Chapter 9

Fluid-sound

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This chapter outlines some possibilities for engaging sonically with freshwater aquatic systems. It focuses on the carrying streams of human and non-human sounds in and around water – described together here as *fluid-sound*. It offers approaches for engaging with what Hayden Lorimer (2005, 83) describes as 'our self-evidently more-than-human, more-than-textual, multisensual worlds'. Such 'non-representational' modes of engagement offer rich interdisciplinary potential for folding together techniques of geographical and artistic enquiry and production, as Phillip Vannini (2015, 3) puts it, 'a hybrid genre for a hybrid world'. Grounded in an attention to more-than-human[1] forces and processes, Derek McCormack (2015, 92) describes such exploratory methods as being about 'turning things around: defamiliarizing them; placing them in generative juxtapositionings that allow thinking to grasp a sense of liveliness of the worlds of things anew, however modestly'. Such approaches are less methodologies than styles or registers; experiential and experimental ways of being-in-the-world. This chapter is written through such registers, outlining a more-than-human approach for engaging with aquatic systems through sound, presenting three techniques for recording and collaboratively reimagining fluid-sounds.

We live in an age in which human influences have become all pervasive across global environments, shifting ecological and climatic processes and leaving traces at all scales: an era increasingly termed the 'Anthropocene'.[2] For Donna Haraway (2015, 160), the emerging epoch might be more appropriately termed the 'Chthulucene', which 'entangles myriad temporalities and spatialities and myriad intra-active entities-in-assemblages – including the more-than-human, other-than-human, inhuman, and human-as-humus'. For Haraway (2015, 2016), ongoing socio-ecological concerns prompt us (as humans) to perceive, value and empathise with assemblages of life at all scales, a process of 'living together' in in that we may 'live and die well as mortal critters' (Haraway 2015, 160) As Helmreich (2015) notes, though, if we are to take seriously calls to attend to such more-than-human assemblages, we need to pay close and critical attention to the ways in which life is brought into perceptual being. What sound recording and production offers in this context, is an opportunity to engage with often unheard and unseen more-than-human worlds: sediment decomposition,

pondweed photosynthesis, microinvertebrate activity, submerged flows, abstractions and bifurcations of water and pollutants.

Water flouts and transcends space, states, boundaries and categories; it seeps through complex and often leaky urban networks from our every pore through underground sewers to water-treatment plants, through ponds, canals, wetlands, bogs and rivers to pub cellars and swimming baths to our food, drinks and bodies. It can be alternatively clean and polluted; still and in spate; corralled and culverted in concrete yet always at risk of spilling over on to former flood plains. Water, particularly urban water, is a hybrid and dynamic medium, an often unseen and unnoticed support network for life, through which issues of capacity, resilience and adaptation are central in ecologically stressed worlds. Soundings[3] of water can be similarly mutable depending on the fluid state and space(s) of origin. For humans, listening underwater without the aid of technology can be a muffled and disorientating experience, lacking, as we do suitable organs to clearly receive underwater sound waves, as fish can through their lateral lines, or whales through specially adapted 'floating' ears (Helmreich, 2015). When frozen, water can take on a set of new acoustic properties, cracking and groaning as it physically shifts; variously dripping and popping as it melts[4]. Calm lakes and rivers can act as 'sound mirrors' for surrounding landscapes, reflecting and amplifying elements of their sonic traces.

The 'soundscape' concept is a central (and geographically inflected) means by which sound has been understood to emanate from, be shaped by, and shape the characteristics of different spaces and places. The term was developed and popularised by composer R. Murray Schafer in 1977. Schafer's framing of the soundscape as a means of understanding the 'tuning of the world' – namely its cultural and ecological components – was shaped by his concerns over the sonic impacts of noise pollution and environmental change. The centrality of such a perceiving subject in framing the soundscape (often through technological filters such as microphones) is clear in Emily Thompson's (2002, 1) contemporary definition of 'an auditory or aural landscape … simultaneously a physical environment and a way of perceiving that environment; it is both a world and a culture constructed to make sense of that world'.

In recent years, geographers have increasingly engaged with listening and sound-recording practices, leading to the nascent field of 'sonic geography' (Gallagher and Prior 2014; Gallagher 2015). Gallagher and Prior (2014, 2) suggest that 'audio recording produces distinctive forms of data and modes of engaging with spaces, places and environments which can function in different (and complementary) ways to more commonly used media such as written text, numbers and images', which can help researchers 'tell different kinds of stories to other media … particularly useful for highlighting hidden or marginal aspects of places and their inhabitants'. Attending to fluid-sound – both through listening and recording – may thus offer a valuable mode of multisensory research in multi-species landscapes (Tsing 2015), helping tease out 'small stories' of more-than-human worlds (H. Lorimer 2003), providing both

audio material for 'creative geographies', which unsettle space-times (following Massey 1992; Hawkins 2013), and a document of the ongoing rhythms and becomings in/from a landscape.

The next section of this chapter narrates encounters with fluid-sound undertaken as artist-geographer. Drawing on the process-orientated philosophy of Tim Ingold and Gilles Deleuze, the listening practices outlined by Jean-Luc Nancy, and Henri Bergson's notion of duration, it is framed by reflective accounts of practices in two 'sonic geography' projects – Water of Life (Edinburgh, 2013) and Surface Tension (London, 2015). Three techniques for listening to, recording and remaking fluid-sound are explored:

1 Hydrophone;
2 Contact microphone;
3 Tape loop.

Recordings of each fluid-sound technique can be heard and downloaded at: www.robstjohn.co.uk/portfolio/fluidsound/.

Hydrophone

On the southern edge of Edinburgh is a small loch – a pond, really – in the middle of a housing estate; dug out of the footprint of a demolished tower block. On a sunny summer's day, the air above the water's surface flickers with life: a dragonfly resting on the skeleton of a partially submerged shopping trolley; a family of coot skittering through bankside irises, their leaves waving blue shopping bag flags in the breeze. The loch's shallow bed is thick with green pondweed, but seemingly still and calm. Lowering a pair of hydrophones into the tangle of oxygenating plants, a new aquatic lifeworld becomes audible. Percussive fizzing clicks ring out across the stereo field, the result of thousands of tiny air bubbles created through pondweed photosynthesis rising through the water column. A relentless 'busyness' invisible to the naked eye; a (quite literal) diurnal rhythm shaped by sunlight. Other sounds emerge from the backdrop of pops: the burring stridulations of underwater insects, the muted calls and cheeps of the coot family refracting through the surface tension and the regular upwelling of anonymous sounds in abstraction.

Hydrophones are underwater microphones that detect sub-surface vibrations and sound waves. They allow the recordist to hear underwater soundscapes that would otherwise be inaudible. Hydrophone technologies were developed through military use in the early twentieth century, largely in a marine setting, used as a complement for sonar and in so doing facilitating early recordings of whale song (Helmreich 2015). The resulting insights hydrophones offered into both the sounds of underwater life and the sonic characteristics of water have informed the work of artists such as John Cage, Max Neuhaus, David Dunn, Peter Cusack and Jana Winderen. In particular, Dunn's (2016, 28) environmental art practice figures hydrophone listening as

means of accessing hidden more-than-human lifeworlds, suggesting that such practices can 'facilitate an increase in our collective environmental sensitivity and discovery of unknown natural and human made phenomena'.[5]

There is often a palpable sense of dislocation when underwater listening through hydrophones. Some sounds – like photosynthesis, the crackling and fizzing of icesheets, or the 'popping' noises made by marine shrimps in rock pools – are soon identifiable and strangely familiar, if rarely predictable. There are sounds that are harder to pin down: rumbles, drones, scratches; periodical intensities and silences. Some are artefacts of the hydrophone's movement on the waterbody's bed, often transmitting a sonic reflection of its materiality: the scree-slip sharpness of a gravel bed; the slow gloop of soft, stratified layers of silt. Others may be movements or sounds made by activity from underground trains or nearby industry, or the periodic abstraction or infilling of water to and from connected water networks. Perhaps the upwelling of trapped air from bottom sediments – a brief pulse of anaerobic microbial memory. Or, like a twitch on a fisherman's rod tip or float, the bow-waves of a passing shoal of fish.

Listening and recording with hydrophones has resonances with Bear and Eden's (2011) discussion of how recreational angling practices can create transformative encounters with animals, particularly fish. Drawing on Deleuze and Guattari's (1988) concept of the rhizome– characterised by a multiplicity of actors, processes and things – they write that 'becoming-fish' is 'not merely about the anglers' skilful mastery over a fish but about an affective contagion, involving an assemblage of fish, human and technology, each one already multiple. In other words, the angler and the fish 'enter into composition' with each other' (Bear and Eden 2011, 338). Critiquing Deleuze and Guattari's (1988) notion of 'becoming-animal' for its lack of curiosity about actual animals, Haraway (2008, 244) outlines an alternative notion of multispecies encounters: 'If we appreciate the foolishness of human exceptionalism, then we know that becoming is always becoming *with* – in a contact zone where the outcome, where who is in the world, is at stake'.

Hydrophones offer the potential for engaging with fluid worlds in ways akin to that Bear and Eden's angler; indeed the process of placing or throwing hydrophones beneath the surface is akin to 'fishing for sound'. However, following Haraway, we can also align it to emerging discussions around multispecies ethnography – 'how a multitude of organisms' livelihoods shape and are shaped by political, economic, and cultural forces' (Kirksey and Helmreich 2010, 545) – as a set of ongoing sonic becomings into which the listener/recordist is inherently folded. In the emerging field of multispecies enquiry, creative practices are foregrounded as a means of testing and troubling human/non-human boundaries and attending to the liveliness and agency of organisms at all scales (Kirksey 2014). There are resonances here with the styles and registers of non-representational methodologies, which similarly often incorporate creative practices in order to explore the multi-sensory and multi-model rhythms and affective[6] forces of the world (Vannini,

2015), and to the concerns of more-than-human geographies (Whatmore 2006), which acknowledge 'the lively agencies and hybrid ontologies of the nonhuman realm and ... construct accounts of human–nonhuman interaction which do not privilege human agency and consciousness' (J. Lorimer, 2009, 348).

Such an attentiveness towards the presence and potential agency of – often hidden water flows and lifeworlds – through sound has resonances with Gandy's (2004) notion of the 'urban metabolism' of water networks. Here, water – and its dynamic physical, chemical and symbolic elements and meanings – is foregrounded as an active agent in the production of space in urban areas. As a result, we might 'bring ashore' Steinberg and Peters' (2015, 248) oceanic 'wet ontology', to think with freshwater systems as 'a world of flows, connections, liquidities and becomings ... the reimagining and reenlivining of a world ever on the move'.

There are also echoes of debates in post-phenomenology (see review in Ash and Simpson 2016). In an essay 'Against Soundscape', Tim Ingold (2007) suggests that the soundscape concept frames environmental sound as something 'out there', which can be 'tuned into' by humans, when instead sound is inherently processional and co-produced by meshworks of human and non-human actors. For Ingold (2007, 11), listening to sound is instead the process of 'immersion in, and commingling with, the world in which we find ourselves'. Helmreich (2010) extends this argument, stating that the soundscape concept 'emerges from a mix of contemplative aesthetics and technologies of objectification and subjectification. The soundscape is shadowed by an acoustemology of space as given and listener as both apart from the world and immersed in it'. Acoustemology is the term coined by Steven Feld (2000, 184) to describe human engagement with sound through 'a union of acoustics and epistomology ... the primacy of sound as a modality of knowing and being in the world'.

In order to overcome this phenomenological conceptualisation of a soundscape 'out there', which is variously heard, felt and described by human perception, Helmreich proposes a transductive concept of listening underwater. For Helmreich (2007, 622), a transductive approach questions the 'cognitive, affective, and social effects of transducing – that is, converting, transmuting – sound from the medium of water into that of air'. Listening underwater is thus the simultaneous 'mixed' sensing of medium and matter, mediated through listening technologies such as hydrophones and contact microphones.[7] This approach shares a post-phenomenological perspective with Ingold (2008), in which human perception of the world is continually 'coming into being' through a constant binding and unbinding of its surfaces, substances, airs and atmospheres. For Ingold (2008), such 'geographies of mixture' are characterised by ongoing processes of amalgamation, distillation, coagulation and dispersal, in a manner akin to Mol and Law's (1994) notion of 'fluidspace', in which there are no well-defined objects or entities: rather a flow of substances that accumulate in temporary, ephemeral forms. Transduction,

then, may offer a means of understanding listening to fluid-sound in a way that unsettles fixed structures and boundaries.

The experience of engaging with water flows through transductive and interdisciplinary sound practices might be framed in terms of Deleuze's concept of the 'encounter'. For Deleuze (1968 [1994], 139), the encounter is 'something in the world [that] forces us to think', an affective force that causes a break or rupture in our habitual ways of interacting with the world, and forces us to undergo reflection or reconfiguration of these interactions. Jane Bennett (2012, 232) expresses a similar sentiment, suggesting that encounters with the world through creative processes (in this case, poetry) can 'help us feel more of the liveliness hidden in such things and reveal more of the threads of connection binding our fate to theirs'. Engaging with fluid-sound with hydrophones offers the potential to open up new spaces of encounter, which might help us perceive, comprehend and think with the different assemblages of more-than-human life with which we are intertwined (Dixon et al. 2012). Listening with hydrophones foregrounds the notion of the 'soundscape' as a collaborative, ongoing process between its source, the (technological) transductor, and (human) receiver; sounds that can alter along micro-scales afforded by minor position shifts, revealing invisible transects of diversity. Listening to fluid-sounds offers the potential to attend to the multiple flows, processes and soundings of worlds woven through by water, and typified by temporary and sometimes uncertain human and non-human forces: splits and joins, currents and eddies, suspensions and dissolutions, becomings and disappearances.

Contact microphone

The trail begins in the city archives; following the trail of the first water systems through Edinburgh; water sprung from the Pentland hills, and run through wooden pipes to the growing city. In the late 1600s, a series of springs were routed to a single wellhouse, and each of the spring wellheads marked by a lead sculpture of an animal: a fox, a swan, a lapwing and a hare (rumours of an additional owl remain inconclusive). The stone wellhouse, a small chapel-like structure with a triangular roof, has been out of use since the 1940s, a relic of a pre-industrialised era of water management. Standing in a small playing field bordering the city bypass, the structure has a resurgent vegetative upwelling of its own, as nettles and brambles tangle towards the sky, entwined with shaky security barriers; a circle of unruly life where the park's mower can't reach. The spectre of the sculptures (taken to the city museum in the 1960s) lends a sense of animism as much as the water does a sense of animation. Whatever, for now, the wellhouse is off limits; quiet in the midsummer bloom. Teetering on the lip of an unstable metal fence, I reach its heavy black metal door; which barely sounds when tapped with a fist. A pair of small contact microphones, each roughly the size of a two-pence piece, are jammed into the gaps between the metal door and its stone frame. Transmitting through trailing black wires in the undergrowth to headphones laid out on

the grass, the building's subtle rumbles and resonances are suddenly audible: the unmistakable ebbing flow of water; less a roar than an yawning/becoming of water springing forth. The ruin reframed by flow: as ongoing, as emergent.

Contact microphones (or piezos) sense audio vibrations through contact with solid objects: transductors of sound waves and physical movements mediated through material. They can be variously clipped (with woodworking clamps), stuck (with electrical tape) or wedged (into cracks in rock or bricks) into material. Contact microphones thus offer the practitioner the potential to access hidden rhythms of the world, means of abstracting invisible water flows across all manner of surfaces – a 'lost' urban river running under a manhole cover, the rattle of a long fence wire caught by flood water, the bell tones of a submerged dock cable chain, the braided trails of water through a ruined building.

Jean-Luc Nancy's (2007) distinction between the processes of 'listening' and 'hearing' is a useful means of conceptualising the use of contact microphones. For Nancy, to hear (*entendre*) is to understand and contextualise a broadly recognisable sound: he suggests 'a siren, a bird, or a drum' (ibid., 6). On the other hand, to listen (*écouter*) is 'to be straining toward a possible meaning, and consequently one that is not immediately accessible' (ibid., 7), whether an unfamiliar sound, piece of music or sound art, or ideas in speech. The listening process, for Nancy, is 'one where sound and sense mix together and resonate in each other, or through each other' and where 'to be listening is always to be on the edge of meaning . . . a resonant meaning, a meaning whose *sense* is supposed to be found in resonance, and only in resonance' (ibid.).

Listening and recording with contact microphones can detect otherwise inaccessible rhythms and resonances through material; in so doing, opening up spaces of possibility, encounter and meaning. Sounds abstracted from their source can generate a (sometimes tense) range of affective intensities somewhere between curiosity, imagination and frustration. As John Cage (1952/1967) might have put it, the listener is prompted to hear such sounds 'in themselves', stripped of referentiality. But, following Nancy, such strained listening to unheard resonances of the world may create fertile proving grounds for extending human perception of our entanglements with more-than-human worlds through fluid-sound.

Contact microphones are frequently used in experimental music and sound art practices as a means of teasing otherwise-inaccessible sounds from everyday objects and instruments (Gottschalk 2016). They are cheap and straightforward to build with a basic understanding of DIY electronics. Contact microphones have a unique capacity to access and record emergent sounds, rhythms and resonances in the landscape. Seemingly inert materials can be heard as animated, lively and fluid through contact microphones, as they variously transmit, filter and refract audio vibrations. Water as a weathering, sculpting, shaping, percolating, seeping, seeding agent of change is foregrounded here by

sound. There is vast potential, as a result, for practitioners seeking to engage with post-human notions of the agency and fluidity of 'inert' non-human materials and objects such as rocks (e.g. Bennett 2009; Cohen 2015; Dixon et al. 2012; Yusoff 2014), through contact microphones. Contact microphones, in short, can help reveal the seemingly inert as inherently lively.

Tape loop

A bucket of Lea river water is carried back on the train from London to Lancashire; fluorescent specks of duckweed caught around the rim like abandoned archipelagos, deltas of minor spills seeping along the carriage floor. Split across a series of darkroom trays, the water – collected from a stretch of the lower river lit by eutrophic, oily slicks (organic traces of the city's excesses) – becomes a developing bath for sounds recorded in and around the Lea. Recordings of the river's soundings are dubbed on to 1/4' tape using a reel to reel recorder, and loop short lengths of tape: top to tail; source to mouth. Each loop roughly the length of outstretched arms, carrying a few seconds of abstracted sound embedded in a magnetic layer. Shimmering like elvers, the loops are left for varying lengths of time in the developing baths – a day, a week, a month – and then dried and replayed. The action of the water, its organic life and dissolved pollutants gradually alter and erode the surface of the tape, leaving thin threads of discontinuity: braids and knickpoints. When replayed, some of the 'developed' tapes transmit more noise than signal; the recording only haunting the edges of white noise, generated here (perhaps counter-intuitively) by still, rather than turbulent waters. A small number are transformed in a different way. A loop revolves: the white tape marker of the join – like a depth marker on a river bank – travelling out from the spool, around a heavy glass bottle of water, and back again. Each orbit shifts subtly; new rests and reconfigurations of a fracturing melody and pealing rhythm, until finally, a submerged sort of silence.

There are numerous ways of bringing recordings of fluid-sound together in forms that might be used in multi-media academic/artistic publications, presentations, installations and releases, drawing from thick (and often entwined) histories of sound art and music (Connor 2010; Gough 2016). One such technique is the tape loop. Recordings made with hydrophones, contact mics and other sources can be dubbed onto magnetic tape, which is then cut into sections and spliced into loops. Tape loops can be physically altered by their durational immersion in aquatic environments: a technique that might be understood as an experimental collaboration with more-than-human forces and processes to create sound pieces for which the recordist has only set the starting points for emergence.

Such practices owe a debt to New York artist and composer William Basinski. In 2001, Basinski began digitising a series of tape loops[8] of synthesiser music he had made in the early 1980s. Replaying the loops on a reel-to-reel recorder, Basinski (2001) found that intervening years had caused the tapes' magnetic strips to decay and warp:

> I soon realized that the tape loop itself was disintegrating: as it played round and round, the iron oxide particles were gradually turning to dust and dropping into the tape machine, leaving bare plastic spots on the tape, and silence in these corresponding sections of the new recording . . . Yet the essence and memory of the life and death of this music had been saved: recorded to a new media, remembered.

His resulting work, *Disintegration Loops*, consists of six separate loops repeating and decaying for anything up to an hour, each altering in substantially different ways.[9] Basinski draws a direct link between the fallible materiality of the magnetic tape layer and the slow decay of human memory and bodies (Gough 2016). The magnetic tape has a lively 'body', which is slowly reduced to flaking dust by the action of playback, an ever-eroding sense of granularity and atomism revolving in creative-destructive tension.

Disintegration Loops signposts the potential of using tape loops as a means of engaging sonically – and non-representationally – with aquatic lifeworlds. In the vignette above, recordings of the River Lea in London – made using contact and hydrophone microphones – were dubbed onto tape alongside sparse cello and piano instrumentation responding to their fluctuations. The Lea is one of the most polluted and modified rivers in Britain. The combined (if difficult to quantify) action of microbial decomposition, the physical effects of submergence in water, and the effects of suspended and dissolved inorganic pollutants etch and decay the 'body' of the magnetic tape, adding new layers of process and alteration to a discrete snippet of space and time encoded in sound. Working with environmentally 'developed' tape loops offers possibilities for recorded fluid-sounds to be shaped and altered in an emergent process of creative destruction tied to the biological and chemical processes of a particular place or space: a polluted water bath, an anaerobic bog, a discarded cup of morning coffee.

As ongoing, emergent moments of space-time caught between accumulation and disintegration, repetition and change, tape loops are a generative means of engaging with water flows, processes and lifeworlds through sound. For Connor (2010, 4), 'loops are parentheses, procrastinations, pockets of time and space which are held apart from the general conditions of propagation and passing away . . . a loop saturates space, filling it up from the inside out'. In the constant state of 'feedback' in tape loops, Gough (2016, 95) writes that, 'individuals and objects, or individuals and events, mobilize each other; they are both agents. Both the discrete instances and continuous processes are necessary for history to "run"'. Loops, then, can trouble time and space and muddle intention and outcome; oscillating in a constant state of tension and reciprocal sonic change and becoming.

Here, Henri Bergson's (1946) notion of duration (or *la durée)* is useful for conceptualising the use of disintegrating tape loops. For Bergson, time should be conceived as a flow or continuum, in which the past, present and future permeate each other, producing beings and events in an ongoing processional

'becoming'. In short, time is always mobile and incomplete; a multiplicity of ephemeral moments of different rhythms, vibrations, tensions, dilations and contractions. The revolving tape loop is a procession of sonic moments, each shaped by historical conditions and choices (the environment, the recorder, the recordist, the tape), but never quite the same; an ongoing echo of worldly spaces, processes and conditions; a durational topology of chance.

A pre-history to such approaches can be found in auto-destructive art. Writing in 1960, Gustav Metzger, the chief architect of the movement states, 'Auto-destructive art demonstrates man's power to accelerate disintegrative processes of nature and to order them … Auto-destructive art is the transformation of technology into public art' (cited in Stiles and Selz 2012, 470). Through the use of acid paints, smashing glass and entropic sculptures, 1960s artists like Metzger and Jean Tinguely pointed to how destructive artistic processes could (perhaps counter-intuitively, initially) inform a new mode of creative practice and production, closely engaged with socio-political and ecological concerns. More recently, the artist-academic Daro Montag (2001) has created a series of 'bioglyphs' using photographic negatives and paper, artefacts traced by the activities of micro-organic life, created by burying films in earth or placing organic matter such as decaying fruit upon their surface. Similarly, the artist and musician Richard Skelton created a series of recordings (e.g. *Landings*, 2009) based around a series of instruments buried on the West Pennine Moors, then exhumed and played.

The concept of emergence is central to such auto-destructive (or, in many senses auto-*creative*) work, particularly that of Montag and Skelton. Emergence is an organising principle in which larger or more complicated phenomena arise through interactions among smaller or simpler phenomenon (Johnson 2001). The emergent phenomena cannot be reduced to the properties or characteristics of their constituent parts. Emergence is a concept that takes on different registers and meanings in different disciplinary realms, and is central to Henri Bergson's (1946) vitalist philosophy.[10] Thinking with emergence can help us see the way that other things – pondweed, water or sediment, say – have powerful agency in shaping worlds, both vast and tiny, and that our lives as humans are forever caught up in these entangled webs of coexistence. Allowing for emergence in research and practice creates space to be challenged, surprised or disappointed. Starting points for enquiry and process are set – durational recordings taken in a space, place, transect or drift; technological means for engaging with the rhythms of the world – and then potentially unpredictable (in)organic patterns and processes are encouraged. 'Environmental' production techniques, of which ecologically altered tape loops are only one,[11] offer the potential for the outcomes of such a 'sonic geography' to be determined by worldly processes such as disintegration and decay; perhaps aptly in an age of socio-ecological uncertainty, flux and environmental change.

Practically, such tape-loop approaches require modest amounts of equipment and expenditure. Their primary investment for the artist-geographer is

one of time: to make, edit and dub recordings onto tape; to conceptualise and carry out a fluid alteration or degradation process (if deemed appropriate); and to play back the resulting sound loops over sufficient duration that any shifts in their character, intensity and affectual resonances become apparent. This is, evidently, slow work with no guarantee of emergent outcomes. But, such slowness and uncertainty of outcome can lend a productive tension to the research process, and particularly to any (re)presentation of the work in installations, presentations and releases. As a disintegrating tape loop shifts over the duration of its playback it initiates both the practitioner and listener (*sensu* Nancy) into an unfolding sense of attentive, or 'strained', listening. In other words, through the durational process of replaying a dynamic loop of sound, meaning is constantly accumulating, fragmenting and disintegrating through a series of resonances and referrals. The listener becomes inherently folded into the fluid dynamics of recorded spaces and human and non-human traces 'becoming' (*sensu* Bergson) through sonic forms in unstable processes mediated by the collective actions of the artist-researcher and the mediating technologies.

Looping and (re)sounding

Drawing on experiences and experiments as an artist-geographer, this chapter has traced a set of techniques for interdisciplinary engagements with aquatic environments using sound. It highlights the potential of drawing from thick lineages of creative practice to inform and extend contemporary geographical and socio-ecological debates, events and (non)representations. As McCormack (2015, 100) writes, this involves

> taking a familiar technique from one context [in this case sound art] and showing how it can do a qualitatively different kind of work in another, and in a way that remakes that technique, or inventively inflects it, or transforms it such that both it and world in which it is situated are rendered strange.

A common thread to all of the processes described here is the role of more-than-human assemblages of humans, non-humans, materials and technologies enrolled in the co-production (and potential disintegration) of fluid-sound. In many ways, this approach represents a break from many established modes of sound recording, concerned with clarity, fidelity and the isolation of individual sounds.[12] In effect, the techniques here form part of ongoing conversations about how socio-ecological and geographical researchers may become 'creative' or 'experimental' in their practice (e.g. Hawkins 2013), and particularly in how their work may attend to the non-representational rhythms, affects and intensities of the world (H. Lorimer 2015). The spirit of this chapter, then, is to encourage ongoing experiments to expand to possibilities of creative research and practice through fluid-sound.

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Notes

1 Defined by Sarah Whatmore (2006, 604) as 'modes of enquiry [that] neither presume that socio-material change is an exclusively human achievement nor exclude the "human" from the stuff of fabrication [and] attend closely to the rich array of the senses, dispositions, capabilities and potentialities of all manner of social objects and forces assembled through, and involved in, the co-fabrication of socio-material worlds'.
2 For original Anthropocene terminology, see Crutzen and Stoermer (2000); for a post-colonial reading of how the concept unsettles imaginaries of the 'human', see Chakrabarty (2009); and for a folding of process-orientated cultural theory and conservation biology in the Anthropocene, see J. Lorimer (2015).
3 Helmreich (2015: xi) reframes the oceanographic term *sounding* as one that is useful 'for investigating things not yet known, things whose limits are not clear or whose boundaries may be obscured – perhaps by the sounding apparatus itself'.
4 The sound of melting ice-caps and calving glaciers might be figured as a 'sound-mark' (analogous to a distinctive terrestrial 'landmark' (in Schafer's (1977) terms) of ongoing climate change; explored in sonic works including Chris Watson's *Weather Report* (2004) and Katie Paterson's *Vatnajökull* (2007).
5 Dunn's (2016) work on using contact microphones to sense (and, ultimately manage) the destructive agency of pinon bark beetles in California is a notable example of such art-ecologies in practice.
6 H. Lorimer (2008, 552) describes affects as 'properties, competencies, modalities, energies, attunements, arrangements and intensities of differing texture, temporality, velocity and spatiality, that act on bodies, are produced through bodies and transmitted by bodies'.
7 See Sterne (2003) for a discussion in the role of technology in mediating listening practices and cultures.
8 Repeating loops of audio tape; used by mid-twentieth-century music concrète and minimalist composers such as Pierre Schaeffer, Steve Reich, John Cage and Karlheinz Stockhausen.
9 See https://williambasinski.bandcamp.com/album/the-disintegration-loops.
10 See Ash and Simpson (2016) for a review of the centrality of emergence in post-phenomonological approaches; Kirksey (2015) for a review of the concept of emergence through non-equilibrium ecologies, dynamic conservation approaches and process-based environmental art; Bateson (1972) for a cybernetics-inflected exploration of emergence in social and ecological systems.
11 Digital audio loops can be produced using software such as Max MSP. Similarly, sonification is a popular emerging means of making worldly rhythms, patterns and process audible through the 'sonification' of datasets (e.g. Palmer and Jones 2014), but there remain significant questions over the tensions between the aesthetic qualities, affective responses and actual representations of the world that they generate.
12 See the variety of contemporary sound recording perspectives and practices offered in Lane and Carlyle (2013).

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