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Listening to/in the Field: Polyphony in the Exploring Arctic Soundscapes Project

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This article reflects on the Exploring Arctic Soundscapes project, a transdisciplinary venture of seven natural scientists, social scientists, and artists that sought to explore how a focus on sound could spur development of a new research sensibility for generating insights beyond the comfort zone of any one discipline. Viewing sound less as an object of study (“what sounds define a place?”) or methodology (“how do we listen to a place?”) than as an inroad for addressing complex forces and questions of becoming *in* place, the researchers turned to sound as a focal point for exploring difference and relations between the researchers and their modes of data acquisition, analysis, and artistic-academic production. The “field” in which we carried out our work thus became, simultaneously, the place (the island of Andøya, in Arctic Norway), the human and more-than-human communities on Andøya and the adjacent ocean, the transdisciplinary team of researchers, and the universe of (direct and indirect) outputs from our research. The experience of listening to sound(s) in the field demonstrated how transdisciplinary research across the sciences, arts, and humanities must be seen as an unfolding process, where all parties learn from each other as they pursue their disciplinary research agendas, rather than a pre-determined journey toward a single, “interdisciplinary” output. **Key Words:** Arctic, co-production, fieldwork, sound, transdisciplinarity.

RETHINKING RESEARCH

Established practices of academic scholarship are increasingly being questioned from both within and outside the academy. Calls for multidisciplinary, interdisciplinary, or transdisciplinary approaches to research (Lawrence 2015; Nicolescu 2014; Rigolet 2020; Sellberg et al. 2021; Tress, Tress, and Fry 2005) have been taken up by research councils, whose requests for proposals seek cross-disciplinary research that is “disruptive” and “transformative” (UKRI (United Kingdom Research and Innovation) 2023). Others challenge the extractive nature of contemporary research, decrying “the field” as a space where scholars use physical co-presence with the object of study to access valuable data while, simultaneously, devaluing local knowledge systems and destabilizing local social and socioecological systems (Ahmed 2012; Guasco 2022; Loboiron 2021; Tallbear 2014; Tuhiwai Smith 2021). Still others emphasize the need for research to turn away from the advancement of grand theories and instead become more directly relevant to the world outside academia, whether through providing technologies for business and policy innovations for governments or through suggesting pathways for empowerment of marginalized communities (Herrmann et al. 2023; Kramvig et al. 2023; Marabelli and Vaast 2020).

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Numerous alternative research models have been suggested to address these perceived deficiencies (or injustices) of the dominant research model. Inductive grounded theory, where explanations emerge from the research (Charmaz 2008; Strauss and Corbin 1998); community-led participatory approaches, where those being researched not only provide data but frame the questions and explanations (Castleden and Sylvestre 2023; Davis and Ramírez-Andreotta 2021; Shea 2025); open-ended, iterative research design (Bentancur and Tiscornia 2024; Brewer 2013; Sawyer 2021); and creative research methods that both facilitate involvement by members of researched communities and provide a pathway for incorporation of non-academic knowledges (Parsons, Fisher, and Nalau 2016; van den Akker and Spaapen 2017) all have their advocates. Although these calls for rethinking research are distinct from each other (e.g., one should not confuse the opening of research to insights from other disciplines with the opening to insights from other knowledge systems), the critiques and methods proposed for addressing them have some overlap. For instance, Verran and Christie's (2011) call for "generative dialogue" includes both dialogue among researchers *and* between researchers and those being researched, wherein the research questions, the design of research practice, and the production of output are co-produced (see also: Horvath and Carpenter 2021). Likewise, the definition of "transdisciplinarity" proposed by Tress, Tress, and Fry (2005) (unlike that proposed by Nicolescu (2014)) explicitly includes the incorporation of non-academic knowledges as well as those from a multiplicity of disciplines. Turning from research design to its practice, Bruun and Guasco (2024) propose that a reconsideration of "the field" goes hand-in-hand with a reconsideration of established research methods. All of these innovations also require revisiting the institutional context of research. A co-created project requires a long-term commitment that is challenging in relation to institutional commitments, funding structures, and the time and trust that needs to be embedded in such an ambition (Hermann et al. 2023). Such an approach is crucial if one is to conduct research based on principles of reciprocity and mutual learning.

Largely missing from these discussions about "disruptive" research, however, is how the disruption of norms, boundaries, and practices of exclusive, extractive, monodisciplinary research requires one to also disrupt the norm of the textual academic output. For most disciplines this is the journal article, where research questions and hypotheses are posed as if they had been guiding the process from the beginning (even if they actually had evolved over the course of the project, as indeed they must in the case of co-produced or open-ended research); the discussion of methodology is reduced to a description of the context and procedures underpinning data acquisition and analysis (ideally, to facilitate replication of the study); and conclusions are offered with omniscient certainty that reflects an imagined, "God's eye" view (*contra* the situated perspective promoted by scholars like Haraway (1988)).

At one level, our call to diversify the products of our research resonates with that made by many others. Researchers are often admonished to "give back" to the community that facilitated their research (e.g. *Journal of Research Practice* 2014), or to generate "impact" through engagement with individuals (or consultants) with expertise in forms of communication that reach beyond academia, so as to influence policy makers as well as the broader public (e.g. O'Loughlin 2018). Indeed, research councils frequently require grant holders to engage in some form of "outreach" or "impact." However, this "outreach" is typically posed as an external activity that occurs subsequent to research and in addition to "scholarly" publication of findings. As Hawkins (2021, 2) notes, with specific reference to calls for artists to collaborate on research projects, the artists participating in such "collaborative" efforts all too often find that "art

practices' relationship to research [is] seen as a form of dissemination and perhaps public engagement" rather than "research" or even "method."

We reject this utilitarian, transactional approach to broadening outputs for two reasons. First, it reduces the artist to a tool, ignoring the fact that artists – like their non-artist counterparts, if through different means – develop research agendas, gather data, and produce output to synthesize and communicate their findings relative to established (or contested) bodies of knowledge. Secondly, and relatedly, it diverts researchers from interrogating how different ways of defining, processing, and communicating understanding could be used to re-shape what is commonly labelled as "scholarly knowledge" or "academic outputs."

What would it mean to truly conduct research differently, not just using different methods, for different ends, across multiple disciplines and perspectives (within and beyond academia), but also producing different outputs? For one example, it is useful to turn to the Bawaka Collective, a grouping of Indigenous and settler Australians that, since 2007, "has focused on the transformative potential of Indigenous-led tourism to strengthen communities, progress self-determination and contribute towards inter-cultural understandings through the communication of Yolngu knowledge for non-Indigenous audiences" (Bawaka Collective, n.d.). The Bawaka Collective is notable not only for its longevity but for its structure of authorship. Reflecting Yolngu ideals where communities (including the land) are the holders and tellers of stories, the first author on most Bawaka publications is Bawaka Country, followed by a diversity of contributing individual Indigenous and settler authors. The "outputs" themselves, whether academic articles, popular publications geared toward non-Indigenous audiences, or material productions with knowledge transmission (e.g. from weaving workshops), are designed to translate Yolngu perspectives that decenter academic ideals of individual authorship as well as a range of associated western ontologies (Bawaka Country et al. 2015). Perhaps most radically, the Bawaka Collective has used the vessel of the academic article to opine on topics that are not typically placed within the remit of "Indigenous studies" but that, in fact, are ones where emerging legal norms can be challenged by an Indigenous perspective (e.g. their article on outer space governance (Bawaka Country et al. 2020)).

We mention this example not to suggest that we are engaging in the kind of long-term work of translation and empowerment that guides the Bawaka Collective. However, just as the Collective's settler researchers' experiences working across ways of knowing have led them to not just ask different questions and answer them in different ways but to *produce differently*, the members of the Exploring Arctic Soundscapes project have likewise realized that this project requires a different way of thinking of "output," whether the output being produced is an academic journal article, a musical composition, or a community meeting. This way of producing output blends the sensibilities and styles of the author and the composer, the scholar and the artist, the researcher and the researched.

Thus, the writing that follows in this article – which itself is one form of "output" that sits alongside (rather than *above*) the project's compositions, concerts, and community events – is not just a "God's eye" description and assessment of the effectiveness of an experiment in how engaging sound-in-place can build bridges across disciplines and across "researcher" and "researched" communities. The writing *is* intended to do that. However, following Haraway's (1997) admonition that we blend the story, the narration of the story, and the narration of the story's production, this writing, like the parallel artistic compositions, is also *part* of the experiment: one of many episodes in a circular, process-based mode where the lines between research design, research practice, and research outputs – like those between researcher and researched, and between our collective and individual identities – are blurred.

The writing that follows is also not intended to be a comprehensive, or even synthetic, accounting of the sounds heard, or inspired by, our field visits to Andøya. For this, we refer the reader to program notes from a concert in 2023 when the two main compositions resulting from the project to date – *Ábifruvvá* and *Bleikdjupet* – were performed (Musicon 2023), as well as a live recording of *Ábifruvvá* from that same concert (Mainly Two 2023). Rather, the focus of this article is to reflect on our method, in the sense that Law (2004) uses the word, as a complex and “messy” set of practices designed to tease out the entanglements of the socio-material world.

Given our emphasis on “output” being a process rather than a product, we also acknowledge the peer review as part of this process, not to be hidden through “corrections” but to be engaged through generative dialogue. On the initial submission of this article to *GeoHumanities*, one reviewer felt that we included more details than necessary and were “too anecdotal” in our discussion of how we interacted (and did not interact) with each other in the field. However, this discussion of our “fieldwork” was (and remains) intended not simply to contextualize the research but to describe the *place* (in the sense that Massey (1994) uses the term, as a montage of our individual and collective trajectories through space and time) that was the research “field” that we created as we interacted with each other and with various aspects of Andøya, including its sounds. Likewise, another reviewer wrote, “The point that the team sought to discard structure and questions in order to free up the creativity sure sounds like it made for an amateur field expedition.” Arguably, it was! But then the point of a *dérive* – perhaps the paradigmatic example of an “amateur field expedition” (Debord 1958) – is not the resulting map but the experience of making it, and the narration of that experience. Our aim, in this article, is to reproduce that experience as we also reflect on it.

That same reviewer noted: “A documentary on the activity would either be interesting or frustrating.” We’d like to think that it would be both: *frustrating*, in its slow wander through the intricacies of field work conducted by seven people who don’t really know each other well and don’t have a singular, unifying research question, but also *interesting* as a semi-linear story slowly emerges and as surprising interludes break through the underlying drone. If this article were a documentary film, it would be in the *cinema vérité* genre, meandering through the time and space that we are creating in “the field,” with writers, artists, and composers learning from each other not just about the sounds of the research site, but about ways of listening to, interpreting, and communicating our individual and collective thoughts, textually and sonically. Or perhaps, to use a more appropriate analogy, it would be a polyphony of repeating and linearly progressing melodies complementing and informing each other, but never uniting in a single narrative.

That, in turn, takes us to the central conclusion that emerges from our reflection on the experiment: For research to be truly “disruptive” the “field” must be understood not simply as a space for data collection or hypothesis testing but as multiple spaces that are shaped by the unfolding production of ever-evolving research questions, data collection and interpretation methods, and output strategies, and these elements themselves feed into each other. This requires listening across researchers, remaining attuned to the agency of human and more-than-human others, being open and respectful to multiple modes of expression, and being attentive to knowledge hierarchies.

TUNING IN TO SOUND ON ANDØYA

Sound is an inherently immersive medium and an integrated part of our understanding of the world around us (Gaver 1993). It helps forge connections across time and space and offers

pathways to communication and knowledge. “Sound says something about actions and contexts, and consequently about relationships between people, nature and culture ... [It] creates knowledge of the specific contexts in which we are situated, and influences how we relate to each other” (Rudi 2008, 118). Furthermore, sound helps build bridges between species and facilitates opportunities to access distant and/or invisible places; it has helped shape understandings of outer space (Zanella et al. 2022) and of life in the ocean (Au and Lammers 2016; Webb, Fay, and Popper 2008). Moreover, there is an increasing understanding that in order to interpret and represent the Anthropocene – when assumed categories of nature as stable and contained are being overturned – new forms of thinking and expression, including the sonic, are required (Biogroop 2021; Helmreich 2016; Louro et al. 2021). Therefore, when we entered “the field” to undertake our various, and purposefully underspecified, research on sound(s) (detailed below), we focused on sound less as an object of study (“what sounds define a place?”) or methodology (“how do we listen to a place?”) than as an inroad for addressing complex forces and questions of becoming *in* place. Following through on the imperatives outlined in the previous section, we engaged sound to reorientate the relationship between the definition of research questions and the acquisition of data, echoing the work of geographers seeking to rethink received notions of “the field,” as well as the imperatives of transdisciplinary, open-ended research.

As Gallagher, Kanngieser, and Prior (2017) note, geographic research on sound varies widely, from studies of the emanations of a place (i.e. a soundscape), to research on how individuals use sounds to produce meaning and exert power over their environment, to studies of how sound, as atmosphere, affectively impacts the listener through emotional and bodily sensations that go far beyond the conscious, aural act of hearing (see also: Paiva 2018; Whittaker and Peters 2021). Each of these perspectives on sound suggests a different object of study and, accordingly, a different methodology.

Taking up this methodological challenge, and following the lead of thinkers like Barad (2007), sound became, for us, a lens through which to understand a complex set of intersecting forces – climate change, militarization, globalization, tourism, cultural change, governance, environmental interdependencies – not through construction of a single narrative but through a kaleidoscope of undefined, and undefinable, intersections that affect both humans and other species. Moreover, as we detail below, we sought to understand the effects of these intersecting forces on/through a specific place with which many of us had little prior experience. And finally, we wanted to understand sound as a process by which humans and other species make and interpret meaning as they (re)produce place. As we also detail below, this frequently required reaching beyond sound to other media – e.g. images, text (including this article) – to articulate the sonic natures that were surrounding and impacting us and the community.

A focus on sound was particularly well suited for our experiment in transdisciplinarity because of how sound decenters human cognition, opening up possibilities for new modes of understanding (Rudi 2008). In appreciating a space through sound, one fuses one’s imagination with the place being portrayed, potentially paving the way for an engagement with and understanding of aspects of the space that might be evaded by other senses, such as vision. As Tuan (1977, 18) states, “[A] place achieves concrete reality when our experience of it is total, that is, through all the senses as well as the active and reflective mind.” Moreover, “sound enhances the spatial dynamics of place, including its meaning” (Yildirim and Arefi 2022, 1), as the expressive properties of sound allow for the mediation or (re)creation of a place, transmitting a sense of physical presence and aiding in the communication of complex issues (Rudi 2008).

Additionally, by de/re-materializing temporalities, sound can draw our attention to time on a variety of scales, from the immediacy of the present to the memories that internalize the past. As stated by Firat, Masullo, and Maffei (2020, 3485): “[With sound,] we may not travel in the time, but the time can be reconstructed in our minds.” Furthermore, when composing with sounds, as when sonifying data, one can speed up or slow down processes, and thus communicate both real-time developments and long-term change. This property can be used both artistically and as a vehicle for dissemination of scientific insight and knowledge, or both. One could, for example, express a process of change, over a period of hours, years, or millennia, in a matter of minutes. A sonically expressed structure allows us to experience a process in a tangible, embodied way (see, e.g., Benioff 1953; Wishart 2017).

The experience, meaning, and interpretation of sound for individuals and communities varies according to different bodies, cultural contexts, and life experiences. Sound also has pointedly political valances. For instance, and of particular relevance to this project, scholars have highlighted the important role of sound in giving voice to Indigenous experiences of place, from Indigenous peoples’ interconnectivity with nature to traumatic histories of colonial dispossession (Aubinet 2022; Galloway 2020; Magnat 2020), while others have noted sound’s unique suitability for evoking the histories and spaces of the Arctic (Coutu et al. 2024). At the same time, scholars have noted that “Anglo-European modes of listening and interpreting the world through sound are shaped by ‘sonic colonialities’” which apprehend and represent environments as “discrete, unmediated, and possessable” (Kangieser 2023, 1). This can especially be the case when working with field recordings, which are often perceived as accessing and presenting the sounds of “nature” as purified from human inhabitation and impact. Moreover, colonial epistemologies are reproduced any time that listening is “acquisitive, disciplinary, or competitive” (Hemsworth et al. 2017, 150).

It is relatively common for sound artists and composers to take inspiration from nature and from research in the natural sciences. This can be done directly, by using recordings from nature in a work of art, or loosely, for example by drawing inspiration from birdsong in a composition. Across the sciences, sound can be a means for accessing and exploring spaces and processes (Winderen 2010, 2010-2014, 2011, 2018; Winterling 2018). In some fields, such as soundscape ecology, it is integral to the research carried out (Pijanowski et al. 2011a, 2011b). Elsewhere, sound is frequently supportive of a wider research method. Additionally, as noted in the previous section, scientists increasingly collaborate with artists to disseminate their work to different audiences and achieve “impact.” Yet, despite these apparent intersections, there have so far been few instances of transdisciplinary projects that have focused on sound as a means of understanding a space, where artists have been embedded as equal research partners in the project from the outset (but, see Duarte et al. 2021). One precursor to Exploring Arctic Soundscapes was the Dark Ecology project, which ran from 2014-2016 and which, like Exploring Arctic Soundscapes, combined art and science with a problematization of the “the field” (Fridaymilk n.d.). A collaboration between Sonic Acts and the Norwegian curator Hilde Methi, Dark Ecology included three curated journeys through regions of Norway and Russia. The project was inspired by Timothy Morton’s (2018) concept of “dark ecology,” a radical criticism of the modernist way of thinking about nature as something outside of us, proposing instead that we think of an interconnected “mesh” of all living and non-living objects. Two of the Exploring Arctic Soundscapes participants (Jana and Britt) participated in this innovative project that created a space for dialog

between art and different scientific disciplines, and they brought their sensibilities from Dark Ecology to Exploring Arctic Soundscapes.

DETAILS OF THE PROJECT

The Island of Andøya

Our research team consisted of a political geographer, a human-environment geographer, an Arctic ecologist, an interdisciplinary scholar within Indigenous studies, a medium- and material-based artist, a sound artist with a scientific background specializing in underwater sounds, and an acoustic composer. The project was funded by Durham University's Institute of Advanced Study, which gave space for sustained collaboration through residencies for three international fellows, a seminar series with members of the university community, two weeklong fieldtrips to Andøya in Arctic Norway, and two subsequent writing retreats.

Andøya is approximately 60 km long and up to 15 km in width (*ca.* 500 km² in area). It is the northernmost island in Norway's Vesterålen archipelago and is 330 km north of the Arctic Circle (Figure 1). Its physical geography comprises steep mountain ranges climbing to 700 m in height, complimented by an exceptionally narrow continental shelf that extends just 15 km from shore before ending in the 2000-3000 m deep Bleik Canyon. Andøya's extensive mires are home to diverse migratory bird species. With a human population of *ca.* 2000, Andenes, located at the northern tip of the island, has been a fishing port since the Middle Ages. Fishing and, more recently, whale watching have thrived here due to the proximity of rich feeding grounds, with biomass supporting squid and their predators such as sperm and pilot whales, as well as orcas. Likewise, the island's second largest community, Bleik (*ca.* 10 km southwest of Andenes; pop. *ca.* 450), has a long history of commercial fishing as well as nature tourism (Borgos 2020; Thorsnæs and Engerengen *n.d.*).

Andøya hosts a range of activities beyond marine resource extraction. Andenes is home to the Andøya Air Station, built in 1954. During the Cold War, the Norwegian Air Force based its 6 P-3 Orion surveillance aircraft there and the base played a central role in the defense of Norway, Europe, and the North Atlantic. In 2022, in response to the Russian invasion of Ukraine, the Norwegian government announced that the base would be used as a permanent military reception facility for allied NATO forces. In addition, the island hosts Andøya Space, a rocket launching facility that was significant in early studies of the aurora borealis and is currently undergoing extensive expansion for commercial satellite launches (Bennett 2022).

Exploitation of marine, terrestrial, and atmospheric environments of Andøya often manifest impacts mediated through sound. At their extreme, anthropogenic sounds may impact severely upon or dominate over natural sound cues used by biota in their daily survival, seasonal habits/migrations, or lifecycles. For example, intermittent but frequent rocket launching noise in the atmosphere as well as seismic testing in the waters offshore not only disturb animal behaviors but also are a source of tension in the community (Bjørkan and Veland 2019; Kristoffersen, Bridge, and Steinberg 2022). As researchers, we were entangled with sound from the moment we set foot on Andøya.

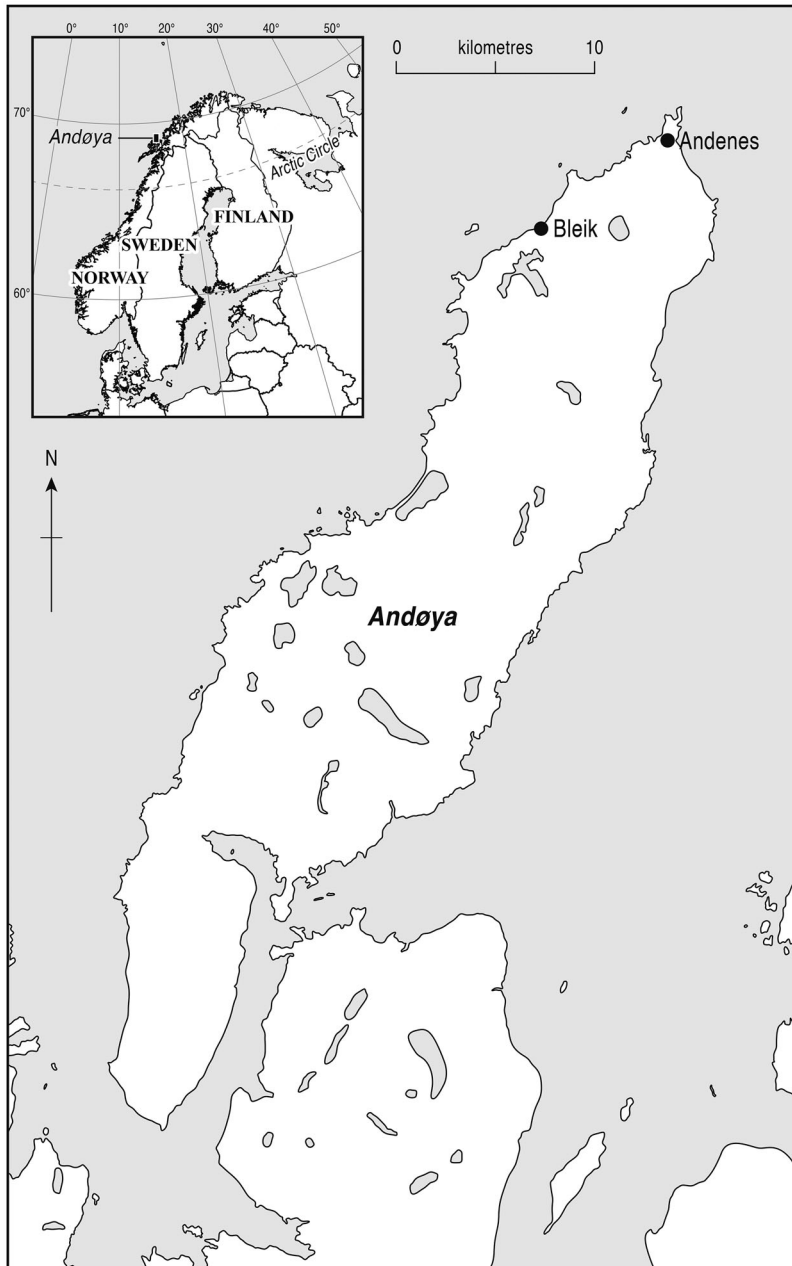


FIGURE 1 Andøya, Norway (and locator map). Cartographic Unit, Durham University Department of Geography/Chris Orton.

The Exploring Arctic Soundscapes Project

The Exploring Arctic Soundscapes Project originated in the Durham Arctic Research Centre for Training and Interdisciplinary Collaboration (DurhamARCTIC), an interdisciplinary (but not explicitly *transdisciplinary*) doctoral training program. Bob (the biologist) and Phil (the political geographer), as leaders of DurhamARCTIC, recognized that in order to further explore transdisciplinary possibilities in Arctic research, new methods, outside their respective comfort zones, were required. After identifying sound as a route toward generative dialogue, they recruited two additional Durham-based researchers: Eric (the composer) and Jessi (the human-environment geographer) as well as three Norwegian colleagues who were brought to Durham as international fellows: Jana (the sound artist), Susanne (the artist), and Britt (the interdisciplinary scholar) (see Table 1).

Together we developed our main objectives, which covered a number of methodological and epistemological questions concerning knowledge production, transdisciplinarity, place-based practice, and sonic methodologies, as well as relations between art, science, and social science. Whilst these questions speak to pressing issues in a region that is undergoing rapid transformation (through climate change, large-scale resource extraction, human migrations, indigenous empowerment, militarization, etc.), they also engage broader areas of enquiry within academia with reference to entangled relationships between materiality, knowledge systems, embodied experiences, and the practice of science (Barad 2007; De la Cadena and Blaser 2018; Green 2020; Haraway 1988; Povinelli 2016).

The research proceeded in five stages. First, during Autumn 2021, the project sponsored a series of five evening online interactive sessions curated by the Durham academics and involving each of the appointed fellows, prior to their residencies. These were open events advertised to the entire Durham community as well as international participants. In addition to allowing us to introduce ourselves, these sessions let us delve into a range of issues concerning understanding and representing the Arctic, including through sound. They provided starting points for further discussion and project development.

Then, in January 2022, the incoming fellows, all based in Norway, spent a week in Bleik. Due to COVID travel restrictions, the four Durham-based team members were not able to attend this fieldtrip. From January through March 2022, the fellows completed residencies in Durham,

TABLE 1
Exploring Arctic Soundscapes Participants

Individual	Institution	Self-identification
Robert (Bob)	Durham University	Arctic ecologist
Britt	UiT: The Arctic University of Norway	Interdisciplinary scholar within Indigenous Sámi studies
Eric	Durham University	Acoustic composer
Jana	Independent artist	Sound artist with a scientific background specializing in underwater sounds
Jessica (Jessi)	Durham University	Human-environment geographer
Philip (Phil)	Durham University	Political geographer
Susanne	Oslo National Academy of the Arts	Artist

where they gave a series of public lectures as well as engaging in extended discussions with each other and their Durham hosts. In June, the entire team travelled to Andøya for a week of further research, and the group then held two further writing retreats, one in Norway and one in Durham, in Spring of 2023. The latter of these retreats also included a public performance of original works that had been inspired by the field visits to Andøya. An additional public event to build links with Norwegian academic, artistic, and environmentalist communities was held in Oslo in Autumn of 2023.

LISTENING (TO) METHODOLOGIES

In this section, we describe how we approached “the field” as a research site that brought us together, both geographically and through a sharing of practice, while also giving us the space to achieve our transdisciplinary objectives. As we discuss below, the fieldwork encounter was vital to our collaboration, not because it provided a unified theme, but because it gave us an environment to experience, and learn from, our epistemological and methodological differences.

Establishing Fieldwork

During the first fieldwork period (January 2022), Jana, Britt, and Susanne lived together in a house in Bleik. It was January and stormy. Like the fishing fleet that was forced by the weather to remain in the harbor, we too needed to stay on land – and this required us to be flexible regarding our plans for conducting field/sound work out at sea. Climate change was becoming embedded locally in more unpredictable, stormy, and wetter weather during the winter season, which also is the high season for the migration of Atlantic cod, essential for the economy of the coastal fleet and fishing communities. We adapted by contacting the local newspaper, which printed an article highlighting our interest in the “sound of Andenes” and asking people to contact us. No one responded directly to this call, but later - when we visited coffee shops or other public places - people recognized us newcomers and why we were on the island. As newcomers, we understood that in order to enter into local relations we needed a story, and we hoped that the newspaper article would be taken by residents as an invitation to work with us to create that story.

When we connected with people directly, after the article appeared, they had some opinions about “the researchers” who walked around on the beach, sat down at cafés, and asked different groups of people to talk about the importance of sound for navigation, storytelling, environmental knowledge, and memory. These first conversations revealed that it was difficult for locals to distinguish between sound and other senses in their stories about their engagement with the environment. Sound is always there. Turbulent and loud. Sometimes silent - which could be even more alerting. The sound of the sea and seabirds are important actors that participate in envisioning the future in a coastal community and in giving all inhabitants – human and more-than-human – environmental awareness. In the Arctic, in particular, where environmental awareness is crucial for survival, local residents are dependent on sonic sensing. As researchers, we worked to incorporate the local sound into our experiences and knowledge, by walking outside in stormy weather, but also by telling stories about these experiences after, looking for stories of sound in

historical records, in song traditions, and in how sound was negotiated as one factor (among others) that could predict the near future.

Most fishermen pointed us in the direction of Gunnar, a 92-year-old man who, according to them, remembered “everything.” We called him and made an appointment. He did have a good memory he told us; when he started fishing there were no electronic navigational aids, so the only way to stay safe was to notice and remember everything. In the method of wayfinding common to the Norwegian coast (known locally as *mea*), fishermen recognize places on the seabed based on the relation between formations on land. In addition, the movements and directions of the clouds and the behavior and different sounds of the seabirds are important within this traditional field of knowing (Kramvig 2015). Gunnar told us stories about *egga* - the edge from which the seabed falls 2,000 meters down into a valley where whales and other species feed on the nutrient-rich waters of the upwelling. Whales, cod, seabirds, and fishermen feed on deep-ocean currents driven up to the surface by differences in the water’s density, which is controlled by temperature (thermo) and salinity (haline). Using spoken words as well as putting pen to paper, he drew us a map from the perspective of the seabed, looking upward into the water column. It was important that we, as a team, listened carefully to this and to other stories and ways of knowing the sea and the multiple inhabitants they related to and cared for in their stories. These sounds, no less than those recorded with hydrophones, were the sounds of the sea and the maritime community.

Also on that first trip we met with Geir, the skipper of a whale watching vessel, who has been listening to whales for decades and could identify a specific sperm whale by its clicks. Geir was concerned with, and had deep knowledge of, not only how the whales used sound as a device for communication and hunting, but also how they reacted and became stressed by soundwaves created by other boats and activity within the space of *egga* - where so many different interests met, tensions appeared, and the need for better governance was central. During this fieldtrip we became more aware of how we encountered the wind and waves, how the seabirds behaved in relation to feeding fish and whales, and how the movement of the boat changed according to the shape of the seabed. We were reminded how the ocean world includes, but also *exceeds*, the volume of sea water that on maps is labelled as “ocean” (Peters and Steinberg 2019), and that this is true for the sounds of the ocean world as well.

Indeed, we found that sometimes the most effective way to evoke the sound of the ocean was to focus on neither the material ocean nor its sounds but its imagery. Like Gunnar’s map, although visualized from a point above the ocean rather than at its bottom, Figure 2 highlights the ocean’s bathymetry, leading the viewer to imagine the upwelling of nutrient-rich water from Bleik Canyon and to virtually feel, smell, and hear the potentially nausea-inducing cacophony of swells from intersecting currents, diesel fumes from fishing boats, and cries from sea birds that characterize *egga*. This map evokes a universe of meanings (including, indirectly, the sounds of Andøya) not found in Figure 1.

The second visit to Andøya (in June 2022) brought further complexity to the conversation as the Norwegian team was joined by the researchers from Durham. Whilst in the field we prioritized working in two modes. First, we each focused on our own approaches. Sometimes this meant working separately, for example recording sounds at sea or interviewing local residents. Even when we went to places or met with people together, we did not agree on a set of questions or mode of inquiry ahead of time. It is important to note that in this fieldwork period most of us were working in an exploratory mode, trying to gain context and identify interesting questions

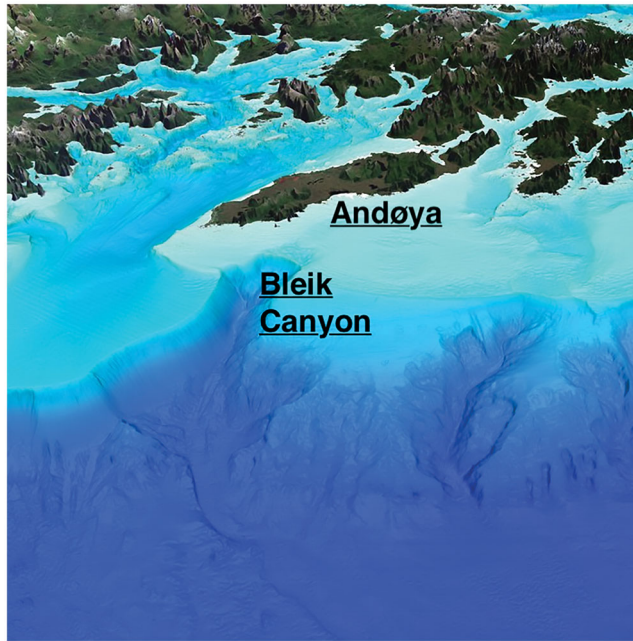


FIGURE 2 Terrain model of Andøya, viewed from the Norwegian Sea. Extracted from Kartverket (Norwegian Mapping Authority) (2021). ©Norwegian Mapping Authority/MAREANO, used with permission.

rather than collect data on predetermined topics. We went to the field to open an inquiry rather than to answer questions.

In addition to bringing a new set of disciplinary perspectives and methods to the project, the second visit saw us expand our relations to the materialities as well as histories of the field site. This was enabled by engaging with local artists, scientists, and tourism promoters, as well as by better weather that allowed us to conduct fieldwork at sea. Working together with the leadership of The Whale (<https://www.thewhale.no>), a public education and research center under development in Andenes, we held a community event where we presented alongside locally-based marine biologists and artists. We also signed a letter of intent with The Whale, highlighting how the project could support future programs there. We consider this as a long-term, open-ended vision of how we can create knowledge and art pieces that are relevant to local institutions and people, while assisting in giving voice to their concerns.

Reflecting on the Field

Our mode of working in the field – being relatively independent while in close geographic and intellectual proximity to each other – was somewhat by design and somewhat accidental. Already, during the preliminary seminars in Autumn 2021, we recognized that the questions we were asking, and the ways that we sought to engage with “data,” were varied. Although we could

identify unifying themes (regarding sound and place, in an Arctic marine environment), we acknowledged that we likely would not benefit by trying to work around a common research question or method. Then, as the first January field trip was approaching, discussions about what we would be *doing* while in the field were sidetracked by discussions of whether we would be able to go there at all due to COVID restrictions. By the time we all made it to Andøya as one group in June 2022, working relationships had already been established and individual members of the team had developed pent up demand for conducting specific projects. As a result, as much by default as by design, our research was characterized by a relatively unplanned interweaving of micro-explorations, in many cases undertaken individually.

Perhaps paradoxically, while sound brought us all together it also made space for us to work independently. As noted above, sound on its own does not prescribe any particular research method or orientation. Indeed, it might encourage experimentation and openness - to different technologies, voices, sensations, and ways of knowing. This open-endedness of sound can open new avenues for collaboration, but it also meant that no specific set of questions or methods emerged intuitively for the project. Given our transdisciplinary objectives, a prior commitment toward incorporating sound in a certain way (or certain ways) would likely have limited the creative potential of the project and narrowed the ways in which “the field” could inform the research.

Moreover, agreeing to collaborate across disciplines did not mean making a unified decision to drop our individual methodologies and approaches to research. To do so would have meant jettisoning the very expertise and interests that brought us together in the first place. Instead, given our interest in transdisciplinarity, we chose to explore synergies through a concentrated field experience, to draw a sense of place from a site at which we all had different levels of familiarity, ranging from having conducted fieldwork in the local community to having never set foot in the region. The *togetherness* of the field experience, even as we carried out our own projects, created spaces for reflection, both collectively and as individuals, a crucial element of any research project (Kanngieser et al. 2024; Steier 1995).

The complexities of collaboration also transcended the time and space of the field. It wasn’t only what we each brought to the project, but also what would happen after. We each had commitments to others outside the field site: Indigenous communities, musicians, curators, co-authors, and other collaborators. These commitments played a role in shaping our work as a team. So did many questions about the future of our work. Would we continue to work collaboratively, or pursue independent projects inspired by our time together? Would we have the resources (time, funding, etc.) to return to Andøya, either together or separately? If we were to return, would we continue our investigations around sound/soundscapes or focus on other things that had struck our interest during field research? How did this project fit with our passions and feelings of responsibility and accountability, as well as our career goals and different institutional restrictions? In many ways, these questions had to be answered organically (and are largely still open at the time of writing). They certainly couldn’t be easily answered by a shared interest in sound.

The multiplicity of our individual, disciplinary-informed approaches also brought about a number of logistical challenges. We required different technological apparatuses, contact with different local people, daily work patterns, and exposure to different sites for our academic and/or artistic outputs. We variously needed small boats, recording devices, walks alone in the community or moorland, Norwegian-English interpretation, access to local residents, and calm

weather, among other requirements. What “data” looked like was different for each of us and impacted not only our work in the field but how we might carry that work onward. Eric, the composer, might be inspired by a few days’ observation on Andøya and then bring this inspiration into musical convention to produce a composition. Susanne required biological data that they similarly could bring back to their studio to recompose through artistic interpretation. Bob, like Susanne, required biological data, but his sampling requirements were very different due to his different intended outputs. Jana’s artistic practice required a long time-frame of deep listening to the sea and all the multiple spaces that we live with both beneath and above the surface, spaces that extend beyond the ocean itself to include the land, the seabirds, the wind, and the people. Through a long-term engagement with local knowers and local knowledge, her compositions bring to the public a sense of life, and a sense of what is at stake.

Meanwhile, the social scientists – Britt, Jessi, and Phil – largely approached the field work as pilot research (and as a methodological experiment). Especially for Jessi and Phil, who had not worked on Andøya previously, the one-week visit might raise questions that possibly could be developed into future research projects. However, it was not seen as providing data that in itself could be directly transformed into academically “usable” knowledge or conventional outputs.

Not only did we have different needs, but some needs actively impinged on our ability to collaborate. For example, the small boat, state of concentration, and long hours at sea required by Jana for capturing hydrophone recordings were not conducive to collaboration with a group of variously chatty, seasick, and technologically inept social and biological scientists. Likewise, although at various stages artists and social scientists alike engaged with members of the community to gain an understanding of local environmental knowledge, these interactions provided uneven benefits for the various researchers, depending on previous experience and research capacities. Thus, a fortuitous meeting with a group of sound engineers who were in Andenes testing hydrophone technologies was inspiring to Jana and Eric, but much less so for the other members of the research team. A visit by Phil and Eric to a cafe in Bleik where fishermen were having their morning coffee was frustrating for both researchers, but for different reasons. Phil was unable to follow the conversation in Norwegian, while Eric, who is fluent in Norwegian, realized that the fishermen were having a tense discussion about a community conflict and that the moment was not conducive to a wider conversation.

In addition to pursuing our individual approaches according to our methodological needs, we also learned about each others’ work practices. In some instances, this occurred through actual observation in the field. For example, Jessi and Phil accompanied Eric on a walk through the landscape around Bleik, observing him making field recordings and talking through his creative process whilst he set up microphones. However, this was not always possible (see above re: small boats, seasickness, language barriers, etc.). Therefore, we also relied on evening discussions around the dinner table, where we reflected on what we were learning and asked each other questions about our approaches and perspectives. We recorded these conversations for further reflection, creating yet another sound archive that we could variously treat as primary data, engage with as secondary analysis, or ignore, depending on one’s individual approach to sound and the stories sounds tell.

We also each brought with us our own understandings of and personal relationships with the natural and anthropogenic environments that shaped our inquiry, in excess of our respective disciplinary practices. Throughout the week, we reflected on these relationships individually and collectively. For example, over dinner one night a discussion about scientific measurements of

the aurora borealis and the much-debated question of whether the aurora has a sound shifted to reflections on how nature might respond to humans, and how this conception leads us to feeling more responsible toward nature. Different ways of knowing, our own personal life experiences and subject positions, and normative notions quickly became entangled with our understandings of and livelihoods in the material world, in what could be seen as an enactment of, as well as a reflection on, Barad's (2007) concept of "intra-action" by which meaning and matter are co-constitutive. These entanglements were produced and deepened not only by working and talking together, but also by the intensities of fieldwork, and fieldwork focused on sensation in particular. Each day we were pushed to hear, feel, listen, and reflect more, differently, and more deeply - and even to consider some of the "sonic colonialities" that shape our listening practices (Kanngieser 2023). For example, a visit to a sacred Sámi site prompted some non-indigenous members of the team to reflect on the gaps, ambivalences, and settler inheritances in their embodied sensorial apprehension of the site, as well as their understanding of its broader context and history. While this was obviously productive, it could also be exhausting and difficult to process, especially without a clear set of methodologies for doing so, such as a designated time to write up and share field notes.

The discussions also, quite frequently, took us to insights that had little to do with sound *per se*. In retrospect, this was not surprising, as sound was being used to help us bridge languages and methods, not to direct questions. Indeed, that was a guiding principle behind the research design. Thus, as the sonic focus opened new lines of enquiry, these often drifted away from the strictly sonic. As noted above, during our initial visit to Andøya we found that local fishermen were unable (or, at least, unwilling) to distinguish sonic knowledge from other modes of sensing, such as feeling the waves and currents, reading the color of the ocean and the shape of clouds, observing the seabirds, or drawing on past experiences and intergenerational knowledge. We discovered that while sound was a useful tool for building a transdisciplinary focus among disparate researchers - drawing our attention to multiple ways of listening - it was less effective as a means for parsing the knowledge of research subjects.

To elaborate on another example, during the second trip to Andøya we found ourselves in tense cohabitation with a family of gulls who were nesting next to the house we had rented. Hurrying from the house to our van and back, we were constantly looking up, in the hope that we could avoid being pecked, and down, to avoid the chicks who were just learning to walk (and who were the objects of their parents' protection). At one level this inter-species interaction was sonic: the gulls used sound (unsuccessfully) to try to scare us off and (somewhat more successfully) to alert us that we were endangering ourselves as well as their offspring, and we used sound (also unsuccessfully) to try to communicate that we meant no harm. But ultimately the interaction, and our discussions of it, transcended the sonic to address broader questions of inter-species cohabitation and how we live in ways that are both antagonistic and synergistic.

Researching across Worlds

As we have discussed throughout this article, transdisciplinarity requires more than just adding new techniques or even new questions to our research. It also requires us to rethink how we design and formulate the aim of a research project. Reflecting on our transdisciplinary fieldwork that united scientists and artists we are reminded that a space/field always is multiple and

sharpened by the unfolding production of ever-evolving research questions and output strategies, as well as serving as an arena where we engage with sedimented pasts that so often remain unspoken.

During our research on Andøya, our different theoretical and philosophical approaches and working methods became visible to all of us – as we moved along our own paths within a shared space. Fieldwork – being co-present in a “taskscape” while engaging in shared concepts and interacting with shared matter, even while using different methods – was essential for this process: it would have been different if we were merely having a conversation (Ingold 1993). Working in dialogue with each other while sited in the field required us to listen across research positions, remaining attuned to the agency of human and more-than-human others, open and respectful to multiple modes of expression, and attentive to language and knowledge hierarchies. Our commitment to transdisciplinarity required us to rethink preconceived ideas and to reconsider how we create trust and interest in our research topic and the relationships between how we pose questions, share thoughts and observations, and make links between the world we study, our own lives, and the way we present our work. The conversation was not only among different disciplines but among us as researchers, local partners, non-humans, and the materialities of the place.

One can debate whether the research that we conducted on Andøya truly involved co-production. Although we brought on community residents as collaborators (both individually and through institutions such as The Whale) and engaged their assistance in defining our research questions and methods as well as in providing data, the research agenda remained driven by us. Nonetheless, the open-endedness required of a transdisciplinary research project and the flexibility and patience on the part of funding agencies and universities that is needed for such transdisciplinarity to function is well aligned with what is similarly required for co-production (Tress, Tress, and Fry 2005; Verran and Christie 2011). We see potential overlaps between the co-production and transdisciplinarity movements as ripe with possibility, and this would be crucial to explore further in a subsequent iteration of the project.

The other set of relations explored, *inter alia*, by our project was between “academics” and “artists.” We place both of these terms in quotes for a number of reasons: two of the three artists (Eric and Susanne) hold academic positions and all three are heavily involved in research. Furthermore, the two categories reflect great variation: a sound artist works very differently than a classically trained composer, just as a biologist works very differently than an interdisciplinary Indigenous researcher trained in anthropology. Notwithstanding the caveats around these two categories, the field experience was rich with examples of academics being inspired by artists and vice versa. For Bob, observing Eric, Jana, and Susanne listening to and documenting the intersections of the shoreline in ways that he was not accustomed to led to new insights on the interface of terrestrial and marine ecologies. Jessi’s discussions with Eric and Jana about their recording and composition processes led her to new insights on relations between technology, bodies, and environments in making knowledge across the sea-land boundary. Eric’s composition reflecting on the tense intersections of Sámi and Norwegian histories of the sea incorporated emotions and insights spurred by a visit to a Sámi *sieidi* (sacred stone), where Britt had contributed her expertise on the materialities and histories of Sámi culture. Jana’s description of the physicality of the recording process and how her music reflects the cold, wind, currents, and meanings and stories of the sea, intertwined with the soundwaves captured by her hydrophone, has made a lasting impact on Phil’s work on the emotive and cultural impact of geophysical forcings in the ocean

environment and their integration into scientific and legal ontologies. The impacts of the experience on the seven researchers continue, long after their return from “the field.”

CONCLUSION: LEARNING TO LISTEN

Every project has outputs, but this project’s outputs are particularly diverse, not just in form (ranging from musical compositions to academic articles) but as process. Furthermore, different outputs emerge in different time scales and their production requires different technical skills. Nonetheless, throughout the entire process we have attempted to collaborate, mirroring our practices where we jointly reflected on field experiences while leaving room for individual creative and academic practices, allowing collaboration beyond conventional notions of co-authorship.

In addition to rethinking “outputs” the experience has also led us to rethink “impact.” For instance, the writing retreat in Durham was paired with a public concert where Jana and Eric introduced world premieres of pieces that emerged from the project. Jana’s piece, *Bleikdjupet*, was inspired by the dialog we had with Gunnar, the fisherman who told us stories about how he understood the sea and how to navigate it from an imagined position beneath the surface. Eric’s piece, *Ábifruvvá*, was based on his experience of the cultural conflicts and conflicting narratives around Andøya: between nature and marine-based industry, and between historical Sápmi and modern Arctic Norway. Whereas these performances, and a subsequent performance several months later in Oslo where we were joined by a speaker from The Whale, might be viewed as “impact,” we understand them as essential moments in production, where the musical “outputs” both reflect and inspire insights that will be expressed in further outputs, including articles, compositions, and community events on Andøya and beyond.

On reflection, we learned three central lessons from our experimental research project. Turning first to sound, and echoing a theme that has already been made in the geographic literature on sonic research, we found that sound means many things and can be researched through a number of methods. However, while this plurality of meanings (and methods) could elicit tensions if one were trying to bring together a diverse body of sound researchers to pursue a common question, we viewed this diversity as positive. When one’s ultimate objective is transdisciplinarity, having a number of questions and methods that ask related, but ultimately quite different, questions in an open-ended research design may be just what is needed to spur the novelty of such an approach.

Secondly, and following from that previous point, we affirmed that research needs to be seen as a process. Under the classic research model, in advance of beginning research one can envision how all the parts will fit together and how the members of the team will use their areas of expertise to gather data to fill in those parts. However, this is not sufficient if one aims to be truly transdisciplinary. Inevitably, a directed approach to research will defer some questions in favor of others, stifle some researchers’ creativity, and necessitate a degree of singular leadership (by one person or one discipline) that will limit the benefits of transdisciplinarity.

And thirdly, our process speaks to the value of a research *experience*, where diverse researchers engage in dialogue, even if not in a carefully delineated research project. Going to “the field” is useful not just for obtaining data (either for oneself or for the collective of researchers) but for fostering an environment where one can build the trust and interdisciplinary knowledge and understanding that is crucial if one, ultimately, is to engage a transdisciplinary research agenda.

In other words, part of the value of going to “the field” is that we learn to value each other, through our own ways of listening (Kanngieser et al. 2024). In the field, we learned not just about each others’ disciplines, with their attendant methodologies, journals, conferences, exhibitions, and intellectual communities, but more fundamentally we learned about the ways that we each co-create our objects of study, how we understand the differentiation and entanglements of humans and nature, knowledge and noise, art and environment. We each learned how the others think and how they work, building understanding across the divides between academics, artists, and local communities. This understanding is transforming each of us in ways that go far beyond the findings or outputs of any specific research project.

In short, while one benefit of our transdisciplinary project was that we all discovered new and different ways of listening to the world around us, perhaps even more importantly we learned how to listen to each other, enabling polyphonic research that transcends disciplinary boundaries.

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