Political Acoustic Ecology:
Uncovering power, politics, and justice in the sonic environment

Arnim Scheidel

Institut de Ciència i Tecnologia Ambientals (ICTA-UAB), Universitat Autònoma de Barcelona, Spain
`arnim.scheidel@uab.cat`

ABSTRACT

Which role may Political Ecology play for studies of Acoustic Ecology? As global environmental change is rapidly transforming soundscapes along the frontiers of resource use, important questions arise about who precisely occupies the common sonic environment, how resulting sonic burdens and benefits are distributed among diverse human non-human beings and across the audible and inaudible spectrum, as well as how affected communities, activists and movements may respond to adverse sonic environmental change. This paper delves into some of the intersections of Political Ecology and Acoustic Ecology and explores five points of inquiry for a "Political Acoustic Ecology" that may offer fresh insights into the social-political dimensions of sonic environmental change.

1. INTRODUCTION

We are currently on the onset of a *sonic knowledge revolution*, characterized by rapidly rising interest in the sonic environment across the humanities, the social and the natural sciences [1]. Since Murray Schafer's thought-provoking work *The Soundscape* [2], numerous artists have explored soundscape compositions to engage with the ecological crisis [3]. Research into noise pollution, identified by the World Health Organization as the 3rd most hazardous environmental pollution [4], is increasing rapidly in Urban Planning [5]. The development of low-cost, full-spectrum microphones able to acoustically log species and biodiversity [6] has accompanied an explosion of scientific papers in Bio- and Ecoacoustics, while the global bioacoustics sensing market has reached the size of billions of dollars [7].

At the time of this *sonic awakening*, the ethical, political and justice dimensions inherent to soundscape research and sonic environmental change are becoming an important field of inquiry [5, 8, 9]. Key questions about who exactly dominates the acoustic space, how, why, under which governance schemes, and with which implications for diverse actor groups as well as and non-human beings, remain to be further explored. Approaches and inquiries from the field of Political Ecology might help to inform a *Political Acoustic Ecology*. Political Ecology emerged as a response to the frequently apolitical approximations to environmental change and is generally concerned with questions of power, politics and justice in environmental governance, and with the co-

production of nature and society [10]. In this paper, I explore how listening to soundscapes from a Political Ecology angle may enrich our understanding of the social-political dimensions of sonic environmental change.

Specifically, I draw on five specific lines of inquiry of the diverse field of Political Ecology and discuss how they relate to concerns in Acoustic Ecology: i) issues of equity, distributional justice and accountability in the use and governance of the sonic environment, ii) human interactions with the more-than-human world, iii) the role of global drivers for local environmental change, iv) the transformative dimensions of (sonic) environmental conflicts, and v) the study of successful forms of environmental activism and resistances. Instead of providing answers, I aim to identify key questions and discuss pathways of how to address them. Far from being complete, these five points of inquiry offer some starting points for a broader research agenda of *Political Acoustic Ecology* that I will discuss briefly in the conclusions.

2. FIVE POINTS OF INQUIRY

2.1 Who exactly uses the acoustic space?

Bioacoustics have developed precise methods to acoustically log and distinguish more than 1,000 different species through passive monitoring over space and time [7]. We know comparatively little, and have few systematic methods at hand, to identify how, and to which extent, specific social actors are using the sonic environment. Yet, soundscapes reveal not only ecological structures, but also social structures [4], [8]. While quantitative noise studies advanced substantially our understanding of the extent to which "humans" in general occupy given soundscapes, further disaggregation of "humans" into specific actors and activities is needed to understand the social-political structures behind human dominance of the acoustic space.

Methodologically, the combination of approaches from Acoustic and Political Ecology (i.e., qualitative identification and analyses of sounds linked to specific human activities, their impacts and justice implications for diverse social groups) with the tools of Bio- and Ecoacoustics (i.e., using audiomoths as *earwitness,* quantitative analyses and coding of spectrograms) is a promising pathway to deepen our qualitative and quantitative understanding of the social-political dimensions of sonic environmental change. The combination of these methods may reveal who exactly uses, enjoys, or pollutes the sonic

environment, which is key for understanding *sonic environmental justice*. It may reveal distributional issues, such as who occupies the sonic environment, and who suffers from noise pollution along lines of class, race, gender, and generation. This is also a premise for accountability which requires sonic degradation to be associated to specific actors, rather than to the analytically diffuse category of "humans". Conceptually, this entails moving beyond too general descriptors such as *anthropophony,* and explore and conceptualize, for instance, the *capitalophony* to capture more precisely the underlying systems of power and profit [11] shaping the sonic environment.

2.2 How to move beyond anthropocentric listening?

Further knowledge about who exactly uses the acoustic space also helps to better understand forms of *acoustic colonization, i.e.,* how certain actors and activities have come to appropriate and dominate the sonic environment. However, to get the full account of acoustic colonization, requires moving from *anthropocentric to biocentric listening*, i.e., to acknowledge the hidden sonic footprint beyond the human hearing range, i.e., below 20Hz and above 20 kHz, where much species communication is taking place.

Each time, a car driver hits the brake, an inaudible ultrasound is emitted, occupying the acoustic space in which bats communicate[1]. The global expansion of windmills currently reshapes the infrasonic space, raising concerns over health impacts [12]. Climate change and industrial activities in oceans has caused severe impacts on the marine ecosystems due to anthropogenic noise and perturbations of marine soundscapes, affecting species communication, among other issues [13]. Understanding such "hidden" acoustic footprints can reveal both environmental justice concerns (i.e., who is causing and carrying environmental burdens?) and inter-species justice concerns (i.e., how do specific actors and species compromise other species?). Both technology and art can help to overcome humans' biological limits and support biocentric *listening*. Full-spectrum audio-loggers reveal and make quantifiable the hidden sonic footprints of actors' activities beyond the human hearing range. Musical transposition [14] and sonification [15] can translate inaudible vibrations into hearable sound. Acoustic Ecologists and artists have explored in their works the full spectrum of *geo-, bio-, anthro- and capitalophonie*s, creating aesthetic experiences for biocentric listening [16].

The creation of aesthetic works and experiences requires, in itself, careful attention to questions of ethics and politics in recording practices [10], representation and positionality [17], and sound translation and interpretation [8]. Yet, such works may dialogue well with recent interest from Political Ecologists in widening the languages used to relate to the web of life[2], forming a fertile ground for collaborations.

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[1] Adrià López Baucells, Pers. Comm. Dez 2022.
[2] See e.g., DOPE 2022 panel by Amanda Hilton and Cari Tusing on sensory approaches, Dimensions of Political Ecology (DOPE) 2022 conference: https://www.politicalecology.org/2022/sensory-approaches

## 2.3 How to account for sonic rucksacks, virtual noise?

Hidden sonic footprints occur not only over the full acoustic spectrum, but also across geographical space. Consider the case of silent electric cars rapidly expanding in cities of the Global North. From an Urban Planning perspective, electric cars are desirable to reduce local noise pollution [4]. However, their hidden (sonic) footprint is enormous and rapidly encroaches territories of customary groups in the Global South. The energy transitions materials, needed for both photovoltaic power generation and electric car batteries, substantially drive mining expansion in Indigenous Peoples' territories worldwide, exacerbating their exposure to adverse environmental burdens [18]. Noise is a central health concern of mining, reaching up to 120dB during normal operations, and up to 160dB during explosion[3]. Hence, for each dB of noise reduction achieved by electric cars in the Global North, an unknown but substantial amount of *virtual noise* was generated previously elsewhere.

The Sustainability Sciences have termed such hidden upstream impacts and resource inputs *ecological rucksacks, footprints or virtual flows,* referring to materials required in the supply chain, often at far-away places of the product or service consumed in another place. *Political Acoustic Ecology* may consider the *sonic rucksacks*, *acoustic footprints*, and the *virtual noise* embedded in global production chains. *Sonic rucksacks* raise questions of *sonic justice and equity*: i.e., how sonic environmental benefits (i.e., pleasant, healthy sounds) and burdens (i.e., noise) are distributed among diverse social groups, across centers and peripheries, and across the Global North and South.

2.4 Which role plays activism for Acoustic Ecology?

While people affected by extractive industries suffer severely from noise pollution, they are not only passive victims of environmental injustices. Affected communities often turn into key political actors that mobilize against the environmental burdens affecting their livelihoods, lands, and lifeways. Through creative forms of protest, activists politicize and shed light on unsustainable or unjust resource uses, create knowledges about alternatives, voice their grievances, and often take radical actions to stop conflictive (and noisy!) projects [19]. According to the global Environmental Justice Atlas (EJAtlas) - the world's largest database of environmental mobilizations - about 31% of all documented projects causing environmental conflicts are characterized by noise pollution. 27% of these noisy projects could be temporarily stopped or entirely cancelled, partly because of the mobilizations and oppositions of local communities, activists, and social movements against these projects (Fig 1). This illustrates that worldwide bottom-up movements, while protesting loudly at specific times and places, may significantly shape our global soundscape towards less extractivist sonic spaces, reclaiming acoustic environments for other human and non-human communities.

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[3] See https://minetek.com/mining-noise-pollution
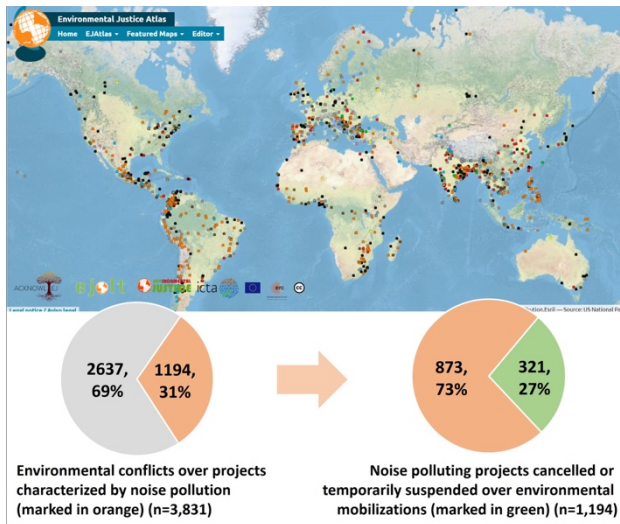
Figure 1. 1,194 environmental conflicts documented in the EJAtlas are caused by projects characterized by noise pollution (n=3,831). Own elaboration, based on www.ejatlas.org (accessed on 08.03.2023)

Also, the rise of the *degrowth* academic and social movement, aiming to counter the global social-ecological crisis by downscaling global material and energy consumption voluntarily, might well contribute to deaccelerated, quieter spaces [20]. Acoustic Ecologists concerned with the *sonic sustainability* of the global economy may well ally with degrowth proponents[4].

2.5 What role does Acoustic Ecology play in activism?

Global environmental activism importantly shapes the planet's Acoustic Ecology. Yet, which role plays Acoustic Ecology for environmental activism? Sound provides diverse narratives to experience the worlds in which people partake. Soundscapes compositions raise awareness and evoke imaginations over the social-ecological worlds people would like to maintain or transform [21]. Sound mediates relationships among sentient beings and creates communicative and empathic bridges to the more-than-human world. In this context, how can sounds and soundscape compositions act as mobilizers for activism and transformative change?

The discovery of whale songs and the invention of whale music [22] illustrates well how Acoustic Ecology shaped environmental activism. The popularization of whale sounds through Roger Payne's famous album *Songs of the Humpback Whale* created a watershed moment in movements' campaigns to save the whales, which eventually lead to the ban of deep-sea whaling in 1982. Whale sounds were not only the soundtrack of the save-the-whales movement, but, across large parts of Western society, changed how whales were perceived; from monstrous animals (as depicted in Melville's *Moby Dick*) to

highly intelligent, cultural, and sentient beings [23]. Many more inaudible sounds of the more-than-human world remain to be explored by Acoustic Ecology, which may further change society's relations to other sentient beings.[5] Acoustic Ecology has much to offer to raise environmental awareness and support environmental activism, not only by mobilizing for action through sound, but by complementing the more visible forms of activism with what Kanngieser [8] describes as more passive forms of activism, based on careful and reflective listening to the complex relations within the web of life. Such reflective listening practices, understood as *quiet activism,* may have the power to challenge hegemonic Western narratives and worldviews predominantly based on visual perception, by acting as a counter-hegemonic practice of knowledge creation (ibid).

For the current global ecological crisis, characterized by climate change, environmental degradation, and the 6th mass extinction, which listening practices and sounds will have the power to support awareness, recreate knowledges and mobilize people – quietly and loudly – to address these challenges? If whale music contributed to stop their industrial hunting, which kind of soundscapes may Acoustic Ecology explore to mobilize people and support environmental movements in mitigating the current ecological crises?

3. TOWARDS A POLITICAL ACOUSTIC ECOLOGY

In this paper, I have touched upon five points of inquiry for which the integration of concerns and approaches from Political Ecology and Acoustic Ecology may create fruitful investigations into the social-political dimensions of sonic environmental change. Research into these dimensions can reveal important issues of power, politics, and equity in the sonic environment, address concerns of sonic environmental justice and accountability, and discuss the diverse roles that non-institutional politics, such as activism and environmental campaigning, may play in shaping the world's soundscapes - and vice versa.

These lines of inquiry, far from being exhaustive and complete, may form part of a broader research agenda of *Political Acoustic Ecology,* with which I refer to the creative combination of concerns and approaches from both fields. Towards this end, Political Ecology may expand its sonic sensibilities and listen more systematically to the sonic environment, sonic narratives, and sonic forms of knowing and perceiving the world. Acoustic Ecology, in turn, may deepen its sensibilities to power, politics, conflict and justice in the exploration, documentation and creation of sonic environments. The resulting research agenda of *Political Acoustic Ecology* is vast, and inspiring works in that direction are emerging from diverse fields of study. In addition to the five lines outlined in this article, further areas of inquiry include, for example, the ethical implications of field recording [10]; the

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[4] Schafer saw two ways to address growing noise pollution; either through "ear cleaning exercises", or a "worldwide energy crisis" to "crack-up technology" [2]. Degrowth makes the case for a drastic but planned and redistributive downscaling of material and energy consumption to benefit people and the planet.

[5] For example, some bat sounds, when transposed, sound similar to birds, which contrasts prevailing depictions of bats as 'bloodsucking vampires' [1].

colonial and capitalist control dimensions of AI-based acoustic monitoring in national parks [7][6]; the inclusion of diverse acoustemologies [23] into sound and noise studies through knowledge co-production [24]; the role that traditional ecological knowledges may play in the perception and governance of the environment [25], and the possible tensions with Western forms of knowledge often considered superior [26]; issues of positionality and political representation in experiencing, recording, documenting and composing soundscapes [17]; the social construction of environmental concepts [10] such as "noise" and their potential implications for cultural gentrification; as well as systematic research into the diverse sonic forms of control of spaces, places and peoples, exercised through interventions into the sonic environment[7]. Further conversations among authors concerned with power, politics, and justice in the sonic environment, and attentive dialogues between the fields of Political and Acoustic Ecology, will form the basis for composing collectively a sound and systematic research agenda for *Political Acoustic Ecology*.

Acknowledgments

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[6] See for example the *Guardian Platform* based on AI technology by the *Rainforest Connection*, through which national parks can be acoustically surveilled against threats such as poachers and loggers (https://rfcx.org/guardian). Such developments raise important questions about who surveils whom, which forms of forest uses are considered "threats", which sonic ecosystems are considered "natural" or "disturbed", and more general how conservation initiatives are shifting from soft and hard forms to "smart" forms of territorial control.

[7] Examples of interventions into the sonic environment to control spaces, places, and people, are sonic warfare technology, high-pitched audio devices to get rid of pupils and homeless people used in some residential and urban areas, sound cannons to disperse crowds and control demonstrations, among others. See [9] for discussion of some of these.