Ecoacoustic Soundscapes in Colorado Springs

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Introduction

- Ecoacoustics studies ecosystems and anthropogenic landscape alterations in order to reveal patterns amongst soundscapes.
- Noises in the environment can be classified into three categories:
  - Anthrophony: human-produced sounds
  - Biophony: natural biotic sounds
  - Geophony: natural abiotic sounds
- We hypothesized that patterns of biophony, anthrophony, and geophony would reflect the differences in landscapes as well as the differences in loudness throughout the day.

Methods

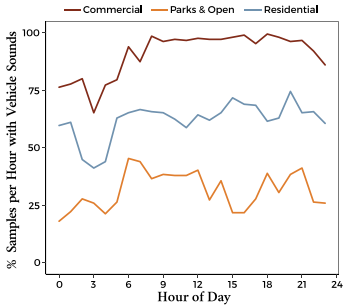
- We examined three landscape types in Colorado Springs: residential, commercial, and parks and open spaces, selecting three representative study sites in each.
- At each site, AudioMoth acoustic recorders were deployed at three sample points, recording for 1 min every ½ hour for 3 days, totaling 48 minutes of audio/day/recorder.

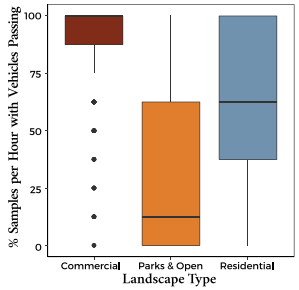
AudioMoth recorder with case

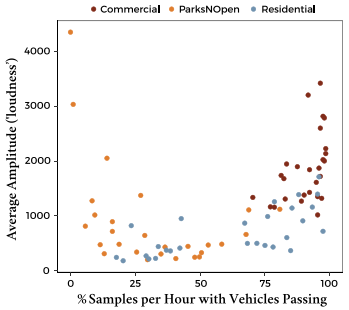
- We then scored audio files by 15 sec intervals identifying specific sounds which were grouped by biophony, geophony, and anthrophony.

Results

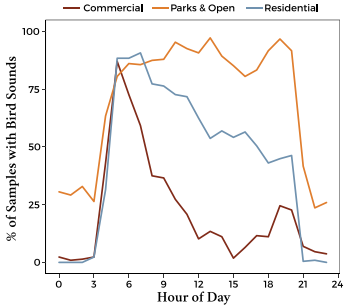
Anthrophony in commercial and residential zones was more frequent than in parks and open spaces. Anthrophony was more prevalent and loudness was higher in commercial zones.

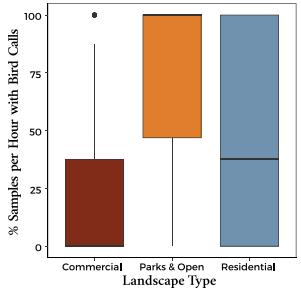


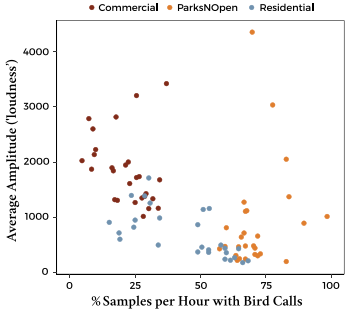




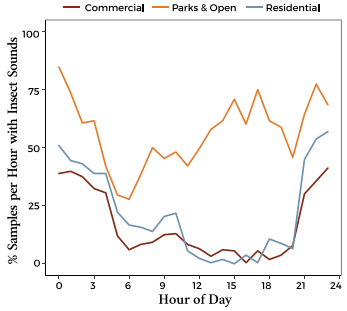
Biophony in commercial and residential zones was less frequent than in parks & open spaces. Biophony was more prevalent and louder in parks & open spaces than in other landscape types.

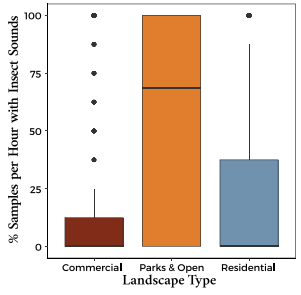






Both anthrophony and biophony varied by time of day with increased activity during peak travel times in commercial and residential zones. For files with high amplitude due to vehicle noise (louder files), other types of sounds (birds, insects, etc.) may have been obscured by dominant vehicular sounds.





Using Kruskal-Wallis tests followed by Mann-Whitney U tests for post hoc multiple comparisons, we found statistically significant differences ($p<0.05$) among the three landscape types for vehicle, insect, and bird sounds.

Conclusions

- Anthrophony has far-reaching impacts, especially in areas in Colorado Springs that are considered protected natural areas.
- This research demonstrates the successful application of ecoacoustics across varying sites to reflect the landscape ecology.

Setting up fence posts to place AudioMoths on PVC pipes in Jimmy Camp

Future Research

More study sites combined with fewer acoustic samples (i.e., sampling less often) could enhance capacity to explore across the entire city. A future study could focus on residential areas, to tease apart socioeconomic factors in relation to soundscapes. Other future work could explore specific sounds: bird calls – identified to species level – to reveal patterns across the city. In general, affordable, user-friendly AudioMoth recorders could be used for studies in a variety of disciplines at Colorado College.

Literature Referenced

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