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Biogeography Synopsis 3: Biophony, Aural Niches and Noise Pollution
MAR 13, 2008

What is the relationship between sound and biodiversity? Environmental researcher Bernie Krause might answer that the richer the texture of faunal sound in an environment the healthier it is. Krause coined the term biophony to describe the "delicate acoustic fabric" of animal vocalization in contrast to environmental sound like wind or surf (geophony) or human-made sound (anthropophony) such as from machines. Analysis of soundscape signatures provides aural 'pictures' of place and time characterized by patterns of biophany, geophany and anthropophony.

Born in 1938 in Detroit, Krause has always been auditorily-oriented. He began work as an electronic musician and composer and was an early *aficianado* of the Moog synthesizer. For over 35 years Bernie Krause has concentrated upon listening to and recording animals in remote environments. He describes his process:

> *"Armed with various types of sound recorders, a pair of earphones, and microphones, I search out rare undisturbed sites, set up my equipment, and sit quietly and patiently for hours waiting for this symphony of the natural world to unfold before me"*

As Alan Lomax catalogued world folk music, Bernie Krause has collected animal sound. Sadly, perhaps his most lasting social legacy may be his role in the preservation of wild sounds for humans who would never hear them otherwise. But more than the drive to capture the most ephemeral physical characteristics of wilderness locations, urgency is leant to Krause's work by the observation that much more quickly than exotic floral species invade ecosystems human machine noise erodes natural aural landscapes. Krause reports that formerly for every single hour of uninterrupted natural sound he needed to record fifteen hours, now the ratio is approximately 2000:1, an observed shift that he connects to degradation of the bio-social framework in natural environments. This intuition has provided impetus to his work to discover and document linkages between acoustic dynamic equilibrium and habitat health, an idea known as the Acoustic Niche Hypothesis.

In Sequoia National Park , CA (1991 – 1992) Bernie Krause and bioacoustical engineer Stuart Gage developed remote sensing systems and modeling to qualify this idea.

> *"Acoustic Niche predicts a positive correlation between species composition and soundscape structure in terms of time, frequency, and amplitude. When a habitat reaches dynamic equilibrium, the spatial structure of the acoustic spectrograms illustrate complex features (both frequency and temporally based) indicative of the relationships between the vocal organisms*."

When athropophony overtakes a landscape animals become disoriented and can't make reproductive and survival-associated communication. Krause has quantified this phenomena around the world and it ought to drive preservation efforts but for many humans the dominant sense is vision and our systems are slow to respond.

Like the Lomax Brothers' contributions to the Library of Congress, Krause has created a repository of endangered auditory spaces, a "Wild Archive". Lately he has used Google Maps' KML, Keyhole Markup Language, to share his soundscapes online. It is a peculiarity of internetworked life that as real systems are vanishing a digitized virtual mirror of them has grown up. This may be reassuring but false comfort, not equivalent to something like an heirloom seed repository in its regenerative capacity. Audio archives are digitized; they depend on signal compression or sampling. Since animals often hear in expanded frequency ranges, more broadly than can be contained in 8-bit packets, much stands to be lost in translation.

Resources

Krause, Bernie; Gage, Stuart. "Testing Biophony as an Indicator of Habitat Fitness and Dynamics". SEKI Natural Soundscape Vital Signs Pilot Program Report. 2003.

Krause, Bernie. "Loss of Natural Soundscapes: Global Implications of its Effect on Humans and Other Creatures". 2001. Address to World Affairs Council.
http://www.wildsanctuary.com/BK_WAC.pdf

Wild Sanctuary Archive of Natural Sound
http://www.wildsanctuary.com/niche.html

"The Biological Effects of Noise on Wildlife"
http://www.acousticecology.org/wildlandbiology.html

"Listening to Nature" http://www.museumca.org/naturalsounds/home.html