

Visualising Soundscapes: enhancing audience engagement with ecoacoustics

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Abstract

Soundscapes and the sounds that compose them are many and varied, and deserve our attention. Ecoacoustics is the rapidly advancing scientific discipline of recording and monitoring the sounds in our environment and can be used as an indication of the health of our environment. Generating interest among the general public can be challenging, and this paper introduces research into creative ecoacoustic visualisation. It aims to increase public awareness of ecoacoustics and its use in broader conservation initiatives by using evidence-based, iterative methods to design ecoacoustic visualisation experiences that enhance audience engagement with sound, space and place.

Keywords

Ecoacoustics, conservation technology, environmental sound data, wilderness, visualisation.

Introduction

The natural world speaks through its soundscapes. [1] A soundscape is the acoustic equivalent of a landscape, and the scientific field of ecoacoustics is concerned with recording and interpreting those sounds. Using creative visualisations of ecoacoustics presents an opportunity to communicate ecoacoustics to a wide audience through art-science expression. Sound is widely described in visual media circles as being “half the picture”. [2] However, as Douglas Kahn remarked, western society has a tendency to scopocentricity, the paramount importance of the visual, due to its long history of visual recordings overshadowing our aural literacy. [3] Visual recordings can encompass forms including cave paintings, writing, photography, and more recently cinema. This accepted visual convention surrounding us continually influences our spatial awareness, which tends to always be directed by the line of sight. [4]

Landscapes can appear as if timeless, but that visually tranquil landscape is pulled into the now by the audible: it is suddenly alive. The sounds of the natural world constantly remind us that the landscape is part of an ecosystem forever pulsing with life and activity. Soundscapes are an audible experience that is unique to place - constantly transforming with the days and the seasons, influenced by broader climate events, and at times metamorphosing completely due to

shifts in biodiversity. Encompassing landscapes and soundscapes is the overall concept of “nature”: a semantically fluid term whose definition has been debated for centuries, but that has some degree of conceptual familiarity within popular vernacular. [5] For the purposes of the research associated with these creative works, it is intended to be a reference to “... material reality,... independent of human activity and history” [5], drawing contextualisation from Merleau-Ponty’s ontology [6].

Creating effective ways to raise awareness of listening

The effects of awareness

The connection and appreciation of place that is felt by people is a transformative experience and learning concept: “love of place and a sense of connection” promote feelings of value which are in turn associated with conservation related behaviours. [7] Audience engagement with a particular ecosystem has the potential to promote a greater appreciation for it, and establish a connection with the ecosystem where the recordings originated. Singleton also comments that “[t]his love of nature may need to be triggered by experience or will otherwise remain dormant”. [7] Experiencing a digital visualisation may be a way to awaken that love in someone who, for any number of reasons, might not otherwise be able to have that experience in person.

In this way, raising awareness of soundscapes and the ecosystems that support them can directly contribute to the current societal discourse around conservation issues [8]. And discourse around significant environmental issues, such as the conservation of specific ecosystems either local or further afield, may help to promote a greater desire from the audience to participate in conservation related activities.

Using art to bring attention to soundscapes has the potential to heighten audience awareness of the sounds around them long after they have finished experiencing the artwork. A broader consciousness of the sounds present in an environment can contribute to further curiosity about sound and its

role in the natural world. It may also promote the identification of technophony and its effects amongst non-scientists.

Seeing as a way to engage with listening

As a novel way to bridge the divergences between creative practice and science, combining the two disciplines creates beneficial outcomes for a wide range of audiences and will encourage further crossdisciplinary and transdisciplinary communication and innovation. [9] John W. Tukey states “[t]he greatest value of a picture is when it forces us to notice what we never expected to see.” [10] Seeing sound is not a new idea. It’s popularity with both practitioners and audiences is undeniable by virtue of its longevity. For example, sustaining the engagement of citizen scientists who are reviewing acoustic recordings has been shown to be problematic, and visualisations have been identified as one method of increasing their engagement with those recordings. [11][12]

As an extension of that theme, it is anticipated that the delivery medium of visualising ecoacoustic recordings can make them more approachable for a general audience, and create an opportunity for increasing environmental awareness. Engagement with the sounds that form a particular ecosystem can develop a greater interest in, appreciation of, and desire to further understand it. [13] Fostering a greater appreciation of an ecosystem may in turn assist with facilitating a greater desire from the audience to participate in conservation related activities, which is the fundamental intention of this research.

Research as the basis for creative practice

Within the grounding of ecoacoustics, the research seeks to primarily discover what types of digital visualisations enhance audience engagement. By revealing the types of visualisations that audience feel that they are most engaged with, the project then seeks to discover if and how perceptions have been influenced or impacted by viewing media containing ecoacoustic visualisations. This knowledge will allow people to capitalise on our visual literacy and use it as a means for becoming more aware of our aural surroundings. To answer these questions, an interpretive approach is being adopted: using creative visualisations as the medium for investigating novel ways of depicting ecoacoustics.

Evidential scholarship

Evidencing the visualisation styles that audiences find engaging, appealing, and informative will underpin efforts to engage non-scientific audiences with ecoacoustic recordings. Currently there is very little research output that can assist with designing engaging experiences of environmental acoustic recordings intended to support conservation activities. [13] Artworks using a combination of ecoacoustics and visualisations have, to date (with a few notable



Figure 1. Screenshot of creative work development showing some initial tests of the visual breakdown of the audio frequencies. ©Leah Gustafson.

exceptions), focused on depicting musical composition. The focus on the audience’s response to the representation of ecoacoustic sounds will provide a proof of concept for using artistic visualisation to communicate complex non-music-based audio. Specifically, Dema et al. state that “[t]o the best of our knowledge, there are no interventions that focus on investigating human-environmental sound data interactions to inform design of processes and technology to support species conservation.” [13]

Knowledge of the fundamental elements that make an ecoacoustic visualisations engaging to an audience can guide its application and will bring new understandings to light. This research aims to capitalise on our visual literacy and use it as a means for becoming more aware of our aural surroundings. The visual communication of the ideas and complexities inherent in ecoacoustics can raise audiences’ awareness of the intricacy and fragility of soundscapes.

Progress Discussion

First Project

The first creative project to be developed was *Wild Soundscapes*, a 5:20 minute 360° mixed reality mobile experience (see Figure 2). Its focus was to emphasise the ecology of place and how its soundscape shifts with the shifting temporality. The visual serenity contrasted with lively ecoacoustic recordings of predominately unseen animal activity near a billabong in a remote south western Queensland wildlife sanctuary.

Within the piece, audio excerpts from ecoacoustic recordings portrayed four different times within a diurnal/nocturnal cycle. Corresponding 360° video footage was edited and time lapsed to create the visual component of the work. For instance, an ecoacoustic recording from midday was paired with midday video footage. The audio was displayed visually in three frequency bands (0-2kHz, 2-6kHz, and above 6kHz) at differing vertical positions. Each frequency band

was animated separately and coloured to blend with the background video plate (i.e., high frequencies was depicted using blue shades, mid and low frequencies used greens and browns – see Figure 1).

A combination of scientific knowledge and artistic licence were used to determine the duration of each temporal period within the final work. Dawn is known to be the time of greatest bird activity therefore the morning time period is

featured most prominently in the final audio-visual work. [14] The first iteration of *Wild Soundscapes* was displayed at the *2018 Ecoacoustics Congress* and was positively received by delegates.



Figure 2. Screenshot of *Wild Soundscapes* – showing an unwrap of the final 360° visuals. ©Leah Gustafson.

Second Project

The second creative project consists of a series of three iterative, anonymous, online surveys, each containing series of short ecoacoustic visualisation media clips. These will be followed by focus groups conducted with a subset of survey participants who have self-nominated to further participate in the research.

The surveys aim to discover audience attitudes towards differing styles of ecoacoustic visualisations by asking participants to view the media clips then answer questions about their viewing/listening experience. The results from each survey will be analysed, then the learnings used to create a subsequent survey iteration and accompanying ecoacoustic media clips. The first survey [currently underway] consists of 17 questions that, along with viewing three one-minute media clips, is estimated to take participants 20-25mins to complete.

Comments on participant recruitment

As the research is directed towards creating ecoacoustic visualisations that engage the general public, recruitment for the surveys is non-targeted and there are no specific inclusion and exclusion criteria. Participation in the online survey

is invited through a range of channels including social media channels, community groups, and word of mouth.

Conclusion

Visualising a soundscape challenges perceptions of how we think about place and time: evoking recollections and associations that have created unique memories. Sounds can elicit those memories from audience members – and visualisations can add new layers of understanding as well as opening up new ways of experiencing country.

Acknowledgements

Thanks to Dr Leah Barclay for her editorial assistance. This doctoral research is being undertaken at the University of the Sunshine Coast.

Development of *Wild Soundscapes* supported by Dr Susan Fuller, filmed on location at Bowra Wildlife Sanctuary (part of the Australian Wildlife Conservancy), with in kind technology resources provided by Queensland University of Technology.

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Author Biography

Leah Gustafson has a background in multimedia development and has studied, trained in, taught, and worked in multimedia development (interactive media, television production, games) for over ten years. She currently a PhD candidate at the University of the Sunshine Coast and has a Masters degree in animation, arts degree majoring in internet studies, and an environmental science degree. Her

research work combines the two fields of knowledge, science and the digital creative arts, to generate new knowledge that contributes to both fields through art-science. Leah has a particular interest in raising the awareness of conservation topics in novel ways that promote audience engagement and immersion.