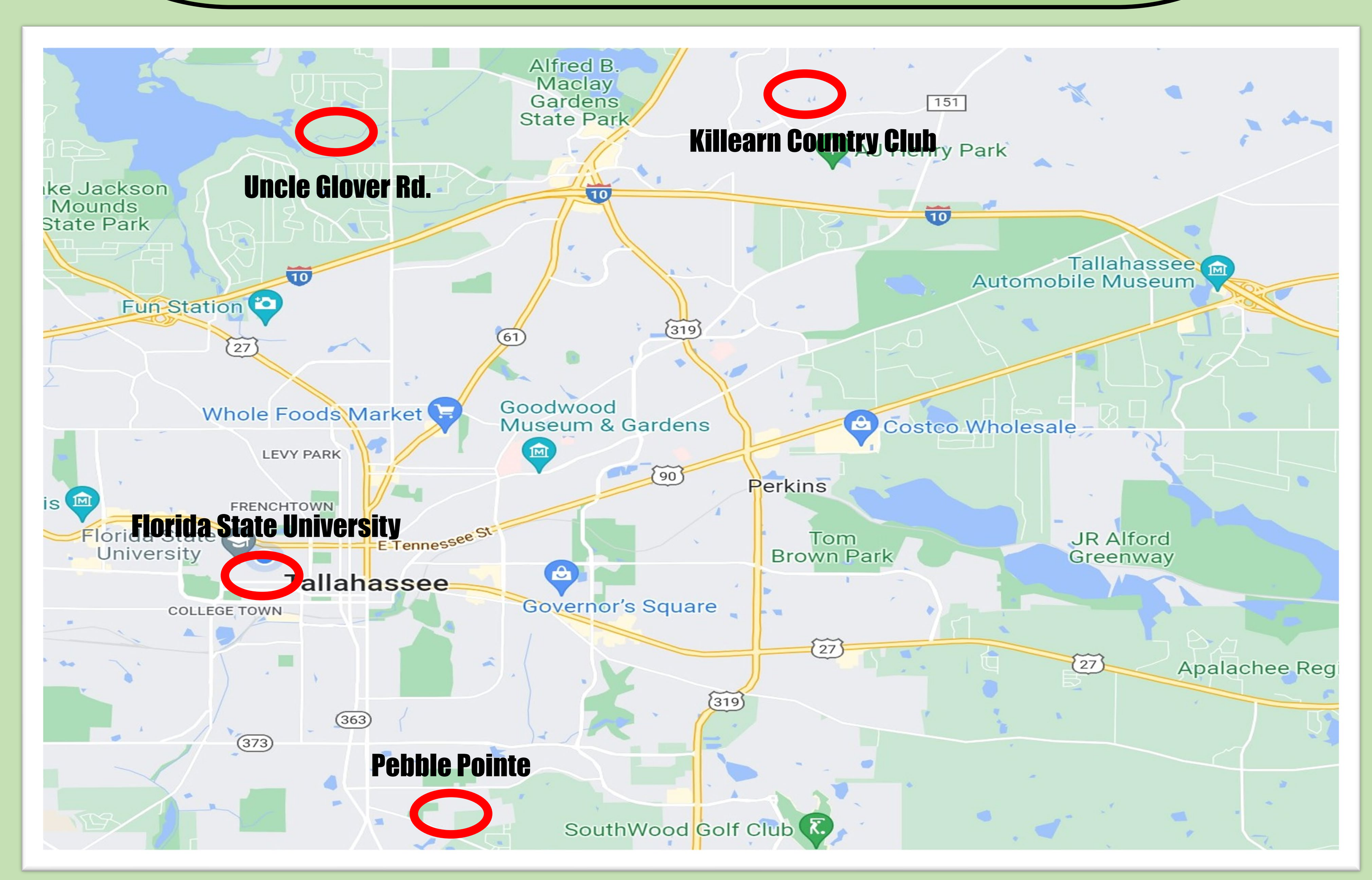
This study, as stated in the abstract, included choosing four distinct locations based on the average real estate values surrounding or very near to a body of water. For this study, the chosen areas were Carter-Howell Strong Park, Pebble Point, Uncle Glover Rd. real estate, and Killearn Country Club. The median price of these locations is listed from left to right cheapest to most expensive. After choosing locations, sampling of these bodies of water was all taken on the same day where several tests such as temperature change, Dissolved oxygen saturation, and pH levels were tested on-site while the rest were performed back at the lab. These tests are being executed to find measurements on fecal coliforms, biochemical oxygen demand, total phosphate, nitrate levels, turbidity, and total solids. To find the number of fecal coliforms we used the standard coliscan easy gel test that allowed us to find the total number of E. coli coliforms per 3 mL of sample added. To test biochemical oxygen, demand the initial dissolved oxygen saturation taken on-site was measured and compared to a reading taken after samples were held in an incubator at 20 degrees Celsius for 5 days, to see how much oxygen was needed by the life within the sample for the given time period. To find total phosphate levels, testing was done with a colorimeter where the sample was mixed with phosphoric acid reagent to find the phosphate levels in units of ppm. Testing of total solids was done by taking 200mL of each sample and heating it in an oven overnight at approximately 105 degrees Celsius then measuring its mass before the oven and after to find the total mass of solids left behind after heating. Finally, the last two measurements of turbidity and nitrates were each found with probes with the specific function of finding said values. After all tests were completed, results were input into Know Your H20's Water Quality Index scale which gave back differing numbers based on the overall quality of each water sample. After this, we were able to determine a sort of correlation between local real estate value and the quality of the waters sampled.

Results

After inputting our test results into Know Your H2O's Water Quality Index test, we found that the results were not exactly what we expected. With our low-income sample, from Carter-Howell-Strong Pond having a water quality of 70 close to our highest income water sample at Uncle Glover Rd., with a water quality of 73. While our two more centered area prices fell more in line with what was to expect with Killearn Country Club giving a score of 59 compared to the lower income sample taken from Pebble Point showing a score of 48. As for the causes of these differing water qualities it is unclear, but from our sampling we found several single values that were huge outliers that likely shifted the water quality index scores of each sample greatly. For example, at Pebble Point the turbidity was recorded as 78.8 ntu, a value much higher than the other three samples which had not even passed a value of 10 ntu. Another outlier we found was also with Pebble Point where it had an unusually large number of fecal coliforms cultured compared to our other samples with it having an average of 55 coliforms per every 3 mL of sample, compared to the 1-5 coliforms displayed in the others. Although these numbers were found to be interesting, one is likely causing the other, which is why they are the only two true outliers found in our sample set.



higher Water Quality Index value indicates better water quality



Water sample locations pictured above, circled in red

Conclusions

While in many areas of the United States it is abundantly clear that socioeconomic status has a clear influence on the water quality of an area, with our admittedly small sample size we were not quite able to add on to these findings. Even though our research team may plan on increasing our sample size and catalog of water samples it is clear to see that there is not simply one variable that can be logically reasoned as the sole cause of poor water quality. Instead, there are many, which is what future research will continue to use and build on our slowly growing base.

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References

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Know Your H2O Water Quality Index. Water quality index calculator for surface water. (n.d.). Retrieved March 2, 2022, from https://www.knowyourh2o.com/outdoor-3/water-quality-index-calculator-for-surface-water