



Original research article

Collaborative research praxis to establish baseline ecoacoustics conditions in Gitga'at Territory



Max Ritts^a, Stuart H. Gage^{b,*}, Chris R. Picard^c, Ethan Dundas^d,
Steven Dundas^d

^a 1920 East Second, Vancouver, British Columbia, Canada

^b Michigan State University, East Lansing, MI 48824, United States

^c Gitga'at Lands and Marine Resources Department, Hartley Bay, British Columbia, Canada

^d Gitga'at Nation, Hartley Bay, British Columbia, Canada

ARTICLE INFO

Article history:

Received 5 February 2016

Received in revised form 16 April 2016

Accepted 16 April 2016

Available online 11 May 2016

Keywords:

Soundscape ecology

Citizen science

Street science

Biophony

Technophony

Normalized difference soundscape index (NSDI)

ABSTRACT

This paper combines methodological discussion and scientific analysis to convey the results of an effort by the Gitga'at First Nation and academic partners to construct an acoustic baseline in Gitga'at Territory (aka. British Columbia, CA). Between June 2013 and 2014, we collected 257,327 field-recordings from eight sites as part of the Gitga'at Ecological and Cultural Monitoring Program. Our goals were: (1) to develop an acoustic baseline in a portion of Gitga'at Territory prioritized by local decision-makers, (2) to advance Gitga'at research capacity through the collaborative and reflexive structure of our approach. We argue that reorienting ecological knowledge production as praxis-based "Street Science" benefits resource management, as well as academic and local community interests. Gitga'at oral histories (*adawx*), and laws (*ayaawx*) guided our application of soundscape ecology, including our use of the normalized difference soundscape index (NSDI). Our results suggest Gitga'at Territory is a diverse acoustic-ecological space with numerous site-specific features. Significant differences were found between recording sites, with the greatest amount of biological activity noted June and July. We also found that the frequency and intensity of anthropogenic noise (i.e., technophony) in the Territory is currently very low, suggesting a low degree of anthropogenic disturbance. We conclude that soundscape ecology is well-suited for collaboration with indigenous communities, provided it is 'attuned' to the complex terms of engagement that constitute cross-cultural research.

© 2016 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

A vast majority of the conservation research conducted in the world today takes place on indigenous lands, yet operates at a significant remove from the peoples who reside there. The challenges indigenous communities confront in efforts to effectively feature in conservation research can be myriad (Smith, 1999). Competitive timelines, budgetary constraints, and specialized disciplinary interests dissuade researchers from forging ties with interested local groups (Adams et al., 2014). All too often, the consequence is a double-loss: indigenous communities are barred from important sites of local knowledge production while scientific efforts to study lands, waters, resources and biology omit vital bodies of skill and understanding.

* Corresponding author. Tel.: +1 517 927 6368.

E-mail addresses: max.rittts@geog.ubc.ca (M. Rittts), gages@msu.edu (S.H. Gage), chris.r.picard@gmail.com (C.R. Picard).

This paper discusses how a soundscape ecology project was established as part of the Gitga'at Ecological and Cultural Monitoring Program, and specifically to advance the conservation interests of the Gitga'at Nation, an indigenous people whose Territory overlaps geographically with British Columbia's North Coast. Our study centered on building a baseline of sounds in Gitga'at Territory. The Gitga'at Nation is particularly interested in understanding the acoustic composition of the Douglas Channel—part of the Territory (Fig. 1), as this region has lately been proposed as a conduit for potential shipping activities (Bocking et al., 2011). We contend that soundscape ecology is ideally suited to assist the community with these concerns, as soundscape ecology considers the aggregate sounds of given landscapes in terms of acoustical patterns at a variety of spatial and temporal scales (Pijanowski et al., 2011). Growing interest in sound as a medium for the study of ecological processes (Mullet et al., 2015; Sueur and Farina, 2015) is being facilitated by advances in user-friendly eco-acoustic measurement technology (Wildlife Acoustics, 2015). The ecological impacts of increasing levels of anthropogenic noise are receiving increased public interest as well (Tennesen et al., 2016). Merchant et al. (2015) suggest that the use of passive acoustic monitoring (PAM) can enhance understandings of sound's ecological function in a range of contexts, and has the potential to inform efforts to mitigate the rising influence of anthropogenic noise in these ecosystems. Keeping this dual-use goal in mind, our study sought to examine the patterns of sound at the terrestrial–ocean interface, both a novel site of inquiry for soundscape ecology and site of pressing concern for a marine-dependent Gitga'at community.

We were surprised to discover an absence of soundscape ecology work at the interface of indigenous-settler collaborations. Place-based listening has been shown to be a vital source of indigenous knowledge (Basso 1996) and disruptive anthropogenic sounds can lead to major cultural-use impacts within indigenous lands (Henricksen 2009). We suspect that very often, indigenous communities simply endure acoustical impacts as part of the cumulative effects of industrial development; one component of the “slow violence” that includes multiple stressors of greater and lesser state-institutional legibility (Nixon, 2011). There is critical need for research at the intersection of soundscape ecology, and indigenous-led collaborative science. While there is now ample (and deserving) scientific inquiry into the catastrophic effects an oil spill would have on the Gitga'at community (Bocking et al., 2011; Chan, 2011), the potential impacts of chronic low frequency tanker noise on terrestrial and coastal ecologies remain undocumented. Of particular concern for Gitga'at is the Enbridge Northern Gateway Project (ENGP), a multi-billion-dollar transportation project that would send over two hundred tankers through territorial waterways annually (see Fig. 1). There is now a considerable literature profiling the ecosystem impacts of chronic anthropogenic noise in related contexts (see Reijnen and Foppen, 2006; Rheindt, 2003; Nowacek et al., 2007). Deleterious physiological and behavioral responses to chronic low frequency noise have been observed in birds common to Gitga'at Territory (Slabbekoorn and Peet, 2003; Fuller et al., 2007; Goodwin and Shriver, 2010). Regional management plans identify marbled murrelets (*Brachyramphus marmoratus*) as “important marine wildlife species” (Yen et al., 2004), and avoidance patterns of marbled murrelets have been correlated to noise and increased vessel traffic (Hamer and Thompson, 1997). Various animals could be impacted by noise created under “routine operations” of large shipping (and the Enbridge NGP in particular) in Gitga'at Territory (Bocking et al., 2011). There are thus numerous pathways linking the noise of marine industrialization to potentially system-altering impacts on Gitga'at livelihood practices. Community concerns about possible eco-acoustical changes in the Territory were a major reason we were invited to conduct our research in Gitga'at Territory (08/07/2013).

Between June 2013 and 2014, our team collected 257,327 field-recordings from eight sites in Gitga'at Territory. Our goals were to: (1) develop an acoustic baseline in Gitga'at Territory along a marine corridor that faces the prospect of intensive industrial development and (2) advance Gitga'at research capacity through whatever means our study made available. As we show here, the terms of our contribution to Gitga'at could not have been predetermined; it was only through a reflexive approach that the emergent interests, understandings, and skills of the community could be known and incorporated within the context of our research. This approach was not without challenges, and may not be duplicable in contexts where the research parameters are too narrowly set. Nevertheless, we contend that soundscape ecology is well suited for collaboration with indigenous communities, insofar as the project is ‘tuned and retuned’ to the complex terms of engagement that constitute cross-cultural research.

Context: To understand how our methodological procedures developed, it is necessary to consider the dynamic role of context in our project. Gitga'at Territory is the Gitga'at people's “ceremonial and political base”—a vital source of Gitga'at cultural knowledge, identity and renewal (Roth, 2008). It consists of a 14,000 km² expanse of land and ocean along British Columbia's North Coast. Much of this temperate region is classed as Coastal Western Hemlock (BC CDC, 2013), and includes significant stands of hemlock and western red cedar in addition to many species of vascular plants, mosses, fungi and lichens (Fissel et al. 2010). To maintain effective stewardship over Gitga'at Territory, the Gitga'at have undertaken a range of conservation efforts rooted in Gitga'at traditional knowledge, foundational oral histories (*adawx*), and laws (*ayaawx*). One of us (CP) is Science Director for the Gitga'at Nation, and oversees the Gitga'at Ecological and Cultural Monitoring program (Gitga'at, 2014). This program is designed to support Gitga'at core values of improving conservation, asserting rights and title, enhancing stewardship and resource management decisions, and ensure that the traditional Gitga'at way of life is protected by increasing knowledge and understanding of the Territory. By pursuing our efforts under the ambit of the Ecological and Cultural Monitoring program, our study was well positioned to incorporate the insights of Gitga'at community members.

Ecologists and policy-makers are increasingly recognizing that indigenous-led approaches to ecological conservation can achieve relevant, sustainable outcomes in resource management (Deur and Turner, 2005; Ban et al. 2008; Ostrom, 2009; Housty et al., 2014). When scientific research is respectful of multiple knowledge forms and values, science can be usefully

Download English Version:

<https://daneshyari.com/en/article/4379453>

Download Persian Version:

<https://daneshyari.com/article/4379453>

[Daneshyari.com](https://daneshyari.com)