



CALIFORNIA STATE SCIENCE FAIR 2016 PROJECT SUMMARY

Name(s) Erin K. Lamphear	Project Number J1117
Project Title A Spatial and Temporal Comparison of Sound Levels in a Rural and Urban Interface	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this experiment was to determine the sound level variation between time periods and between zoning in a rural and urban interface in Northern Coastal California.</p> <p>Methods/Materials The study area, consisting mainly of industrial, commercial, residential, and agricultural zones, had 49 sites distributed evenly, sampled over three time periods (weekday afternoon, late evening, and weekend morning). Decibel (dB) sound recordings were taken for 30 seconds at each site and mean and maximum dB values calculated. Area weighted mean and maximum values were calculated for all periods. Inverse distance weighted interpolation was used to generate study-wide mean and maximum sound surface rasters for each time period. Zonal mean and maximum sound levels were calculated for each of the three time periods.</p> <p>Results Across the study area, the weekday afternoon period exhibited the highest mean and maximum dB values, followed by the weekend morning, and evening periods. Area-weighted zonal mean and maximum dB values followed predicted results with the exception of Residential Medium Density and Natural Resource Public Trust zones exhibiting higher than expected mean sound levels. In addition, unexpected maximum dB values were experienced in Agriculture Exclusive and Residential Low Density zones.</p> <p>Conclusions/Discussion Sound levels in all temporal periods were higher in the east side of the study area, consisting mainly of residential and commercial zones. Sound levels were lower in the west side of the study area, primarily comprised of agricultural land and low density residential zones. Unexpectedly high sound levels within the Residential Medium and Low Density zones can be explained by the zones' proximity to major primary and secondary transportation arteries. High sound levels adjacent to major streets throughout the study area and across time periods indicate that vehicular traffic is the primary cause. Noise pollution is a growing concern in rural and urban areas. Detrimental effects of noise pollution include, stress-related illnesses, high blood pressure, speech interference, hearing loss, sleep disruption, and lost productivity (U.S. EPA 2016). Interpolative surface raster modeling of dB values provides spatial information raising local awareness about unsafe sound levels and can be used to evaluate and monitor the influence of sound effects across a heterogeneous rural and urban interface.</p>	
Summary Statement This study is a spatial and temporal comparison of sound levels (dB) in a rural and urban interface.	
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