

The Listenⁿ Project: Acoustic Ecologies of the American Southwest Desert(s) and Transmedia Dissemination

Leah Barclay

leah.barclay@asu.edu

Arizona State University, Tempe, AZ, USA

Sabine Feisst

sabine.feisst@asu.edu

Arizona State University, Tempe, AZ, USA

Daniel Gilfillan

dgilfil@asu.edu

Arizona State University, Tempe, AZ, USA

Garth Paine

garth.paine@asu.edu

Arizona State University, Tempe, AZ, USA

Abstract

The Listenⁿ Project explores remote embodied experiences of natural environments through sound. It focuses on community awareness, and sustainability, studying how rich digital media environments and acoustic ecology practices can be used to broaden discussion about the value of precious, yet fragile environments. It explores how virtual ecological engagement through sound can nurture environmental awareness and community agency. This paper introduces the conceptual grounding for the project and the preliminary outcomes from conducting two field laboratories in the American Southwest deserts. The proposed outcomes include immersive virtual reality experiences of being present in such natural environments without needing to travel and without degrading them by visitation. The prototype integrates a clear accessibility strategy and consists of a dynamic website, immersive sound installations and two mobile phone apps permitting direct community input and embodied remote walking experiences that could bring the acoustic ecologies of the American Southwest deserts to global audiences.

Keywords: acoustic ecology, field recording, ambisonics, immersion, virtual reality

1. Introduction

In our current state of ecological crisis, the Listenⁿ project is designed to explore how virtual immersive environmental engagement through sound can cultivate environmental stewardship and community agency and awareness. Listening is a critical perception that provides rich information about the surrounding environment, yet it is often overlooked in such a visually dominant society. The Listenⁿ project, founded by Dr. Garth Paine in 2013, brings together a diverse team of artists and academics working in the field of sound to explore how emerging digital technology and rich media environments can create embodied experiences of being present in remote natural environments. The project is grounded in the possibilities of ambisonics, specialist practices in surround sound recording to deliver immersive, embodied sonic experiences remotely. Ambisonics is a technique that enables the recording and diffusion of sound sources above and below the listener in addition to the horizontal plane. Ambisonics (Gerzon, 1992) is one solution to dynamic post production changes in auditory scene perspective (Benjamin, et al, 2006), and also provides options for dynamic selection of playback format (Pernaux et al, 1998) that are yet to be fully explored in virtual environments.

The Listenⁿ project will develop a prototype that examines issues relating to disseminating these integrated media streams and exploring new approaches for digital community outreach to engage a wide public audience in contemporary acoustic ecology. The prototype will deliver immersive experiences (via the internet) of being present in highly valued natural environments without needing to travel and without degrading the environments by visitation. The prototype is designed with an explicit accessibility strategy that provides open access to the experience of pristine natural environments across the globe, including for the elderly and people with disabilities who may otherwise not have access.

This prototype focuses specifically on the creation of five core audio-visual assets that will be housed on a dynamic website:

- Database of surround sound recordings that can be streamed over the internet and accessible to a global audience as remote embodied sonic experiences.
- Audio client app that will decode the ambisonic audio stream for Binaural (headphones), Stereo, 5.1/7.1 surround from a single ambisonic stream.
- A series of audio-visual experiences using virtual reality headsets, including the Oculus Rift.

- Mobile app for users to undertake GPS tracked, geo-mapped walks through one of the recorded wilderness environments while commuting or undertaking exercise (jogging, walking, etc.)
- Mobile app and digital platform for global accessibility and community outreach that enables participation in the project through user generated content. The system will integrate a series of new tools that encourage community leadership, such as dynamic tagging systems and heat maps that demonstrate community activity and focus and facilitate real-time engagement with other locations.

These proposed outcomes combine to deliver a prototype that encourages public engagement with the environment and humanities ideas related to the value of sound. This collection of proposed audio-visual assets are the result of conducting field research in the Southwest deserts and experimenting with the most captivating forms of engagement. The prototype will bring attention to these fragile ecosystems, local communities and their stewardship of the environment and also highlight the future possibilities of digital technology and rich media environments in creating immersive experiences that can generate a deeper ecological awareness and engagement globally.

2. American Southwest Deserts

The Listenⁿ project pivots on engagement and outreach programs with a series of identified communities in the USA. These communities were selected during immersive field laboratories involving ambisonic sound recordings conducted in Arizona, New Mexico and California during March and May 2014. These laboratories were supported by seed funding from Arizona State University and resulted in partnerships with five communities in Joshua Tree National Park, Mojave National Preserve, Sequoia and Kings Canyon National Park, Organ Pipe Cactus National Monument and Death Valley National Park that will be integral in developing this project. The community engagement and digital capacity building tools proposed in this project will enable the community in each location to remain actively engaged in the Listenⁿ project, and ultimately be the primary content creators on the digital platform.

The preliminary field laboratories involved researching the most appropriate ways to develop long-term relationships with the communities of the American Southwest Deserts. These forbidding landscapes are renowned for their beauty and wonderment yet paradoxically also feared by many. The Southwest deserts are governed and managed by a diversity of organisations including NPS (National Parks Service) and local associations. There is a wide range of national and international recognitions across the region, including National Monuments and UNESCO Biosphere Reserves. The Listenⁿ team was particularly interested in engaging with the communities of Biosphere Reserves, as there were clear synergies between their community engagement philosophies and the research intentions of our project.

UNESCO Biosphere Reserves are sites managed by passionate communities that are inspired to explore new approaches to the conservation of biological and cultural diversity. They differ from world heritage sites in that they encourage active community participation and are ideal locations to test and demonstrate innovative approaches to sustainability. The Man and Biosphere program was initiated by the United Nations Education, Scientific and Cultural Organisation (UNESCO) in the 1970s as a practical tool to deal with some of the most important challenges of our time: “how can we reconcile conservation of biodiversity and biological resources with their sustainable use” (UNESCO, 1995). To them the concept of Biosphere Reserves serves as an incubator for local sustainable development projects and helps share this information and learning with other Biosphere Reserves. The concept can therefore be considered as a tool for enabling respectful dialogue and knowledge sharing across a diverse set of communities.

The Listenⁿ field laboratories focused specifically on six Biosphere Reserves in Arizona, New Mexico and California representative of the richness and diversity of the southwest desert ecosystem. Capitalising on the Biosphere Reserve status within each location, this stage of the project sought to extend the existing efforts and build the capacity of the community to engage new technologies in understanding the environment. The long-term community engagement strategies will involve extensive consultation with key stakeholders in the region prior to hosting a series of workshops and sound walks. The sound walks will facilitate the process of identifying locations, which will be followed by ambisonic field recording labs directed by the Listenⁿ team. The community outreach programs will also involve installations, performances and capacity building to encourage the local community to take agency in creative outcomes and ongoing acoustic ecology practices.

The ambisonic recordings during each of the Listenⁿ field laboratories produced a rich diversity of sonic material and revealed valuable information about the local communities’ understanding of acoustic ecology. In some locations we were highly impressed with the

research programs and monitoring associated with protecting and improving natural soundscapes. However, in other locations we were shocked by the level of human intervention and industrial noise apparent in the arid deserts. Unfortunately the proposed framework of working directly with the communities of Biosphere Reserves proved difficult, primarily because there was very limited engagement and awareness of the Biosphere Reserve status in each location. The UNESCO branding was often concealed and most locations operated under a different name. While there are speculations as to why this was apparent, it was likely primarily due to national resourcing for the programs and a desire to focus on national recognition, as oppose to international associations with the UN. This dramatically changed our initial approach, but also provided the opportunity to extend our scope beyond the proposed locations and to evaluate the best methods for community engagement based on our experiences during the field laboratories. This resulted in forming partnerships with NPS (National Park Services) to facilitate permissions and research permits and a spectrum of partnerships with local organisations in Joshua Tree National Park, Mojave National Preserve, Sequoia and Kings Canyon National Park, Organ Pipe Cactus National Monument and Death Valley National Park, who are now the primary communities for the Listenⁿ project.

3. Research Questions

The Listenⁿ project engages in crucial humanities-based questions related to the notions of presence and embodiment within the natural landscapes represented by the five National Park and Preserve communities. It investigates how the perceptual mode of sound and its attendant processes of listening and hearing help achieve these moments of presence, and connection to place, when it is not possible or desirable to be physically present in the natural landscape. Drawing on scholarship from across the humanities, Listenⁿ explores relationships between a human-centered experience of the world and the complex adaptive ecosystems we seek to understand, but which continually perplex us, both as individuals and as communities. In asking the series of following questions, the project engages its audiences in critical humanities ideas about their own philosophies of place (how have people thought of place and presence within place over time, what does it mean to “be” somewhere), about

how they distinguish between “sound” and “noise,” and about how their own experiences of sound make them reconsider what place means to them:

- What relationships exist between sound, sustainability, and human connection to environmental understandings of place?
- What constitutes listening? Does the sonic environment allow for a deeper understanding of human experience of place than visual or haptic encounters with such spaces?
- To what extent can human experience be “presenced” through such simulations as immersive audio recordings? In this regard, does the auditory allow immersiveness to be shaped more readily than does the visual?
- What constitutes attention in or through sound (a bird or animal call or a ‘silent’ landscape) and how does such attention through sound provide for an embodied experience for members of a larger public not immediately able to encounter such sites of environmental significance?
- How central is the sonic environment to our communal, social and global health?

At its core Listenn explores this range of research questions to learn more about the role and function of sound for a deeper understanding for how communities of listeners engage their own interconnectedness to place, and to educate our range of audiences about these very interconnections (Cresswell, 2013; Cresswell 2004). In creating a set of independent and interwoven communities oriented toward issues and questions related to sustainability, we seek to imagine an embodiment within naturescapes far from the urban and suburban dwellings common to most of us. Imagination roams, thinking of an idealized wilderness or of possibilities within the wild. In hearing without sight, we are invited to visualize the wilds. The “we” here becomes individual and collective participation in the project of imagining life worlds just beyond our reach.

4. Sound, Agency, and the Intermediality of Place

Sound exists across a networked spectrum of production and reception, and enjoys a life of its own, irrespective of the object or agent involved in the multiplicity of its origination or its

reception. As a perceptive mode that inherently engages an intermedial relationship to the world, sound both conveys and withholds knowledge, adopting and adapting the realms of the vocal, the textual, the spatial, and the affective, to be mediated for reception and parsing aurally, and by extension epistemologically, in the mind of the listener. When we focus on human agents, sound's ability to capture and convey movement, spatiality, and emotion in very distinct ways works synergistically with the human mind's ability to unify within consciousness a number of perceptual inputs, such that a cognitive picture of the world and one's position within it comes to light. (LaBelle, 2006; Searle, 2002).

In his philosophy of mingled bodies, Michel Serres explores human sensory perception as shaped by the contingences of bodily experience. He writes:

Before making sense, language makes noise: you can have the latter without the former, but not the other way around. After noise, and with the passage of time, a sort of rhythm can develop, an almost recurring movement woven through the fabric of chance. The sea gives birth to a tidal flow, and this flow to Venus: a rhythmic current emerges from the disorderly lapping of waves, music surfaces to this place. In turn, this layer of music, universal before the advent of meaning, carries all meaning with it; distilled, differentiated language selects the meaning or meanings it will isolate from this complex, and then broadcast. Whoever speaks is also singing beneath the words spoken, is beating out rhythm beneath the song, is diving into the background noise underneath the rhythm. (Serres 2008, 120)

When we examine his musings on sound and hearing, we are immediately struck by two things: the descriptive way he links aurality and the natural rhythms of the world; and the siting of music as the location where meaning takes shape as a constant outgrowth of these flows and rhythms. Sound, noise, rhythm, music, language, meaning—for Serres, these are medial points that move steadily further away from a phenomenological understanding of the world. At the heart of Serres' ideas about sensation lies a critique about language – a hegemonic notion of language that has become too far removed from the network of relationships that our system of sense perception sets up with the world around us. In his mind, sensate experience is disappearing behind a newly acquired language of logic that is based in data, calculation, and isolation. It is precisely our move away from a conscious understanding of the world as a unified sensate experience, as reflective of our being in some way severed via language from an interwoven network of phenomenological experience that underlines Serres' philosophy. His comments here about sound and the function of language provide reminders about the constant play of uncertainties that lead to meaning-making, that meaning and truth are more about the sensual processes of composition that lead to language than they are about the practices of rationality, fixity, and exactitude that current-

ly impede language. In his explication of how sound filters through noise and the complex rhythms of music to become meaning, Serres lights upon language as the requisite medium for its broadcast, and upon voice as the instrument for the realignment of language, and of human beings, within a larger world of sensation and experience. And it is here with voice and vocality that we might find a response to Serres' misgivings about language, where we would see voice forming the entrance to and vocality the resonance of the interior surfaces of a body connected to an origin prior to language.

In his crucial work on the relationships between the environment and perception, Tim Ingold makes clear that voice forms a core element of how humans engage with and in the realm of the natural, and that human voice serves as our interface, our connection, to an existence where humans reside alongside other entities:

Non-human sounds like thunder or animal calls, the voices of other-than-human persons, and the speech of human beings are alike in that they not only have the power to move those who hear them, but also take their meaning from the contexts in which they are heard. In these respects, no fundamental line of demarcation can be drawn between the sounds of nature and of human speech. (Ingold 2000, 104-105)

The immersive sonic productions, which form the foundation of Listenⁿ, provide a palpable framework within which such a phenomenology of human experience of the world can be experienced, shared, examined, and understood. Yet these acoustic ecological recordings of varying environments also belie the full range of non-human agents (animals, atmospheres/densities, geological formations, landscapes, etc.) that exists as counterparts to, and thus also apart from, any human-centered perceptual understanding of the world. What is at stake in locating a non-human, and at times, non-sentient, origin point for the production of sound is the acknowledgement that a human-based reception of sound can never fully capture the full spectrum of sound production made available within any time-delimited space. Because we cannot truly inhabit the auditory receptors of these other, non-human sound producers, nor place ourselves inside the geological formations or atmospheric conditions that affect acoustics, we can only make theoretical assumptions about the production/transmission/reception of those sounds that comprise the acoustic composition of a soundscape. Being able to arrive at this realization is an important step in opening ourselves up to a wealth of alternative ways to encountering sound in the landscape, and seeing through them new avenues for signification and knowledge production. Whether we conceptualize it or not, and whether we perceive it or not, these environments as remote landscapes produce a wealth of acoustically interwoven sounds, and these sounds function in concert to create an inter-medial composition evocative of their atmospheric, density-driven, and geologically formed spaciousness and human and non-human co-production or sitting as place.

5. Accessibility

Accessibility is a core priority not just in terms of meeting required technical best practice standards, but in actively designing the system to support its creative use for as many different people as possible. The system will reflect and advocate for the proper recognition, respect and the active involvement of indigenous communities, elderly communities and those with disabilities that would not traditionally have visitation access to pristine natural environments.

In the year 2012, an estimated 12.1 percent of non-institutionalized, US citizens reported a disability. The Listenⁿ project values inclusivity and believes it is important to develop tools that can empower collaboration and capacity building from communities that do not traditionally have access to audio technology. The prototyped virtual reality experience is also highly valuable for the selected environmental locations, particularly as sites continue to experience the ramifications of climate change. National Parks Services advocates for promoting and maintaining an environment without human impact, yet they are often faced with contradictions when the sustainability of the park management is based on tourism and visitation. The features and technical aspects of the Listenⁿ project prototype are grounded in accessibility and inclusivity resulting in appealing digital formats that will engage the general public.

6. Transmedia Dissemination

The distinctive layers of Listenⁿ combine in a single interface and each complement the overall vision of the project. This multi-platform approach is essential in our accessibility strategy and community engagement methods. The contemporary practice of a transmedia methodology requires cultural assets that fuse not just audio and visuals but design, interactivity and a host of other disciplines. Contemporary audiences are now consciously creating and viewing the narrative of their own lives across multiple platforms (e.g. via Instagram, Flickr, Facebook, Twitter) and we believe artists and humanities researchers should con-

sciously be aware of this when designing community outreach projects. Listenⁿ combines highly accessible outcomes (such as listening to field recordings) with technologies at the forefront of entertainment (such as the embodied mobile geo-locating walk and Oculus Rift experiences) to enable communities to take agency in this project and contribute to the overall narrative.

The Listenⁿ project pivots on a database of surround sound (ambisonic) recordings that can be streamed over the internet and accessible to a global audience as remote embodied sonic experiences. This database provides the content for the proposed creative outcomes and underpins the development of the prototype. It is built using industry standards for programming and data management that also enable it to connect and share content with other large databases. This connectivity opens up exciting creative opportunities and helps to future proof the system. The database will be accessible through an independent streaming interface within the website, and will also be embedded in separate pages for each location and community. The database will be developed in parallel to an audio client app that will decode the ambisonic audio stream for Binaural (headphones), Stereo, 5.1/7.1 surround from a single ambisonic stream and will form the basis for the embodied sound walks application.

Each geographical location on the website will feature an embedded digital community. The community platform will be developed in collaboration with Feral Arts using PlaceStories, a dynamic software system for digital storytelling, communication and collaborations. PlaceStories provides individuals and groups with powerful, easy to use tools to create, communicate and collaborate. Along with the database, the community platform will be embedded in pages that document each location of the Listenⁿ project. Individuals can set up profiles to publish stories in the form of audio, video, documents, images and postcards. These stories are published to locations that become connected and searchable through the Listenⁿ community. Everything published in the Listenⁿ community will be geolocated in an interactive map that will be updated in real-time as content is published. While the focus of Listenⁿ is firmly grounded in auditory perception, the accessibility of images, videos and text has been identified as fundamental in generating broader environmental engagement and documenting and understanding the value of listening and remote embodied experiences. By framing the user-generated content of the Listenⁿ project as digital storytelling, we are empowering and encouraging communities to make their own contributions and have agency in the development of the project.

The community platform will be accompanied by the development of a mobile phone app for community outreach and user generated content. The app will allow the community to send updates (geo-tagged sound recordings, photographs and text) as digital stories directly

to the community platform while working in the field. This app will be built for both iOS and android and will facilitate a real-time engagement and enable collaborations between the locations. For example, community members in Death Valley National Park might observe the calls of a particular bird outside of its seasonal migration. By documenting this observation in real-time they could connect with other locations where the bird is also present and understand any behavioral and environmental changes taking place. This app will also encourage real-time storytelling, recognizing stories as valuable, often untapped community assets. This app will integrate a series of new tools that encourage leadership, such as dynamic tagging systems and heat maps that allow real-time engagement with other locations.

In addition to the community mobile apps, a secondary iOS and android mobile app will be developed so that users can undertake GPS tracked, geo-mapped walks through one of the recorded wilderness environments while commuting or exercising (jogging etc). The community app targets community members directly engaged with the Listenⁿ project locations, while the sound walks app is targeted at global communities. It is particularly aimed at those living in urban areas that would rarely have the opportunity to listen to pristine natural environments and through its somatic, embodied action, makes the engagement with the soundfield more dynamic.

The final creative outcome is a series of audio-visual experiences using virtual reality headsets. An alpha version of this experience exists for the Oculus Rift, and a version will also be developed for the Sony VR headset and others as they become present in the market place. The alpha version developed by Dr. Paine has been widely tested throughout 2014 with extremely positive feedback in creating immersive embodied experiences of remote environments. The virtual reality experiences will be developed with two purposes, the first as touring experiences that will promote further engagement in the Listenⁿ project internationally, and the second as virtual experiences available for download via the website for those with access to virtual reality headsets. While virtual reality has been an active field for a number of years, it is only now that it is becoming a viable opportunity for humanities projects to truly explore the possibilities of this technology. Previously it has been cost prohibitive and high latency caused disorientation and nausea if the visuals did not correlate with the user's head position. The Oculus Rift headset has addressed these problems and designed a system that can create the illusion of presence in another location. By combining stereoscopic 3D, 360-degree visuals, and a wide field of view, along with advanced engineering and software, the Rift can engage visual perception in ways that have not been possible in the past.

The rapid emergence of virtual reality is now evident with a number of other devices in development and the Facebook acquisition of Oculus Rift in March 2014. It has become clear

that personal virtual reality is the next big market in the entertainment industry. Facebook CEO Mark Zuckerberg has publicly stated “This is about being able to share experiences.” He believes that the true promise of VR is “going beyond the idea of immersion and achieving true presence – the feeling of actually existing in a virtual space” (Rubin, 2014).

The main challenge in creating realistic VR is having the image change with head movements, precisely and without perceptible latency. The Oculus Rift fuses readings from a gyroscope, accelerometer, and magnetometer to evaluate head motion. It takes 1,000 readings per second, allowing it to create predictive motion and pre-render images. While these advances are highly innovative for visual engagement, there has been limited innovation in the potential of auditory immersion in personal virtual reality experiences. This is the core focus of the Listenⁿ VR experience, in extending and expanding the existing technology to develop auditory experiences that enhance the visual experience. The current system developed by Dr. Paine uses the headset tracking on the Oculus Rift to spatialize the ambisonic field recordings so they become embedded in the visual environment. By combining this technology with ambisonics, users can follow a flock of birds flying over their head and move through landscapes with similar visual and auditory experiences that match actually being present at that location. The next version of the Oculus Rift headset uses a small external camera and monitors 40 infrared LEDs on the headset, extending current motion tracking to include letting the user crouch, lean, or approach an object. The success of the alpha version of the Listenⁿ VR experience is largely due to the fact that the Point-Of-View (POV) of both auditory and visual streams moves without perceptible latency and produces such a tightly correlated experience as to be perceived as an embodied relation to the content. This element of the project is critical to the accessibility of the Listenⁿ project and will be essential in exploring how digital technology and rich media environments can be used to create experiences of being present in remote environments.

7. The Future

The Listenn digital platform will be disseminated in the five identified communities in Arizona and California through a series of outreach and engagement workshops during 2015 and 2016. The education program is supported by Arizona State University and additional funding for community workshops will be sought from various state and national organisations. These will involve a series of activities directed at capacity building and engagement with the community platform.

The prototype phase for Listenⁿ project is proposed as two years of intensive research and development. This phase forms the initial component of a five-year strategy in creative outcomes, publications and community engagement. It is hoped that by the third year, the five selected communities will be actively facilitating the project from each location by curating activities, generating cultural assets and maintaining the community presence on the website. The fifth year of the project will see the community platform emerge as the core content provider for the database and we predict the system will continue to evolve documenting seasonal and climate changes to the acoustic ecologies of the Southwest deserts over the next decade and beyond. As a dynamic interdisciplinary project, Listenⁿ provides a platform to consider the role of sound in contemporary society and the possibilities of digital technology and remote environmental engagement through sound.

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