# Land Management reveals differing concentrations of Heavy Metals

## How Metal is your Campus Vol III

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## Introduction/Background

- Many studies found that land management corresponds to heavy metal concentrations in soil[1].
- These concentrations are often associated with fertilizer treatments[2].
- Common fertilizers include nutrient rich elements such as nitrogen, potassium, phosphorus, and zinc intended to promote plant growth[2 6].
- Arizona State University-West Campus in Glendale, Arizona contains both managed (Quad and Herberger Institute Lawn) and unmanaged properties (Desert Restoration Zone and Desert North).
- We hypothesized there would be a significant difference of heavy metal presence between the managed and unmanaged lands.

## Materials and Methods

- We collected samples throughout ASU's West Campus in five locations: Desert North (DN), Desert Restoration Zone (DRZ), Quad, Herberger Institute Lawn (HIL), Wash.
- We grouped the Quad and HIL as managed while DN and DRZ were unmanaged. We analyzed the wash separately.
- We made a 10 m diagonal transect on each location.
- We dried and then measured 5 g of each sample in individual sample cups to analyze the various metals present using an X-Ray Fluorescence machine.

## Results

- We analyzed the 10 most common metals within each transect using a One-Way ANOVA with Tukey's test for Post-Hoc Analysis.
- We then found the average concentrations of each metal in managed plots as well as unmanaged plots.
- Higher average levels of Magnesium and Calcium were found in unmanaged land compared to managed lands.
- Managed areas had higher levels of Potassium, Silicon, Sulfur and Phosphorus compared to unmanaged land.
- The wash had higher levels of Sodium compared to both managed and unmanaged lands.

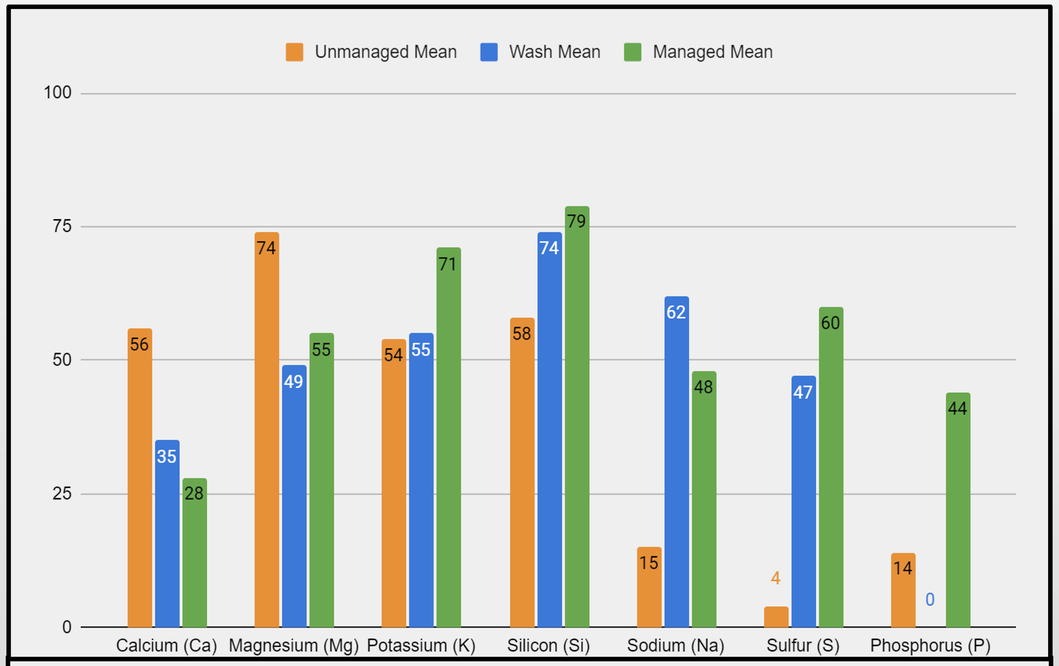
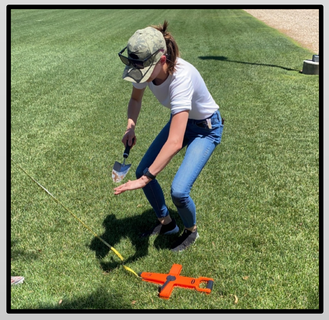
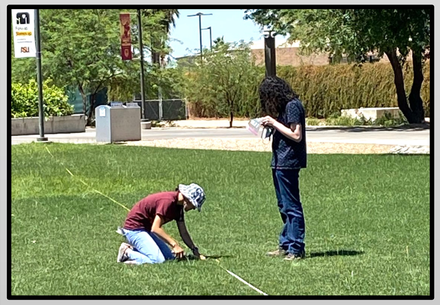



**Figure 1. Normalized Concentration of Significant Metals Between Unmanaged, Managed, and Wash Transects.** Metals with significant findings were selected using a One-Way ANOVA with Tukey's test with Post-Hoc Analysis. Data was normalized using a min-max normalization method with a range from 0-100.





## Conclusion

- Our findings show that there is a significant difference in heavy metals between managed and unmanaged lands.
- Fertilizer use in the ASU managed lands is linked to increased levels of potassium, silicon, sulfur, and phosphorus[2 3].
- The wash contained higher levels of sodium due to potential runoff from managed lands[4].
- The low presence of fixed nitrogen in both unmanaged plots limits plant growth, inhibiting uptake of calcium and magnesium. This leads to increased levels of calcium and magnesium in the soil[5].
- Further research could be conducted to determine other sources for varying metal concentrations in these areas.

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