University of Puget Sound
Sound Ideas

Summer Research

Summer 2016

Soundscape Composition as Environmental Activism and Awareness: An Ecomusicological Approach

Megan A. Reich
University of Puget Sound, mreich@pugetsound.edu

Follow this and additional works at: http://soundideas.pugetsound.edu/summer_research

Part of the Biodiversity Commons, Ecology and Evolutionary Biology Commons, Musicology Commons, and the Other Music Commons

Soundscape Composition as Environmental Activism and Awareness: An
Ecomusicological Approach

Megan A Reich
Dr. Gwynne Brown, Faculty Advisor
University of Puget Sound
AHSS Summer Research 2016

Soundscape Composition as Environmental Activism and Awareness: An Ecomusicological Approach

TABLE OF CONTENTS

ABSTRACT

Soundscape composition is a musical field that has converged from a diverse array of philosophies and methods of listening. Informed by the common mission of raising awareness towards the current environmental crisis, soundscape composers aim to re-connect audiences to the natural soundscapes of their everyday lives. To achieve this mission, soundscape composers interact with soundscape ecology, a scientific field that also addresses environmental issues like global warming and declining biodiversity through the study of sound. In so doing, soundscape composers repurpose scientific technology, transforming it into a tool that challenges the traditional nature/culture dichotomy and integrates listeners with their environments through spiritual, emotional, and sense-based ways of knowing.

INTRODUCTION

We attach ourselves to the landscapes we live in. Home becomes synonymous to a horizon of evergreen trees, a big sky, or a distant mountain range. These landscapes, however, change with human activity. We often conceive of the current environmental crisis in terms of the devastating visual impact it leaves – from the jarring empty spaces of deforestation, grassland monocultures, to polluted smog-covered cities. While the earth indeed looks a lot different than it did even a few hundred years ago, the damage is reaches far beyond what we can simply see: we can also hear it. We might not always realize it, but sound plays a fundamental role in defining the relationships between ourselves and the environments in which we live. The developing scientific discipline of soundscape ecology explores just this, identifying the mechanisms by which sound impacts the functioning of organisms and ecological processes. Soundscape ecology explores the complex interplay of biological, geophysical, and anthropogenic sounds produced by a landscape over space and time – the "soundscape."[1] When we listen,

---

[1] Pijanowski, B.C., Villanueva-Rivera, L.J., Dumyahn, S.L., Farina, A., Krause, B.L., Napoletano, B.M., Gage, S.H. and Pieretti, N.Soundscape ecology: the science of sound in the landscape. *BioScience* 61, no. 03 (2011), pp.203-216.

things begin to reveal themselves, often in insidious ways. By recording and quantifying soundscapes, soundscape ecologists have been able to identify how anthropogenic sounds ("noise pollution") affects the communication ability, fitness, survival, and long-term health of organisms.[2]

Meanwhile, another developing field, the musical genre of soundscape composition, has been challenging this same visual bias towards understanding environmental crisis.. Soundscape compositions converge from a diverse array of disciplines, philosophies, and methods of listening. Central to this music is the use of "real-world" environmental sounds, through either the direct incorporation of field recordings or the conversion of natural processes into audible frequencies of sound. Most soundscape compositions fall under the category of "electroacoustic" music, a genre that uses electronics to modify recorded sounds. While soundscape compositions inhabit a wide variety of mediums, techniques, and performance contexts, they share a common mission to make audiences question and reflect on their relationship to the environment. The work of both soundscape ecologists and composers speaks to the state of the soundscape as a reflection of the biological and ecological health of natural environments, and stress that an improved connection of humans toward soundscapes is key to preserving the health and vitality of the environments they represent. However, as two disciplines that inhabit the separate realms of science and art, soundscape ecologists and soundscape composers naturally approach their work from different perspectives and methodologies. But how can music – an art form, not a science - possibly be relevant towards addressing the environmental crisis?

In the following paper, I will be demonstrating how a growing number of composers, sound artists, and field recorders are utilizing soundscape composition as a powerful medium that encourages attitudes of environmental activism and awareness, starting from the ways we listen to the spaces and places surrounding us. To achieve this mission, soundscape compositions engage in interdisciplinary "boundary work" with scientific

---

[2] Ibid.

fields, including sonification and soundscape ecology.[3] In the process, soundscape composers repurpose scientific technology for artistic uses. In the soundscape composition, the microphone, seismometer, or thermometer becomes a musical instrument, translating acoustic data into sound meant for aesthetic appreciation. Rather than measuring and reporting *quantitative* information to increase an audience's objective knowledge of environmental crises, these tools instead assist the composer's goal of increasing the audience's *qualitative* knowing from spiritual, emotional, and sensory-based perspectives.

Through the critical lens of ecomusicology, this paper attempts an argument for the environmental relevance of soundscape composition through its providence of an alternate "qualitative" relationship to nature. Ecomusicology is a subset of musicology that interrogates connections between music and nature. The *Grove Dictionary of American Music* defines ecomusicology as a consideration of "the relationships of music, culture, and nature; i.e., it is the study of musical and sonic issues, both textual and performative, as they relate to ecology and the environment."[4] Taking up the practices of literary ecocriticism, ecomusicology asks questions about how art reflects, relies on, or is informed by nature. It seeks to address what the study of music can tell us about "humans, other species, the built environment, the natural world, constructed 'nature,'" and most importantly, the connections between these components.[5] How do soundscape compositions address these components? How have soundscape composers and artists approached the challenges and opportunities of advocating for more "qualitative" way of environmental knowing? And most importantly, does this alternate perspective have the potential to promote real social, political, and cultural change? This paper will begin an examination of these questions by investigating how the concept of music and natural sound has been approached by the musical predecessors of soundscape composition, experimental music and sound art, with an emphasis on how these genres set up a

---

[3] Supper, A. "The search for the "killer application": Drawing the boundaries around the sonification of scientific data," in *The Oxford Handbook of Sound Studies*, T. Pinch and K. Bijsterveld, Eds. New York, NY: Oxford University Press, 2012, ch. 10, pp. 249–70.

[4] Allen, Aaron S. "Ecomusicology: Ecocriticism and musicology." *Journal of the American Musicological Society* 64, no. 2 (2011): 391-394.

[5] Ibid.

framework for the type of listening that soundscape composition requires. Part Two centers on the mediating role that technology plays in soundscape composition. By embracing scientific technology, soundscape composers have counterintuitively brought listeners not further from but closer to nature, calling into question the traditional dichotomy that places nature and human into two distinct spheres. To the soundscape composer, nature, culture, and technology are deeply interconnected. As a tool, soundscape composers have used technology to explore nonhuman spatial and temporal scales, stress the importance of all life forms, cultivate interactive participant-observation mindsets towards nature, promote "glocal" attitudes, invite "amateurs" into the art-making process, and engage interdisciplinary and multimodal thinking.

Part Three explores how from these technology-aided developments, soundscape composers have established for their genre a method of listening that implicates a uniquely environmental "way of knowing." When listening to a soundscape composition, listener utilize their imagination to navigate between the real and abstract elements of the work, a personal journey that requires listeners to play an active part in the realization of the composition. Through the process of breaking down of hierarchical roles between composer and listener, along with the merging of mediums and performance spaces, soundscape composition embraces a "qualitative" conception of nature that moves from reductionist to holistic, cognitive to embodied, categorical to integrative. Out of these processes, this paper concludes with a discussion of how soundscape composition has the potential to make a significant contribution towards addressing the environmental crisis through facilitating attitudes of activism and awareness.

CHAPTER ONE: PHILOSOPHIES OF LISTENING

"What Is Music?": The Historical Roots of Soundscape Composition

Soundscape composers challenge their audiences to perceive music in the natural world in different and new ways, ways that can better understandings of the values of the biodiversity and ecological processes behind natural music. This attitude has been shaped by an ever-evolving definition of music and its relation to nature. Notions of music and nature vary greatly across, cultures, time, and space. As ecomusicologist Aaron Allen observes, the words environment, ecology, and nature are "immensely complex words that are rich with contested meanings."[6] Thus, in order to properly address these terms as they relate to soundscape composition, it is important to first unpack them and to navigate their significance to the discipline.

In terms of the Western classical tradition, a definition for music is often traced back to Pythagoras's *musica universalis*, or "music of the spheres." In this scheme, the celestial bodies (the sun, moon, and planets) orbit around the earth in spheres related by the whole-number ratios of pure musical intervals, as expressed by the harmonics of the monochord.[7] Much later, Johannes Kepler expanded Pythagoras's music of the spheres in his *Harmonices Mundi* of 1619, positing a relationship of "sacred geometry" between the (now elliptical) planetary orbits and an inaudible musical "harmony."[8] Scholar Frances Dyson suggests that Pythagoreas's *musica universalis* framed a Western conception of music where sound became unitized as a form of abstract mathematics. Music was a means by which to quantify sound, to transcend noise by revealing the underlying rationality and harmony of the cosmos.[9] We see evidence of this model in the medieval

---

[6] Allen, Aaron S. "Ecomusicology: Ecocriticism and musicology." *Journal of the American Musicological Society* 64, no. 2 (2011): 391-394.

[7] Dyson, Frances. *The Tone of Our Times: Sound, Sense, Economy, and Ecology.* Cambridge (MA): Leonardo, The MIT Press, 2014. Print.

[8] Grond, Florian, and Thomas Hermann. "Aesthetic strategies in sonification." *AI & society* 27, no. 2 (2012): 213-222.

[9] Dyson, Ibid.

quadrivium, which places music among the "mathematical sciences" of arithmetic, geometry, and astronomy. Daniel Heller-Roazen suggests that this quantification of music was further solidified with the transition from an oral tradition to written notation systems for Western music in the eleventh century. Written notation allowed for the standardization of musical practice across space and time and for the development of polyphony. Ultimately, however, Heller-Roazen suggests that it also enabled an objectification of music as an "empirical reality" made up of sounds that were inherently discrete, intelligible, and measurable.[10]

Music and Nature: A Brief Historical Survey

How has this quantitative conception of music shaped the way composers relate to nature? While a complete analysis of this question is beyond the scope of this paper, I will turn to a general scheme outlined by the musicologist Stefan Helmreich. Helmreich chronicles three periods that describe how composers' use of water in their music has changed over time, which I will extend to nature as a whole: evoking, invoking, and soaking.[11] In evoking, music acts as a mathematical tool, representing nature symbolically, metaphorically, or timbrally through compositional techniques employed in traditional ensembles and instrumentations.[12] In Debussy's waves of *La Mer*, Wagner's raging storm in *Die Walkuire*, and even Bach's earthquake in the *Saint Matthew Passion*, conventional instruments imitate nature through arrangements of notes, organization of rhythms, or choice of instrumentation.[13] For Helmreich, the practice of symbolically evoking nature suggests a humanistic philosophy of nature as "the opposition, the force to be controlled and eventually mastered in the name of human survival."[14] Viewed as a

---

[10] Kruth, Patricia, and Stobart, Henry. *Sound.* Darwin College Lectures, Cambridge University Press, 2000. Print.

[11] Helmreich, Stefan. "Underwater music: tuning composition to the sounds of science." In *The Oxford handbook of sound studies.* Pinch, Trevor, and Karin Bijsterveld, eds. Oxford University Press, 2011.
[12] Helmreich, Ibid.
[13] Brush, Leif, and Gloria DeFilipps Brush. "Monitoring Nature's Sounds with Terrain-Based Constructions." *Leonardo* (1984): 4-7.
[14] Faulhaber, Edwin F. "Communicator Between Worlds: Björk Reaches Beyond the Binaries." Doctoral Thesis, Bowling Green State University, 2008.

type of technology under a humanistic scheme, evoking instruments become the tools of humans working as the "master controllers" of nature, "convinced that what they create is always beneficial, and more easily controlled than nature itself."[15] At the same time, Romanticism in music, as well as the broader Romantic-Transcendentalist ethic of the mid-1800s emphasized a spiritual connection to nature, and it was valued for the aesthetic gains it brought humans.[16] Both the humanistic and romantic conception of nature ultimately create a sharp division between humans and nature. Nature is either at the bottom of the hierarchy as a force to be controlled by humans, or at the top as a source of sublime awe and reverence. The Industrial and Electrical revolutions of the mid-19th and early-20th centuries, however, began to introduce new sounds that challenged conceptions of both music and nature. composers turned away from indirect representation and began to let the new noises speak for themselves.

The onset of the Industrial and Electrical Revolutions brought about a world of new sounds. The strange buzzes, whirs, and hums of rising industry challenged music's cosmology of a rational nature. An increasing number of composers begian to embrace all sounds – even the "noisy" ones – as objects worthy of aesthetic appreciation. In his 1913 manifesto "Art of Noises," the Italian Futurist Luigi Russolo proposed a celebration of all sounds, including and especially noise. "We have had enough of Beethoven," Russolo intones "…and we delight much more in "the noise of trams, of automobile engines, of carriages, and brawling crowds."[17] For Russolo, musical sound was too limited "in its variety of timbres." Noise, however, represented a means by which a composer could search for new sounds. Noting developments in classical music towards more complex harmonies and dissonances, Russolo argues that composers should

---

[15] Faulhaber, Ibid.

[16] Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. *Principles of Conservation Biology*. Sunderland, MA: Sinauer Associates, 2006. Print.

[17] Norman, Katherine. "Real-World Music as Composed Listening." *Contemporary Music Review*, Vol. 15, Part 1 (1996).

continue along this trend, and ultimately "break out of this limited circle of sounds and conquer the infinite variety of noise-sounds."[18] Industrial machinery for Russolo were noise-making, sound-producing musical instruments in their own right.

Russolo and his contemporaries were practicing Helmreich's second musical relation with nature, invoking. Rather than symbolically representing sound, instruments become onomatopoetic. Central to this scheme Russolo's search for new musical sounds and instruments, a mindset also found in composers such as Edgard Varèse, who expressed that "…Our musical alphabet must be enriched" and "…always felt the need of new mediums of expression… which can lend themselves to every expression of thought and can keep up with thought."[19] One important source for new sounds became electronic technology. Varèse, known for his tape work such as his 1958 *Poème Électronique* and commonly referred to as the "father" of electronic music, certainly falls under this category. Another "invoking" composer drawing from electronic sources was Pierre Schaeffer. In his compositional technique of *musique concrète*, developed in the late-1940s and 50s, Schaeffer took tape-recorded sounds of everyday objects and events and processed them to the point of unrecognizability (i.e. by editing, speeding up and slowing down the tape, using distortion, etc.).[20] By divorcing the sound from the object that produced it, Schaeffer promoted what he called an *acousmatic* listening, a term derived from the Greek word *akousmatikoi*, the name for the students who listened to Pythagoras's lectures delivered from behind a curtain. Schaeffer contrasted *acousmatic* listening with écouter, a type of "everyday" listening that involves an awareness of a sound's source. Rather than listening to gather signs about the world or for the purposes of acquiring information, Schaeffer argued through his *musique concrète* for an appreciation for the sound itself.[21] Thus, Schaeffer's *musique concrète* established not only a new conception of music, but a new conception for how to listen. For this new

---

[18] Norman, Ibid.

[19] Jackson, Myles. "From Scientific Instruments to Musical Instruments: The Tuning Fork, the Metronome, and the Siren." In *The Oxford handbook of sound studies*. Pinch, Trevor, and Karin Bijsterveld, eds. Oxford University Press, 2011.

[20] Kane, Brian. "L'Objet Sonore Maintenant: Pierre Schaeffer, Sound Objects and the Phenomenological Reduction." *Organised Sound* 12, no. 01 (2007): 15–24.

[21] Kane, Ibid.

type of listening, technology is a tool that, rather than distancing us, helps us better understand the "nature" of things. By expanding beyond the limitations of traditional instrumentation, the electronic music of *musique concrète* allows for what scholar Edwin Faulhaber describes as "a new freedom for both artist and listener," where such "technology as sampling and sequencing enables compositions that borrow from a myriad of musical styles and even everyday 'noise.'"[22] In this way, the "invoking" techniques of Russolo, Varèse, and Schaeffer combat the criticisms of critical theorists such as Adorno and Horkheimer that technology was "part of a larger culture industry that induces social alienation and passive reception, empties meaning from life, and is controlled by a dominating and oppressive power."[23]

"Invoking" composers such as Russolo, Varèse, and Schaeffer have used technology to posit an attitude of greater receptivity towards our aural environments. This attitude became fundamental to the practices of experimental music of the mid-20th century, and ultimately, soundscape composition. In fact, they lead us to Helmreich's third and final musical relation to nature, soaking. Soaking works are works that are literally and physically performed or recorded in the water.[24] Expanding this to nature in general, soaking works are composed, recorded, or performed within both urban and natural environments. This type of relationship characterizes the work of experimental musicians and sound artists beginning in the mid-1960s. These individuals, which included the sound artists Maryanne Amacher, Annea Lockwood, Bernhard Leitner, Max Neuhaus, Bill Fontana, and La Monte Young, as well as experimental musicians such as John Cage, Christian Wolff, and Karlheinz Stockhausen, expanded the definition of music to include any and all sounds that one chooses to hear.[25] From the 1952 premiere of his infamous four minutes and 33 seconds of "silence," John Cage encouraged listeners to

---

[22] Faulhaber, Edwin F. "Communicator Between Worlds: Björk Reaches Beyond the Binaries." Doctoral Thesis, Bowling Green State University, 2008.

[23] Faulhaber, Ibid.

[24] Helmreich, Stefan. "Underwater music: tuning composition to the sounds of science." In *The Oxford handbook of sound studies*. Pinch, Trevor, and Karin Bijsterveld, eds. Oxford University Press, 2011.

[25] Licht, A. *Sound art, beyond music, between categories*. New York, NY: Rizzoli International Publications, Inc., 2007.

extend their ears beyond the stage and consider elements of the broader soundscape as music. Other sound artists were quick to follow Cage. Sound artist Christian Wolff's early pieces have been described as "openings which let the sounds of the environment mingle with and perhaps even obliterate the composed sounds."[26] In the spirit of Russolo, La Monte Young has cited his musical influence as all the sounds emanating from the environment around him, both natural and man-made: "the sound of the wind; the sounds of crickets and cicadas; the sounds of telephone poles and motors; sounds produced by steam escaping such as my mother's tea kettle and the sounds of whistles and signals from trains; and resonances set off by the natural characteristics of particular geographic areas such as canyons, valleys, lakes, and plains."[27]

The reaction to the increasing industrial noise of the early 20th century through a celebration of all sounds, however, was not shared by all. In that late 1960s, Murray Schafer, a composer and communications professor at Simon Fraser University, conceived of human-produced noise a source of unwanted pollution to be measured and managed, a view that became a central tenant in his development of the field of acoustic ecology. For Schafer, the city creates a negative "lo-fi" soundscape that masks sounds and isolates the listener.[28] Anthropogenic industrial noise damages natural and social soundscapes by imposing a sense of disconnection between human culture and the surrounding environment.

One alternative to this change, at once a sign of both progress and destruction, is a peaceful return to Schafer's hi-fi soundscape away from the threats of industrial noise. Here, "man lives mostly in isolation or in small communities their ears operated with seismographic delicacy" where subtlest sounds can be important tools of communication for both the animals and human living there: "For the farmer, the pioneer, or the woodsman the minutest sounds have significance. The shepherd, for instance, can

---

[26] Licht, Ibid.
[27] Licht, Ibid.
[28] Schafer, R. Murray. *The soundscape: Our sonic environment and the tuning of the world*. Inner Traditions/Bear & Co, 1993.

determine from sheep bells the precise state of his flock."[29] For Schafer, then, one might equate his definition of noise with anthropologist Mary Douglas's notion of dirt as "matter out of place." Noise, "sound matter" out of place, is a force that disrupts an implied natural order of things.[30] Seth Kim-Cohen is highly critical of Schafer's conception of the soundscape, positing that "The suggestion of an unadulterated, untainted purity of experience prior to linguistic capture [i.e., the soundscape before anthropological disruption] seeks a return to a never-present, Romanticized, pre-Enlightenment darkness."[31] For Kim-Cohen, there is danger in idealizing the soundscape as something "pure" or "pristine" that we must return to in order to save it.

Soundscape composition represents an alternative to Schafer's idealistic vision of an undisturbed nature by moving from a conception of music as *about* place to a music that *is* place in itself.[32] While there is not a defined group of specialists in soundscape composition, a number of emerging of artists and scientists from diverse backgrounds have expressed an interest in not merely imitating or replicating an idealized nature through their field recordings, but in artistically exploring the complexities that come with personally engaging with nature. These individuals include the field recorders Bernie Krause and Jana Winderen, visual and sound artists Christina Kubisch, Andra McCartney, and Andrea Polli, acoustic ecologists Murray Schafer, Barry Truax, and Hildegard Westerkamp, experimental musicians Leif Brush, David Dunn, Francisco López, and composers with Western classical training such as Katherine Norman and John Luther Adams, whose works will be explored in the following pages. For now, it can simply be acknowledged that the work of these individuals reflects the current state of a long-changing conception of music, nature, and their relationship to one another.

---

[29] Schafer, R. Murray. *The tuning of the world*. Alfred A. Knopf, 1977. Print.
[30] Licht, A. *Sound art, beyond music, between categories*. New York, NY: Rizzoli International Publications, Inc., 2007.
[31] Kim-Cohen, Seth. *In the Blink of an Ear: Toward a Non-Cochlear Sonic Art*. London: Continuum, 2009. Print.

[32] Adams, John Luther. *Winter music: composing the North*. Wesleyan University Press, 2004.

Soundscape composers prefer to invoke and soak in nature over evoking it. By constructing new electroacoustic sounds from scratch and using actual field recordings, soundscape composition strives to reach not only an accurate depiction, but also an authentic connection to nature.

By meeting soundscapes as they are, in all their complexities, music for soundscape composers becomes a language for mapping reality through the act of listening. Along these lines, soundscape composer David Dunn suggests a definition of music as analogous to written language: "if music might be our way of mapping reality through metaphors of sound as parallel to the visually dominant metaphors of speech and written symbols."[33] For Dunn, music-as-language is powerful because it provides the tools to put names, or in this case, sounds, to the reality we experience. This music, as a method of mapping reality allows us to experience our connection to the natural environment in a physical and kinesthetic way rather than be limited to the virtual, descriptive, and metaphoric act of interpreting the symbols of the written word. This attitude aligns itself art theorist Wassily Kandinsky's critique of the symbolic, evoked nature of Romanticism: "Imitations of frogs croaking, of farmyards… are worthy of the variety stage and may be very amusing as a form of entertainment." Ultimately, however, "Nature has its own language, which affects us with its inexorable power. This language cannot be imitated."[34] When we respect nature as its own language, Dunn explains that "the physical act of using our aural sense, in contrast to entertainment, can become a means to practice and engender integrative behavior."[35]

In this way, soundscape composition marks a full departure from Pythagoreas's abstract, mathematical music. Rather, it is visceral. By directly importing field recordings from the natural environment into their compositions, soundscape composers allow listeners to

---

[33] Dunn, David. "Nature, Sound Art, and the Sacred." *The book of music and nature: an anthology of sounds, words, thoughts.* Rothenberg, David, and Marta Ulvaeus, eds. Wesleyan University Press, 2013. Print.

[34] Licht, A. *Sound art, beyond music, between categories.* New York, NY: Rizzoli International Publications, Inc., 2007.

[35] Dunn, David. "Nature, Sound Art, and the Sacred." In Rothenberg, David, and Marta Ulvaeus, eds. *The book of music and nature: an anthology of sounds, words, thoughts.* Rothenberg, David, and Marta Ulvaeus, eds. Wesleyan University Press, 2013. Print.

become immersed in the physical setting of a place. In other words, the human is no longer outside of nature. Consequently, soundscape composition, accepts neither a purely romantic nature nature nor a scare-quoted "nature" as a cultural construction.[36] Rather, soundscape composers appear to take on the suggestion Timothy Morton posits in his 2007 book *Ecology Without Nature*. As a social construct, Morton explains that the meaning of "nature" is constantly changing, having come to variously represent "growth, change, process, continuity, purity, freedom, mystery, transcendence and even fantasy." Morton suggests that we turn away from the polysemantic word "nature" to the word "ecology," which "has the advantage of being defined in a manner not overly constrained by centuries of aesthetics and politics."[37] What does the word "ecology" have to offer us that "nature" doesn't? Ecology, as a system of interacting living and non-living parts, includes both the human and non-human. As a part of this system, the impact of human actions have a real responsibility and accountability that cannot be ignored – and in order to save "nature," we can no longer stand outside of it.[38] This inclusive, holistic conception helps shape soundscape composition's underlying tones of activism, responsibility, and engagement. To the soundscape composer, music has the potential to change the way we understand our relationship with the world, which in turn affects our thoughts and eventually our behaviors.

The World Soundscape Project and the Legacy of Schizophonia

It would be a mistake to reject Murray Schafer's idealistic conception of the soundscape entirely. Although his agenda appears to oppose the concurrent work of experimental composers and sound artists, Schafer also left a legacy that continues to impact soundscape composition today, especially in terms of its relationship to technology. Concerned at the time with the rapidly changing soundscape of developing Vancouver in the late 1960s to early 1970s, Schafer began teaching a course on noise pollution with the

---

[36] Soper, Kate. *What is Nature?: Culture, politics, and the non-human.* Wiley-Blackwell, 1995.
[37] Morton, Timothy. *Ecology without nature: Rethinking environmental aesthetics.* Harvard University Press, 2007.

[38] Parmar, Robin. "The garden of adumbrations: reimagining environmental composition." *Organised Sound* 17, no. 03 (2012): 202-210.

hope that students would gain a greater attention to their "sonic environment."[39] Out of this course, in 1969, Schafer established an educational and research group called the World Soundscape Project, of whom the original members were Schafer, Bruce Davis, Peter Huse, Barry Truax, Howard Broomfield, Hildegard Westerkamp, and Adam Woog.[40] The WSP was founded with the purpose of studying "the acoustic environment and the impact of technology on it."[41] The WSP's conception of the acoustic environment was not necessarily the "natural soundscape" of habitats and ecosystems that soundscape ecologists study, rather, it referred to the soundscape that we humans encounter in our everyday life, and how that soundscape affects our ability to connect to our community. The WSP's goal revolved around finding solutions for an "ecologically balanced" soundscape, where the relationship between the human community and its sonic environment is "in harmony."[42] Through active listening and "ear-cleaning" exercises, the WSP emphasized the responsibility that the listener has towards his or her soundscape.

According to the WSP, the listener should acknowledge the soundscape as an "intimate reflection of the social, technological, and natural conditions of its area" where "listening and soundmaking stand in a delicate relationship to each other."[43] Industry and technology, however, was a force that disrupted this balance. Schafer feared that Pierre Schaeffer's *acousmatic* listening via technology would only separate people further from their soundscape. In his seminal work *The Tuning of the World*, Schafer uses the term "schizophonia" (conjuring the notion of schizophrenia or mental dislocation) to describe Schaeffer's separation of the sound from its source. For Schafer, a soundscape "cannot and should not be separated from its geographical location" – exactly what emerging

---

[39] Truax, Barry. "The World Soundscape Project." Simon Fraser University, http://www.sfu.ca/~truax/wsp.html

[40] Westerkamp, Hildegard. "The World Soundscape Project." The Soundscape Newsletter 01, August 1991. http://wfae.net/library/articles/westerkamp_world.pdf

[41] Westerkamp, Ibid.

[42] Westerkamp, Hildegard, Woog, Adam P., Kallmann, Helmut, and Truax, Barry. "World Soundscape Project." *The Canadian Encyclopedia*, http://www.thecanadianencyclopedia.ca/en/article/world-soundscape-project/

[43] Westerkamp, Hildegard. "The World Soundscape Project." The Soundscape Newsletter 01, August 1991. http://wfae.net/library/articles/westerkamp_world.pdf

methods of electroacoustic composition were doing.[44] Modern technology was changing how people made and listened to sounds, and not in a good way. In this sense, Schafer would agree with medieval scholar Christopher Page, who makes the point that with technology we ironically lose some of the "tricks of past trades." Because, Page argues, "we are accustomed in the West to associate change with improvement," we assume that technological development has improved standards of musicianship. Page, however, refers his readers to a 1909 recording of the Westminster Cathedral Choir singing part of Palestrina's Mass, where the singers were "crowded around a [phonograph] horn and probably making adjustments… to overcome the limitations of the recording medium," "being told to project and hammer the notes to get them onto the wax cylinder" and disregarding any previous respect towards historical performance practice.[45] Schafer interprets Schaeffer in a similar light. Without knowledge of the "historical" source of the sounds they are hearing, a listener of *musique concrète* is forced to piece together a fragmented construction that lacks the larger context and meaning of an integrated whole.

Hildegard Westerkamp, however, argues that the WSP was about more than just combating technological and industrial noise pollution. After the original WSP research group dissolved when Schafer left SFU in 1975, the ideas of the WSP lived on through teaching and research programs in acoustic communication at SFU, Truax's 1984 publication *Acoustic Communication*, and the compositions of individual composers, most notably Westerkamp. In 1993, Westerkamp helped found the World Forum for Acoustic Ecology (WFAE) and 1993 and served as editor of the *Soundscape* Newsletter. Today, the WFAE connects groups and individuals from a diversity of backgrounds and disciplines who share a common concern for the soundscape. Westerkamp describes that the goal of acoustic ecologists to design more "healthy and attractive sonic environments" and contribute to an "innovative preservation of worthwhile sounds of past and present," with the ultimate mission of "turning the negative spectre of a polluted

[44] Polli, A. "Soundscape, sonification, and sound activism," AI & Society, vol. 27, pp. 257–68, 2012.

[45] Page, Christopher. "Ancestral Voices." *Sound*. Kruth, Patricia, and Stobart, Henry, eds. Darwin College Lectures, Cambridge University Press, 2000. Print.

sound world into a vision where the sonic environment becomes a place for renewal and creativity."[46] It is this emphasis on renewal and creativity that today's soundscape composers, whether or not they agree with the WSP's ideologies, try to instill in their works.

Rejecting the Idealism of the WSP: Towards an Inclusive Approach

Ironically, soundscape composers have been attempting to "tune" the world using the very tool that Schafer criticized: modern technology. The force of technology is often described as falling on one of two sides – either life-enhancing or destructive.[47] Schafer's schizophonia interprets technology as the latter - fundamentally opposed to nature. Soundscape composition, however, harnesses technology as a connective force, a tool that can be integrated with and ultimately serve nature by giving it a voice we can hear and respond to. Rather than become discouraged or disillusioned by an increasingly fragmented sound world, soundscape composers engage us as audience members to, as composer Katherine Norman describes, "learn from real world sounds and the way we listen to them in order to gain understanding through investigation and analysis of both the environment and ourselves."[48]

Soundscape composers stress that the human disconnection from nature has resulted not directly from technology but in how we have chosen to use it. Norman, for example, argues that composers have a choice in how we use technology. Composers can practice a Schaeffer-inherited "sonic alchemy," employing computers to "'orchestrate' sampled sounds from the 'real world', and to use sophisticated wizardry to cajole them into new forms, frequencies and fantastic documentaries," thus promoting Schafer's dreaded schizophonia, or they can create music that "seeks to preserve our connection to its

---

[46] Westerkamp, Ibid.
[47] Dunn, David. "Wilderness as reentrant form: Thoughts on the future of electronic art and nature." *Leonardo* (1988): 377-382.
[48] Norman, Katherine. "Real-World Music as Composed Listening." *Contemporary Music Review*, Vol. 15, Part 1 (1996).

recorded sources."[49] In the latter option, the sounds may be heightened or transformed, but their meaning is ultimately maintained.

Robin Parmar, among others, has suggested that Schafer's concept of schizophonia represents an unrealistic, idealistic desire to repair the soundscape to an original pristine state, a desire to rebuild perceived lost connections "by way of the 'preservation of soundmarks', 'repairs to the soundscape', 'imaginative excursions into utopia', encouraging nature to 'speak for itself', and 'the recovery of silence as a positive state.'"[50] For Parmar, Schafer's efforts ultimately represent a "nostalgic enterprise [that] in no way prepares us for the contemporary milieu in which the schizophonic is the norm."[51] Parmar's criticism of Schafer points to an observation by music scholar Simon Frith towards the broader world of ethnomusicology – the idea that any new technology is perceived as a "threat to the establishment," considered "false and falsifying" and "opposed to nature and community."[52] Lysloff and Gay further note how "when 'natives' use electronic devices or enjoy mediated performances, technology is now considered intrusive and often rendered invisible by the [ethnomusicologist]," citing examples such as the insistence of ethnomusicologists to use "ambient 'room' microphones for recording gamelan music, even though the Javanese gamelan players usually record with direct microphones to feature the singers and provide clearer distinction between vocal and gamelan."[53] Soundscape composers, on the other hand, reject the assumption that technology is "inauthentic." Hildegard Westerkamp, for example, deliberately evokes what she calls a "creative use" of schizophonia in her compositions, noting that the electroacoustic medium enables her to layer different "levels of remove," where "the actual present, the recorded present of the running commentary, the reenacted and remembered past, as well as imagined events past or future, may co-exist with the listener

---

[49] Norman, Ibid.

[50] Parmar, Robin. "The garden of adumbrations: reimagining environmental composition." *Organised Sound* 17, no. 03 (2012): 202-210.

[51] Parmar, Ibid.

[52] Faulhaber, Edwin F. "Communicator Between Worlds: Björk Reaches Beyond the Binaries." Doctoral Thesis, Bowling Green State University, 2008.

[53] Lysloff, René T.A. and Leslie C. Gay, Jr. *Music and Technoculture.* Middletown, CT: Wesleyan University Press, 2003.

moving fluidly between them."[54] It is in this imagined space where a listener can draw their own personal meaning from the soundscape that Westerkamp presents.

Another soundscape composer who has explicitly embraced the schizophonic is Francisco López (1964-), an experimental musician and sound artist based in Madrid, Spain. Described as the successor of Pierre Schaeffer's acousmatic listening, López attempts to depict through his works an "environmental acousmatics," or what he fondly refers to as "the Hidden Cicada Paradox" – that "there are many sounds in the forest, but one rarely has the opportunity to see the sources of most of those sounds."[55] In an effort to further direct the listener's attention to the sounds themselves rather than their sources, López leaves most of his recordings as "untitled," and even his album covers are sparse of imagery. López infuses his soundscapes with sampled sounds from sources ranging from insects and human voices to heavy metal bands. He often manipulates the recordings so to erase any hint of where the sound may have come from, a process López describes as "exploring blurred territory between reality and the creation of self-contained sound environments through a long process of transformation of sonic materials."[56] "In my conception," López describes, "sound recording does not document or represent a richer and more significant 'real' world. Rather, it focuses on the inner world of sounds." In this sense, López's work moves away from rationalization, categorization, and representation of sounds towards the "being" of sound itself. López sketches through his work a realistic, non-bucolic view of nature that acknowledges how the richness and mystery behind the sounds of the soundscape.[57]

By rejecting schizophonia as a move towards a non-idealistic nature, soundscape composers such as López demonstrate an important philosophical shift that connects music, technology, and nature. Soundscape composers may not "celebrate" industrial

---

[54] Westerkamp, Hildegard. "Linking soundscape composition and acoustic ecology." *Organised Sound* 7, no. 01 (2002): 51-56.
[55] López, Francisco. "Profound listening and environmental sound matter." Audio culture: readings of modern music. New York (NY): Continuum International Publishing Group (2004): 82-87.
[56] López, Ibid.

[57] López, Francisco. "Profound listening and environmental sound matter." Audio culture: readings of modern music. New York (NY): Continuum International Publishing Group (2004): 82-87.

noise, as Russolo suggests, but draw audience awareness towards it, engaging with it critically and interrogating how it has influenced all forms of life in both good ways and bad. For some composers, welcoming in noise in this way means embracing the totality of sounds produced by nature. In a recent interview, for example, field recordist and soundscape composer Jana Winderen, was asked the question "Are there such things as ugly-sounding lakes?" Winderen remarked that "'Ugly-sounding' is a taste issue, not a scientific one. I have not found 'ugly' sounds, maybe because I enjoy listening to them so much."[58] Winderen's response comes back to the question of "what is music?" By considering all sounds of the soundscape as a source of both data and music (sounds inherently worthy of aesthetic appreciation, whether or not they were "intended" by a composer), the question of noise for composers like Winderen is no longer even an issue.

Other soundscape composers recognize the concept of "noise" in the soundscape, but in a way that addresses the sheer power and subliminal quality of nature. John Luther Adams, for example, has emphasized in his writings how the sheer physicality of noise has the power to touch and move us in profound ways that music can't: "…noise commands our attention and breaks down the barriers we construct between our selves and our awareness."[59] For Adams, embracing the noise of nature enables a listener to move beyond the limitations of self-expression and ultimately reach connection. In Adams's words, noise "…invites communion, leading us to embrace the patterns that connect us to everything around us."[60] Soundscape composition as a merging of music with noise, nature with technology, and the self with the other, speaks to the core of the word *ecology*. From the prefix eco- comes the Greek word *oikos*, or household. As the philosopher Giorgio Agamben has described, "this house should not be thought of in terms of the modern day single family home, but is rather "a complex organism composed of heterogeneous relations, entwined with each other…" [61] Through its

---

[58] Fischer, Tobias. "Interview with Jana Winderen." Tokafi.com, Web. http://www.tokafi.com/15questions/interview-jana-winderen/. (Accessed 10 July 2016). Fisher, John Andrew. "The value of natural sounds." *Journal of Aesthetic Education* 33, no. 3 (1999): 26-42.
[59] Adams, John Luther. *Winter music: composing the North*. Wesleyan University Press, 2004.
[60] Adams, Ibid.
[61] Dyson, Frances. *The Tone of Our Times: Sound, Sense, Economy, and Ecology*. Cambridge (MA):

innovative use of technology, soundscape composition, too, represents a study of relationships and interactions between seemingly disparate parts. The following chapter will assess specific works and techniques that shift perspectives, blur lines, and draw connections between human and nature in ways similar to how deep ecology strive to draws attention to the oneness of all life.

CHAPTER TWO: THE MEDIATING ROLE OF TECHNOLOGY

The Uses of Technology in Soundscape Composition

Soundscape composition is a type of music that uses repurposes scientific technology to achieve artistic ends, capturing real-world environmental sounds and aiming to instill in the listener a sense of place and connection. This can be done in several ways, each of which comes with their own implications and challenges:

1. Field Recording Compositions

The prototypical soundscape composition is a musical piece intended for playback that incorporates actual recorded sound from natural or urban environments. These recordings are most often by the composer themselves. A composer can choose to later process the recorded sounds in the studio, fragmenting elements from the recording, combining recordings from different locations, manipulating the recorded sounds, and so on. The technological tools required for field recording compositions are, at the most basic level, a recorder and microphone. Both these tools possess rich histories in both scientific and musical contexts.

The advent of the microphone in the 20th century, for instance, has changed how we produce and receive music. In the context of singing styles, we can observe a transition between the full, powerful style of Bessie Smith to the microphone's era of "intimate"

Leonardo, The MIT Press, 2014. Print.

vocal technique – the more whispering, confiding approach taken by singers such as Billie Holiday and Frank Sinatra. Kim-Cohen describes how in band recording processes, the "microphone's expanded dynamic field closes down the sense of perceived space." When each instrument has its own microphone, it occupies its own dimension. While the "sense of a collective space of performance is lost," a new feel of intimacy is also created.[62] The idea that the microphone is a non-neutral interface that influences how we record and perceive sound is a major theme in soundscape composition, pointing to the idea that our relationship to nature is always colored by the subjectivity of our own perspective.

In soundscape composition, the microphone becomes a type of musical instrument in itself. Similar to a camera lens or microscope, a microphone can be used to "enhance or distort one's perception of specific parts of our sensory environment."[63] In this sense, it acts as a framing device – with it, the recordist decides where the soundscape will begin and end. Francisco López suggests that even before the recording itself, the choice of microphone makes a difference, as he points out that microphones "hear" in very different ways depending on model.[64] Even if they do not alter the recording any further, the use of the microphone in itself places a mark of subjectivity upon the recorded soundscape.

Hildegard Westerkamp expands upon the idea of microphone-as-musical instrument in her essay "Linking Soundscape Composition and Acoustic Ecology." Westerkamp points out that our human ears are selective. When we listen without a microphone, we have the ability to focus in and out of certain elements in the foreground and background of what we can hear. A microphone, however, is non-selective, and will pick up all sounds equally. Therefore, what the microphone picks up is often very different from

---

[62] Kim-Cohen, Seth. *In the Blink of an Ear: Toward a Non-Cochlear Sonic Art.* London: Continuum, 2009. Print.

[63] Derrick, Reuben George. "Acoustic illuminations: recorded space as soundscape composition." Doctoral Thesis, 2014.

[64] López, Francisco. "Profound listening and environmental sound matter." Audio culture: readings of modern music. New York (NY): Continuum International Publishing Group (2004): 82-87.

what the ear perceives.[65] Westerkamp plays with this discrepancy in her field recording piece *Kits Beach Soundwalk* (1989). At the beginning of the piece, the listener is placed on Kits Beach in Vancouver. They hear waves lapping and birds in the foreground, and a lower roar of city traffic in the background. At 1:42, Westerkamp says into the recording "I could shock or fool you by saying that the soundscape is this loud" – she proceeds to increase the levels of the beach sounds – "but it is more like this" – she lowers the levels again.[66] Suddenly, the listener is aware that what they will be hearing throughout this piece won't necessarily be the "truth." The sounds they will be hearing are a cross between physical reality and Westerkamp's interpretation and imagination. Bernie Krause, himself a professional field recorder, describes this split as an exposure of "the gulf between our inner and outer worlds."[67] In reference to anthropologist Gregory Bateson's statement, "the map is not the territory," the recording of a wild soundscape is not a perfect representation of what we think we're hearing, as our acoustic impressions are often influenced by the other senses, and by the proximity (i.e., foreground vs. background) of the sounds we hear.[68]

The use of the microphone in field recordings can be traced back to the scientific field of ornithology (the study of birds). For ornithologists of the early to mid-20th century, recording birdsong was primarily a process of extracting the sound out of the context of the natural environment for study in isolation. Recording equipment such as the parabolic microphone reflected the sound waves of birdsong so they were selectively directed right into the focal point of the microphone, minimizing input of background noise.[69] In fact, ornithologists preferred to ignore background sounds altogether in their studies - "sterilizing" field sound through techniques as explicit as tweaking recordings and

---

[65] Westerkamp, Hildegard. "Linking soundscape composition and acoustic ecology." *Organised Sound* 7, no. 01 (2002): 51-56.

[66] Westerkamp, Hildegard. "Kits Beach Soundwalk." Electronic Music Selections (1989). https://www.youtube.com/watch?v=hg96nU6ltLk. Web. (Accessed 2 July 2016).

[67] Krause, Bernie. *Voices of the Wild: Animal Songs, Human Din, and the Call to Save Natural Soundscapes*. Yale University Press, 2015.

[68] Krause, Ibid.

[69] Krause, Bernard L. *Wild soundscapes: discovering the voice of the natural world: a book and CD recording*. Wilderness Press, 2002. Print.

whiting out evidence of noise on spectrograms.[70] Birdsong, not the soundscape, was their primary objective for study. That being said, the aims of these ornithologists could be said to align more with the field of bioacoustics rather than soundscape ecology. While bioacoustics is closely related to soundscape ecology in that it also studies the sounds made by organisms, it focuses on behavioral and physical aspects of animal communication limited to individual species or comparisons between species rather than "the acoustics of entire communities, the environment and the relationship of sounds to ecological processes."[71] Soundscape ecologists of today, such as Bernie Krause, stress the importance of capturing the soundscape in its complete context, as a complex "collection of biological, geophysical and anthropogenic sounds that emanate from a landscape and which vary over space and time reflecting important ecosystem processes and human activities."[72] Krause stresses that biophony (sound produced by non-human living organisms), geophony (abiotic sounds), and anthropophony (human-produced sounds) cannot be conveniently organized or isolated. Rather, all these sound sources together form a web of interrelationships and impacts.

Soundscape composers also emphasize the importance of valuing the soundscape's complexity through their use of the microphone to move between and explore all aspects of the soundscape. One example of this concept in action is David Dunn's work entitled *Chaos and the Emergent Mind of the Pond* (1992). *Chaos* consists of a collage of aquatic insect recordings from ponds throughout North America and Africa. Using two omnidirectional ceramic hydrophones and a portable DAT recorder, Dunn captured surround-sound settings of activities occurring in the ponds. Dunn's collage attempts to illustrate the rhythmic complexity he heard in these ponds, "a rhythmic complexity altogether greater than that in most human music." Out of this "chaos," the pond becomes "a kind of superorganism, a transcendent social 'mind'" that calls to mind the seemingly

---

[70] Bruynickx, Joeri. "Sound sterile: making scientific field recordings in ornithology." In *The Oxford handbook of sound studies*. Pinch, Trevor, and Karin Bijsterveld, eds. Oxford University Press, 2011.

[71] Bruynickx, Ibid.

[72] Krause, Bernie. *Voices of the Wild: Animal Songs, Human Din, and the Call to Save Natural Soundscapes*. Yale University Press, 2015.

unified intelligence of eusocial insect colonies.[73] *Chaos* represents a manifestation of soundscape composition's interest in the holistic interactions and relations of the environment. Because Dunn fuses together field recordings from drastically different ecologies, Chaos is not a representational document that freezes time "in order to study, intensify experience, or cherish the past." Nor is it merely an audio portrait of a place that does not exist. Rather, Dunn describes *Chaos* and other pieces of this type as strategies for listening, pieces that allow a listener to evolve "an intrinsic relationship to a subject." Anthropologist Hugh Raffles describes Dunn's compositional process as "a research method, one that flows easily from a principle of wholeness." Through the interface of the microphone, what Dunn and his colleagues seem to be researching is the formation of a new human relationship to nature. This relationship is not based on a human-centric, romanticized vision of nature, but on a method of active participation with nature as it is.

2. Sonification and Audification

If there is any technique that better captures nature "as it is" than field recording, it would be sonification. Simply stated, a sonification is a process that maps data into sound. The term itself generally refers to its use as a scientific method of data display. Kramer, who helped form the annually meeting International Community for Auditory Display (ICAD) in 1994, defines sonification as "the use of nonspeech audio to convey information. More specifically, sonification is "the transformation of data relations into perceived relations in an acoustic signal for the purposes of facilitating communication or interpretation."[74] A variety of data can be sonified, from seismographic data, election results, molecular structures, to the electrical activity of the brain. Audification, a subset of sonification, is simply the conversion of a previously inaudible signal into a sound signal whose meaning can be inferred by the listening.[75] For example, the seismographic

---

[73] Dunn, David. "Nature, Sound Art, and the Sacred." In *The book of music and nature: an anthology of sounds, words, thoughts.* Rothenberg, David, and Marta Ulvaeus, eds. Wesleyan University Press, 2013. Print.

[74] Supper, A. "The search for the "killer application": Drawing the boundaries around the sonification of scientific data," in *The Oxford Handbook of Sound Studies*, T. Pinch and K. Bijsterveld, Eds. New York, NY: Oxford University Press, 2012, ch. 10, pp. 249–70.

[75] Supper, Ibid.

waves of an earthquake are below the frequency range of human hearing, but by increasing playback speed of these waves, they can become audible to the human ear.[76]

Sonification as an artistic medium, however, existed before the scientific understanding of the term. Practices akin to sonification can be observed in the conceptual art movement of the 1960s, through the work of composers such as John Cage, Alvin Lucier, Charles Dodge, and installation artists including Hans Haacke, Sol Lewitt, Dan Graham. These artists were similarly concerned with using raw material such as sound as a basis for their art. In his *Atlas Eclipticalis*, for example, John Cage superimposed music paper on top of star charts and plotted musical compositions as though they were constellations. Cage's techniques of chance and indeterminacy, through the lens of sonification, were a way of letting nature speak for itself, dismantling "the romantic notion of the artistic genius."[77]

The type of sonification relevant to studies of the soundscape is what soundartist Andrea Polli has termed "geosonification," or the transformation of data from natural environments into sound.[78] Notably, sonification as a formal practice was originally conceived under scientific terms, as an alternative method for presenting datasets for scientists with visual impairments or as "a complement to existing modes of representation, [to] yield a more thorough comprehension of certain scientific data and phenomena."[79] One example of soundscape composition that incorporates geosonification techniques is John Luther Adams's *The Place Where You Go to Listen* (2006). *The Place*, a permanent gallery exhibit located at University of Alaska Fairbank's

[76] Winters, R. Michael, and Gil Weinberg. "Sonification of the Tohoku earthquake: Music, popularization & the auditory sublime." In Proceedings of the 21st International Conference on Auditory Display (ICAD 2015). 2015.

[77] Sterne, Jonathan. and Akiyama, Mitchell. "The Recording That Never Wanted to be Heard and Other Stories of Sonification." In The Oxford handbook of sound studies. Pinch, Trevor, and Karin Bijsterveld, eds. Oxford University Press, 2011.

[78] Polli, A. "Soundscape, sonification, and sound activism," AI & Society, vol. 27, pp. 257–68, 2012.

[79] Supper, A. "The search for the "killer application": Drawing the boundaries around the sonification of scientific data," in *The Oxford Handbook of Sound Studies*, T. Pinch and K. Bijsterveld, Eds. New York, NY: Oxford University Press, 2012, ch. 10, pp. 249–70.

Museum of the North, converts real-time streams of solar and lunar cycles, weather, seismographic, and geomagnetic data from stations located throughout Alaska and converts them into sound and color. Adams notes that while the music of *The Place* is produced by natural phenomena, it "is not a scientific demonstration."[80] Subjective, artistic choices were made in the designing of the computer program for *The Place*, for the sounds that would represent the changes in each type of natural process. Furthermore, Adams asserts that all these choices are filtered through the interpretation of the listener: "The essence of this work is the sounding of natural forces interacting with the consciousness of the listener." For Adams, this does not make *The Place* any less "authentic" or "truthful." "*The Place*," Adams asserts, "is not a simulated experience of the natural world. It is a heightened form of experience itself."[81]

Nevertheless, the way in which Adams essentially repurposes sonification to fulfill artistic intentions in *The Place* is a notion that many sonification practitioners are uneasy with, especially in the context of their attempts to establish sonification as a legitimate scientific discipline. Fighting against the bias of a predominantly visual culture, scholar Alexandra Supper notes that sonification already represents a type of "breaching experiment," violating established customs of scientific data display and calling into question cultural norms of what constitutes an acceptable way of representing scientific data.[82] As a result, newer definitions of sonification attempt to emphasize the field's objective distinctness from art. At the 2008 ICAD conference, for example, Hermann proposed a new definition of sonification as not simply a means of translation but "a technique that uses data as input, and generates sound signals" that can only be termed sonification if the data reflects objective relations, is a systematic translation, is reproducable, and whose procedure can be applicable to different data. Supper observes that with this new definition, "we are witnessing the establishment of a set of procedures to reduce subjective intervention in an appeal to 'mechanical objectivity.'"[1]

---

[80] Adams, John Luther. *The place where you go to listen: In search of an ecology of music*. Wesleyan University Press, 2010.

[81] Adams, Ibid.

[82] Supper, A. "The search for the "killer application": Drawing the boundaries around the sonification of scientific data," in *The Oxford Handbook of Sound Studies*, T. Pinch and K. Bijsterveld, Eds. New York, NY: Oxford University Press, 2012, ch. 10, pp. 249–70.

The use of sonification in soundscape composition, however, demonstrates that due to its inherently translational nature, sonification must appeal to some degree of subjectivity in order to function. Hermann and Grond observe that "sonification is the acoustic representation of data. Ultimately, it is just sound. Therefore, we can only hear a sound as sonification, if we make sure to listen attentively in order to access the abstract information it contains."[83] This notion is strikingly similar to the emphasis in soundscape composition that interpretation ultimately depends on the subjective agency of the listener. Thus, in both scientific sonification and soundscape composition, the role of the listener appears to be key.

Furthermore, as Polli observes, the numerical data used to construct a sonification is itself a type of simplification, "as it is impossible to collect discrete data on every process that happens in a continuous environment." She goes on to note that just as with the microphone, humans must make choices "about when, where, and what to record [sonify], from microphone placement to post-processing."[84] Therefore, one could argue that rather than striving for objectivity, sonification practitioners can also achieve legitimacy by engaging in what Supper calls "boundary work." By engaging in negotiations at the boundaries of their field, sonification can establish its own cultural authority and set itself apart from other endeavors as a unique "hybridization of the empirical and expressive."[85]

One example of such a hybridization is Polli's *Heat and the Heartbeat of the City* (2004), a project that documents the effects of climate change on New York City's Central Park through a combination of video interviews and sonification. Using records and model predictions, Central Park's maximum daily summer temperatures from 1990 to 2080 are "translated into pitch, loudness, and the speed of sounds," as well as changing visual

[83] Grond, Florian, and Thomas Hermann. "Aesthetic strategies in sonification." *AI & society* 27, no. 2 (2012): 213-222.

[84] Polli, A. "Soundscape, sonification, and sound activism," AI & Society, vol. 27, pp. 257–68, 2012.

[85] Polli, A. "Soundscape, sonification, and sound activism," AI & Society, vol. 27, pp. 257–68, 2012.

background colors. The piece is broken up into four approximately seven-minute time periods - the 1990's, 2020's, 2050's, and 2080's. As the piece guides the listener through each period, they not only can objectively detect rising temperatures, but also experience a growing feeling of ominous uneasiness that comes with the shifting timbres and intensity of the sound.[86] By placing this effect in a familiar location (Central Park, as opposed to the notion of distant melting glacier), combined with the narratives provided by the interviews, *Heat and the Heartbeat of the City* places the listener in a position of both empirical and emotional alarm and relevancy. *Heat and the Heartbeat of the City* shows how soundscape compositions can emerge out of Supper's "boundary work" as types of "artistic" sonifications - projects that translate data into sound to communicate meanings less quantifiable and more metaphoric. These meanings ultimately pose more questions than answers, calling listeners to engage with and decipher the natural sounds being presented in order to acquire new perspectives and relationships with the environment.

3. Soundwalking

The third major type of soundscape composition is the soundwalk. In a soundwalk, the composer moves through their chosen environment, listening and recording the sounds they hear along the way. The composer might invite participants to take part in the experience of the soundwalk, and may or may not incorporate their own vocal observations and reflections into the recording. Organized throughout the world, today's soundwalks often take shape as public events that emphasize awareness and engagement with the environment, usually an urban city location. The soundwalk emphasizes the embodied nature of listening on the human scale. In a soundwalk, compositional techniques become the physical movements the recordist's body – as they walk, stop, turn around, or change their pace, the perspective of the soundscape shifts.[87]

---

[86] Polli, Andrea et al. "Heat and the Heartbeat of the City," web. http://archive.turbulence.org/Works/heat/index2.html

[87] Paquette, David, and Andra McCartney. "Soundwalking and the Bodily Exploration of Places." *Canadian Journal of Communication* 37, no. 1 (2012): 135.

In their paper "Soundwalking and the Bodily Exploration of Places," Andra McCartney and David Paquette trace a rich history behind the soundwalk that that spans across the fields of literature, philosophy, and art. Thoreau revered "the art of walking" as a method of inquiry and introspective reflection. The flâneur, a figure found in the writings of Edgar Allan Poe, Charles Baudelaire, and Walter Benjamin, among others, is something of a soundwalker, a detached "observer of the marketplace" who, according to McCartney and Paquette, "feeds on the sensory data taking shape before his eyes" and experiences an unfolding image of his surroundings that both encompasses the present and speaks through "the loaded past of memories, histories, and history."[88] In mid 20th century psychogeography and French situationist theory, the *derive* could be seen a another, more political predecessor of the soundwalk, in which a person drops all their usual work/life obligations and motives and wanders on an unplanned journey across the urban landscape, drawn by chance attractions and encounters discovered along the way.[89] What these modes of walking share with soundwalking draws from is an intimate, sensory-based connection to the landscape as a means of gaining insight.

A second main thread from which soundwalking has emerged is the concept of walks as a source of qualitative data for research purposes. In the field of urban acoustics, for example, Jean-Paul Thibaud (2001) developed a method using commented walks to complement metrological surveying techniques, with researchers recording the experience and perceptions a participant describes as they move through a space.[90] Hildegard Westerkamp's soundwalk works originated as a qualitative complement to research taking place in the World Soundscape Project. Westerkamp's experimental "Soundwalking" radio series, for example, blended soundscape documentary, commentary, and debate on social issues around noise with musical imagery that was based on recorded soundscape material.[91] Later, Westerkamp produced several formal

---

[88] Paquette and McCartney, Ibid.

[89] Paquette, David, and Andra McCartney. "Soundwalking and the Bodily Exploration of Places." *Canadian Journal of Communication* 37, no. 1 (2012): 135.
[90] Pacquette and McCartney, Ibid.
[91] Westerkamp, Hildegard. "The soundscape on radio." *Radio Rethink* (1994): 86-94.

soundwalk compositions, including the aforementioned *Kits Beach Soundwalk*, which, like Dunn's *Chaos and the Emergent Mind of the Pond*, reflect a creative transformation or mode of research.

One example of a soundwalk that also incorporates audification is Christina Kubisch's *Electrical Walks*, a series of projects which began in 2003. In these collaborative projects, Kubisch guides participants through city streets wearing specially-designed headphones that "amplify electromagnetic fields into the range of human hearing."[92] Interesting, unexpected sounds arise from just about anywhere and anything that uses electricity - from lighting and wireless networks to antitheft security devices and cell phones.[93] Even more so than other forms of soundscape composition, the participant in a soundwalk holds a large degree of agency in determining the outcome of the composition they hear. Following Kubisch's prescribed route is only optional, and by adjusting their proximity and position relative to objects, the participant can alter the timbres, intensities, and rhythms they hear, a freedom that Polli describes as "an opportunity to reestablish an ecological link with the source of information."[94]From this new link, Kubisch emphasizes a discovery of music in what might normally be cast off as meaningless noise. She describes the electromagnetic sounds revealed as "complex layers of high and low frequencies, loops of rhythmic sequences, groups of tiny signals, long drones and many things which change constantly and are hard to describe," intricate worlds that demand attention and investigation.[95] Kim-Cohen notes that by providing participants with these new, intricate worlds, Kubisch's role becomes one typically assigned to a scientist rather than an artist, as an agent alerting the participant of "previously undisclosed facts."[96] However, like Polli in her *Heat and the Heartbeat of the City*, Kubisch aims to influence

---

[92] Kim-Cohen, Seth. *In the Blink of an Ear: Toward a Non-Cochlear Sonic Art*. London: Continuum, 2009. Print.

[93] Kubisch, Christina. "Biography." Christina Kubisch website, Web. http://www.christinakubisch.de/en/home.

[94] Polli, A. "Soundscape, sonification, and sound activism," AI & Society, vol. 27, pp. 257–68, 2012.

[95] Kubisch, Ibid.

[96] Polli, A. "Soundscape, sonification, and sound activism," AI & Society, vol. 27, pp. 257–68, 2012.

her audience in a way that moves beyond merely presenting quantitative information. Instead, Kubisch has stated through *Electrical Walks* an aim to emphasize the shift in our perception of everyday reality that comes when one listens to a familiar environment through the unfamiliar context of the electromagnetic spectrum.[1] Again, the expansion of perspective through the medium of technology arises as a key theme.

4. *In situ* Performance Works

Some soundscape composers leave the concert hall or gallery entirely, places sound, an object, or a performance situation directly into an outdoor environment. In contrast to soundwalks, these *in situ* compositions are often carried out in non-urban "natural" settings where human-produced noise is not the dominant feature of the soundscape. More performance acts than conventional compositions, *in situ* works are often centered around the concept of interaction, manipulating the features of environments in ways that reveal aspects of its soundscape.

One example of such a work is artist Leif Brush's *Meadow Piano* (1972), a grid-like structure that uses sensors to pick up weather conditions and nearby insect activity. The structure records these sounds and uses them to make its own aural responses, creating a back-and-forth communication with nature.[97] In Brush's *Terrain Instruments*, a series of outdoor installation works that began in the late '60s and continues today, Brush uses electronic devices that turn sources of environmental motion (e.g. leaves, wind, precipitation) into sound via a variety of structures. These structures generally consist of strung "weaving and meshings" between tree clusters using tunable brass, steel, and copper wires. Rather than simply physically replicate environmental sounds or synthesize them from artificial sources, Brush aims for a direct-as-possible orchestration of actual natural forces as they are found in their places of origin.[98]

---

[97] Licht, A. *Sound art, beyond music, between categories*. New York, NY: Rizzoli International Publications, Inc., 2007.
[98] Brush, Leif, and Gloria DeFilipps Brush. "Monitoring Nature's Sounds with Terrain-Based Constructions." *Leonardo* (1984): 4-7.

David Dunn has also created a number of soundscape compositions that fall under this *in situ* category. Dunn describes these pieces as "real-time performances" that take place within "wilderness spaces," and involve interacting with some component of that environment in a way that produces sound. In his *Mimus Polyglottos*, for example, Dunn, compelled by the mimetic skills of the mockingbird, recorded electronic tones in a range and rhythm that matched the mockingbird's song. He played this recording back for an actual mockingbird in a forest, which reacted as if it had heard another mockingbird's song. Dunn took things a step further with his *Entrainments 1*, in which he played an oscillator tone into a forest and recorded the annoyed response of a blue jay. He then played the recording of the blue jay's response back into the forest and recorded the response of the wildlife again. He repeated this process numerous times until wildlife actually would become attracted to the sounds of the recording.[99]

For both Brush and Dunn, the music they create is more than just the sounds. Rather, it's about the technology and its interaction with living systems. For the resulting sounds that do end up being produced through these interactions, Dunn emphasizes how they are "contextually bound... evidence of purposeful, living systems with attributes of mind" in their own right."[100] By stressing the intelligence and conscious behind these living systems, the interactivity of *in situ* works explicitly rejects the traditional dichotomic relationship between music and nature.

CHAPTER THREE: BREAKING BOUNDARIES THROUGH TECHNOLOGY
Perspectivism: Exploring Nonhuman Spatio-temporal Scales

Technology makes it possible for a soundscape composer to portray different scales of time and space through their work. By allowing a listener to feel what it's like experience time or space on a nonhuman scale, soundscape compositions lend listeners an opportunity to develop an expanded perspective and empathy towards other forms of life.

---

[99] Dunn, David. "Nature, Sound Art, and the Sacred." In *The book of music and nature: an anthology of sounds, words, thoughts.* Rothenberg, David, and Marta Ulvaeus, eds. Wesleyan University Press, 2013. Print.
[100] Dunn, Ibid.

Polli notes, for example, the ability of recording equipment to "amplify barely audible environmental sounds." In her work, Hildegard Westerkamp will ''position the microphone very close to the tiny, quiet, and complex sounds of nature, then amplify and highlight them...they can be understood as occupying an important place in the soundscape and warrant respect'' – a technique we see her execute with the barnacles of *Kits Beach Soundwalk*.[101] Like looking through a microscope and seeing a tiny world of strange organisms in a droplet of river water, changing perspectives has the potential to change our perception of reality.

Interestingly, awareness of perspective is also central to soundscape ecology. In his article "Soundscape Conservation," Dumyahn observes that, "We [soundscape ecologists] recognize that how wildlife and humans perceive and respond to sounds will vary."[102] Dumyahn notes that this concept has been largely influenced by landscape ecology, a field that recognizes that different organisms experience the landscape in different ways. The landscape of a bird, for example, is different from that of a slug in terms of the niches they occupy or their mobility from place to place. In the context of the soundscape, not all organisms occupy the same "acoustic niche." They may not have the same hearing range, or they may use sound to different extents or in different ways (vocal vs. vibratory communication, for example). Recognition of this diversity of perspectives has helped shape the interdisciplinary, receptive attitude of the field. As Dumyahn describes, "...individual human perceptions and responses to sounds also are not universal. With this in mind, we acknowledge that different social and ecological research approaches are necessary to understand these dynamics."[103] In other words, we realize that there is a lot more to see and hear than what we can detect with our own eyes and ears.

---

[101] Westerkamp, Hildegard. "Linking soundscape composition and acoustic ecology." *Organised Sound* 7, no. 01 (2002): 51-56.

[102] Dumyahn, Sarah L., and Bryan C. Pijanowski. "Soundscape conservation." *Landscape Ecology* 26, no. 9 (2011): 1327-1344.
[103] Dumyahn, Ibid.

Soundscape compositions such as Jana Winderen's 2015 *The Wanderer* employ this concept of perspectivism. A 16-channel installation that documents zooplankton and phytoplankton sounds from across the Atlantic Ocean, *The Wanderer* intends to raise awareness and conscious appreciation for these two underappreciated creatures. In the notes for the piece Winderen describes that "Mammals, fish and crustaceans feed on zooplankton and they in turn feed on phytoplankton" and that "Half of the world's oxygen is produced by phytoplankton photosynthesis."[104] By focusing on the insight that can be gained from shifting perspectives and switching frameworks, Winderen's hydrophone recordings represent a strategy to amplify the presence of organisms vital to life on earth.

Sonification, too, can render data audible that normally lies far outside of possible human experience, compressing time "into a few minutes" or shrinking "vast geographical distances" to "the size of a room."[105] By converging data streams from throughout Interior Alaska into a single location, John Luther Adams's *The Place Where You Go to Listen,* certainly falls under the latter category. As Adams describes, "*The Place* resonates sympathetically with the world outside. In turn, I hope it reverberates back into the world. We enter with our everyday perceptions of the world around us. Inside *The Place* we hear and see things differently. When we leave, perhaps we carry some of these new perceptions with us." In this fast-paced Information Age, we seldom stop to "listen beneath the surface of everyday life."[106] *The Place*, however, provides us with an opportunity to pause to pay attention to the sounds around us, allowing us to enter another realm where time moves more slowly. Because *The Place* as a composition essentially never ends, it also refers to the idea of the constant presence of the soundscape, as if one were simply ''dropping in'' to an ongoing process, which listener also experiences through engaging in the activity of the soundwalk. In this way, *The Place* speaks to a similar desire of some sound artists for an elimination of time – from

---

[104] Winderen, Jana. "The Wanderer." Web, https://janawinderen.bandcamp.com/album/the-wanderer

[105] Polli, A. "Soundscape, sonification, and sound activism," AI & Society, vol. 27, pp. 257–68, 2012.

[106] Adams, John Luther. *The place where you go to listen: In search of an ecology of music*. Wesleyan University Press, 2010.

the notion of conceptual artist Les Levine that "environmental art can have no beginnings or endings" to Piet Mondrian's vision for a new kind of concert hall where "people could come and go freely without missing anything because the compositions would be repeated just like in movie theaters."[107] Polli notes how ultimately, soundscape composition emphasizes the idea that a soundscape is present before and after a listener experiences, implying a "continuity of the natural world existing before and after human life."[108]

Hearing the Unheard: Forgotten Voices

Leif Brush's aforementioned *Terrain Instruments* exposes not only the external sounds trees make (from leaves, wind, precipitation), but also the "internal sounds" (the moan and groan of the sap, the creaking of wood) that coalesce to create an "orchestra of trees."[109] Likewise, Adams emphasizes that *The Place* doesn't illustrate the visible. It doesn't amplify the audible. It resonates with the inaudible and the invisible." By placing their audiences in new perspectives from which to listen to the environment, soundscape compositions initiate a "transformation of the inaudible into the sphere of the audible."[110]

The human ear can detect frequencies between about 33-16,700 Hz (approximately none octaves) with the highest sensitivity in the region of 1000-2000 Hz. Audification, however, allows us to perceive sounds below (infrasound) or above (ultrasound) this range.[111] Müller's *Bat* (1989), for example, consists of ultrasound recordings of indigenous Icelandic bats processed to be audible to human ears.[112] (Bats use ultrasound to perform echolocation so they can fly in the dark without hitting objects, and locate

---

[107] Polli, A. "Soundscape, sonification, and sound activism," AI & Society, vol. 27, pp. 257–68, 2012.
[108] Polli, Ibid.

[109] Brush, Leif, and Gloria DeFilipps Brush. "Monitoring Nature's Sounds with Terrain-Based Constructions." *Leonardo* (1984): 4-7.
[110] Adams, John Luther. *The place where you go to listen: In search of an ecology of music*. Wesleyan University Press, 2010.
[111] Kruth, Patricia, and Stobart, Henry. *Sound*. Darwin College Lectures, Cambridge University Press, 2000. Print.

[112] Müller, Wolfgang. Wolfgang Müller website, Web. http://www.wolfgangmueller.net/.

insects).[113] Müller's *Bat* allows the listener to become aware of the fact that there are many sources of sound (and for that matter, sources of life) of which we are usually unaware. From the other direction of the audio spectrum. The Youtube video "Sonification of the Tohoku Earthquake" audifies a time-aligned seismograph and heatmap of the earthquake into the range of human hearing. Winters and Weinberg argue in their article "Sonification of the Tohoku Earthquake: Music, Popularization & the Auditory Sublime" that by creating a new experience of a seemingly-familiar phenomena that is more "immersive and visceral" than visuals alone, the video gives audiences access to an auditory sublime, "a sudden awareness of one's own tiny presence against the vastness of the universe."[114] According to the authors, artistic audifications like "Sonification of the Tohoku Earthquake" cause listeners to ultimately realize that they are conceiving something almost inconceivably great and powerful and thus represent a powerful strategy for attracting audiences to artistic sonifications.[115]

The idea of making audible the humanly inaudible also applies to the sounds of extinct species – sounds inaccessible to in terms of time rather than space. Müller's 2008 project *Séance Vocibus Avium*, for example, recreated the calls of eleven extinct Icelandic bird species. Collaborating musician was assigned to reconstruct the sounds of a particular species would have many by studying historical documents. Rather than relying on electroacoustic technology, all the sounds are recreated using only the human voice – an underscoring of both a sentimental connection and the haunting fact that humans directly or indirectly caused the extinction of these birds.[116]

In sum, a deeper appreciation for natural environments can be gained by revealing the unheard. In a recent interview, Jana Winderen notes how recording sounds in "hidden

---

[113] Kruth, Ibid.

[114] Winters, R. Michael, and Gil Weinberg. "Sonification of the Tohoku earthquake: Music, popularization & the auditory sublime." In Proceedings of the 21st International Conference on Auditory Display (ICAD 2015).

[115] Winters, Ibid.

[116] Sudyka, Diana. "Wolfgang Müller - *Séance Vocibus Avium,*" Tiny Aviary. November 27, 2009, Web. http://thetinyaviary.blogspot.com/2009/11/wolfgang-muller-seance-vocibus-avium.html.

places" – such as her speciality, underwater environments - put us in a position of humbleness towards Earth when we realize how much we are unaware of and how much we do not know. Winderen further describes how oceanic soundscapes, which cover 70% of our planet, " reveal a complex and generally unknown sonic world under the surface. It reveals that creatures we did not know could communicate with sound are doing exactly that." And when we realize that "something is communicating through sound," "we gain a sense of it having intelligence."[117]

Familiar and Foreign: Cultivating a "Glocal" Mindset

While soundscape compositions and sonifications utilize "real-world sounds" as the primary material for their work, these sounds often come from environments that are not familiar to listeners. Most listeners haven't ventured into the rain forests of Costa Rica (*La Selva*, Francisco López) or come face-to-face with the tumbling glaciers of north Arctic seas (*Heated*, Jana Winderen). In addition to the places themselves being foreign, the sound processing techniques composers apply in their pieces warp a listener's sense of familiarity even further. This dichotomy between familiar and foreign seems to surface as an important asset of soundscape compositions. Nature itself is often conceived as a place that we find refuge in, a place of rejuvenation, a place of wonder. Yet at the same time, we know very little of it. We've described about 1.8 million species of organisms, but estimations suggest there may be 10 times as many species living in the world. Life hiding in deep-sea trenches has been largely unexplored. A single gram of soil from our backyards contains thousands of species of bacteria.[118] Through the use of technology, however, soundscape composers navigate listeners through such an explicit confrontation with the "Other."

For some composers, the creative use of real-world sounds is vital exactly because it destroys a listener's normal perception of reality. Entering the realm of imagination,

[117] Fischer, Tobias. "Interview with Jana Winderen." Tokafi.com, Web. http://www.tokafi.com/15questions/interview-jana-winderen/. (Accessed 10 July 2016).
[118] "How Many Species are There?" The Environmental Literacy Council, Web. http://enviroliteracy.org/ecosystems/classifying-species/how-many-species-are-there/

composer Katherine Norman describes how this enables the listener to "travel away from both listening, and experiential, assumptions."[119] Norman engages with these themes in her work *Bells and Gargoyles* (1996), a collage of digitally-manipulated recordings made on a stormy night in the village of Hatersage, Derbyshire. Norman describes this piece as a suspenseful, nocturnal journey where "outer reality becomes confused with inner imagination." Free from the barriers of assumption, a listener is more likely to explore, engage with, and ask questions about unfamiliar sounds rather than reject them outright as something that doesn't fit into their conception of reality.[120]

The use of active imagination when listening to soundscape composition, in a way, directly contrasts with how society normally presents music to us. In his book *Noise: The Political Economy of Music*, economist Jacques Attali sketches music, particularly mainstream popular music, as a "commodified product of the music business" which "seeks to repeat messages already received, digested, and therefore comfortable and comforting."[121] Rather than repeating messages already digested, soundscape compositions introduce the listener to unknown and unexplored worlds of sound. By introducing the listener to soundscapes from around the world, a soundscape composer encounters challenges similar to musicians and composers who draw from the traditions of unfamiliar (i.e., non-Western) cultures, challenges that have already been encountered in the fields of anthropology and ethnomusicology. Ethnomusicologist Steven Feld describes that when a soundscape composer deals with "worlds of sound" – "the multiplicity of distinctively local environmental soundscapes mapping the globe, and the complex ways their distinctiveness blurs as they change through space and time" – they must recognize that they are also dealing with the "sounds of the world" – the "diversity of human musical practices" found within and throughout these soundscapes.[122] In other

---

[119] Norman, Katherine. "Real-World Music as Composed Listening." *Contemporary Music Review*, Vol. 15, Part 1 (1996).

[120] Norman, Katherine. Katherine Norman website. Web. http://www.novamara.com/.

[121] Kim-Cohen, Seth. *In the Blink of an Ear: Toward a Non-Cochlear Sonic Art*. London: Continuum, 2009. Print.

[122] Feld, Steven. "Sound Worlds." In *Sound*. Kruth, Patricia, and Stobart, Henry, eds. Darwin College

words, a recognition of the foreign in music necessitates a recognition of the extramusical dimension behind the sounds. Kubisch, for example has presented her *Electrical Walks* across the globe, including Germany, England, France, Ireland, Sweden, Switzerland, Slovakia, Spain, Japan, and the US. While the presentation format remains the same for each location, Kubisch notes how each soundwalk experience is local to its given environment, with the timbre and volume of the electromagnetic noise varying from site to site. Kubsich has found that while some sounds are unique to their site and others alike across the world, in all places, these electromagnetic noises are ubiquitous, and pop up in the most unexpected of places.[123] In this way, the *Electrical Walks* are simultaneously a global phenomenon, a unique convergence of local and global mindsets.

Fabio Ciardi addresses the concepts of locality and globality in his article "Local and Global Connotations in Sonic Composition." Ciardi describes a "global" method of composition in which musical material is regarded as completely self-referential. From this abstract, Pythagorean perspective, global music rejects any "possible semantic ties between the sound and the world." A "local" music, however, actively draws from "local elements" in their environment. A local composer recognizes the historical and cultural connotations behind the way they use their sounds and focuses on how these sounds signify and express the relationship the composer has with the world around them.[124] Ciardi goes on to outline a continuum of attitudes by which a composer can incorporate "locality" into their work. On one end, a local composition can take on a "colonial" approach. Roughly equivalent to exoticism in classical music, a colonial composer uses material connected to a local situation or context for the purpose of "colour[ing] a style with atmospheres pertaining to far-off lands."[125] In this approach, dominant cultures "subjugate" sounds of the Other, assimiliating foreign frames of reference into a familiar style. A colonial composer, then, may be local on the superficial level but his aims are

Lectures, Cambridge University Press, 2000. Print.

[123] Kubisch, Christina. "Biography." Christina Kubisch website, Web. http://www.christinakubisch.de/en/home.
[124] Ciardi, Fabio Cifariello. "Local and Global Connotations in Sonic Composition." *Organised Sound* 13, no. 02 (2008): 123-135.
[125] Ciardi, Ibid.

ultimately global. The music of the world enters the world of his or her music. At the other end of the spectrum is the post-colonial, or "ecological" approach. Here, rather than forcing the local elements into a familiar frame, the composer allows his material to be shaped by the local elements.[126] As Ciardi describes, "the sound and the network of relationships that define it are not simply chosen in order to be used within a predefined syntactic framework, but instead they are considered as elements that can cause profound changes in the strategies and syntaxes used by the composer."6 Importantly, the rules, philosophies, and traditions of the local culture are taken into account by the composer. The composer's own background, methods, and styles may still be evident in the piece but "no local element seems to feel the need to dominate the other, but on the contrary each one is used in an original way to convey various aspects of the other."[127] It is on this ecological end of the spectrum where soundscape compositions reside.

Francisco López, for example, finds no contradiction in infusing his soundscapes with sampled sounds from sources ranging from insects and human voices to heavy metal bands. He often manipulates the recordings so to erase any hint of where the sound may have come from, a process López describes as "exploring blurred territory between reality and the creation of self-contained sound environments through a long process of transformation of sonic materials."[128] Take his 1997 piece *La Selva*, a montage of field recordings from the La Selva rainforest reserve in Costa Rica. López is not interested in creating an accurate or easily digestible representation of the rainforest soundscape for listeners. While species can be identified from the recording, López made the effort that "none are singled out in the process of recording and editing." López contrasts this with commercially-released "pure" recordings that contribute to a "restricted and bucolic view of nature" by artificially mixing "various animal vocalizations" over a generic "background matrix of environmental sound" – a process Ciardi would describe as

---

[126] Ciardi, Fabio Cifariello. "Local and Global Connotations in Sonic Composition." *Organised Sound* 13, no. 02 (2008): 123-135.

[127] Ciardi, Ibid.

[128] López, Francisco. "Profound listening and environmental sound matter." In *Audio culture: readings of modern music.* New York (NY): Continuum International Publishing Group (2004): 82-87.

assimilating the foreign into the familiar.[129] For López, sound recording is not a travel documentary concerned with providing listeners "a richer and more significant 'real' world." Rather, "it focuses on the inner world of sounds" that challenges a listener to expand their aural understanding of nature. For instance, in *La Selva*, López highlights how geophonic sounds like wind and rain change when filtered through different plant material, topography, and topsoil material, bringing awareness to the fact that "A sound environment is the consequence not only of all its sound-producing components, but also of all its sound-transmitting and sound-modifying elements." Revealing these subtleties contributes to an "uglier" but more authentic conception of La Selva as a noisy place, filled with "multiple rich, complex layers."[130]

By incorporating recorded environmental sounds, soundscape composers like López let the formal, aural, aesthetic, and sociopolitical outcomes of their work be shaped not only by their personal agenda but by "the complexity of local sonic landscapes" themselves.[131] In so doing, the soundscape becomes much more than the sound-in-itself. It achieves a revelation that Rosalind Krauss has attributed to postmodern art, where "the very existence and meaning of the "I" is thus dependent on its manifestation to the "other."[132] Soundscape works, in this way, are works of the Other. This embracing of the Other echoes similar sentiments in experimental music, a genre that explicitly attempts to stretch the ear's ability to structure and conceive of unfamiliar sounds as music, whether through unconventional instrumental techniques or by using everyday household objects to produce "musical" sounds.

However, a soundscape composer deals with not just a musical unfamiliarity, but a social and political unfamiliarity. Hildegard Westerkamp, for example, describes that as a

---

[129] López, Francisco. "Profound listening and environmental sound matter." In *Audio culture: readings of modern music*. New York (NY): Continuum International Publishing Group (2004): 82-87.

[130] López, Francisco. "Profound listening and environmental sound matter." In *Audio culture: readings of modern music*. New York (NY): Continuum International Publishing Group (2004): 82-87.
[131] López, Ibid.
[132] Kim-Cohen, Seth. *In the Blink of an Ear: Toward a Non-Cochlear Sonic Art*. London: Continuum, 2009. Print.

composer who records her own sounds and soundscapes, whether or not she is a foreigner to the environment is an important factor that shapes the outcome of her work – "it inevitably influences the choices of sound sources, the acoustic perspective, the emphasis of microphone placement as well as what message a piece may transmit."[133] As a visitor to a soundscape, a composer may have the advantage of noticing details that local inhabitants take for granted. However, there is a danger of being "so unfamiliar with cultural, social and political undercurrents and subtleties of a place or a situation that we can't help but create a superficial, touristic sonic impression of a place."[134] Ultimately, Westerkamp suggests that approaching a soundscape from both familiar and foreign perspectives can be enlightening, but only if the composer remains conscious of their relationship to the place and the situation.8 For John Luther Adams, the indigenous sounds of his former Alaskan home are key to his work. According to Adams, "like our precious remnants of physical wilderness, the cultures of the "developing world" are viewed as storehouses of raw materials and products for exploitation and consumption." By consciously choosing to respectfully use the sounds of their immediate environment and its local peoples, a composer for Adams helps "to create genuine alternatives to global monoculture."[135]

The emphasis by soundscape composers such as Westerkamp to have their works heard as "ecological" rather than "colonial" local works can be paralleled to Steven Feld's notion of celebratory and anxious narratives in the context of the "world music" genre. Soundscape composers fit their work into a "celebratory narrative" in the way that proponents of world music have insisted on "world music's abilities to reassert place and locale against globalization." Feld describes that this narrative emphasizes "fusion forms as rejections of bounded, fixed, or essentialized identities" and places "positive emphasis on fluid, deessentialized identities."[136] Likewise, a soundscape composer does not present

[133] Westerkamp, Hildegard. "Linking soundscape composition and acoustic ecology." *Organised Sound* 7, no. 01 (2002): 51-56.
[134] Westerkamp, Ibid.
[135] Adams, John Luther. *Winter music: composing the North*. Wesleyan University Press, 2004.
[136] Feld, Steven. "Sound Worlds." In *Sound*. Kruth, Patricia, and Stobart, Henry, eds. Darwin College Lectures, Cambridge University Press, 2000. Print.

an unaltered environmental recording to an audience but "fuses" and distorts its identity, mixing soundscapes from multiple locales, adding commentary or other synthesized sounds, and altering the soundscape through technology (e.g., sound processing and editing techniques, sonfication, or audification). This modification and transformation is not a process of distancing oneself from local sounds. Rather, it is a process of reconnection, a fulfilling of what Adams describes as the need "to rediscover and recreate order between ourselves and the world around " through "continually renew[ing] our connections with older, deeper sources."[137]

From Specialization to Democratization: The Age of the Amateur

By challenging their audiences to take up an ecological perspective that is at once both local and global, soundscape compositions place the listener in an active, rather than passive role of reception. How does technology facilitate such a role shift? Technology has the potential to exclude people from composing or enjoying music through the forces of specialization and professionalization. But at the same time, it also has the potential to welcome the amateur into the music-making and listening process. Take pianist Glenn Gould, who ceased performing live in the mid-60s, partly, Licht suggests, because he thought records would replace the concert hall. Conceptualizing albums as "a kind of interactive sound installation," Gould emphasized the increased freedom and agency of the record-listener: "the listener is able to indulge preferences and, through the electronic modifications with which he endows the listening experience [presumably bass or treble controls on a home stereo] imposes his own personality upon the work. As he does so, he transforms that work, and his relation to it, from an artistic to an environmental experience."[138]

Likewise, technology can alter the way we listen to the soundscape in ways that can actually enhance discovery through interaction, rather than fracture it through

---

[137] Adams, Ibid.
[138] Licht, A. *Sound art, beyond music, between categories*. New York, NY: Rizzoli International Publications, Inc., 2007.

disconnection. Katherine Norman's *Window (for John Cage)* (2012), an online "interactive sound essay" that explores the everyday experience of listening, is a fitting exemplar of this discovery in action. As tribute to Cage's assertion that "everything is worth a listen," Norman emphasizes the "deliberate indirection" of the piece, daily recording whatever sounds happened to be outside of her window at a specific time throughout the year. In the work, a user explores the soundscape of different months of the year outside the artist's window by dragging different elements of the soundscape across the screen and reading text descriptions and window-view images associated with each month. The sounds are quite ordinary – birds, muffled traffic, rainfall, neighbors talking. While irrelevant to the general listener, to Norman, they hold an intimate familiarity, a "dynamic construction of place and the human experience of place through the accumulation of sensory perception, repetition, memory and emotion." but extrapolated from her personal experience and placed in a public domain of Internet interactivity, a user has the chance to play with these sounds, memories, and associations – attending to the ordinary to "make it extraordinary." In a choose-you-own-adventure fashion, a user has the freedom to make the narrative experience of the text as linear or fragmentary as they want, and move sounds in their own way to create a "self-constructed place."[139]

Andrea Polli's ongoing *Sound-Seeker* project hands agency to the audience in an even more explicit way by allowing them to take part in the creation process. As part of the NYSoundmap project of the New York Society of Acoustic Ecology, Polli's *Sound-Seeker* is an interactive digital media work that allows a user to explore the sounds of New York City. Using interactive satellite photos on a Google Maps software, a user can zoom, pan, and search for recorded sounds that have been located and updated by participants via GPS.[140] Bryan Pijanowski's *Record the Earth* project takes on a similar approach, but on an even broader scale. A website and app created by the Center for

[139] Norman, Katherine. "Window - And Undecided Sound Essay." *Journal of Sonic Studies*, volume 4, no. 1 (May 2013). http://journal.sonicstudies.org/vol04/nr01/a03
[140] Polli, Andrea. Andrea Polli website, Web. http://www.andreapolli.com/

Global Soundscapes at Purdue University, *Record the Earth* is at once a citizen science and art project. Users can upload sound clips and tag their location on the globe, as well as categorize the recordings as biophony, geophony, or anthropophony, and even assign them with associated "emotions," making the project not only an effort to "document the diversity of sounds that occur on earth" but also to "better understand how people relate to the sounds that occur around them."[141] Music scholar Mark Katz suggests that the user-centered perspective of projects like those of Polli and Pijanowski embrace interaction with the amateur by treating the technologies they use as "quasi-musical instruments," and treating sound recordings made by amateurs as "quasi-performances."[142] The technology of the smartphone becomes a tool to engage with place, and the outcome of the work represents a collective understanding of the soundscape rather than the filtered perspective of a single composer.

The soundwalk in particular depends on audience perspective and participation. Take Andra McCartney's *Soundwalking Interactions*, a documentation of public soundwalk through media including sound recording, still photography, and video recording. *Soundwalking Interactions* emphasizes the various points of interaction created via the process of the soundwalk, between and among "among audiences, sound environments, research contexts, movements, media, senses, and places."[143] Concerned with the role of the participant in the soundwalk, *Soundwalking Interactions* addresses issues such as agency and improvisation. One recent soundwalk that explored relationships between bodily movements and sense of place developed into a presentation of the soundwalk recordings in collaboration with a choreographer and dancers. The project has also led to an interactive installation that allows people to "dance" with sounds.[144] Spanning much of McCartney's work, in fact, is the emphasis she places on the embodiment in soundscape recordings. As McCartney has explained, ''Soundwalk work is far from

---

[141] Pijanowski, B.C., *Record the Earth*. Global Soundscape Project, Web. 28 Feb 2016. https://www.recordtheearth.org/
[142] Katz, Mark. "The Amateur in the Age of Mechanical Music." In *The Oxford handbook of sound studies*. Pinch, Trevor, and Karin Bijsterveld, eds. Oxford University Press, 2011.

[143] Paquette, David, and Andra McCartney. "Soundwalking and the Bodily Exploration of Places." *Canadian Journal of Communication* 37, no. 1 (2012): 135.
[144] Paquette, Ibid.

detached. The recordist's perspective is written into the recording...a recording soundwalker is simultaneously an intensely engaged listener, connected by a phonic umbilicus to the surrounding world."[145] For McCartney, a participatory embodiment in the soundwalk serves as an important source of reconnection. Following Westerkamp, McCartney's work uses the soundwalking experience to engage audience and participants in asking questions about their relationships to places and their histories, with the walks culminating in an open discussion in which participants reflect on their experience of the walk.[146]

Changing Roles: The Value of the Listener

The notion of increasing the agency of the listener in soundscape composition points to a larger questioning of the conventional roles of composer, performer, and audience member. In this way, soundscape composition again reflects a move from an emphasis on hierarchical levels of organization to an "ecological" network of reciprocal relationships. This largely contrasts with the Western classical myth of the musical composition as a product aligned with the vision and goals of an all-knowing composer-genius, received by the audience member as a packaged product to decode. In a soundscape composition, a breakdown in this perceived hierarchy begins when the composer records real-world sounds outside of the studio, where he or she no longer has total control over the shaping of every sound he captures. Here, chance, indeterminacy, and surprise take over. As Brian Ferneyhough remarks, "In attempting to arrive at a particular envisaged goal, the artist frequently succeeds in arriving somewhere else."[147] This is particularly true for field-recording soundscape composers. Jana Winderen describes how in her own recording experience, "I always get surprises, finding sounds by creatures and environments I did not expect."[148] A soundscape composer must be willing to give up

---

[145] McCartney, Andra. "Soundwalking: creating moving environmental sound narratives." *Soundwalking interactions* 27 (2010).

[146] Pacquette, Ibid.

[147] Ferneyhough, Brian. "Shaping Sound." In *Sound*. Kruth, Patricia, and Stobart, Henry, eds. Darwin College Lectures, Cambridge University Press, 2000. Print.

[148] Fischer, Tobias. "Interview with Jana Winderen." Tokafi.com, Web. http://www.tokafi.com/15questions/interview-jana-winderen/. (Accessed 10 July 2016).

previously envisioned goals and accept what sounds the environment gives them. In this sense, they become part audience-member. This dissolution of compositional intentionality, reminiscent of Cage, effectively emphasizes process over product.[149]

For a soundscape composer, this recording *process* is not merely a tool to capture a composition, it itself becomes the "creative and exploratory" activity that defines the work. Within the recorded sounds, there is always more that exists unheard, even for the composer themselves. In regard to *The Place*, for example, John Luther Adams has remarked how "the sound world of *The Place* has exerted a lasting influence on the way I hear …my ears have become more finely attuned to the breath of the world around me."[150] For the composer, the act of listening becomes even more important than the act of creating. Derrick suggests that this increased listening prompts "a shift towards direct engagement with spatial, temporal, acoustic, geographic, social and narrational aspects of the location."[151] In other words, the soundscape to the composer or recording artist becomes less about the individual sounds making up the landscape and more about a holistic perspective that explores how sounds relate to the organisms and phenomena that surround it, how the sound is an expression of place. As this place is met with and filtered through the artist's compositional techniques, the broader soundscape becomes a meeting of inner and outer worlds, a dialectic between the abstract and referential to be discussed in greater detail later in this essay. By letting the inner vision meet outer observation, a composer can reach, as Ferneyhough describes, "a place whose qualities he had not been able to imagine before undertaking his journey his journey, whose qualities, in a certain sense, might be said not to have existed at all."[152]

---

[149] Kim-Cohen, Seth. *In the Blink of an Ear: Toward a Non-Cochlear Sonic Art*. London: Continuum, 2009. Print.

[150] Adams, John Luther. *The place where you go to listen: In search of an ecology of music*. Wesleyan University Press, 2010.

[151] Derrick, Reuben George. "Acoustic illuminations: recorded space as soundscape composition." Doctoral Thesis, 2014.

[152] Ferneyhough, Brian. "Shaping Sound." In *Sound*. Kruth, Patricia, and Stobart, Henry, eds. Darwin College Lectures, Cambridge University Press, 2000. Print.

The breakdown of roles in soundscape composition continues at the place of the performer. Most soundscape compositions, in fact, don't require performers at all. Field recording, electroacoustic composition, and sonification replace human performers with technological ones. This seems contradictive given soundscape composition's message of reintegration of human with environment, and eerily suggestive of Varèse's prediction of a future of the mechanization of music, where "the performer, the virtuoso, ought no longer to exist: he would be better replaced by a machine, and he will be."[153] But as we've seen, the role of technology in these situations isn't necessarily to put up a barrier between "human" and "nature" – rather, technology is a tool that allows a listener to extend their senses. In a way, the composer indeed gains what Varèse describes as a new flexibility and ability to "find new intensities" within the realm of sound.[154] Technology can allow a listener to hear previously unheard sounds and therefore develop an even deeper connection with the soundscape.

The emphasis of soundscape composition on listening allows the listener to take on a role that is equally important to the composer. Again, as an early proponent of shifting the central role of understanding music to the listener, echoes from Cage resonate here. Cage's definition of music as "sounds heard" implies that music depends on listening and the unique perspective that the listener brings to a piece – whether that listener be the composer themselves or an audience member.[155] John Luther Adams has expressed influence from this idea. In Adam's own words, "the center of music is no longer the omniscient composer. It's the listener. And the composer is free to be a listener too. The broader implications of this musical worldview are ecological. Cage taught us that music is Nature and Nature is music."[156] As pieces like Norman's *Window*, Polli's *Sound-Seeker*, and Pijanowski's *Record the Earth* show, by requiring active participation from the listener, the listener assumes a greater responsibility in shaping the meaning and

---

[153] Jackson, Myles. "From Scientific Instruments to Musical Instruments: The Tuning Fork, the Metronome, and the Siren." In *The Oxford handbook of sound studies*. Pinch, Trevor, and Karin Bijsterveld, eds. Oxford University Press, 2011.
[154] Jackson, Ibid.
[155] Adams, John Luther. *The place where you go to listen: In search of an ecology of music*. Wesleyan University Press, 2010.
[156] Adams, Ibid.

message of the piece. In her essay "Real World Music as Composed Listening," Norman describes real-world music as emerging from an explicitly "listening-centered" aesthetic. In this manner, soundscape composition entails what Norman describes as a process of "re-discovery," in which a listener must piece together the recorded materials a composer uses in order to make sense of the meaning behind the work.[157]

While a soundscape composer may desire to guide their audience towards a sense of connection to the environment or soundscape they present through their work, the type of connection that results will be unique according to the audience member's individual memories, associations, and experiences. Hildegard Westerkamp has noted that this can result in a struggle to reconcile the experiences of the composer with the experiences of the audience member. Returning to the theme of foreign and familiar, the composer's desire to instill meaning in the sounds they use is complicated further by the fact that the sound sources might have originated in a place, situation, or culture that is foreign to the audience. The composer themselves may have developed a close relationship to the sounds during the field recording process, but an audience member may only be able to recognize certain sounds through mediated ways, background knowledge provided by books and media "several steps removed from the original physical place and experienced time."[158] In other words, they cannot truly connect to the soundscape presented because they never experienced the sounds firsthand themselves. Westerkamp proposes that herein lies the challenge of the soundscape composer, the fact that in the face of "corporate globalization," they must "to bridge the gap between audience and the compositional language that originates in foreign places and transmit that which assists us to be open to foreign cultures, to hear and understand each other."[159] More than ever before, music becomes a communicational process, an open dialogue between composer

---

[157] Norman, Katherine. "Real-World Music as Composed Listening." *Contemporary Music Review*, Vol. 15, Part 1 (1996).

[158] Westerkamp, Hildegard. "Linking soundscape composition and acoustic ecology." *Organised Sound* 7, no. 01 (2002): 51-56.

[159] Westerkamp, Hildegard. "Linking soundscape composition and acoustic ecology." *Organised Sound* 7, no. 01 (2002): 51-56.

and audience, and audience and composer. For Westerkamp, it is the link between the composer and audience that generates energy for change.[160]

So how can a soundscape composer foster a communication line with their audience? Firstly, a composer can treat their work as more than a one-way line of communication. John Luther Adams, for example, finds joy in discovering his piece anew through the lens of the audience's perspective – "One of a composer's fondest aspirations is that someone else will make the music theirs, giving the music a life of its own."[161] Another factor that shapes the communicative quality of soundscape compositions is in that soundscape composers are interested not only in the sounds themselves, but in how we respond to them. The piece becomes less about the content of the piece itself and more about the experience of it. This attitude could be in part inherited from the philosophies from sound art. Michael J. Schumacher, a sound art gallery proprietor, has described that for him, "…sound is experience, so there's no point in trying to make it into an object as a collector's piece, so I'm trying to create situations where people come to it as experience, and value that."[162] In a similar vein, Adams describes the primary intention of *The Place* as "…not to convey information. It is to provoke experience."[163]

In a way, this sense of experientiality circles back to the indeterminate role of the soundscape composer. When an audience member encounters a given sound in a composition, we make sense of a sound based on both our "experiential network" (memories, previous knowledge) – and the way we think the composer wants us to hear it as part of the composition.[164] When a listener knows that the piece has an author, they assume that each and every sound has a reason for being what it is and where it is in the piece – they have trust in the composer's intentions. But with pieces that incorporate field

---

[160] Westerkamp, Ibid.

[161] Adams, John Luther. *The place where you go to listen: In search of an ecology of music*. Wesleyan University Press, 2010.

[162] Licht, A. *Sound art, beyond music, between categories*. New York, NY: Rizzoli International Publications, Inc., 2007.

[163] Adams, Ibid.

[164] Parmar, Robin. "The garden of adumbrations: reimagining environmental composition." *Organised Sound* 17, no. 03 (2012): 202-210.

recordings or sonifications of environmental data, the listener becomes aware that the composer themselves isn't making all of the decisions. With this type of indeterminacy, unexpected sounds and surprises causes the listener's attention to switch from "content to container." Parmar describes the resulting listening experience as a tension between "self-intended" and "composer-intended" listening, with the piece becoming at once "a subjective experience interpreted compositionally," or as "a direct representation of objective reality."[165] As a result, inner and outer worlds meet. It is at these crossroads where the connection with the soundscape begins, but such a place cannot be arrived at until the traditional roles of composer and audience member become blurred.

Harnessing the Imagination: Between the Real and Abstract

As Parmar implies, the meeting of the soundscape composer's personal vision with the recorded material puts the soundscape composition at a juncture, between the imaginary and real. The first element of this "meeting," the composer's personal experience, yields to Hildegard Westerkamp's remark that a soundscape composition is inherently colored by the unique choices a composer makes. These choices will vary with the composer's "cultural, social and political background and experiences, by age and gender, musical taste, past experiences with various soundscapes, as well as the present life situation."[166] Another aspect of the composer's experience that is worth noting is the extended knowledge a composer has with the soundscape if they were present for the recording itself. Factors such as "the smells, the air, the temperature, the time of day, the atmosphere, the feel of a place, the season, the social situation and significantly, the changes that occur when a microphone enters a space" all have the potential to shape decisions made during the compositional process.[167]

---

[165] Parmar, Robin. "The garden of adumbrations: reimagining environmental composition." *Organised Sound* 17, no. 03 (2012): 202-210.
[166] Westerkamp, Hildegard. "Linking soundscape composition and acoustic ecology." *Organised Sound* 7, no. 01 (2002): 51-56.
[167] Westerkamp, Ibid.

But with the onset of the second element of the "meeting," the recorded material, intent becomes more malleable, now subjected to the influence of the sounds produced by the environment. As Westerkamp observes, "the materials speak with their own language, which emerge only with repeated listening and sound processing."[168] A soundscape can shift intent because there is always more to discover. New sounds and phenomena can emerge and surprise after recording has already taken place. To what extent does this remove the voice and personality of the composer from the composition? Kyle Gann notes, for example, that one of the few qualities of John Luther Adams's music that could fall to negative criticism is its "impersonal" quality. This quality deserves not to be seen as cold and unwelcoming, but rather as evidence that Adams, in the words of Gann, "trusts the material and considers sound itself more interesting than his own idiosyncrasies of character."[169] Thus, this "impersonal" quality could be considered as a point of entry for a listener that entirely self-centered music can't. Adams affirms this notion in his concern to move his music "beyond expression." It is his desire to "move beyond self-expression and the limit of my own imagination to a deeper awareness of sound itself."[170] While there is certainly nothing wrong with this activity of self-expression in itself, Adams believes that it is his responsibility as a composer to create art that draws awareness towards "the larger fabric of life – the life of the individual, the life of the community, the life of the land and the life of the animals and spirits that inhibit this place."[171] This mindset aligns quite well with one of the core aims of soundscape composition as a genre – to leave listeners more aware of the environment around them and how they relate to it.

The "meeting" allows the to relate our personal expression to the expression of the larger world. In so doing, The "meeting" pushes the listener out from the illusion of isolation and brings them face-to-face with the responsibility they have towards taking care of the soundscapes we find ourselves situated in. For Adams, art "grounded exclusively in self-expression" also encourages the false notion that humans "somehow stand above and

---

[168] Westerkamp, Ibid.
[169] Adams, John Luther. *Winter music: composing the North*. Wesleyan University Press, 2004.
[170] Adams, Ibid.
[171] Adams, Ibid.

beyond the rest of life." He goes on to imply that the alienation this stance imposes has contributed to human-caused "overpopulation, overconsumption, pollution, deforestation and widespread extinction are both symptoms and results of this alienation," and ultimately, climate change. The soundscape composer, through reconciling their own experience with a broader awareness, initiates a worldview shift from egocentrism to ecocentrism.[172] As Adams has described in his journey of creating *The Place*, "it's like taking a journey. I can decide more or less where I want to go. I can make preparations for the journey. But exactly how things unfold is beyond my control."[173] By recording whatever is encountered or opening up all possible sounds to the flow of natural events, a piece like *The Place* becomes open to chance, surprise, and stochastic processes - what Parmar calls "accidents of listening."[174] This openness, of course, is in stark contrast to the months of tweaking that went on behind the making of *The Place*. Timbres, tuning systems, balance, the lighting display, and other elements were adjusted with care. In describing that *The Place* Alex Ross notes this same paradox between indeterminacy and control. On one hand Ross notes, *The Place* "lacks a will of its own; it is at the mercy of its data streams, the humors of the earth. On the other hand, it is a deeply personal work." He calls this observation a "probably irresolvable philosophical contradiction."[175] But that's part of the beauty of the "meeting" – it adds an element of complexity to a work. Soundscapes do not offer instant gratification for a listener. They leave with more questions than answers – but in a way, that's what good art is supposed to do. In a sense, meaning has not been determined. That is up for the listener to decide.

The freedom a listener gains from being shifted into a position of active participation allows the listener to explore and find significance in the soundscape on their own terms. While a composer may have a certain idea in mind (e.g. Adams and ecocentricism), it ultimately remains the listener's task to reconnect through their own imagination the sounds the composer has fragmented, reduced, and transducted from the soundscape.

---

[172] Adams, Ibid.
[173] Adams, John Luther. *The place where you go to listen: In search of an ecology of music*. Wesleyan University Press, 2010.
[174] Parmar, Robin. "The garden of adumbrations: reimagining environmental composition." *Organised Sound* 17, no. 03 (2012): 202-210.
[175] Adams, Ibid.

Norman compares the experience to poetry. "Poetry takes words out of their usual context and seeks to defeat the power of language, the rational 'conditioning of forms' that gives words their 'normal' sense. In this imaginative space, standard expectations are shaken. Real-world music, similarly, takes real events out of their usual context, defeating our rational balance of recognition."3 Kim-Cohen argues that recorded sounds possess an even greater ability to decontextualize compared to poetry because in order for words to reach us they must ultimately pass through "the bottleneck of the signifier," compressed and reduced in the process. The recorded sound, on the other hand, deliver 'acoustic events as such," unhampered by symbolic language and free to be transformed by the composer in ways that remove all previous associations and meanings.5 Regardless, when we have surpassed the syntactical limitations of the written word, or in this case, our normal association of a particular sound to a particular event, we are left with "the free play of our creative imagination."3 This gives the listener an important degree of agency.

In this freedom, a listener listens simply for the sake of listening, and in so doing allows oneself to, as Hildegard Westerkamp has described for her own works, "'invent new codes, invent the message at the same time as the language. [It is] playing for one's own pleasure." Westerkamp describes this playful approach as listening to one's own inner world, which she ties to our notion of fantasy by comparing the activity to "giving children the time and space to develop their 'inner life,' by allowing them to daydream and fantasize."[176] In this inner world, in this imagined space, Westerkamp describes that "imagined content produces metaphors for complex behaviour that would otherwise be interpreted as chaotic and meaningless."[177] By giving them space to dream, the soundscape composer allows the listener to discover their own meaning and order out of the soundscape they hear, as Norman describes: "While not being realistic, real-world music leaves a door ajar on the reality in which we are situated. I contend that real-world

---

[176] Kolber, David. "Hildegard Westerkamp's Kits Beach Soundwalk: shifting perspectives in real world music." *Organised Sound* 7, no. 01 (2002): 41-43.

[177] Westerkamp, Hildegard. "Listening and soundmaking: A study of music-as-environment." PhD diss., Simon Fraser University, 1988.

music is not concerned with realism and cannot be concerned with realism because it seeks, instead, to initiate a journey which takes us away from our preconceptions, so that we might arrive at a perhaps expanded appreciation of reality."[178] In the realm of soundscape composition and other works that incorporate real-world sounds, the imaginary and real do not occupy distinct spheres. Rather, the imaginary becomes immanent in the real, and the journey from the real to the imaginary and back again is a continuous path, a journey taken by the listener.[179]

Open Mind: The Interdisciplinary and Multimodal

Another mechanism by which technology supports the ecological message of soundscape composition is through engaging with the interdisciplinary and the multimodal – a shifting of perspective not through time and space but through perceived categories between forms of knowledge and the senses. As previously mentioned, soundscape composition draws awareness towards the fact that the current environmental crisis is not solely a visual affair. To trace back to the origins of this visual bias, however, we must first turn to the realm of science. In *The Oxford Handbook of Sound Studies*, Pinch and Bijsterveldt remark that of all areas of study, science in particular exercises a dominance of sight over other senses in the acquisition of knowledge. Today, the communication of knowledge about data seems to almost require the use of images, graphs, and diagrams. These types of visual inscriptions are valuable because, according sociologist of science Bruno Latour, data becomes immutable and mobile, facilitating communication of knowledge.[180] Some historians argue, however, that before these visual inscriptions are sent into the world for public consumption, experimental skills in the laboratory still involved experimental skills that heavily relied on non-visual tacit knowledge. Daston and Galison reason that by the Industrial Revolution, such tacit knowledge was replaced by a rise of what they call "mechanical objectivity," a framework that dismissed the

[178] Norman, Katherine. "Real-World Music as Composed Listening." *Contemporary Music Review*, Vol. 15, Part 1 (1996).

[179] Norman, Ibid.
[180] Pinch, Trevor, and Karin Bijsterveld, "New Keys to the World of Sound." In The Oxford handbook of sound studies. Pinch, Trevor, and Karin Bijsterveld, eds. Oxford University Press, 2011.

"human mind and body as trustworthy witnesses of natural phenomena in favor of the registration of such phenomena by machines."[181] As a result, science in general still considers listening as a less objective and legitimate way of knowing. How has soundscape ecology handled science's bias towards the visual, as a discipline that also primarily relies on sound as a source of knowledge? Rather than outright rejecting the visual, soundscape ecologists have used it to aid their understanding of the audible. For example, the spectrograph, visually plotting sound frequency against time, is the primary tool used by ecologists to analyze and compare different biophonies and soundscapes.[182]

Like soundscape ecologists, legitimizing sound as a source of knowing has not implied for soundscape composers an exclusion of the visual. Many of the soundscape compositions previously addressed in this essay incorporate multiple mediums across the senses. Adams's *The Place* includes an array of light panels that change color based on the time of day. Müller's *Bat* was originally shown alongside painted oscillograms at an art gallery. McCarney's *Soundwalking Interactions* has involved collaboration with dancers. Brush's *Terrain Instruments* are as much sculptures integrated with the landscape as they are sound pieces.

For soundscape composers, the difference between sight and sound indicates a difference in how we perceive and interpret our relationship to the world around us. They recognize the subjectivity attributed to listening in culture-at-large, but embrace this subjectivity as a means of acquiring a different kind of knowledge. Sound artist David Dunn explains that vision essentially discriminates between things. Our eyes focus on edges and boundaries in an attempt to define and separate.[183] As a result, vision encourages hierarchical perception of the environment. From foreground to background, our

---

[181] Dunn, David. "Nature, Sound Art, and the Sacred." In *The book of music and nature: an anthology of sounds, words, thoughts*. Rothenberg, David, and Marta Ulvaeus, eds. Wesleyan University Press, 2013. Print.

[182] Slater, Peter. "Sounds Natural: The Song of Birds." In *Sound*. Kruth, Patricia, and Stobart, Henry, eds. Darwin College Lectures, Cambridge University Press, 2000. Print.

[183] Dunn, David. "Nature, Sound Art, and the Sacred." In *The book of music and nature: an anthology of sounds, words, thoughts*. Rothenberg, David, and Marta Ulvaeus, eds. Wesleyan University Press, 2013. Print.

soundscape's emphasis on the holistic echos – and in some cases reacts against – existing twentieth century trends in the art and science worlds.

As previously discussed, the word "ecology" itself is holistic, relating to the "eco-" prefix (*oikos,* "household") as the web of relationships of all living organisms within the context of their physical environments. However, the exact implications of word ecology, like "nature" and "music," has changed and evolved over time. Early textbooks define ecology as "the study of the interactions that determine the distribution and abundance of organisms"[186] Later, the definition expands from a focus solely on the organisms to a larger system that includes the abiotic components they interact with, such as "the study of relationships between organisms and the environment,"[187] and the "living and non-living parts, together with (their) total environment, interacting to form a stable system."[188] This might be further extended to a definition that acknowledges recent emphases on how these interactions are nonlinear and vary over space and time, i.e., "The study of the interactions of organisms with one another and the physical and chemical environment on a range of temporal and spatial scales and how those feedback to influence the system." These increasingly holistic definitions illustrate how ecologists recognize that scientific insight can be gained from all levels of biological hierarchy and organization. And indeed, ecology has branched into sub disciplines that study patterns and processes at the organismal, population, community, ecosystem, landscape, and global levels.

The development of soundscape ecology as a discipline could similarly be seen as a transition of the study of natural sound from a reductionistic to a holistic perspective. As discussed at the beginning of chapter two, recording birdsong for the study of bird behavior was originally a reductionistic process of extracting the sound out of the context

[186] Krebs, CJ. *Ecology: The Experimental Analysis of Distribution and Abundance*. New York, NY: Harper and Row, 1972.

[187] Molles, M. *Ecology: Concepts and Applications.* Dubuque, IA: McGraw-Hill, 1999.
[188] Yeang, K. *Ecodesign: A Manual for Ecological Design. Great* Britain: Wiley-Academy, 2006.

of the natural environment for study in isolation. Soundscape ecology, however, asks different questions. In what ways do species rely or infer information from the sounds produced by other species? How does the introduction of anthropogenic noise pollution or the sounds of a new invasive species affect interactions? These types of questions are answered by indices of measurement that demand knowledge of the entire soundscape. One such type of measurement is the Acoustic Complexity Index (ACI), first developed by Pieretti et al. 2011. The ACI processes sound files by interpolating the spatial distribution of a soundscape, gathering information from multiple recording stations set up across the study site. As it analyzes sounds along the frequency components of a spectrogram, it calculates "the amount of informa- tion produced by the acoustic activity of animals by measuring the relative differ- ence between two consecutive intensity values along a selected frequency band."[189] It also has the potential of filtering out non-biological, continuous sounds depending on the scope of the study. Farina et al. note that the strength of the ACI lies in its ability for "rapid analysis of a large amount of sound data at different frequency and temporal scales" – the opposite of distilling down a recording to a single bird's voice at one moment in time.[190] Instead, the ACI captures the "complex, eavesdropping network" of sounds making up the soundscape that Pieretti at al. refer to as the soundtope.[191]

In music, efforts to achieve "holism" in music are certainly not limited to the realm of soundscape composition. In the words of music journalist René van Peer, "Too often, pieces built from found materials fail to become an integrated whole, remaining only assorted components instead. Recognizable elements bundled together rarely give birth to new pieces."[192] Meanwhile, musicologists eagerly hail achievements of thematic and formal unity in works from Sibelius to Beethoven. Hildegard Westerkamp, however, believes that soundscape composers and other sound artists have a special challenge in

[189] Pieretti, Nadia, Almo Farina, and Davide Morri. "A new methodology to infer the singing activity of an avian community: the Acoustic Complexity Index (ACI)." *Ecological Indicators* 11, no. 3 (2011): 868-873.
[190] Pieretti, Ibid.
[191] Farina, Almo, Nadia Pieretti, and Rachele Malavasi. "Patterns and dynamics of (bird) soundscapes: A biosemiotic interpretation." *Semiotica* 2014, no. 198 (2014).

[192] Westerkamp, Hildegard. "Linking soundscape composition and acoustic ecology." *Organised Sound* 7, no. 01 (2002): 51-56.

creating works that appear as an "integrated whole." A soundscape composer must create out of found sound materials "a piece with its own integrity," "yet still sonically connected to the place and time of the original recordings and the composer's own experiences."[193]

Unlike standard composition, a soundscape composer does not have at his disposal individual notes and rhythms or the isolated sound objects as in the case of *musique concrète*. Rather, they must work sounds in the context of the entire soundscape. For this to happen, Westerkamp asserts that the composer must first intimately get to know the "soundscape itself, its rhythms and shapes, its atmosphere."[194] Duhautpas calls Westercamp's holistic approach to composition an "ecology of sound," and poses it in direct contrast to the traditional way Western music has functioned: "For a long time, music has focused on the production of autonomous objects, erasing the listener's relationship to the world in favour of a deep interiority."[195] Duhautpas, however, takes his analysis a step further by seeing this kind of music production as a cultural industry striving to achieve an autonomy where the piece becomes its own self-contained world – everything in the piece refers back to the piece itself and it serves its own interests (whether those interests lie in the composer's personal self-expression or in reference to a specific religious or social agenda).[196] While Duhautpas's logic here may be a bit over-generalized, it points to Mahler's well-known turn of the phrase – "A symphony must be like the world. It must contain everything."[197] According to Duhautpas, Westerkamp's approach achieves soundscape composition's goal of changing the listener's relationship with the environment. By preserving the complexity of the soundscape within the finished composition, the listener is brought into a position of active participation. They must "reconstruct the links, the connections, the bonds; instead of being reified objects,

---

[193] Westerkamp, Ibid.

[194] Westerkamp, Ibid.

[195] Duhautpas, Frédérick, and Solomos, Makis Solomos. "Hildegard Westerkamp and the Ecology of Sound as Experience: Notes on Beneath the Forest Floor." *Soundscape, The Journal of Acoustic Ecology*, vol. 13 no. 1 (2014).

[196] Duhautpas, Ibid.

[197] "A Debut Symphony That Embraced the World." *Deceptive Cadence*, NPR Classical. Web. http://www.npr.org/sections/deceptivecadence/2014/04/08/300616048/a-debut-symphony-that-embraced-the-world

sounds invite us into an act of listening."[198] This reconstruction of parts back into a holistic whole speaks to Katherine Norman's notion of montage and re-discovery in real-world music. As we've seen in her pieces like *Window*, for Norman, a soundscape composition is like a montage, "a purposeful 'kit designed to be assembled' from apparently incongruous elements." As an active listener "we resynthesize our fractured listening processes" to " 'rediscover' the relationships between them."[199]

Sound artist Francisco López also suggests the holistic through his assertion that environmental music is valuable because it allows the listener to realize that soundscapes are composed of more points of interest than a few emblematic biophonies. López notes that while composers have long been inspired by nature, sonic imagery does not commonly extend beyond a few familiar tropes, such as birdsong and the gentle flowing of a pastoral stream. Soundscape compositions can lift us from these trips and also from our habitual focus on animal sounds in the soundscape.[200] Composer John Luther Adams further posits that this type of holistic approach is necessary not only a reflection of the specific goals of in music, but a nod towards this new direction in which science as a whole is heading: "We live in a time of great exploration and discovery. But unlike those of previous eras, the important explorations of our time are not new places. The most important discoveries are not new phenomena. The great learning of our time is of the endlessly complex and subtle interrelationships between places and organisms, between everything in nature from the subatomic to the cosmic."[201] In this way, practitioners of soundscape composition promote the same imaginative mindset and deeper appreciation for the complexity of the environment that soundscape ecology encourages by shifting focus from individual call to broader relationships and patterns of sounds. Yes, there is

---

[198] Duhautpas, Frédérick, and Solomos, Makis Solomos. "Hildegard Westerkamp and the Ecology of Sound as Experience: Notes on Beneath the Forest Floor." *Soundscape, The Journal of Acoustic Ecology*, vol. 13 no. 1 (2014).
[199] Norman, Katherine. "Real-World Music as Composed Listening." *Contemporary Music Review*, Vol. 15, Part 1 (1996).

[200] López, Francisco. "Profound listening and environmental sound matter." In *Audio culture: readings of modern music*. New York (NY): Continuum International Publishing Group (2004): 82-87.
[201] Adams, John Luther. *Winter music: composing the North*. Wesleyan University Press, 2004.

music in the birdsong, but also meters in the tides, percussion in the rainstorms, rhythm and synchronization in the sonic interactions of all living creatures.

The Search For Definition: Beyond Categorization

Another way soundscape composition embodies the term "holism" is through its rejection of clear categories. While the term "soundscape composition" has been used by individual artists such as Westerkamp and Polli to describe their own works, it has yet to gain a formal definition. Categories and definitions serve a useful purpose for music, to a certain extent. Distinctions ensure that fans and critics can speak in a common language about the art world, and genres are the primary tool used by the music industry to locate their audiences. However, categorization can become limiting when it is used by subcultures to define one type of aesthetics as inherently better than another or to create boundaries that reject the legitimacy of a type of music.[202] Musical genres have a lot more in common than people think. Music scholars like McClary notes that labels are not absolute, with "many genres that are seen as having nothing in common actually come from the same family tree."[203] McClary goes further to point out that most twentieth century music, regardless of genre, shares the same basic attributes of repetition and rhythm and that "the structures of repetition that characterize so much of our music testify to the complex, unpredictable history of our century. . . It owes its emergence to countless moments of creativity, accidents of reception, strange correspondences between distant sensibilities, contributions from long-ignored minorities, and much more."[204]

With McClary's insights in mind, should soundscape composition be formally defined at all? Westerkamp tackles this question in her essay "Linking soundscape composition and acoustic ecology." While Westerkamp acknowledges that boundaries can produce clarity,

---

[202] Faulhaber, Edwin F. "Communicator Between Worlds: Björk Reaches Beyond the Binaries." Doctoral Thesis, Bowling Green State University, 2008.

[203] McClary, Susan. "Rap, Minimalism, and Structures of Time in Late Twentieth-Century Culture." In *Audio Culture: Readings in Modern Music*. Christoph Cox and Daniel Warner, eds. New York: Continuum International Publishing Group, 2004.
[204] McCLary, Ibid.

she suggests that it might be better to keep soundscape composition as a developing art in "its infant state of total openness and full of potential." She goes on to warn that labeling a piece as a soundscape composition "just because it uses environmental sounds as its source material" marks it merely as a subgenre of *musique concréte*.[205] Such an assignment has the danger of ignoring the complex origin of soundscape composition as a confluence of experimental music, sound art, acoustic ecology. Journalist Evelyn McDonnell writes that it is tempting to think for music writers to "think this [genrefication] will help people understand the mysterious appeal of music. We're often right. But sometimes we forget that people want to appreciate, not destroy, the mystery. Sometimes we replace description with conscription, variations with labels, people with stereotypes."[206] There is value to be gained in the mysterious and unknown.

The uneasiness that Westerkamp has expressed towards developing soundscape composition as a musical genre parallels sonification's struggle to be recognized as a legitimate scientific discipline. Sterne notes that because "the field [of sonfication] has no obvious epistemic center yet, and overall unclear impact on the arts and sciences," we cannot restrict the boundaries to soon, and should keep the definition flexible to accommodate future developments, whatever their respective involvement in the arts or sciences might be. But at the same time, a lack of a common vocabulary, "generalizable knowledge, guidelines, or best-practice models" makes it hard for sonification practitioners to form a common front as the community expands.[207] One answer to this problem? Embrace collaboration. Supper notes that ICAD conferences have already been implementing a certain strategic openness by inviting composers or types of people who might not otherwise come in order to attract a 'critical mass' of

---

[205] Westerkamp, Hildegard. "Linking soundscape composition and acoustic ecology." *Organised Sound* 7, no. 01 (2002): 51-56.
[206] Faulhaber, Edwin F. "Communicator Between Worlds: Björk Reaches Beyond the Binaries." Doctoral Thesis, Bowling Green State University, 2008.

[207] Sterne, Jonathan. and Akiyama, Mitchell. "The Recording That Never Wanted to be Heard and Other Stories of Sonification." In *The Oxford handbook of sound studies.* Pinch, Trevor, and Karin Bijsterveld, eds. Oxford University Press, 2011.

people interested in sonification.[208] And as we've seen above, interdisciplinary and multimodal approaches are core to many soundscape compositions.

Researchers in soundscape ecology, too, emphasize connections to other scientific fields. As Krause insists in his work *Voices of the Wild*; "soundscape ecology is no less crucial than spatial or landscape ecology for our understanding of ecosystem function. Animal communication turns out to be as significant a factor in defining material or acoustic real estate as, say, trophic structure - the feeding and nourishment relationships of all organisms in a specific environment."[209] And indeed, an increasing number of studies in the past decade have been confirming Krause's notion. In a similar way, Westerkamp notes that through a common emphasis on conscious listening and conscious awareness, soundscape compositions share a responsibility to " convince other ecologists that the pollution of our soundscape is as much of an environmental issue as the pollution of water and air-that indeed, it is the 'voice' which makes the world's environmental problems audible to all those who care to listen."[210]

Is soundscape composition effectively making such an impact? David Dunn has his doubts, pointing out that "The general public is rarely aware of the activities of radical artists working at the limits of technology and only becomes exposed to their ideas through a distribution network that is generally far removed from the artists and their motivations."[211] However, soundscape compositions appear to strive for the opposite, making their works increasingly available to the general public by leaving the concert hall. Consider museum gallery pieces like *The Place*, internet experiences like Norman's *Window* and Polli's *Heat and the Heartbeat of the City*. Other soundscape works

---

[208] Supper, A. "The search for the "killer application": Drawing the boundaries around the sonification of scientific data," in *The Oxford Handbook of Sound Studies*, T. Pinch and K. Bijsterveld, Eds. New York, NY: Oxford University Press, 2012.

[209] Krause, Bernie. *Voices of the Wild: Animal Songs, Human Din, and the Call to Save Natural Soundscapes*. Yale University Press, 2015.

[210] Westerkamp, Hildegard. "Linking soundscape composition and acoustic ecology." *Organised Sound* 7, no. 01 (2002): 51-56.

[211] Dunn, David. "Wilderness as reentrant form: Thoughts on the future of electronic art and nature." *Leonardo* (1988): 377-382.

highlight themes of mobility and displacement, bringing the soundscape to the place of the listener rather than vice versa. In 2015, for example, Winderen organized the project *Dive,* "an ambitious 80-channel setting of underwater sounds and deep blue light in a darkened traffic tunnel through the middle of Manhattan."[212] Leif Brush's *Fjord: Hexagram Wind Monitors* beamed wind sounds from Baffin Island in Canada to DeDeolen Hall in Holland via satellite, and his 1982 *Teleconstructs Spacework I* project, for example, was simultaneously presented in a museum auditorium and on FM radio broadcast throughout the United States.[213] By blurring the boundaries of performance space, soundscape composers have been able to reach out to a wider audience.

Conclusion: Towards a Qualitative Knowing

Soundscape compositions represent an extension of 20th century experimental music that sought to expand audience awareness towards receiving all sounds from our aural environment as potential music. But where soundscape break from composers such as Varèse, Schaeffer, and Cage is their assertion that "the sounds of living things are not just a resource for manipulation." Rather, Dunn describes, "they are evidence of mind in nature an are patterns of communication with which we share a common bond and meaning."[214] Soundscape compositions are not just works that take place in the outdoors or across the Internet but pieces that break dichotomies between music, technology, and nature, exploring concepts of relationships and interactivity.

Frances Dyson argues that we need to change how we respond to ecological and environmental crisis. The "fractured nature" of media and politics today promotes a "process of division, separation, and multiplication" that ultimately contributes to a "highly mediated, controlled, and detached unity through disaster."[215] Soundscape

[212] Winderen, Jana. Jana Winderen website, Web. http://www.janawinderen.com/.

[213] Brush, Leif, and Gloria DeFilipps Brush. "Monitoring Nature's Sounds with Terrain-Based Constructions." *Leonardo* (1984): 4-7.
[214] Dunn, David. "Nature, Sound Art, and the Sacred." In *The book of music and nature: an anthology of sounds, words, thoughts.* Rothenberg, David, and Marta Ulvaeus, eds. Wesleyan University Press, 2013. Print.
[215] Dyson, Frances. *The Tone of Our Times: Sound, Sense, Economy, and Ecology.* Cambridge (MA):

composition offers an alternative type of response. In the 1970s, the artist Joseph Beuys argued for the potential of art to serve as an ongoing "social structure," "a process of thought, speech, discussion, and political and environmental action that embraces many disciplines, opens participation, and frees art from its materiality creating an active space of potential."[216] Soundscape composition is an example of such an ongoing social structure. Rather than protest against the noise of modernity, soundscape composition attempts to incorporate and make sense of it, observing everything with a critical ear and trying to relate to it. Through its unique blend of field recording, sonification, soundwalking, and *in situ* works, soundscape composition repurposes technology to engage qualitative ways of knowing that broaden perspectives, recognize the "unheard," unite the local and global, promote the position of the listener, engage with the imagination and interdisciplinary, and encourage holistic thinking. Central to soundscape composition is a relentless search for a truth, a deeper understanding of reality that, in John Luther Adams's words, "changes us, infusing us with "sense of wonder at the strange beauty, astonishing complexity, and miraculous unity of creation."[217] The listener comes out a different person from when they entered.

WORKS CITED

Adams, John Luther. *The place where you go to listen: In search of an ecology of music*. Wesleyan University Press, 2010.

Adams, John Luther. *Winter music: composing the North*. Wesleyan University Press, 2004.

"A Debut Symphony That Embraced the World." *Deceptive Cadence*, NPR Classical. Web. http://www.npr.org/sections/deceptivecadence/2014/04/08/300616048/a-debut-symphony-that-embraced-the-world

Akbari, Ehsan. "Soundscape Compositions for Art Classrooms." *Art Education* 69, no. 4 (2016): 17-22.

Leonardo, The MIT Press, 2014. Print.

[216] Polli, A. "Soundscape, sonification, and sound activism," AI & Society, vol. 27, pp. 257–68, 2012.

[217] Adams, John Luther. *Winter music: composing the North*. Wesleyan University Press, 2004.

Allen, Aaron, and Kevin Dawe, eds. "Current Directions in Ecomusicology: Music, Nature, Environment." New York: Routledge, 2015.

Allen, Aaron S. "Ecomusicology: Ecocriticism and musicology." *Journal of the American Musicological Society* 64, no. 2 (2011): 391-394.

Brush, Leif, and Gloria DeFilipps Brush. "Monitoring Nature's Sounds with Terrain-Based Constructions." *Leonardo* (1984): 4-7.

Bruynickx, Joeri. "Sound sterile: making scientific field recordings in ornithology." In *The Oxford handbook of sound studies*. Pinch, Trevor, and Karin Bijsterveld, eds. Oxford University Press, 2011.

Bull, Michael. "iPod Culture: The Toxic Pleasures of Audiotopia." In *The Oxford handbook of sound studies*. Pinch, Trevor, and Karin Bijsterveld, eds. Oxford University Press, 2011.

Ciardi, Fabio Cifariello. "Local and Global Connotations in Sonic Composition." *Organised Sound* 13, no. 02 (2008): 123-135.

Derrick, Reuben George. "Acoustic illuminations: recorded space as soundscape composition." Doctoral Thesis, 2014.

Duhautpas, Frédérick, and Solomos, Makis Solomos. "Hildegard Westerkamp and the Ecology of Sound as Experience: Notes on Beneath the Forest Floor." *Soundscape, The Journal of Acoustic Ecology*, vol. 13 no. 1 (2014).

Dumyahn, Sarah L., and Bryan C. Pijanowski. "Soundscape conservation."*Landscape Ecology* 26, no. 9 (2011): 1327-1344.

Dunn, David. "Nature, Sound Art, and the Sacred." In *The book of music and nature: an anthology of sounds, words, thoughts*. Rothenberg, David, and Marta Ulvaeus, eds. Wesleyan University Press, 2013. Print.

Dunn, David. "Wilderness as reentrant form: Thoughts on the future of electronic art and nature." *Leonardo* (1988): 377-382.

Dyson, Frances. *The Tone of Our Times: Sound, Sense, Economy, and Ecology.* Cambridge (MA): Leonardo, The MIT Press, 2014. Print.

Farina, Almo, Nadia Pieretti, and Rachele Malavasi. "Patterns and dynamics of (bird) soundscapes: A biosemiotic interpretation." *Semiotica* 2014, no. 198 (2014).

Farina, Almo, Nadia Pieretti, and Niki Morganti. "Acoustic patterns of an invasive species: the Red-billed Leiothrix (Leiothrix lutea Scopoli 1786) in a Mediterranean shrubland." *Bioacoustics* 22, no. 3 (2013): 175-194.

Faulhaber, Edwin F. "Communicator Between Worlds: Björk Reaches Beyond the Binaries." Doctoral Thesis, Bowling Green State University, 2008.

Feld, Steven. "Sound Worlds." In *Sound*. Kruth, Patricia, and Stobart, Henry, eds. Darwin College Lectures, Cambridge University Press, 2000. Print.

Ferneyhough, Brian. "Shaping Sound." In *Sound*. Kruth, Patricia, and Stobart, Henry, eds. Darwin College Lectures, Cambridge University Press, 2000. Print.

Fischer, Tobias. "Interview with Jana Winderen." Tokafi.com, Web. http://www.tokafi.com/15questions/interview-jana-winderen/. (Accessed 10 July 2016).

Fisher, John Andrew. "The value of natural sounds." *Journal of Aesthetic Education* 33, no. 3 (1999): 26-42.

Fisher, John Andrew. "What the hills are alive with: in defense of the sounds of nature." *The Journal of aesthetics and art criticism* 56, no. 2 (1998): 167-179.

Galloway, Kate. "Ecotopian spaces: Soundscapes of environmental advocacy and awareness." *Social Alternatives* 33, no. 3 (2014): 71.

Grond, Florian, and Thomas Hermann. "Aesthetic strategies in sonification." *AI & society* 27, no. 2 (2012): 213-222.

Guy, Nancy. "Flowing down Taiwan's Tamsui river: towards an ecomusicology of the environmental imagination." Ethnomusicology 53, no. 2 (2009): 218-248.

Helmreich, Stefan. "Underwater music: tuning composition to the sounds of science." In *The Oxford handbook of sound studies*. Pinch, Trevor, and Karin Bijsterveld, eds. Oxford University Press, 2011.

Herzogenrath, Bernd, ed. *The Farthest Place: The Music of John Luther Adams*. UPNE, 2012.

"How Many Species are There?" The Environmental Literacy Council, Web. http://enviroliteracy.org/ecosystems/classifying-species/how-many-species-are-there/

Jackson, Myles. "From Scientific Instruments to Musical Instruments: The Tuning Fork, the Metronome, and the Siren." In *The Oxford handbook of sound studies*. Pinch, Trevor, and Karin Bijsterveld, eds. Oxford University Press, 2011.

Kane, Brian. "L'Objet Sonore Maintenant: Pierre Schaeffer, Sound Objects and the Phenomenological Reduction." *Organised Sound* 12, no. 01 (2007): 15–24.

Katz, Mark. "The Amateur in the Age of Mechanical Music." In *The Oxford handbook of sound studies*. Pinch, Trevor, and Karin Bijsterveld, eds. Oxford University Press, 2011.

Kasten, Eric P., Stuart H. Gage, Jordan Fox, and Wooyeong Joo. "The remote environmental assessment laboratory's acoustic library: An archive for studying soundscape ecology." *Ecological Informatics* 12 (2012): 50-67.

Kim-Cohen, Seth. *In the Blink of an Ear: Toward a Non-Cochlear Sonic Art*. London: Continuum, 2009. Print.

Kolber, David. "Hildegard Westerkamp's Kits Beach Soundwalk: shifting perspectives in real world music." *Organised Sound* 7, no. 01 (2002): 41-43.

Krause, Bernie. *Voices of the Wild: Animal Songs, Human Din, and the Call to Save Natural Soundscapes*. Yale University Press, 2015.

Krause, Bernard L. *Wild soundscapes: discovering the voice of the natural world: a book and CD recording*. Wilderness Press, 2002. Print.

Krebs, CJ. *Ecology: The Experimental Analysis of Distribution and Abundance*. New York, NY: Harper and Row, 1972.

Kruth, Patricia, and Stobart, Henry. *Sound*. Darwin College Lectures, Cambridge University Press, 2000. Print.

Kubisch, Christina. "Biography." Christina Kubisch website, Web. http://www.christinakubisch.de/en/home.

Licht, A. *Sound art, beyond music, between categories*. New York, NY: Rizzoli International Publications, Inc., 2007.

López, Francisco. "Profound listening and environmental sound matter." In *Audio culture: readings of modern music*. Christoph Cox and Daniel Warner, eds.New York: Continuum International Publishing Group, 2004.

López, Francisco. "Schizophonia vs. l'objet sonore: soundscapes and artistic freedom." 1997.

Lysloff, René T.A. and Leslie C. Gay, Jr. *Music and Technoculture*. Middletown, CT: Wesleyan University Press, 2003.

McCartney, Andra. "Soundwalking: creating moving environmental sound narratives." *Soundwalking interactions* 27 (2010).

McClary, Susan. "Rap, Minimalism, and Structures of Time in Late Twentieth-Century Culture." In *Audio Culture: Readings in Modern Music*. Christoph Cox and Daniel Warner, eds. New York: Continuum International Publishing Group, 2004.

Molles, M. *Ecology: Concepts and Applications.* Dubuque, IA: McGraw-Hill, 1999.

Morton, Timothy. *Ecology without nature: Rethinking environmental aesthetics*. Harvard University Press, 2007.

Norman, Katherine. Katherine Norman website. Web. http://www.novamara.com/.

Norman, Katherine. "Real-World Music as Composed Listening." *Contemporary Music Review*, Vol. 15, Part 1 (1996).

Norman, Katherine. "Window - And Undecided Sound Essay." *Journal of Sonic Studies*, volume 4, no. 1 (May 2013). http://journal.sonicstudies.org/vol04/nr01/a03

Paquette, David, and Andra McCartney. "Soundwalking and the Bodily Exploration of Places." *Canadian Journal of Communication* 37, no. 1 (2012): 135.

Parmar, Robin. "The garden of adumbrations: reimagining environmental composition." *Organised Sound* 17, no. 03 (2012): 202-210.

Pieretti, Nadia, Almo Farina, and Davide Morri. "A new methodology to infer the singing activity of an avian community: the Acoustic Complexity Index (ACI)." *Ecological Indicators* 11, no. 3 (2011): 868-873.

Pijanowski, B.C., *Record the Earth*. Global Soundscape Project, Web. 28 Feb 2016. https://www.recordtheearth.org/

Pijanowski, B.C., Villanueva-Rivera, L.J., Dumyahn, S.L., Farina, A., Krause, B.L., Napoletano, B.M., Gage, S.H. and Pieretti, N. Soundscape ecology: the science of sound in the landscape. *BioScience* 61, no. 03 (2011), pp.203-216.

Pinch, Trevor, and Karin Bijsterveld, "New Keys to the World of Sound." In The Oxford handbook of sound studies. Pinch, Trevor, and Karin Bijsterveld, eds. Oxford University Press, 2011.

Polli, Andrea. Andrea Polli website, Web. http://www.andreapolli.com/

Polli, Andrea et al. "Heat and the Heartbeat of the City," web. http://archive.turbulence.org/Works/heat/index2.html

Polli, A. "Soundscape, sonification, and sound activism," AI & Society, vol. 27, pp. 257–68, 2012.

Roddy, Stephen, and Dermot Furlong. "Embodied Aesthetics in Auditory Display." *Organised Sound* 19, no. 01 (2014): 70-77.

Rothenberg, David, and Marta Ulvaeus, eds. *The book of music and nature: an anthology of sounds, words, thoughts*. Wesleyan University Press, 2013.

Schafer, R. Murray. *The soundscape: Our sonic environment and the tuning of the world*. Inner Traditions/Bear & Co, 1993.

Schafer, R. Murray. *The tuning of the world*. Alfred A. Knopf, 1977. Print.

Schoon, Andi, and Dombois, Florin. "Sonification in music." In Proceedings of the 15th International Conference on Auditory Display (ICAD 2009), Bern University of the Arts, May 2009.

Slater, Peter. "Sounds Natural: The Song of Birds." In *Sound*. Kruth, Patricia, and Stobart, Henry, eds. Darwin College Lectures, Cambridge University Press, 2000. Print.

Soper, Kate. *What is Nature?: Culture, politics, and the non-human.* Wiley-Blackwell, 1995.

Sudyka, Diana. "Wolfgang Müller - *Séance Vocibus Avium,"* Tiny Aviary. November 27, 2009, Web. http://thetinyaviary.blogspot.com/2009/11/wolfgang-muller-seance-vocibus-avium.html.

Supper, A. "The search for the "killer application": Drawing the boundaries around the sonification of scientific data," in *The Oxford Handbook of Sound Studies*, T. Pinch and K. Bijsterveld, Eds. New York, NY: Oxford University Press, 2012, ch. 10, pp. 249–70.

Sterne, Jonathan. and Akiyama, Mitchell. "The Recording That Never Wanted to be Heard and Other Stories of Sonification." In The Oxford handbook of sound studies. Pinch, Trevor, and Karin Bijsterveld, eds. Oxford University Press, 2011.

Truax, Barry. *Acoustic communication*. Vol. 1. Greenwood Publishing Group, 2001.

Truax, Barry. "Soundscape, acoustic communication and environmental sound composition." *Contemporary Music Review* 15, no. 1-2 (1996): 49-65.

Truax, Barry. *The world soundscape project's handbook for acoustic ecology*. ARC Publications, Vancouver, BC, 1978.

Truax, Barry. "The World Soundscape Project." Simon Fraser University, http://www.sfu.ca/~truax/wsp.html

Vickers, Paul, and Bennett Hogg. "Sonification Abstraite/Sonification Concr\ete: An'Aesthetic Perspective Space'for Classifying Auditory Displays in the Ars Musica Domain." arXiv preprint arXiv:1311.5426 (2013).

Von Glahn, Denise. *Music and the Skillful Listener: American Women Compose the Natural World*. Indiana University Press, 2013. Print.

Von Glahn, Denise. *The Sounds of Place: Music and the American Cultural Landscape*. Boston: Northeastern University Press, 2003. Print.

Westerkamp, Hildegard. "Kits Beach Soundwalk." Electronic Music Selections (1989). https://www.youtube.com/watch?v=hg96nU6ltLk. Web. (Accessed 2 July 2016).

Westerkamp, Hildegard. "Listening and soundmaking: A study of music-as-environment." PhD diss., Simon Fraser University, 1988.

Westerkamp, Hildegard. "Linking soundscape composition and acoustic ecology." *Organised Sound* 7, no. 01 (2002): 51-56.

Westerkamp, Hildegard. "The soundscape on radio." *Radio Rethink* (1994): 86-94.

Westerkamp, Hildegard. "The World Soundscape Project." The Soundscape Newsletter 01, August 1991. http://wfae.net/library/articles/westerkamp_world.pdf

Westerkamp, Hildegard, Woog, Adam P., Kallmann, Helmut, and Truax, Barry. "World Soundscape Project." *The Canadian Encyclopedia*, http://www.thecanadianencyclopedia.ca/en/article/world-soundscape-project/

Winderen, Jana. Jana Winderen website, Web. http://www.janawinderen.com/.

Winderen, Jana. "The Wanderer." Web, https://janawinderen.bandcamp.com/album/the-wanderer

Winters, R. Michael, and Gil Weinberg. "Sonification of the Tohoku earthquake: Music, popularization & the auditory sublime." In Proceedings of the 21st International Conference on Auditory Display (ICAD 2015).

Yeang, K. *Ecodesign: A Manual for Ecological Design. Great* Britain: Wiley-Academy, 2006.