

INTERPRETING NATURAL SOUNDSCAPES

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ABSTRACT

An acoustic community is an accumulation of sound-delivering species and naturally is viewed as a fitting proportion of biodiversity inside a living space. Soundscapes offer the possibility to audit bio-phony and local area elements of vocal species in a biological environment that are affected by prompt human and non-human threats like agricultural expansion, energy development and challenges with more underlying impacts like global climatic crisis. All living creates are constantly competing for resources that are globally shared.

KEYWORDS: Bioacoustics, Vocalizing Animals, Soundscape Ecology, Birdsong

INTRODUCTION

Soundscape ecologist, Bernie Krause once made a point, “One of the single most important resources of the natural world is its voice-the natural soundscape. The concept of the soundscape was first introduced by R. Murray Schafer in his 1977 book “Tuning of the World.” (Krause, 1999). The biological sounds of vocalizing animals and non-biological sounds of a breezy night and water flowing through rocks and streams emanate from natural landscapes. There is a case for making a connection between bird song and the development and learning of human language. ‘Language is not just a human property as was previously thought. It’s found in other species too’ (Sorjonen, 1987).

Animals defend their territory vigorously from any unfamiliar and strange intrusion. Their social recognition in animals is primarily based on voice recognition, especially in the case of long-distance sound signals. They can easily differentiate between the voice signals of the members of their own community (family, neighbouring species and known ambient sounds) and any external unrecognized voice. Their auditory abilities are far more evolved than those of humans.

Sound scape – A Resource

Managing and protecting soundscapes is an increasingly important concern as noise is spreading to more remote areas, including national parks due to air travel, motorized recreation, and urban sprawl (Miller, 2008). Society should equally value natural soundscapes as it does other aspects of nature. Soundscapes are integral elements of the heritage of our planet’s acoustic biodiversity and reflect Earth’s natural assemblage of organism. These are our auditory links to nature. In research from Pijanowski et al. (2011), “Many of the basic principles of soundscape ecology are common to those of landscape ecology. These include the assignment of a soundscape to a geographic context, the identification of anthropogenic and biological processes and spectral and temporal patterns in the soundscape, how disturbance alters patterns and processes across scales, the emphasis on interactions between biological and anthropogenic factors, how organisms perceive spatial configuration in landscapes and the need to develop tools to quantify pattern.” The importance of the soundscape resource for wildlife becomes clear in cases where it is degraded. The addition of noise pollution in soundscapes masks interspecies communication, impairs predator avoidance, and can elevate stress hormones (Barber et al.

2009).

Evolution of Bird Songs in Natural Landscapes

Bird songs evolve and alter over the years. An alternate and reformed dialect can emerge quickly, betting on the preferences of the females and therefore, the patterns adopted by the younger birds. While sometimes, the songs can remain precisely the same over a protracted period of your time. Birdsong is additionally modified by changes within the environment. In quiet, open environments, birds can make use of higher frequencies that don't carry far. In urban environments and dense forests, birdsongs are reportedly both plainer and louder (Dooling et al., 2017).

The temporal cycles of communication occur in most terrestrial animals. Birds, amphibians, and insects have noticeable and prominent rhythms in their voice and are less violent as compared to the wilder members of the fauna, and so have been exclusively studied by many scientists and sound experts. Their cyclic acoustic patterns and vocal characteristics are called 'the rhythms of nature'. These songbirds being creatures of habit and routine are known to start singing during an identical time period every year. Studies of soundscapes yield valuable information about the dynamics and ecological characteristics of a range of landscapes.

As per Erwin Nemeth and Henrik Brummin, their study on various urban blackbird species, "Minimum song frequencies vary within cities and are positively correlated with the sound pressure level of ambient noise near the song post. The higher frequency in the motif elements of the city blackbirds studied in European cities could be caused by masking from traffic noise, too. However, lower-pitched song in the Vienna Woods could also indicate that the frequency shift in the city is a release from the constraints of sound transmission in forests, where birds sing at lower frequency to optimize their sound transmission in a more reverberating and frequency-absorbing environment. In addition to frequency shift, urban blackbirds also show a nonsignificant trend to sing with shorter inter-song intervals in a hurried manner" (Nemeth, 2009).

Biological Sounds of Vocalizing Animals

"We humans are more visual creatures than birds", says Abel Souriau, a biologist who researches nightingales. Very similar to common nightingale, thrush nightingale is a migratory bird with highly complex singing abilities but is more dusky brown with a mottled brown breast. Their songs can be vaguely similar, but the latter is more monotonous, less varied, and slower. Male songs recorded at wintering locations are significantly inconsistent in terms of syllables but exhibited great variability (Souriau et al., 2019). This pattern supports the hypothesis that males singing on the wintering grounds often practice songs for the subsequent seasons of breeding. This helps understanding the functions of vocal behaviour out of the breeding context. (Sorensen et al., 2016)

As per a study by the education team of Wonderopolis, "Most owl vocalizations are loud and low in pitch, which helps the sounds travel long distances through the night skies. For example, the easily-recognizable hoot you're familiar with is usually a territorial call. Some owls give out a loud shriek when they feel threatened or are attacking a predator. At other times, loud screeches may be used during mating season to attract a mate. Some people believe these loud screeches sounds just like a human woman screaming. When an owl feels scared or threatened, it may also emit short, low barking sounds. One other common sound heard in the middle of the night is the shriek of baby owls. When owls awaken at night, the parents often head out to hunt for food. Owls known to shriek as infants include common barn owls, common scops owls, and common sooty owls." (Why Do Owls Hoot?, 2020)

Frogs and toads also sing their courtship songs during spring months. Frog songs are less appreciated choruses. Frog concerts is varied, some are clatter while others maybe varied. The richest frog choruses occur in the dark. Multiple species are often all found calling within the same location. The pitch of the symphony is quite impressive around a decent frog pond. In a study, bull frogs were exposed to various vocal cues like natural and synthetic advertisement calls, to which they responded with stereotyped aggressive movements. But it was to be noted that they responded to each call with varying intensity. A habituation phase was also added to the experiment by simulating the entry of a new neighbour or by changing the location of the experiment to test the ability of males to identify spatial cues. Consequently, in a research by Bee et al. (2002), it was proven that, "Bullfrogs can even learn to discriminate between two signals that differ in an individually distinctive voice property in the absence of other sensory and spatial cues. The vocalizations of bullfrogs exhibit reliable individual variation along multiple acoustic dimensions that function as voice recognition cues".

Some specific species of frogs and toads are being widely explored for their medicinal properties. Their body parts, specifically hind legs are illegally sold as they are considered tasty and rare. Scientists and experts all over the world have criticised this practice as it is a possible threat to the survival of the amphibian species. As a result, a pattern of decline in frog concerts has also been recorded. This inappropriate harvesting of frogs is primarily done for medication purposes as some humans believe it can cure many diseases which do not seem to be validated scientifically. In the U.S., one-third of the 230 native amphibian species are on the verge of declining. The boom of the bullfrogs, the calls of the green frogs and songs of chorus frogs is loud enough and therefore, the forests that we discover peaceful are often quite different for the plants and animals in it (Ghosh, 2018).

Woodpeckers have special physical adaptations that allow them to peck and drum quickly on hard objects without hurting themselves. Unlike other songbirds, woodpeckers don't have a particular song, (Woodpecker Drumming Sounds, 2021). Instead, drumming is the way that these birds communicate. A bit like bird songs, drumming is commonest in late winter and early spring when birds are attempting to draw in mates and establish territories. The standard of the drumming including its volume and number of repetitions, all help advertise the health, strength, and dominance of woodpeckers.

Aquatic Sound scapes

Ears and auditory systems of fishes and other marine species are constantly evolving, and underwater soundscape have a major influence on them. These sounds containing vital important information about the environment and events facilitate fishes' appropriate behaviour. For instance, the sounds from reefs have all the earmarks of being utilized by probably a few fishes for their direction and movement. The auditory competency of fishes enables them to differentiate between a friend and a foe and identify the members of their own and related species for the purpose of mating. Aquatic environments also have their own ambient sounds like those of wind, water waves, ground movements etc along with the bio-phony of fishes, mammals and various other marine organisms.

After significant evolution of hearing organs in fishes, acoustic communication got developed. The presence of masking sounds majorly hinders the clear detection of sound in fishes. Often frequency filters are also used by aquatic organisms to improve the recognition of sound and wave signals. These fishes can also differentiate between sounds of varying frequencies and intensities. Their ability to predict the directions from where the sound signals come facilitates the process of locating the source of the sound; an essential ability which allows them to chase the available food resources or move away from enemies.

As per Arthur N. Popper and Anthony D. Hawkins, “However, while sound production is found in some fishes, many, including some that hear very well (e.g., many otophysans) do not produce sounds. Instead, these species use hearing primarily for detection of those natural sounds that make up the acoustic scene. Because of the importance of sound to fishes, it becomes clear that any interference with detecting the acoustic scene or with those sounds used by some fishes to communicate has the potential to affect fitness and survival! Since the onset of the Industrial Revolution, there has been a growing increase in the noise that humans put into the water. These anthropogenic sounds are from a wide range of sources that include shipping, sonars, construction activities (e.g., wind farms, harbours), trawling, dredging and exploration for oil and gas. Anthropogenic sounds may be sufficiently intense to result in death or mortal injury. However, anthropogenic sounds at lower levels may result in temporary hearing impairment, physiological changes including stress effects, changes in behaviour or the masking of biologically important sounds” (Popper, 2019).

Declining Bio-Phony

Various living species are affecting the biospheres and living traits of each other. Human intrusion and activities and environmental threats have led to a decline the quality of sounds of various animals. Forest animal and bird species are endangered due to loss of their habitat and degradation in their quality of life. Frog concerts are now rarely heard. The number of bird species has witnessed a major decline resulting in less diversity in bird songs. In several under water expeditions, fishes and whales are found to be swimming away off the irritating sounds of large tourist vehicles that create enormous bubbles due to strong engine vibrations. Marine organisms are forced to hide in the acoustic shadows of island land masses (Krause, 2015).

As per the data collected by BBC Earth, “In 2015, a US team of scientists and engineers reported that the loudest sound in some waters now comes from millions of tiny bubbles, which are released by melting glaciers and icebergs (Pettit et al., 2015). One study in Brazil found that animal calls were loudest during the day in forests close to opencast mines, whereas wildlife further from mines preferred to call at night. The constant noise from the mines, which is mostly due to the 700 or so trucks that can visit daily, increased sound levels by up to 22dB. This forced species that would usually call at night to become more active in the day. Fewer species were recorded at sites closer to the mine suggesting that for some species, this noise pollution is too much to bear (Duarte et al., 2015).

Amidst increasing urbanization, wars and noise pollution, animal bio-phony is gradually fading. Activity, diversity, and evenness are the greatest assets of natural landscapes, but their values are on a steep decline with increasing human disturbance. We have effectively changed Earth's soundscape to such a major extent that numerous environments would be absolutely unrecognizable to an individual living simply a century prior. The obvious fact which the supposedly pragmatic human species fails to understand is that the rise in anthropony is as awful for human well being as it is for the fauna (Asher, 2016).

CONCLUSIONS

Conservation initiatives by independent and governmental organizations around the world aim to assist conserve the biodiversity of the fauna but it is often difficult to assess the success of these tasks without a detailed on-the-ground surveys. Preservation and protection benefits have to be analysed not only by loss of forest land but also by the amount of deterioration in those woods left standing. Bioacoustics, which includes the account and investigation of whole soundscapes, is an arising instrument for successfully checking creature biodiversity in characteristic scenes like dense

canopies, deep oceans or urban scenarios under different protection plans. Human-induced threats are causing ecological imbalance majorly affecting the very vital natural soundscape. Fading of natural soundscape results adds to the hazards faced by animals as their activities of hunting for food, mating, and protecting themselves from predators might also get disrupted.

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