The sounds of our choices

Representing and reflecting on the *(lack of)* audio diversity of the Science Park through soundscape ecology.

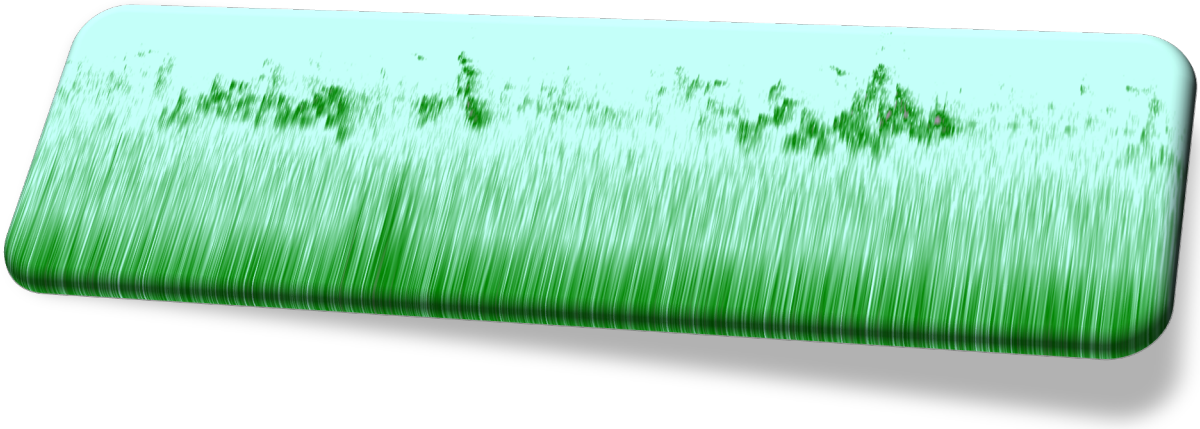

Figure 1 Spectrogram of bird sound recordings[1]

Written by: Máté Szilassi

[1] Bird recordings from Virtual Ambiance. (2016, July 17)

Introduction

The idea for the topic which is the basis of this project first popped in my head when I was biking in last spring from my home to the university, on a beautiful bike path lined with trees, and I was listening to the birds. At some point I realized that I have substantial trouble with focusing on the bird sounds as on the other side of the tree line is a large highway. I found it astonishing that I personally never reflected on, or really even realized, the amount of sound the cars were making, which absolutely dominates the soundscape of not just that street, but the whole surrounding area.

In this text, first I will discuss my research on soundscape ecology, audio-diversity and the effects of anthrophony (human made sounds) on soundscapes, afterwards I will describe my attempt (and my struggles) at trying to localize this topic to the eco-system of the Science Park through field work, and finally I will describe and showcase the method I chose for representing my dream and nightmare soundscape for the science park.

Background // Research

Soundscape ecology is a field with the goal to understand, measure and showcase soundscapes consisting of biophony, geophony and anthrophony (Pijanowski et. al. 2011). The word soundscape relates to how landscapes have unique sounds of their own, which are not just the sums of all the sounds generated by individual things in the landscape, but rather a complex network of communication between living and nonliving things, where each sound and its source (quite literally) interact with each other. One can imagine, that on a physical level, if one sound generated by a car is heard by us, it is also heard by every other thing participating in the landscape, including animals, plants and even nonliving things. Just think of how sand and water move to the bass, sound literally moves particles, so through communication we move each other in all senses possible.

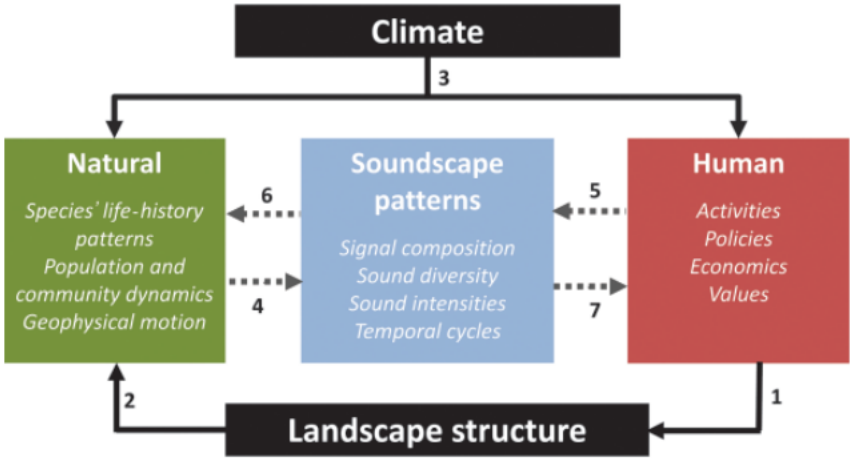

Figure 2 The conceptual framework of soundscape ecology (Pijanowski et. al 2011)

For my imagination assignment, I asked myself the question: What soundscape would be the “dream” soundscape and what would be a “nightmare” soundscape. Obviously, like anywhere else in ecological or earth sciences, there is no easy answer for either of these questions. There is no such thing as the best ecosystem or worst ecosystem, however an ecosystem can be rated along multiple axes to see whether it is good for most of its participants, or perhaps it is only good for one thing. One can imagine an ecosystem of only roaches and bacteria, however arguably this is not desirable from an ecological standpoint, we as humans looking at ecology often assign value to diversity and stability of a system. If a system is both resilient against (internal and external) catastrophe and is diverse at the same time, we see it as a “good” ecological system. So, using this framework, I wondered, what would be resilience and diversity on a sound level?

Resilience is a hard thing to define in a system and defining soundscape resilience is out of scope for my research, but audio-diversity is a topic I found quite some literature on, and which I will try defining and describe, and with which I will work in the creative part of my project.

Soundscape diversity can be thought of in the framework of communications science. If there are multiple senders and multiple listeners, with low noise in the system, easy communication between two individuals is facilitated, as on a group level information spreads quickly and efficiently in a low noise environment. Just think of how our brains as humans is

wired to understand human speech in such an amazing capacity, that even in a loud nightclub or with multiple people talking at a cocktail party we still understand our communication partners speech. All animal species have a selective capacity for hearing their own species better, so If 10 humans and 10 birds are in a room, all actively communicating, the communication will be probably quite efficient. However, when is it that a communicator or a sound source becomes “noise” in the system? That is when the sound in this case is either so loud, or on such frequencies that it “overtakes” or “drowns out” the information of other senders, inhibiting receivers from understanding. In other words: “If the environment is too noisy, meaning the signal-to-noise ratio is too small, it is difficult for an animal to maintain social aggregation, and this may prevent the exchange of strategic information” (Farina A. 2017). The largest and most common anthropogenic source of noise is cars, being the loudest and most common source of sound humans create. We know of creatures that are bigger, louder and noisier than cars, just think of persistent crickets and roaring lions, we also know of geogenic sounds like the wind which can be so loud it makes communication challenging; however, cars are worse for multiple reasons. Firstly, they are not alive thus are themselves neither senders nor receivers, neither are they tools of communication, so arguably their noise is an unnecessary side effect to their function. Secondly, they are human made, and each car on the busy highway has a person who made the choice to drive that morning, making the overwhelming noises of a highway the sounds of our choices. Like many other things in ecology and environmentalism, I believe it is very important to realize and reflect upon how our choices affect the systems we live in, including on this (I think often forgotten) level of audio.

The effect of these sounds of our choices have on individual members of an ecosystem such as birds can be quite radical. Birds are known to adapt their song to fit within a tighter frequency band when other frequency ranges are occupied (Merckel 2022) but this adaptivity comes at a cost, as altough birds get louder and change frequencies in reaction to background noise, this means they spend more energy on communication than in noise free environments (Gentry, McKenna, & Luther, 2017). One can imagine a kind of feedback loop, where you are

in a room with very loud background noise, so you start shouting to communicate efficiently, however due to everyone shouting, a larger amount of noise is created, and thus the room gets louder, communication becomes harder and at the end everyone's throat and ears hurts from the higher energy spent to send and receive signals. This means that just because birds and other animals can adapt to the sounds of our choices, that doesn't mean they should. A louder soundscape is louder for everyone, and high audio volume generally tends to cause stress in living beings (Kunc & Schmidt, 2019).

Following this concept of the (loud) sounds of our choices, in my creative work in creating a dream and nightmare soundscape, I want to present two ends of the soundscape diversity spectrum to see and showcase how different a soundscape can be when it is an efficient and diverse space of communication for hundreds of living things, compared to when it is a homogeneous wall of nonbiological anthropogenic sound. I want to use this project to spread awareness to how our choices affect the soundscapes we inhibit or more often just pass through and imagine a future where our choices do not harm the soundscape diversity of our world.

Field work // Science Park

In this section I will describe my experience in field work in the science park, as I tried to localize the above discussed topic of soundscape diversity. I will do this by discussing questions that I have asked myself while doing fieldwork and working on the dream / nightmare soundscape.

"Should I describe the soundscape of Science Park, or perhaps try change it for the better?"

Richard Oddie in his essay other voices writes: "the acoustic ecologist advocates the preservation and restoration of diverse and informative acoustic environments." (King, Stefanovic 2011) Through this we can see that acoustic and soundscape ecology is not only descriptive, but strives to be a prescriptive science, actively trying to enhance soundscape diversity through art, science and policy making. However, in my hours spent wandering the

science park, the more I listened, the less I felt I would be able to do anything about the issues of the lack of soundscape diversity. This was mainly due to the extremely overwhelming amount of car sounds in the area, as I found there is not a single point in science park, where the loudest thing is not the sounds of a nearby road or highway. This finding was saddening and made me reflect on how naïve I was about collecting sounds in science park to represent both the dream and the nightmare soundscape I was working towards. Seemingly the nightmare soundscape I planned originally had already taken place, and it was impossible for me to create a dream soundscape with sounds only from science park, for this reason I decided to use external (not my original) sound recordings for the dream scenario.

“Should I aim for recording a dream scenario with no anthrophony, or is there a “good” amount?”

While conducting my recordings I found my breathing and steps always somehow taking quite a major role. This has a certain element to it that is true of all research, that by trying to measure something, we inevitably change in it the process. From this finding I decided not to look for a soundscape free of my own audio footprint for the dream scenario, but rather I tried to minimize my own audio footprint to give more space for the sounds I was more interested in.

As previously mentioned, I decided to also include external sound recordings in my dream scenario, due to my failure at finding any place in science park with no overwhelming amount of car noise. For this reason, in my creative work, I decided to only include the sounds of a bike here and there passing by, and humans walking and talking in the distance, but not cars. I do firmly believe that anthropogenic sounds do have their space in a dream soundscape, but car sounds do not.

“What should I do about wind? Are geophonic sounds destroying bio-audio diversity the same way as cars do?

Wind is less loud than cars, but with my relatively amateur equipment my wind shield failed to filter out the loud resonance wind creates. For me personally, wind has a more calming white-noise like quality, especially when it gets most of its “sound” from the objects and living things it interacts with, such as wind blowing trees or reeds. Cars on the other hand have an objectively louder noise, with a wider frequency range and they are lots of individual source of noise creating a more diverse wave like soundscape, with some cars being louder and faster. I noticed the loudest machines by far were motorbikes, which had tremendous amount of mid frequency presence, almost like a horn or a trumpet being constantly played at a note. This kind of overwhelming loud noise is just simply impossible from wind “whistling” in my experience.

Figure 3 The author conducting a (seemingly one sided) interview with hundreds of reeds

Dream / Nightmare soundscape

I used an audio and music production software called Ableton to mix my recordings together and achieve the soundscape I was aiming for.

This table captures all the aspects I wanted to showcase in the dream and nightmare soundscapes.

Dream soundscape	Nightmare soundscape
No cars, only bikes	Lots of cars
Wind blowing trees/reeds (white noise like)	Wind blowing science park building (screeching sound)
External (not my own) recording of local Dutch birds	My own recording of birds next to a highway around science park Showcasing audio resilience of birds and giving a challenge for listener to try find the biophonic sounds in the anthrophonic mess.
Own recording of bees from science park	No insects (they are dying!)
Human sounds	

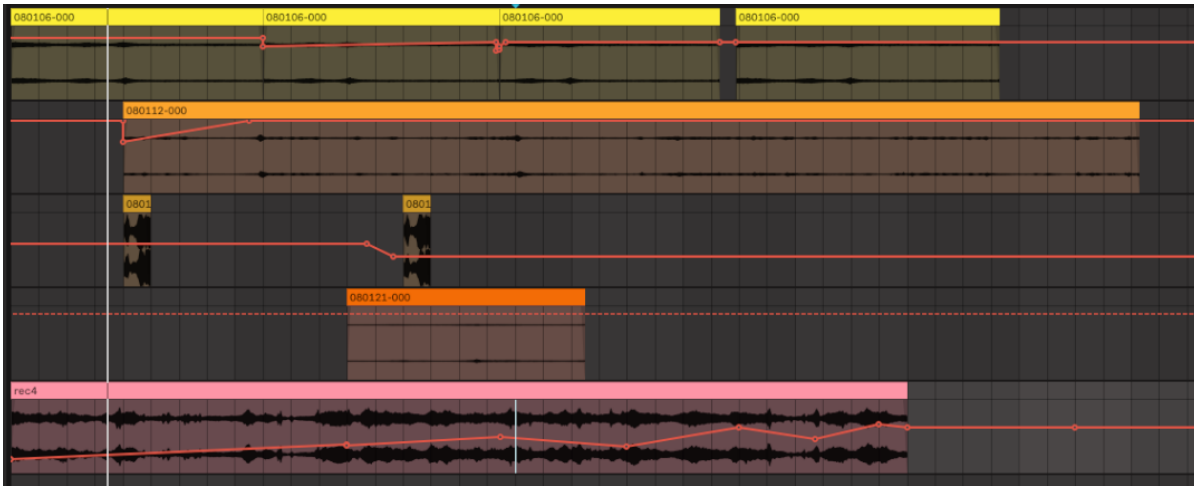

Figure 4 screenshot of Ableton, showing how the nightmare soundscape looks like as a collection of clips

Bibliography

Farina, A. (2013, October 28). *Soundscape Ecology: Principles, Patterns, Methods and Applications* (2014th ed.). Springer.

Farina, A. (2017). The Ecological Effects of Noise on Species and Communities. In Ecoacoustics (eds A. Farina and S.H. Gage). https://doi-org.proxy.uba.uva.nl/10.1002/9781119230724.ch6

Gentry, K. E., McKenna, M. F., & Luther, D. A. (2017). Evidence of suboscine song plasticity in response to traffic noise fluctuations and temporary road closures. *Bioacoustics*, *27*(2), 165–181. https://doi.org/10.1080/09524622.2017.1303645

Kunc, H. P., & Schmidt, R. (2019). The effects of anthropogenic noise on animals: a meta-analysis. *Biology Letters*, *15*(11), 20190649. https://doi.org/10.1098/rsbl.2019.0649

Myles Merckel. Sonic Conservation, Research made within "Why look at animals" course by Cocky Eek, As part of the Machine Wilderness program at ARTIS Royal Zoo (Amsterdam)

Pijanowski, B. C., Villanueva-Rivera, L. J., Dumyahn, S. L., Farina, A., Krause, B. L., Napoletano, B. M., Gage, S. H., & Pieretti, N. (2011, March). Soundscape Ecology: The Science of Sound in the Landscape. *BioScience*, *61*(3), 203–216. https://doi.org/10.1525/bio.2011.61.3.6

Sarah J. King, Ingrid Leman Stefanovic (2011). Children and Nature in the City. In *The Natural City* (p. 322–). University of Toronto Press. https://doi.org/10.3138/9781442698024.26

Smith, & Pijanowski, B. C. (2014). Human and policy dimensions of soundscape ecology. *Global Environmental Change*, *28*, 63–74. https://doi.org/10.1016/j.gloenvcha.2014.05.007

Virtual Ambiance. (2016, July 17). *Nature Sounds: Dutch Forest Trail with Relaxing Bird Sounds* [Video]. YouTube. Retrieved October 17, 2022, from https://www.youtube.com/watch?v=-beM-S1iWUA