

Rainfall Effects on Trash Accumulation in the San Diego River

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Background

The San Diego River is an urban riparian corridor that has experienced significant environmental pressure due to surrounding development and human activity. Runoff, litter, illegal dumping, and encampments contribute to the accumulation of trash within the riverbed. The San Diego River Park Foundation conducts regular surveys and cleanup efforts to monitor and remove trash from the river corridor.

This project examined whether rainfall events influence trash accumulation in the San Diego River. Trash survey data collected by the foundation were compiled into a master dataset and paired with precipitation data obtained from the National Oceanic and Atmospheric Administration. Using this combined dataset, exploratory analyses were conducted to evaluate potential correlations between rainfall patterns and measured trash volumes.

Methods

Data Sources

- Trash survey data collected by the San Diego River Park Foundation from August 2022 to March 2025.
- Monthly precipitation data obtained from the National Oceanic and Atmospheric Administration.

Data Processing

- Survey data were stored across multiple files produced by different interns.
- File naming conventions changed during the study period and duplicate survey files were present.
- A Python script was developed to:
 - standardize file naming conventions.
 - identify and remove duplicate survey records.
 - extract and compile relevant variables from each survey file.

Dataset Construction

- Cleaned data were compiled into a spreadsheet containing:
 - survey date.
 - total pounds of trash observed.
 - monthly rainfall totals.

Data Analysis

- Scatter plots were used to evaluate correlations between rainfall and trash accumulation.
- Time series charts were generated to visualize trends across the study period.
- Because trash accumulation may occur after rainfall events, lagged time series analyses were also explored.

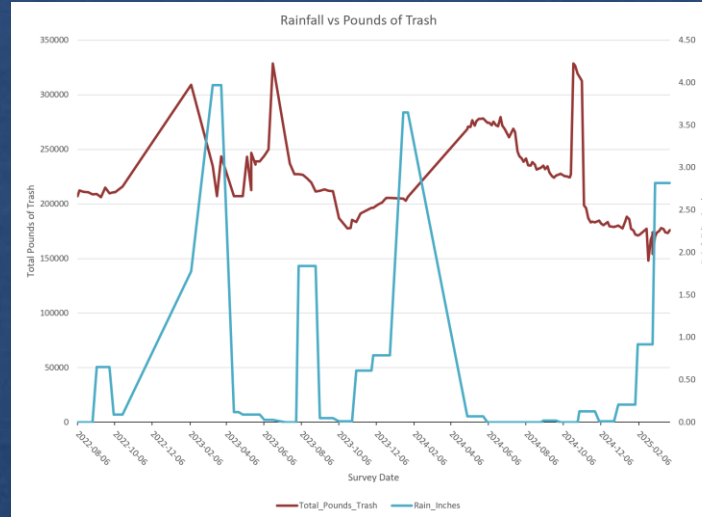


Figure 1. Time series comparison of rainfall and trash accumulation.

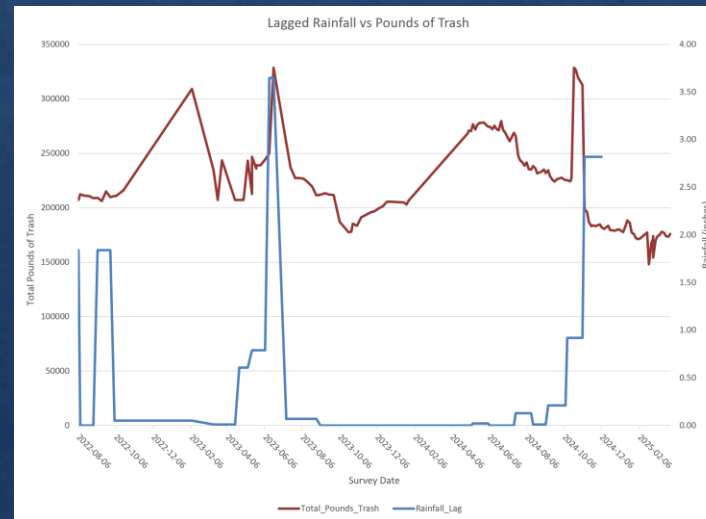


Figure 2. Lagged time series suggesting delayed trash accumulation following rainfall events.

Results

Key Findings:

Rainfall shows a weak immediate relationship with trash accumulation, but patterns suggest a delayed (lagged) effect.

Time Series Analysis (Figure 1)

- Rainfall peaks during winter months.
- Trash accumulation peaks in spring and summer.
- This indicates a delay between rainfall events and amount of trash observed.

Lagged Time Series (Figure 2)

- Improved the visual alignment between rainfall and trash trends.
- Suggests rainfall may contribute to river trash accumulation over time.
- Limited dataset reduces the statistical certainty.

Conclusion

- Rainfall alone does not strongly predict trash accumulation in the San Diego River.
- Time series patterns suggest a delayed relationship, with trash accumulation occurring after rainfall events.
- This lag may be influenced by factors such as human activity and survey timing.
- Findings may inform urban watershed management strategies for reducing pollution in river systems.
- Despite apparent visual trends, R^2 values remained low, indicating a weak statistical correlation.

Acknowledgements

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- Rainfall data were obtained from the National Oceanic and Atmospheric Administration (NOAA).