

UNIVERSITY OF CALIFORNIA
SANTA CRUZ

**ATTUNING TO THE PLURIVERSE:
DOCUMENTARY FILMMAKING METHODS, ENVIRONMENTAL
DISASTERS, & THE MORE-THAN-HUMAN**

A dissertation submitted in partial satisfaction
of the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

FILM & DIGITAL MEDIA
with an emphasis in ANTHROPOLOGY

by

Isabelle M. Carbonell

December 2022

The Dissertation of Isabelle Carbonell is
approved:

Professor Irene Gustafson, chair

Professor Anna Friz

Professor Anna Tsing

Peter Biehl
Vice Provost and Dean of Graduate Studies

Copyright © by
Isabelle M. Carbonell
2022

Table of Contents

List of Figures	iv
Abstract	viii
Dedication	xi
Acknowledgements	xii
Introduction	1
Chapter One Multispecies Cinema Methods	24
Chapter Two Interactive Documentary for Watery Disasters	70
Chapter Three Uncovering the Bleeding-Through of Slow Violence	94
Conclusion	182
Appendix of audiovisual works	189
Bibliography	206

List of Figures

<i>Underwater in Mar Menor</i>	1
<i>A langostino in the foreground and a human in the background</i>	11
<i>Anguillas, or eels from Mar Menor</i>	13
<i>A common blow-up toy seen in Mar Menor, with real flamingoes nearby in abandoned salt flats</i>	15
<i>Mining tunnel from Cueva Victoria</i>	17
<i>Still from my film Baffle Their Minds with Bullsh*t, Kerry Leigh (2011)</i>	30
<i>Deckhands Jack and Ack sweep the jellyballs into the hold</i>	38
<i>Darien waters: A 14-year-old deckhand swings from the ropes</i>	40
<i>A long-nosed spidercrab on a cannonball jellyfish</i>	41
<i>Wynn captaining the helm</i>	44
<i>Author shooting jellyfish with a GoPro and recording with a hydrophone in the hold</i>	46
<i>An endoscope on a common land snail in Santa Cruz, CA</i>	48
<i>Mangrove swamp roots that are just a few centimeters high. Vieques, Puerto Rico. Captured with an endoscope</i>	50
<i>Still from the endoscope of the cannonball jellyfish</i>	55
<i>Spy-camera velcroed to a large, invasive land-snail. The images produced from this situation open up The Golden Snail Opera</i>	61
<i>Homepage of the interface of The River Runs Red</i>	70
<i>Two rivers merging to form the Rio Doce. Clean water on the left, the mine tailings on the right</i>	78
<i>GoPro on a cow, being licked by a bull</i>	88
<i>Wave crashing over a GoPro</i>	89
<i>Sample dialectic screen from the interface of The River Runs Red</i>	92
<i>Mar Menor: a postcard from paradise</i>	97
<i>The Mar Menor beach scene</i>	106

<i>The Mar Menor lagoon. Source: Map data © 2022 Google Earth.</i>	108
<i>Mar Menor relative to the Sierra Mountain Range. Source: Map data © 2022 Google Earth.</i>	114
<i>Escombreras, Spain's oldest petrochemical port, nearby Mar Menor.</i>	119
<i>Maria Elena dancing flamenco on top of Cabezo Rajao.</i>	121
<i>Billboard of "Real Spain in the heart of the sunshine coast"</i>	131
<i>Close-up of hydrochloric acid tailings at an abandoned mining site.</i>	133
<i>An open-pit mine leaching acid, surrounded by agricultural fields, less than a kilometer from Mar Menor.</i>	138
<i>Hydrochloric acid puddle after rainfall in Llano del Beal, with Mar Menor in the background.</i>	139
<i>Jose Matias Castejón, showing us an abandoned processing site for lead and zinc.</i>	140
<i>Maria showing me the open-pit mine a few steps from Llano del Beal.</i>	143
<i>Army, with guns, guarding the mines against the town's protest.</i>	144
<i>Aerial map showing Portmán Bay. Source: Map data © 2022 Google Earth.</i>	147
<i>Archival image of Lavado Roberto dumping tailings straight into the Mediterranean. Source: Jose Matias personal archive.</i>	149
<i>The flow of water between Llano del Beal to Rambla del Beal. Source: Map data © 2022 Google Earth.</i>	151
<i>El Campo de Cartagena. Source: Map data © 2022 Google Earth.</i>	152
<i>Teenagers doing wheelies on toxic ground in front of Mar Menor.</i>	154
<i>Andres posing in a contamination suit on Rambla del Beal.</i>	157
<i>Mar Menor is to the left, the Mediterranean to the right, and La Manga in the middle.</i>	161
<i>The oldest map found of Mar Menor. Anonymous manuscript. Archive of the Real Chancillería de Granada. Source: R. Baragaño Alvarez (Ed.) y S. Alonso Navarro (Dir.) in the Gran Enciclopedia de la Región de Murcia. Murcia. Ayalga Ediciones. 1992, t. 3, p. 105.</i>	163
<i>Archival images of La Manga from the 1960s. Source: Dominguez, Jose Luis. De Cabo De Palos A La Manga Del Mar Menor Del Siglo Xv Al Xx. Edlibrix. 2016.</i>	164

<i>A tourist floating in Mar Menor</i>	166
<i>Callinectes sapidus, or the American Blue Crab on the shore of Mar Menor</i>	173
<i>Miguel Vivas dissecting Callinectes sapidus</i>	174
<i>Callinectes sapidus underwater in Mar Menor, filmed with an endoscope</i>	175
<i>Medusa’s Mirage: A Tidal Opera. Sample screening space with three-channel installation</i>	189
<i>October 22, 2022 installation of “La Manga” chapter of Medusa’s Mirage in the Aeroclub of Como, Italy</i>	190
<i>October 22, 2022 installation of “La Manga” chapter of Medusa’s Mirage in the Aeroclub of Como, Italy. Lake Como in the background.</i>	191
<i>Andres posing in a contamination suit in Mar Menor</i>	192
<i>Close-up of “moon-milk” a type of mine-tailing residue flowing down to Mar Menor</i>	193
<i>A grasshopper shot with a macro lens</i>	194
<i>Foam created by either the DOW chemical plant across the river, or a nearby sugarcane processing facility. Ants ate this foam avidly</i>	195
<i>Ants using a twig as a bridge over to river foam to eat</i>	196
<i>The radio installation in use in a sample installation space</i>	197
<i>Aurelia or “moon jellyfish” polyps, filmed with an endoscope in an aquarium in Piran, Slovenia</i> ...	198
<i>Author listening to one of the river channels. Installation at the Poetics and Politics conference in Santa Cruz, CA</i>	199
<i>The Camel Race poster; camels just breaching the finishing line</i>	200
<i>The Blessed Assurance poster with festival screenings and awards</i>	201
<i>Homepage of The River Runs Red, with each word being a link</i>	202
<i>Sample dialectic screen from the interface of The River Runs Red</i>	202
<i>Gopro on a mule, about to drink water from the Rio Doce</i>	203
<i>The Golden Snail Opera poster. Two images blended together that show the snail’s “POV” combined with the rice paddy they so often reside in</i>	204

Original interface conceived for the Cultural Anthropology Journal. This is now no longer active. 204

Abstract

Attuning to the Pluriverse: Documentary Filmmaking Methods, Environmental Disasters, & The More-Than-Human

Isabelle M. Carbonell

This practice-theory dissertation focuses on expanding the documentary form to better attune to the more-than-human in order to trace the slow violence that leads to environmental disasters. At the heart of this dissertation is a new mode of filmmaking, called *multispecies cinema* which centers the more-than-human through several methodological expansions. The groundwork for the collapse of an ecosystem is often invisible within a human timeframe, encompassing connections across species, elements, genres, time and space too temporally and spatially vast, too micro- or macroscopic to be captured as visible evidence, and instead, needs speculative practices to register these scalar frequencies. While multispecies cinema is rooted in hard science and ethnographic fieldwork methods, it attempts a reorientation and a recalibration of the senses: to relearn different ways to see, to hear, to feel and to understand an ecosystem in flux. In essence, this dissertation explores how cinema can be a potential world-making methodology that allows us to decenter the anthropos in the so-called Anthropocene.

The Anthropocene, however, is not a monolithic event, but rather an ongoing patchy, emplaced aggregation of slow violence that is *bleeding-through* to the present – and future. This work considers how a multispecies cinema requires new techniques

to challenge human exceptionalism and practice attuning to the pluriverse. This includes expanding the interview beyond the human, expanding the act of listening beyond the human ear, and expanding the close-up beyond the human face. In tandem, two expansions of the term attunement are proposed: *thick emplacement*, which argues for deep, place-based observations, and *panesthesia*, which argues for an awareness of all human senses in order to form an active correspondence with the more-than-human.

Building on these place-based methods, waterscapes launch us into a different type of world-making practice, and are a prime site to investigate the *bleeding-through* of slow violence. The dissertation examines interactive documentaries (i-docs) which focus on bodies of water, and how multilinear narrative structures provide new opportunities to decenter the human in the representation of environmental disaster. The main case study is the *The River Runs Red* (2018), an i-doc which showcases the world's largest tailings disaster on the Rio Doce in Brazil. The project attunes to the river's more-than-human ghosts to challenge an anthropocentric, totalizing narrative around the aftermath and the river's many stories.

This work culminates in a deep ethnographic dive into the ecological collapse of the Mar Menor lagoon in Southeastern Spain, as portrayed in the feature film *A Mirror of the Cosmos* (2022). The film and the writing center the lagoon, and explore how Mar Menor as an ecosystem struggles to survive centuries of destructive anthropogenic actions.

In conclusion, this dissertation argues for a close attunement to the more-than-human in order to challenge human exceptionalism and practice attuning to a pluriverse in the hopes that what futures are possible are a shared decision, a consensus for which a multispecies cinema can have a pivotal role.

Dedication

I dedicate this dissertation to my human family, especially my mother, my husband, my daughters, my brother and sister-in-law, my nephew and niece. I dedicate this as well to my father, who passed away during the writing. I also dedicate this work to all the more-than-humans which have deeply inspired me to connect to all that is alive, and to stay endlessly curious.

Acknowledgements

As with all things in life, nothing is ever made alone. Therein lies the folly of authorship. While this is “my” dissertation, so many have helped me along the way.

Thank you first and foremost to my advisors: Irene Gustafson, Anna Friz, and Anna Tsing. You were excellent stewards of my journey, and true companions to dream with besides. Your support through difficult times has been invaluable, as well as advice and mentorship on my professional opportunities. Thank you to the FDM department as a whole, as it is still rare to find practice-theory programs in film. Other very important mentors were Irene Lusztig, the late Jonathan Kahana, TJ Demos, Gustavo Vazquez, and Sharon Daniel. My peers: Abram (Aphid) Stern, Topiary Landberg, Francesca Romeo, Luling Osofsky, Patricia Alvarez. My collaborators in the field and off-screen: Lucas Bonetti, Yen-Ling Tsai, Joelle Chevrier, Hannah Meszaros Martin, Sarah Cannon, and especially Duane Peterson and Andres Camacho. A few publishing opportunities helped to bring this dissertation to life, and I thank the various editors (TJ Demos, Kathleen Marie Ryan, Jason Fox, Mauricio Godoy, Sander Holskens) and anonymous peer-reviewers who helped sharpen my writing along the way. Receiving a fellowship from the Center for Creative Ecologies and the Mellon foundation, and winning a grant from the Princess Grace Foundation, were incredible financial and emotional buttresses along the way that reminded me: yes, this work matters.

I want to acknowledge the tremendous support and help I got in the various field sites – in Taiwan, Georgia, Brazil, the Mississippi, Italy, Slovenia, and finally

Spain. A few standouts who remain invisible but shouldn't be: Woody Carroll back in Santa Cruz for all the equipment support. Tiziano Sambo and Gianluca Franceschini in Chioggia opened so many doors, I got on an anchovy-sardine ship within days of arriving in a town where I knew no one. Tjaša Kogovšek in Piran led me to filming the much-sought-after aurelia polyps. The real heroine who connected me to all nodes in my research in Mar Menor was Isabel Rubio. A chance encounter with author Fiona Pitt-Kethley, and reading her unpublished field guide-memoir, gave me more ideas than she'll ever know. I also thank Chip Lord for making me dream big with my art, and for emailing me that I should apply to this (life-changing) conference on the Mississippi. I thank the HKW team, who organized the Mississippi trip and invited me as a featured artist to canoe down a part of it, and all the wonderful adventurers and friends I gained from this journey to think and play with for years to come.

I think the real reason the writing accelerated has been my children, and my great listener and pep-talking, tough-love, coffee-bringing, give-me-your-phone, here's-a-calendar, I'm-taking-the-kids-now-go-write husband. In addition, my pragmatic and loving brother, who threw down a challenge that accepting this job in Paris might mean I would never finish the thesis.

Lastly, thank you to my mother, Madeleine Graitson. She has read every single word of this dissertation and been, with a PhD in linguistics, my over-qualified editor. I hope to do the same for my children.

Introduction



Underwater in Mar Menor

In both theory and practice, this work is the result of an interdisciplinary commitment to film studies and production, multispecies anthropology, and environmental science. As such, my work as an experimental filmmaker has focused in part on expanding the documentary form to attune to more-than-human life in the aftermath of man-made environmental disasters. I argue that developing new filmic methodologies is important in order to challenge human exceptionalism, decenter the human and practice attuning to the pluriverse, or a “world of many worlds.”¹ A pluriverse acknowledges that multiple ontologies coexist, and that humans and more-than-humans are all negotiating life and death in relation to one another in a constant

¹ Marisol de la Cadena and Mario Blaser, eds., *A World of Many Worlds* (Durham: Duke University Press, 2018), 4.

entangled evolution. Acknowledging and accounting for a pluriverse is necessary in the face of man-made environmental disasters and their long aftermaths which involve actors, and temporalities, far beyond human ones.

I call this type of filmmaking a *multispecies cinema*.² While rooted in hard science and ethnographic fieldwork methods, it calls for acts of speculation which attempt a reorientation and recalibration of the senses: to relearn different ways to see, to hear, to know, to feel and to understand an ecosystem in flux and the long-now of these ecological crises. In this dissertation I explore different methods of attunement via filmmaking both in writing and in critical practice. Ultimately, I am investigating whether cinema can be a potential world-making methodology that allows a decentering of the anthropos in the Anthropocene. Does decentering the human allow for new experiences and representations in the aftermath of slow violence?

No doubt, the category of “human” represents a complex, differentiated sociopolitical and economic construction, not to mention the term does not acknowledge the pluriverse within a body - more accurately described as “holobionts,”³ or an assemblage of a host and the many organisms living in or around

² Isabelle Carbonell, “Multispecies Cinema in Wretched Waters: The Slow Violence of the Rio Doce Disaster,” in *The Routledge Companion to Contemporary Art, Visual Culture, and Climate Change*, ed. T. J. Demos, Emily Eliza Scott, and Subhankar Banerjee (New York ; Abingdon, Oxon: Routledge, 2021).

³ Lynn Margulis and Rene Fester, eds., *Symbiosis as a Source of Evolutionary Innovation: Speciation and Morphogenesis*, 1st edition (Cambridge, Mass: The MIT Press, 1991).

it. To take stock of the violence of colonial destruction that has resulted in oppressed,⁴ subaltern,⁵ less-than-human, and otherized⁶ perspectives and persons, various terms have been used, such as “sacrificial people”⁷ or “nobodies,”⁸ or even the sci-fi “Terrans.”⁹ However, I will continue to use the term “humans” to denote every member of the human species while stressing that humans are neither a united, nor an undifferentiated whole. In turn, “more-than-human” is defined to include not only humans, but also whole ecosystems, landscapes, mammals, amphibians, plants, water, viruses, stone like quartz, and even quarks.

Though “Anthropocene” or the “Age of Man” has been proposed as a new epoch to describe today’s various global environmental crises, other scholars have proposed alternative names, including “Capitalocene”¹⁰ and “Chthulucene”¹¹ as correctives. The renaming aims at avoiding the simplistic, universalizing discourse of “Anthropocene,” which assigns the culpability for global environmental crisis equally to all humans as an undifferentiated whole. However, I will continue using the term Anthropocene, as it has become a homing call for a conversation around different

⁴ Frantz Fanon, Jean-Paul Sartre, and Homi K. Bhabha, *The Wretched of the Earth*, trans. Richard Philcox, Reprint edition (New York: Grove Press, 2005).

⁵ Gayatri Chakravorty Spivak, “Can the Subaltern Speak?,” in *Colonial Discourse and Post-Colonial Theory* (Routledge, 1994).

⁶ Edward W. Said, *Orientalism*, 1st Vintage Books ed edition (Vintage, 2014).

⁷ Naomi Klein, “Let Them Drown - The Violence of Othering” (Lecture, Edward W Said London Lecture, Southbank Center, London, May 4, 2016).

⁸ Eduardo Galeano, *El libro de los abrazos*, 5. ed edition (México, D.F: Siglo XXI, 2001).

⁹ Eduardo Viveiros de Castro and Déborah Danowski, “Humans and Terrans in the Gaia War,” in *A World of Many Worlds*, ed. Marisol de la Cadena and Mario Blaser (Durham: Duke University Press, 2018), 172–204.

The Journal of Peasant Studies 44, no. 3 (May 4, 2017): 594–630.

¹¹ Donna Haraway, *Staying with the Trouble: Making Kin in the Chthulucene* (Durham: Duke University Press Books, 2016).

complex environmental issues and provides a theoretical frame for the environmental disasters I dive into in this work.

The Anthropocene, however, is not a monolithic event, but rather an ongoing patchy, emplaced aggregation of slow violence that is *bleeding-through* to the present – and future. Landscapes and waterscapes are often palimpsests of land, water, time, space, and beings. A palimpsest is a piece of writing, most often on a parchment, where the original text has been erased to make room for new writing. In archeology, there is the “cumulative palimpsest” of place, in which “the successive episodes of deposition, or layers of activity, remain superimposed one upon the other without loss of evidence, but are so re-worked and mixed together that it is difficult or impossible to separate them out into their original constituents.”¹² The superimposition uses the same paper, the same place, and sometimes the earlier writing/doing bleeds through again, depending on the process used to erase it in the first place. A palimpsest then is not just about the overwriting, but rather about the *bleeding-through*. I argue that this is the method to understanding the slow violence of an ecosystem: where do the toxic histories of land and water bleed through to the present? How to notice, and attune to, the bleeding-through, is the challenge of much of my film and written work.

Anthropologist Joseph Masco argues that when the atomic bomb was invented, the possibility of instantaneous total death from nuclear war caused a systemic shift in thinking that changed people’s ability to define catastrophe such that

¹² Geoff Bailey, “Time Perspectives, Palimpsests and the Archaeology of Time,” *Journal of Anthropological Archaeology* 26, no. 2 (June 2007): 12, <https://doi.org/10.1016/j.jaa.2006.08.002>.

it is no longer even possible to configure or pay attention to a slower crisis, no matter the evidence at hand.¹³ Slower events might be defined as accumulating nitrates in a lagoon, the lead poisoning of a river, or climate change – disasters which Rachel Carson called “death by indirection.”¹⁴ Carson’s groundbreaking research on health problems caused by synthetic pesticides, and subsequent book *Silent Spring* in 1962, laid the groundwork for how to systematically document, pay attention to, and narrativize slow violence. Humanities scholar Rob Nixon, inspired from Carson, frames the matter as a “slow violence” that occurs “gradually and out of sight, a violence of delayed destruction that is dispersed across time and space, an attritional violence that is typically not viewed as violence at all.”¹⁵ Nixon’s frame is especially helpful for this dissertation in coding a type of essential temporality within environmental violence. He names the inaction, the inertia, the inability humans have to pay sustained attention to a place-based nonspectacular violence, which poses challenges of representation with its relative invisibility, slowness, and collectivity. The myopia to slow violence is also reinforced by the “issue-attention cycle” in mass media, an issue economist Anthony Downs theorized in 1972.¹⁶ Media theorists McComas and Shanahan take up Downs’ theory and contend that it is not just the

¹³ Joe Masco, “Catastrophe’s Apocalypse,” in *The Time of Catastrophe: Multidisciplinary Approaches to the Age of Catastrophe*, ed. Christopher Dole (Ashgate, 2015).

¹⁴ Rachel Carson, *Silent Spring*, Anniversary edition (Boston: Mariner Books, 2002).

¹⁵ Rob Nixon, *Slow Violence and the Environmentalism of the Poor*, Gld edition (Cambridge, Mass.: Harvard University Press, 2013).

¹⁶ Anthony Downs, “Up and down with Ecology—the ‘Issue-Attention Cycle,’” in *Agenda Setting: Readings on Media, Public Opinion, and Policymaking*, ed. David Protes and Maxwell E. McCombs (Routledge, 2016).

waxing and waning of attention cycles, but the way environmental issues (specifically climate change) are presented through narrative structure and style that elicit, or discourage, a sustained concern or action on the part of the readers.¹⁷ Geographer Susanne Moser argues that the challenges communicators face when trying to convey environmental problems are many: "...invisibility of causes, distant impacts, lack of immediacy and direct experience of impacts, lack of gratification for taking mitigative actions, disbelief in human's global influence, complexity and uncertainty..."¹⁸

The combination of Masco, Carson, and Nixon, brought into conversation with film, provides an essential frame for this writing: it is through a spectacular, man-made possibility – total atomic annihilation – that humans have become myopic to man-made environmental violence – which is slow, attritional, and invisible. I argue that filmmaking – as a field working method as well as a representational instrument – can be an essential tool to (re)learn how to perceive slow violence using new experimental methods that engage a multispecies coexistence. Film can make slow violence visible and audible. Film can produce experiences of accumulation, useful for discerning the accretion of slow violence. Film can provide a temporal ellipsis to address the different temporalities of environmental disaster. Film can be non-linguistic, which can help bridge to the more-than-human. Film can juxtapose

¹⁷ Katherine McComas and James Shanahan, "Telling Stories About Global Climate Change: Measuring the Impact of Narratives on Issue Cycles," *Communication Research* 26, no. 1 (February 1, 1999): 30–57, <https://doi.org/10.1177/009365099026001003>.

¹⁸ Susanne C. Moser, "Communicating Climate Change: History, Challenges, Process and Future Directions," *WIREs Climate Change* 1, no. 1 (2010): 31–53, <https://doi.org/10.1002/wcc.11>.

multiple layers of history and reveal the ways slow violence bleeds-through to the present.

The myopia to slow violence can also be mitigated by cultivating a method of attunement I call a *thick emplacement*. This term makes a nod towards anthropologist Clifford Geertz' well-known theory of "thick description,"¹⁹ where an observation should be made with as much context as possible, as social behavior is rooted in elaborate social and cultural settings. I combine this theory with anthropologist Sarah Pink's concept of "emplacement," where she seeks to transcend the turn in anthropology towards embodiment, towards making sure that senses have roots in a specific place, and that they are, in essence, *emplaced*. In addition, anthropologist Anna Tsing calls for a deep form of observation called "arts of noticing".²⁰ These three approaches in combination make up thick emplacement. This type of attunement is a core conceptual frame of both theory and practice in this entire dissertation, situating research questions and various interventions in a larger ecology, indeed, in a pluriverse. It connects senses, thoughts, ideas to place, demanding a rich contextualization. This sometimes takes the form of a film, a sound piece, an installation, or descriptive, ethnographic writing.

Thick emplacement – which applies to both film and writing, in the field and post-fieldwork – arose alongside a second type of attunement method I call

¹⁹ Clifford Geertz, "Thick Description: Towards an Interpretive Theory of Culture," in *The Interpretation of Cultures*, ed. Clifford Geertz (Basic Books, 1973).

²⁰ Anna Lowenhaupt Tsing, *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins* (Princeton University Press, 2015), 37.

panesthetic attunement. By layering and taking into account all of one's own senses in the field, a human is able then to create an active correspondence with the world and find the resonances in common with the more-than-human. Senses have materiality, and it is through human and nonhuman senses that we can find the worlds we overlap in a shared coexistence. These two fieldworking methods, thick emplacement and panesthetic attunement, are core conceptual frames which inform this entire dissertation.

This work also considers a range of water-based theoretical approaches and literacies. Echoing the concept of emplacement, media theorist Melody Jue, in thinking deeply through, with, and in the ocean, calls for a “milieu-specific analysis,” which pays attention to “the differences between perceptual environments and how we think within and through them as embodied observers.”²¹ Since the sea offers immersive conditions such as three-dimensional movement and omniphonic sound, the ocean is a great milieu to re-evaluate perceptions humans have taken apriori on land. Jue shows how these “cognitive estrangements” produce the ability to see the limits of terrestrial theorizing. Karin Amimoto Ingersoll also argues for a “seascape epistemology,”²² which develops an “embodied literacy of the ocean” as opposed to land-centric viewpoints to place-making. While I experienced a radical reorientation, and disorientation, of my senses when I first learned to scuba dive in the

²¹ Melody Jue, *Wild Blue Media: Thinking through Seawater*, Illustrated edition (Durham: Duke University Press Books, 2020), 3.

²² Karin Amimoto Ingersoll, *Waves of Knowing: A Seascape Epistemology* (Duke University Press Books, 2016).

Mediterranean, my aquatic milieu was the Mar Menor lagoon (my ethnographic project in chapter three). As such, it was less about being submerged, and more about an embodied encounter with the medium of the lagoon-water itself: among innumerable layers, the water has a memory of mine tailings – showing up in jellyfish bodies²³ – and a growing algae bloom problem. Subsequently, a huge storm then galvanized the entire surrounding land like a funnel, directing detritus, nitrate runoff, fresh water, and mine tailings into an already immuno-compromised saline lagoon. I think of the opacity in the water I encountered with my body for weeks, and then how the millions of fish encountered this thick opacity – which eventually became anoxic – and later died.

Jue argues that, “specific thought forms emerge in relation to different environments, and that these environments are significant for how we form questions about the world, and how we imagine communication within it.”²⁴ This foundational argument is precisely why so much of this dissertation takes great pains to provide place-specific ethnographic information and history, such as for Rio Doce, or for Mar Menor. This then contextualizes the thinking, the theory, and the practice. Water-based ecosystems launch us into a different type of world-making, where the assemblage of a lotic ecosystem generates many worlds.²⁵

²³ Ana Muñoz-Vera, Gregorio García, and Antonio García-Sánchez, “Metal Bioaccumulation Pattern by *Cotylorhiza Tuberculata* (Cnidaria, Scyphozoa) in the Mar Menor Coastal Lagoon (SE Spain),” *Environmental Science and Pollution Research* 22, no. 23 (December 1, 2015): 19157–69, <https://doi.org/10.1007/s11356-015-5119-x>.

²⁴ Jue, *Wild Blue Media*, 5.

²⁵ Marisol de la Cadena and Mario Blaser, eds., *A World of Many Worlds* (Durham: Duke University Press, 2018).

Though a reorientation of senses occurs in part from a cognitive estrangement to milieu, I also use specific filmic tools, like the endoscope, to reorient/disorient my human senses for the express purpose of decentering my anthropocentrism and attempting to “think” with the more-than-human. Anthropologist Stefan Helmreich, while on his first submarine trip, cataloged the range of instrumentation the scientists needed to perform their research: submersibles, sonar, remotely operated vehicles (ROVs), hydrophones, etc. Helmreich argues that only through “transduction”²⁶ are humans able to listen underwater, watch the seafloor, measure and map the deep. Technological mediation is *necessary* to study the ocean. The same, I believe, applies to most bodies of water. I particularly resonate with this theory in my practice as I am mediating my direct observations constantly through instruments: cameras, recorders, endoscopes, contact microphones, aerial drones, and underwater drones to name a few. Transduction enables an expansion of human senses, and opens new perspectives that challenge human exceptionalism. Endoscopes, as a transducer, for example, give me an ability to perform a type of close-up that is impossible for the human eye. They allow me to access very small spaces, producing a surrealism of scale possible by its microcinematography. They are lightweight, and possible to affix to, say, the shell of a snail. Or go inside a jellyfish bell. Or shoot upwards through a three-leaf clover. None of these examples claim a “point-of-view” but rather a scalar interplay that reorients a human gaze.

²⁶ Stefan Helmreich, “An Anthropologist Underwater: Immersive Soundscapes, Submarine Cyborgs and Transductive Ethnography,” in *The Sound Studies Reader* (Routledge, 2012), 168–85.

At the same time, it is impossible to avoid human exceptionalism: this is a dissertation, made by me, a human, to be read by other humans, using a human language. My film work is using tools made for humans and my films, sound pieces, and installations are to be experienced by humans. Notwithstanding the unavoidable human exceptionalism, decentering the human allows lagoons like Mar Menor, or rivers like the Rio Doce to become fractal connectors, place-based palimpsests, tying together and superimposing entire continents, civilizations past and present, humans with nonhumans, sediments with atoms.



A langostino in the foreground and a human in the background

In sum, I am especially committed to developing films about *ecosystems* over time, tracing multispecies lifeways affected by environmental disaster.²⁷ The

²⁷ The three films which originally made me want to become a filmmaker are all films about ecosystems: *Darwin's Nightmare* (2004) by Hubert Sauper, *Our Daily Bread* (2005) by Nikolaus Geyrhalter, and *Baraka* (1992) by Ron Fricke. Decades later, my work is in conversation with films

assemblage of an ecosystem is often invisible within a human timeframe, encompassing connections across species, seasons, elements, time and space too vast to be captured as visible evidence and instead needing speculative methodologies. In addition, in order to decenter the human, this type of cinema requires new narrative structures and new cinematographic approaches: techniques which are polyvocal, multi-linear, world-making. Filmmaking also allows for a non-linguistic attunement to the world. Though human speech and language remain a very important part of my films, having a non-linguistic set of tools allows a communication portal that is more democratic with the more-than-human, appealing to other modes of knowing that are more sensorial and visceral.

such as these, which all use various speculative methodologies: *Seahorse* (1933) by Jean Painlevé, *Mothlight* (1963) by Stan Brackage, *Powers of Ten* (1977) by Charles and Ray Eames, *Cane Toads: An Unnatural History* (1987) by Mark Lewis, *Ilha das Flores* (1989) by Jorge Furtado, *still/here* (2001) by Christopher Harris, *Manufactured Landscapes* (2006) by Jennifer Baichwal, *Old Heart* (2009) by Anocha Suwichakornpong, *The Plastic Bag* (2009) by Ramin Bahrani, *Into Eternity* (2010) by Michael Madsen, *Fantomas* (2010) by Andre Novais Oliveira, *Songs for Earth and Folk* (2013) by Cauleen Smith, *A Park for the City* (2014) by Nicole Macdonald, *Single Stream* (2014) by Ernst Karel / Toby Lee / Pawel Wojtasik, *Soon it Would Be Too Hot* (2014) by Jeanne Liotta, *La Cabeza Mató a Todos* (2014) by Beatriz Santiago Muñoz, *Makoko Sawmill* (2015) by Karimah Ashadu, *Crow Requiem* (2015) by Cauleen Smith, *Behemoth* (2015) by Zhao Liang, *INAATE/SE/ [it shines a certain way. To a certain place/it flies.falls.]* (2016) by Adam and Zack Khalil, *By the Time it Gets Dark* (2016) by Anocha Suwichakornpong, *Serpent Rain* (2016) by Denise Ferreira and Arjuna Neuman, *Sublime Seas* (2017) by John Akomfra, *Wild Relatives* (2018) by Jumana Manna, *The Hottest August* (2019) by Brett Story, *In Vitro* (2019) by Larissa Sansour and Søren Lind, *Essa Terra é Nossa!* (2020) by Isael and Sueli Maxakali & Carolina Gangucu & Roberto Romero, *Sons of Monarchs* (2020) by Alexis Gambis.



Anguillas, or eels from Mar Menor

In turn, these speculative methodologies, attempting to decipher ecosystems over time, lend themselves well to essay filmmaking. The essay film, as a method, is especially useful in being able to combine the different approaches needed to represent, and investigate, slow violence and the more-than-human. Essayistic filmmaking is a rich multifaceted category that has generated plenty of debate and definitions,²⁸ but central to its practice, as film scholar Laura Rascaroli posits, is that it is a “hybrid form that crosses boundaries and rests somewhere between fiction and

²⁸ Paul Arthur, “Essay Questions: From Alain Resnais to Michael Moore,” *Film Comment* 39, no. 1 (2003); Nora M. Alter, “The Political Im/Perceptible in the Essay Film: Farocki’s ‘Images of the World and the Inscription of War,’” *New German Critique*, no. 68 (1996): 165–92, <https://doi.org/10.2307/3108669>; Rick Warner, *Godard and the Essay Film: A Form That Thinks* (Northwestern University Press, 2018); Phillip Lopate, “In Search of the Centaur: The Essay-Film,” *The Threepenny Review*, no. 48 (1992): 19–22; Elizabeth Papazian and Caroline Eades, *The Essay Film: Dialogue, Politics, Utopia* (Columbia University Press, 2016); Nora M. Alter, “Translating the Essay into Film and Installation,” *Journal of Visual Culture* 6, no. 1 (April 1, 2007): 44–57, <https://doi.org/10.1177/1470412907075068>.

nonfiction cinema.”²⁹ Film scholar Nora Alter adds, “The term essay is used because it signifies a composition that is in between categories and as such it is transgressive, digressive, playful, contradictory, and political.”³⁰ The “essayistic” modality is especially useful as it echoes the original connotation from the French word *essai* which is a “trial, an attempt” (which comes from the Latin *exigere* “to drive out, examine, test”). As film scholar Luka Arsenjuk elaborates, “I wish to place the stress here on the meaning of the essay as ‘attempt’, which signals both incompleteness and exertion of effort, labor without the guarantee of a result.”³¹ His description for essayistic filmmaking neatly encapsulates practice as a whole, “The status of the essay-attempt is better grasped in relation to a different opposition, namely that of the possible and impossible... [where] form delineates the contours of an impossibility.”³² He then refers to this as “im/possible”. I think of practice this way as well: an attempt, not a success or a failure, but an *attempt* at what is im/possible, and in short, mess does not signal failure but rather *process*, and process is sometimes undefinable except by it being im/possible. The essay film, as a slippery im/possible open-ended method, is a documentary modality well-suited to an emplaced, embodied, and multi-species inquiry.

²⁹ Laura Rascaroli, “The Essay Film: Problems, Definitions, Textual Commitments,” *Framework: The Journal of Cinema and Media* 49, no. 2 (2008): 24.

³⁰ Nora Alter, *Projecting History: German Nonfiction Cinema, 1967-2000* (Ann Arbor: University of Michigan Press, 2002), 7–8.

³¹ Luka Arsenjuk, “‘To Speak, to Hold, to Live by the Image’: Notes in the Margins of the New Videographic Tendency,” in *The Essay Film: Dialogue, Politics, Utopia*, ed. Elizabeth Papazian and Caroline Eades (Wallflower Press, 2016), 276.

³² Arsenjuk, 276.



A common blow-up toy seen in Mar Menor, with real flamingoes nearby in abandoned salt flats

One of my last conversations with renowned documentary scholar Jonathan Kahana, before he passed away, was about the conundrum of how to categorize my film work after a decade of calling myself a documentary filmmaker. I wasn't making "classical" fiction films, but I wasn't making "traditional" documentaries. Kahana implored me to stick with documentary, while challenging the form. The essay film does this well, even if not all my work neatly fits in this unbounded category. Scholar Nico Baumbach, ruminating on Rancière's theory of the fictional capacity of documentary, says:

Documentary, perhaps more than any other 'art form', can explore the capability of fiction to play on the intertwining of art and forms of life. [...] In other words, we need not think of the documentary as constrained by the logic of the real but rather a mode of 'fiction' freed from the logic that demands...the real as effect. [...] Facts, which is to say both what counts as fact, but also how facts can be assembled to both construct or interrupt

meanings, is the terrain of a kind of film fiction, which we can call documentary.³³

And indeed, while I sometimes have the reflex to consider documentary a straitjacket I need to bust out of (down with talking heads!), it is actually a deeply contested practice,³⁴ an incredibly productive space that allows for rich inquiry of many different forms. Documentary is not a monolith, but rather a mode that authorizes an investigation of the real, and of how filmmakers might produce arguments about what that is. All film forms can "productively collapse"³⁵ which is why I started calling my work "sci-fi documentary" to point to an interdisciplinarity, and to a merger between fact and fiction, present and future tenses.

³³ Nico Baumbach, "Jacques Rancière and the Fictional Capacity of Documentary," *New Review of Film and Television Studies* 8, no. 1 (March 2010): 66, <https://doi.org/10.1080/17400300903529356>.

³⁴ Patricia R. Zimmermann and Helen De Michiel, *Open Space New Media Documentary: A Toolkit for Theory and Practice*, 1 edition (New York, NY: Routledge, 2017); Brian Winston, *The Documentary Film Book*, 1st edition (British Film Institute, 2019); Paul Arthur, "Jargons of Authenticity," in *The Documentary Film Reader: History, Theory, Criticism*, ed. Jonathan Kahana, 1 edition (Oxford ; New York: Oxford University Press, 2016), 890–900; Jonathan Kahana, ed., *The Documentary Film Reader: History, Theory, Criticism*, Illustrated edition (Oxford ; New York: Oxford University Press, 2016); Judith Aston and Sandra Gaudenzi, "Interactive Documentary: Setting the Field," *Studies in Documentary Film* 6, no. 2 (January 1, 2012): 125–39, https://doi.org/10.1386/sdf.6.2.125_1; Patricia Aufderheide, "Ethical Challenges for a Documentarians in a User-Centric Environment," in *New Documentary Ecologies: Emerging Platforms, Practices and Discourses*, ed. C. Hight and C. Summerhayes, 2014 edition (Basingstoke, Hampshire New York, NY: Palgrave Macmillan, 2014); Erika Balsom and Hila Peleg, eds., *Documentary Across Disciplines* (Cambridge, MA: The MIT Press, 2016); Sheila Curran Bernard, *Documentary Storytelling: Creative Nonfiction on Screen*, 3rd edition (Amsterdam ; Boston: Focal Press, 2010); Trinh T Minh-Ha, "Documentary Is/Not a Name," in *Documentary*, ed. Julian Stallabrass (London : Whitechapel Gallery ; Cambridge, Massachusetts: The MIT Press, 2013), 68–77.

³⁵ Genevieve Yue, "Field Notes \ Programming Experimental Documentary - World Records," *World Records Journal, The Exceptions*, 6, no. 04 (April 26, 2022), <https://worldrecordsjournal.org/field-notes-programming-experimental-documentary/>.



Mining tunnel from Cueva Victoria

This is, as I wrote in the beginning, a practice-theory dissertation. Practice and theory ricochet for me, shimmering back and forth, each seeding ideas and epiphanies for the other. Practice itself takes a certain amount of messiness, an open-endedness that can be hard to put into words, harder even to theorize. Many decisions in the field are based on intuition, thoughts that are more muscle-memory than words. I “dance” with my camera(s) and recorders, movement integral to how I interact with my surroundings, how I interact with the space around me.

Choreographer Twyla Tharp frames practice as “scratching.” For her, a choreography doesn’t deliver itself whole cloth onto a stage from her mind, but rather

comes in “molecules of movement.”³⁶ It is the same with my own film work. Many small moments – such as watching seaweed crash like confetti underneath a wave, or listening to the wind produce a ghostly sound over a metal fence, or getting lost and driving by a faded billboard that says “Futurize yourself!” – can spur much bigger ideas. Tharp writes that scratching is fundamentally at first about improvising without consequence, and that it can’t be a cerebral process: “...I couldn’t think my way into a dance. To generate ideas, I had to *move*.”³⁷ It is the same for me with the camera or the recorder, in a new environment. I move through space with my body, framing and unframing, tuning and detuning my senses, and these overlapping movements and senses begin to make connections.

Walter Murch, who was an editor for many Hollywood blockbuster movies, writes that he needs to stand while he’s editing in order for his cuts to feel rhythmic, embodied, natural.³⁸ My process, both in the field and afterwards, is located in a specific space and time, it is emplaced, it is embodied, and it is contingent. As musicologist Jean-François Augoyard notes, “As often happens, art already grasps what knowledge does not yet perceive.”³⁹ My practice is instrumental to my thinking. Methods, then, are essential to unpack. Though I predominantly focus on the fieldwork, both in terms of filmmaking and sensory attunement, much happens in

³⁶ Twyla Tharp and Mark Reiter, *The Creative Habit: Learn In and Use It for Life*, 1st edition (New York: Simon & Schuster, 2006), 99.

³⁷ Tharp and Reiter, 100.

³⁸ Walter Murch and Francis Ford Coppola, *In the Blink of an Eye: A Perspective on Film Editing*, 2nd Edition, 2nd edition (Los Angeles: Silman-James Press, 2001).

³⁹ Jean-François Augoyard and Henri Torgue, *Sonic Experience: A Guide to Everyday Sounds* (Montreal ; Ithaca: McGill-Queen’s University Press, 2006), 4.

post-production. This dissertation was a type of “post-production” where writing informed my practice as much as my practice informed my writing. Writing and theorizing allow me to name, label, deepen, and reconsider intuitions in the field. Editing is similar: the process includes reflection, analysis, choices, structure. I work often with editors, but I also edit my own work, which informs the way that I think and shoot.

Putting my work into conversation with other thinkers, makers, artists, and writers is challenging and productive. As I stated, this is a deeply interdisciplinary dissertation, and I am constantly thinking in parallel between film studies and methods, anthropology, and environmental science. I have three chapters, each of which perform and embed a multidisciplinary approach.

In chapter one, I argue for a new type of filmmaking which I call a *multispecies cinema* by expanding the interview beyond the human, expanding the act of listening beyond the human ear, expanding the close-up beyond the human face, and expanding a sensorial attunement during fieldwork. I question if the interview, a ubiquitous tool in both documentary filmmaking and anthropology, can have a methodological expansion beyond the human. I briefly trace the historical roots of the interview, as well as the practice of so-called “talking heads.”⁴⁰ I go in depth around an accidental 18-hour interview I made in my film *The Blessed Assurance* (2018)

⁴⁰ The interview-driven documentary using a predominantly “talking head” aesthetic and structure (in environmental films and documentary more generally) is common in our mainstream media landscape, but also often used in non-mainstream documentaries. For example: *The 11th Hour* (2007), *Shored Up* (2013), *The Great Invisible* (2014), *The Forgotten Space* (2010), *Into Eternity* (2010)... and more. The list could be a very a long one.

with a boat captain, and other beings at the same time. In seeking to challenge human exceptionalism, and acknowledge the co-existence of multiple worlds and temporalities, this chapter suggests a new approach to thinking about the interview, leading to a practice I call a *panesthetic attunement*. I question the concept of the exchange needing to be constituted of human voices. What if interviewing is actually a practice of expanded listening?⁴¹⁴² How might humans attune to forms of agency that do not possess cochlear listening?⁴³ I consider also an expansion of the close-up beyond the human face. To explore all of these expansions, I analyze examples from two artists: *Testimonios Futuros* (2007) by Barbara Fluxa, and *Listening to the Mississippi* (2015/2019) by Monica Haller. In addition, I draw an example from a collaborative project I participated in called *The Golden Snail Opera* (2016). The chapter keeps asking: How can a human body attune to different spatio-temporal

⁴¹ Michael Gallagher, "Field Recording and the Sounding of Spaces," *Environment and Planning D: Society and Space* 33, no. 3 (June 1, 2015): 560–76, <https://doi.org/10.1177/0263775815594310>; Michael Gallagher, "Sounding Ruins: Reflections on the Production of an 'Audio Drift,'" *Cultural Geographies* 22, no. 3 (July 1, 2015): 467–85, <https://doi.org/10.1177/1474474014542745>; Michael Gallagher, Anja Kanngieser, and Jonathan Prior, "Listening Geographies: Landscape, Affect and Geotechnologies," *Progress in Human Geography* 41, no. 5 (October 1, 2017): 618–37, <https://doi.org/10.1177/0309132516652952>; Whitney Johnson, "The Emancipated Listener Embodied Perception and Expanded Discourse," *Resonance* 2, no. 3 (September 1, 2021): 334–52, <https://doi.org/10.1525/res.2021.2.3.334>; George Revill, "How Is Space Made in Sound? Spatial Mediation, Critical Phenomenology and the Political Agency of Sound," *Progress in Human Geography* 40, no. 2 (April 1, 2016): 240–56, <https://doi.org/10.1177/0309132515572271>.

⁴² A few pieces of sound art which attempt an "expanded listening" are: *Beneath the Forest Floor* (1996) by Hildegard Westerkamp, *Cuckoo by Radiometer*, *Chernobyl* (2012) by Peter Cusack, *Fire and Frost Pattern* (2006) by Andreas Bick.

⁴³ Aura Satz, "The Listening Cobweb," Show, Exhibition or Event, *The Contemporary Journal* (The Listening Cobweb, Nottingham, UK: Nottingham Contemporary, June 1, 2021), <https://thecontemporaryjournal.org/strands/sonic-continuum/the-listening-cobweb>; Will Schrimshaw, "Non-Cochlear Sound: On Affect and Exteriority," in *Sound, Music, Affect: Theorizing Sonic Experience*, ed. Ian Biddle and Marie Thompson (London and New York: Bloomsbury Academic, 2013), 27–43.

registers, that allow an encounter to an environment, an ecosystem, a being and acknowledge their co-production of the world(s)?

In chapter two, which builds on methods introduced in chapter one, I argue that waterscapes launch us into a different type of world-making practice,⁴⁴ and as such, bodies of water are prime sites to attune and investigate the palimpsest of slow violence. This chapter dives especially into the conceptual frame of slow violence,⁴⁵ and how centering a body of water in the approach, the questions, and the filmmaking methods challenge human exceptionalism. I ask how ecosystems, those that have been a locus of environmental devastation, can survive beyond their “double death.”⁴⁶ The chapter explores several interactive and VR film and sound projects from other artists featuring ecosystems in trouble, and the innovations their distinct interfaces bring to the genre of interactive documentaries. The ecosystems, mostly water-based, span the Guadalquivir River in Spain, the Everglade swamps in Florida, a forest in California, as well as Chad Lake which straddles Niger, Chad, Nigeria, and Cameroon.⁴⁷ Lastly, I feature a deep ethnographic dive into the Rio Doce’s colonial and extractive history, where the world’s largest tailings disaster occurred in Mariana, Brazil in 2016. I explore the process of making my interactive documentary *The River*

⁴⁴ Ingersoll, *Waves of Knowing*; Jue, *Wild Blue Media*; Cadena and Blaser, *A World of Many Worlds*.

⁴⁵ Rob Nixon, “31 Slow Violence, Gender, and the Environmentalism of the Poor,” *Postcolonial Studies: An Anthology*, 2015, 515.

⁴⁶ Deborah Bird Rose, “Double Death,” Academic, *The Multispecies Salon* (blog), November 17, 2014, <http://www.multispecies-salon.org/double-death/>.

⁴⁷ *Guadalquivir*, Interactive Documentary (RTVE, 2013), <http://lab.rtve.es/guadalquivir/>; *Swampscapes*, VR, Documentary, 2019, <http://www.swampscapes.org/guides.html>; *The Great Animal Orchestra* (Foundation Cartier, 2016), <https://www.legrandorchestredesanimaux.com/en>; *Le Lac*, Interactive Documentary, 2019, <https://www.nyashakadandara.com/le-lac>.

Runs Red (2018), based on the Rio Doce and this irreversible disaster. I discuss the process of how this i-doc came together: experimental shooting and recording methods, the editing process creating the 43 short films, and the making of the interface which enabled a multi-linear riverine story. This i-doc attempts to attune to the river's more-than-human ghosts and challenge an anthropocentric, totalizing narrative around the aftermath and the river's many stories.

In chapter three, the concepts, theories, methods, and case-studies from the previous two chapters culminate in concert with a deep ethnographic dive into the ecosystem of the Mar Menor lagoon. Using the methods of thick emplacement and panesthetic attunement, this chapter traces the *bleeding-through* of slow violence on the land, water, and the bodies of humans and nonhumans. Finding the bleeding-through is a way to attune to the slow violence in these complex places which are multi-temporal, multi-layered, with multispecies concerns. So often, the more-than-humans are relegated as an externality in discussions of slow violence in the arrogance of human exceptionalism, when it is human-nonhuman interrelationships which are at the center of an ecosystem in trouble. This ethnography traces the lagoon's accumulative slow violence: from silver mining during the time of the Romans, to the 1950s industrial open-pit mining, to the agricultural revolution of the surrounding land, to invasive species introductions, to a recent mushrooming coastal tourism. As said earlier, often, slow violence is slow only until there is a cliff, a point of no return. Then humans pay attention. This happens in chapter two with Rio Doce, and it happens as well with Mar Menor. Yet, media narratives move on, memories are

short, and the urgency of right-now supersedes an attritional, accumulative reality. It is hard to stay attuned with the temporality needed to understand the true cost of an environmental disaster to an ecosystem and all its relations, human or more-than-human. It can also be difficult to acknowledge that these disasters are irreversible, difficult or impossible to clean up – how to pay attention when there might not be a solution? For the residents of Mar Menor, the fish-die off led to a historical win: Mar Menor became the first ecosystem in Europe to gain full legal rights. The fieldwork in Mar Menor resulted in four practice-based works: a feature film, *A Mirror of the Cosmos* (2021/2023), a radio installation called *Portal Blooms* (2020), a short film called *A Mirror of the Earth* (2021), and an ongoing three-channel installation named *Medusa's Mirage: A Tidal Opera*. The works, along with the writing, center the lagoon, celebrating the possibility for ongoingness, to stay with the trouble of figuring out how the Mar Menor, and any ecosystem in trouble because of a cumulative set of anthropogenic actions, can survive beyond the end of the world.

Chapter One | Multispecies Cinema Methods

A Panesthetic Attunement to More-Than-Human Worlds

The Blessed Assurance (2018)

<https://vimeo.com/289791862>

Password: cannonball

The Golden Snail Opera (2016)

<https://anthrosource.onlinelibrary.wiley.com/doi/full/10.14506/ca31.4.04>

The Golden Snail Opera (2019)

<https://vimeo.com/325446772>

My work as an experimental filmmaker has focused in part on expanding the documentary form to attune to more-than-human life in the aftermath of man-made environmental disasters. I argue that developing new filmic methodologies is important in order to challenge human exceptionalism, decenter the human and practice attuning to the pluriverse, or a “world of many worlds.”⁴⁸ As stated in the introduction, a pluriverse acknowledges that multiple ontologies coexist, and that humans and more-than-humans are all negotiating life and death in relation to one another in a constant entangled evolution. Acknowledging and accounting for a pluriverse is necessary in the face of man-made environmental disasters and their long aftermaths which involve actors, and temporalities, far beyond human ones. Seeking techniques for decentering human exceptionalism in documentary film, and

⁴⁸ Marisol de la Cadena and Mario Blaser, eds., *A World of Many Worlds* (Durham: Duke University Press, 2018), 4.

acknowledging the co-existence of multiple worlds and temporalities, this chapter develops several expansions: an expansion of the interview beyond-the-human, an expansion of listening beyond the human ear, an expansion of the close-up beyond the human face, and an expansion of attunement in fieldwork, culminating in a new genre of cinema I am calling a *multispecies cinema*.⁴⁹ While rooted in hard science and ethnographic fieldwork methods, it calls for acts of speculation which attempt a reorientation and recalibration of the senses: to relearn different ways to see, to hear, to feel and to understand an ecosystem in flux and the long-now of these ecological crises. Essential to this cinema are two expansions of the term attunement: *thick emplacement*, which argues for deep, place-based observations, and *panesthesia*, which argues for an awareness of all human senses in order to form an active correspondence with the more-than-human. Along the way, I provide several case-studies: my own project *The Blessed Assurance* (2018), Barbara Fluxa's *Testimonios Futuros* (2007), Monica Haller's *Listening to the Mississippi* (2015/2019), and a co-produced project *The Golden Snail Opera* (2016/2019). Ultimately, I am investigating whether cinema can be a potential world-making methodology that allows a decentering of the anthropos in the Anthropocene, enabling new experiences and representations in the aftermath of slow violence.

⁴⁹ Carbonell, "Multispecies Cinema in Wretched Waters: The Slow Violence of the Rio Doce Disaster."

Who Cares About the Interview?

The tool *de rigueur* in many documentaries, ethnographic films, and research methods more generally, is the interview. It is synonymous with documentary filmmaking. Undoubtedly, interview methodologies in practice and in theory, when discussed, usually remain firmly in the realm of *Homo sapiens*. While it is usually assumed that the interview is an exclusively anthropocentric method of inquiry and research, it is my contention that the term calls out for an expansion beyond the human. And yet, immediately, questions arise: how can humans tune to otherness in an open-ended way? How can humans “listen otherwise”⁵⁰ and simply stay with something, receptive or engaging, experiencing a resonance in the world without translation? As a tool that is so essential to filmmaking, it is vital to expand and play with the form to meet new challenges in the field. The interview, as it is currently popularly understood, limits the ability to see and hear beyond what one thinks they already know. Seeking techniques for decentering human exceptionalism and acknowledging the co-existence of multiple worlds and temporalities, this chapter suggests a new approach.

A-roll, B-roll, and Ventriloquists

Documentary is not a monolith. However, the mainstream approach in documentary still heavily uses the interview as a main structural device, thanks to

⁵⁰ Lisbeth Lipari, “Listening Otherwise: The Voice of Ethics,” *International Journal of Listening* 23, no. 1 (January 8, 2009): 44–59, <https://doi.org/10.1080/10904010802591888>.

fundlers, grants, festivals and other such gatekeepers whose priorities are first and foremost financial. Interviews provide a formulaic, predictable approach to making a documentary. The words “predictable” and “guaranteed” and “has worked before” are the kinds of things business wants to hear. This has undoubtedly boxed documentary into a specific formula, one which uses the interview in a specific way, at least in the mainstream. There have been many turns in documentary that have questioned, reinvented, and expanded on the form of the interview, such as *cinema vérité*, or the observational mode or swaths of other older and more recent work, too much to list here. No doubt, documentary is a deeply contested space. And yet, I am interested to dive a little deeper into the practice of the “traditional” interview practice, as it remains so persistent in a mainstream conceptualization of what a documentary is.

In mainstream documentary films⁵¹, there is a whole host of verbiage that orients itself entirely to the interview-as-backbone-of-the-film method. For example, terms are used such as “A-roll” (the interviews) and “B-roll” (images which support the interviews), or needing a “paper edit” prior to editing images or other sounds. As a transcript of a documentary's vocal track, the paper edit lays down all spoken words, without indication of inflections, or of any diegetic or non-diegetic sounds. The text is then cut and pasted to create a flowing argument that is the structure of the film, and images are found to fill out this structure. Bill Nichols calls this making “a

⁵¹ The interview-driven documentary using a predominantly interview-based structure, as well as a “talking head” aesthetic is common in our mainstream media landscape, but also often used in non-mainstream documentaries. A few examples, which lean in the environmental documentary direction, are: *The 11th Hour* (2007), *Shored Up* (2013), *The Great Invisible* (2014), *The Forgotten Space* (2010), *Into Eternity* (2010)... and more. The list could be a very a long one.

series of imaginary puppets conform to a line.”⁵² Irina Leimbacher describes this technique as “ventriloquizing the invisible authorial presence who appears to grant them agency only in order to conceal his or her own.”⁵³ Often agency is ascribed to this approach as “giving a voice to the voiceless,” supposedly to empower those without a platform. However, as investigative journalist Katherine Boo points out, “The problem (then, now) is not a lack of voices but of listeners.”⁵⁴ More plainly, film critic Louis Morcorelles, in 1973, commented: “Thousands of bunglers have made the word [documentary] come to mean a deadly, routine form of filmmaking...the art of talking a great deal during a film, with a commentary imposed from the outside, in order to say nothing, and to show nothing.”⁵⁵ Since funding gatekeepers want a predictable formula that will provide a return on investment, this type of approach to the interview is still very present in the current media landscape.

Origins of the Interview

How did the interview become so integral to the documentary? Journalist Michael Schudson documents the rise of the use of the interview in newspapers as a means of evidence and information-gathering from the late 1800s to the present.

⁵² Bill Nichols, “The Voice of Documentary,” *Film Quarterly* 36, no. 3 (1983): 27, <https://doi.org/10.2307/3697347>.

⁵³ Irina Leimbacher, “Hearing Voice(s): Experiments with Documentary Listening,” *Discourse: Journal for Theoretical Studies in Media and Culture* 39, no. 3 (December 21, 2017): 295, <https://digitalcommons.wayne.edu/discourse/vol39/iss3/2>.

⁵⁴ Katherine Boo, “On Not ‘Giving Voice to the Voiceless,’” *The Pulitzer Prize*, accessed April 8, 2021, <https://www.pulitzer.org/article/not-giving-voice-voiceless>.

⁵⁵ Louis Marcorelles, *Living Cinema; New Directions in Contemporary Film-Making*. (New York: Praeger, 1973), 37.

Though hard to believe, in American journalism, “asking questions was not regularly practiced at all until the 1820s and it was not an activity acknowledged in print until after the Civil War.”⁵⁶ Media scholar Paige Sarlin traces its migration from British newspapers in the 1840s to eventually becoming a commodity form on American television⁵⁷ and its use in documentary films. A study of reporters in Washington D.C. in the 1980s found that nearly three-quarters of the stories they wrote relied entirely on interviews with no additional documents.⁵⁸ Schudson does an excellent mapping of the institutionalization of interviewing in journalism, both as practice and written form; a parallel historical overview of the use of interview in documentary is now being developed by Paige Sarlin, in her forthcoming book “Interview-Work: the Genealogy of a Cultural Form,” which is the first of its kind in documentary studies (I point this out to demonstrate that interviews, so ubiquitous in documentary films, have not even been the main subject of a book until now – one still unpublished).

⁵⁶ Michael Schudson, “Question Authority: A History of the News Interview in American Journalism, 1860s–1930s” 16 (October 1, 1994): 566, <https://doi.org/10.1177/016344379401600403>.

⁵⁷ Paige Sarlin, “Interview-Work: The Genealogy of a Cultural Form,” *Paige Sarlin* (blog), December 13, 2022, <https://paigesarlin.info/work-in-progress/interview-work-the-genealogy-of-a-media-form/>.

⁵⁸ Stephen Hess, “Washington Reporters,” *Society* 18, no. 4 (May 1, 1981): 1, <https://doi.org/10.1007/BF02701352>.



Still from my film *Baffle Their Minds with Bullsh*t*, Kerry Leigh (2011)

Talking Heads

The interview and its iconic body part, the talking head, are often used for their informational value. Most of the time, talking heads' essential role is to be performers of information, a delivery system of facts, figures, and data, effectively linguifying⁵⁹ film. Sometimes, such as in Ava Duvernay's film *13th* (2016) about the prison-industrial complex in the United States, interviews can breathe life into information that can be otherwise difficult to comprehend – and difficult to find visuals for. *13th* is a film that tackles a historical *system*: how the United States was founded on coerced labor, and once slavery was abolished, the loss of this free labor

⁵⁹ Lucien Taylor, "Iconophobia," *Transition*, no. 69 (1996): 83, <https://doi.org/10.2307/2935240>.

was recuperated by mass incarceration, and legally justified via the 13th amendment of the constitution of the United States. Other films on the prison system in the US often use a single character narrative arc, focusing on the unique injustice of one inmate, such as *Time: The Kalief Browder Story* (2017) which, while emotionally powerful, does not effectively collectivize the issue of how deeply unjust the prison system is.

However, often talking heads are so overdetermined and performative that they enter the realm of Official Representation, a mere honorific. Talking heads of course are not always performances of expertise. For example, when the aim of the interview is to investigate the character of the interviewee, to ask the fundamental question of “Who is this person?” In such an interview, the person is not representative of information but *is* the information⁶⁰, and this type of intimate knowledge can most easily be revealed verbally by inquiring about the person’s past, the person’s psychological landscape, the person’s testimony to a traumatic event, etc., while remembering with Roland Barthes that speech is not “...in itself fresh, natural, spontaneous, truthful, expressive of a kind of pure interiority; quite on the contrary, our speech (especially in public) is immediately theatrical...”⁶¹ For Eduardo Coutinho, for whom interviewing is at the center of his filmmaking method, interview questions should only be about “stories of life experiences, personal, non-

⁶⁰ Some examples: *The Fog of War: 11 Lessons from the life of Robert S. McNamara* (2003), *The Imposter* (2012), *The Act of Killing* (2012) or its companion piece *The Look of Silence* (2014), the interactive documentary *Question Bridge* (ongoing), and many more could be listed here.

⁶¹ Roland Barthes, *The Grain of the Voice: Interviews 1962-1980* (Northwestern University Press, 2009), 3–4.

transferable,”⁶² for, in essence, avoiding the trap of pre-fixed roles and stereotypes. But often, interviews serve the function of compressing time and offering a short-cut to knowledge. Perhaps the filmmakers want a complex topic rendered succinct, or they may need the “information” as a reference to orient themselves, with the caveat that they are prioritizing only one modality of knowledge-gathering over other potential avenues. Felman and Laub offer the same warning: “What the testimony does not offer, however, is a completed statement, a totalizable account of those events. In the testimony, language is in process and in trial, it does not possess itself as a conclusion, as the constation of a verdict of the self-transparency of knowledge”.⁶³

The talking head interview also suggests a very traditional set-up: there is someone asking questions and someone answering questions. The part that is not often focused on is how both parties also *listen*, especially the person asking the questions. What if interviewing is actually a practice of listening?

Expanding Listening and Expanding the Interview

I contend that the aforementioned type of talking head interview, except when used as testimony, often short-circuits the unique potential of cinema to produce its

⁶² Consuelo Lins, “Eduardo Coutinho, Cómplice de La Realidad Filmada,” in *Cine Documental En América Latina*, ed. Paulo Antonio Paranaguá and José Carlos Avellar, 1. ed, Signo e Imagen 75 (Madrid: Cátedra, 2003).

⁶³ Shoshana Felman and Dori Laub, *Testimony: Crises of Witnessing in Literature, Psychoanalysis and History* (Routledge, 2013), 5.

own knowledge in and of itself. Using an interview solely as a performance of expertise and information eclipses possible sensory surprises, like the utterances in between, above, below, or through the words, the silences or the furtive moments of hesitancy. The talking head interview often does not account for a voice's grain and texture, its musicality, its sonorous aliveness, or the gait of someone's walk and the way they move through space. Often, talking heads implies an image first and foremost: a human head gesticulating with its mouth. This head is often disconnected from the space they inhabit with placeless backgrounds, or the opposite – the space is highly composed, theatrically staged to set a scene. In my own practice I often want to avoid the laborious set-up needed for this mise-en-scene, while wanting to also avoid backgrounds which distract from what is being said. I end up consumed by backgrounds instead of foregrounds, a fixed visual instead of a dynamic exchange. As such, I often ask my interviewees, if I feel I must interview them on camera and not just through sound, to perform the interview while walking somewhere for just this reason: a sense of emplacement is built naturally through their personal connection with the environment and the way their body moves through space. A walking-style interview is difficult to film however, presumes the filmmaker and the interviewee are both able-bodied, presumes there is a place to walk around, and does not allow for the privacy sometimes needed for a difficult topic – in short, it is not always the best method for all situations.

Can the interview be reframed, or expanded, as both a practice of *listening* and a practice of *making sound*? In trying to expand the concept of the interview

beyond the human, I want to rethink the concept of the exchange needing to be constituted of human voices. Film scholar Irina Leimbacher, evoking Mladen Dolar, suggests the voice is a “go-between,” a “transient, transforming wave of sound through which we connect to each other.”⁶⁴ This wave of sound then connects, vibrates, reflects, echoes, absorbs, diffuses, responds between bodies and spaces. This then begs for a different type of listening. Michael Gallagher, Anja Kanngieser, and Jonathan Prior argue for an “expanded listening,”⁶⁵ which investigates how bodies of any kind, human and more-than-human, respond to sound, and how sound moves bodies beyond cochlear listening and human consciousness.⁶⁶⁷ Expanded listening calls for a decentering of the human ear, “Listening especially tends to be understood in strictly anthropocentric terms, linked to human consciousness and aurality (hearing through the ear)... [whereas] An expanded conception of listening concerns the

⁶⁴ Leimbacher, “Hearing Voice(s).”

⁶⁵ Michael Gallagher, Anja Kanngieser, and Jonathan Prior, “Listening Geographies: Landscape, Affect and Geotechnologies,” *Progress in Human Geography* 41, no. 5 (October 1, 2017): 618–37, <https://doi.org/10.1177/0309132516652952>.

⁶⁶ More sources on expanded listening include: Michael Gallagher, “Field Recording and the Sounding of Spaces,” *Environment and Planning D: Society and Space* 33, no. 3 (June 1, 2015): 560–76, <https://doi.org/10.1177/0263775815594310>; Michael Gallagher, “Sounding Ruins: Reflections on the Production of an ‘Audio Drift,’” *Cultural Geographies* 22, no. 3 (July 1, 2015): 467–85, <https://doi.org/10.1177/1474474014542745>; Whitney Johnson, “The Emancipated Listener Embodied Perception and Expanded Discourse,” *Resonance* 2, no. 3 (September 1, 2021): 334–52, <https://doi.org/10.1525/res.2021.2.3.334>; George Revill, “How Is Space Made in Sound? Spatial Mediation, Critical Phenomenology and the Political Agency of Sound,” *Progress in Human Geography* 40, no. 2 (April 1, 2016): 240–56, <https://doi.org/10.1177/0309132515572271>.

⁶⁷ A few pieces of sound art which attempt an “expanded listening” are: *Beneath the Forest Floor* (1996) by Hildegard Westerkamp, *Cuckoo by Radiometer*, *Chernobyl* (2012) by Peter Cusack, *Fire and Frost Pattern* (2006) by Andreas Bick.

responsiveness of bodies encountering sound...”⁶⁸(italics in original). How might humans attune to forms of agency that do not possess cochlear listening?⁶⁹

Expanding the interview beyond the human takes up this same call of expanded listening: decentering the human voice, decentering the human ear, reframing the interview as an exchange of sounds that is inherently a physical and spatial encounter: “Every space and place sounds and resounds, every living body and being vibrates, and every kind of material, object and surface has acoustic properties.”⁷⁰ Sound recordist and anthropologist Steven Feld says, “...as place is sensed, senses are placed; as places make sense, senses make place.”⁷¹ In his concept of “acoustemology,” drawing from his fieldwork of the Kaluli people of Bosavi, Papua New Guinea, he frames sound as a unique medium for knowing the world, for making sense, and as a way to emplace knowledge. He says, “Acoustemology means that as a sensual space-time, the experience of place potentially can always be grounded in an acoustic dimension.”⁷² Listening, of course, is not a universal experience, and it is grounded in cultural, social, and environmental influences.

⁶⁸ Gallagher, Kanngieser, and Prior, 620.

⁶⁹ Satz, “The Listening Cobweb”; Schrimshaw, “Non-Cochlear Sound.”

⁷⁰ Gallagher, Kanngieser, and Prior, 620.

⁷¹ Steven Feld, “Waterfalls of Song: An Acoustemology of Place Resounding in Bosavi, Papua New Guinea,” in *Senses of Place*, ed. Steven Feld and Keith H. Basso (Santa Fe, N.M. : Seattle: School for Advanced Research Press, 1996), 91.

⁷² Feld, 97.

A Thick Kind of Loud

There have been many times in my fieldwork when I felt a sonic presence, a semi-conscious awareness of a sound. This could be a vibration, a resonance or dissonance which I sensed, felt, or absorbed. I am also sure there were other sonic materialities my body responded to in ways I am not conscious of. Sometimes the sonic encounter was revealed after repeated visits, and close attunement to my *panesthesia* (meaning “layers of my senses” – I explain this concept in a few moments, in this chapter), or close attunement to my surroundings. In chapter three I describe the intense drone of the cicadas in the abandoned mining ruins in Spain I visited many times. The cicadas were so *loud* and nearly overwhelming. A thick kind of loud, where I almost felt like I could touch the vibrations and wrap them around me. If I got too close to some spindly grass they were crouched on, there would be a sudden cough into silence. If I stayed long enough, they re-engulfed my presence, drowned my thoughts, my movements, my bodily sounds. They called and responded to each other, loudest in the hottest part of the day. I wondered if they were calling out to me or responding to my sounds and movements in the ruins. They felt like a fever, a touch of madness, a warning for the haunted, toxic ground I was studying. They sang a droning song I didn’t understand, to each other, and to other more-than-humans in the environs. The cicadas disrupted the ruins with their liveliness, creating a new and different perimeter of spatial encounter with these otherwise abandoned deadly places. They were omniphonic, seeming to come from all directions at once, which distorted the typical ability a single source of sound allows: to gather

knowledge on scale, directionality, and material qualities of the landscape. In terms of frequencies, they seemed to occupy an acoustic niche that was otherwise sparse. Little else in these environments made sound. Attending to landscape through listening “can thereby destabilize the very concept of landscape as a specific, identifiable space.”⁷³ Expanded listening is an embodied practice, resonating across bodies, and a spatial practice, resonating across geographies. Sound is democratic, engaging with everything it comes across, and acts to both link and collectivize bodies and environments.

“Haptic listening” is Leimbacher’s term for a type of listening that allows for and attends to an “embodied expression as much as to lexical meanings.”⁷⁴ The call for a different kind of listening entails an attention which reaches beyond linguistic understanding to become receptive to the unknown. Expanding the interview beyond the human, using haptic expanded listening, is about *attuning to an embodied, spatial encounter*. If the interview is reframed as an encounter between bodies in space with sound as the mode of relation, then expanding the interview beyond the human is simple.

As a documentary filmmaker though, I do not want to stop there. I am human, and I want to interview the more-than-human. How do I create *methods* to expand the interview beyond the human within the tools of filmmaking? My first foray was

⁷³ Gallagher, Kanngieser, and Prior, “Listening Geographies,” 624.

⁷⁴ Leimbacher, “Hearing Voice(s),” 293.

happenstance, while filming *The Blessed Assurance* (2018), a short film on a jellyfishing boat in the waters of Georgia, USA.



Deckhands Jack and Ack sweep the jellyballs into the hold

The 18-hour Interview in *The Blessed Assurance*

It's 2am, and I've just arrived at the docks of the one-red-light town of Darien, Georgia. It's quiet, though in mere moments the generator of the boat starts up and the pier is humming loudly, lights flickering on the large boat I'm about to get on, at odds with the black twinkling calm water and the muted fern-green hues of the marsh grass. I am about to do a long immersive interview where I sonically link myself to my (human) subject for over 18 hours of a 24-hour boat trip out at sea to fish jellyballs. The water level is high, which is good for getting out of the narrow channel of Darien but makes the boat hover far above the wooden pier and difficult to climb

into with any grace. I am alone, carrying far too much gear, and I need to sync up with the boat as soon as possible.

I've been on trips with Wynn before during shrimp season, each ride out to sea lasting about 12 hours. I was always a bit late to film certain events, such as when the shrimp were taken up, unable to press "go" on the gopro that was rigged up awkwardly out of reach before they had started the take-up. My time on the boat felt like a fluid microcosm I was dancing around without fully getting inside: somehow, despite how small his shrimp boat was, I was not in-sync with the action. My interviews with him, all direct address, weren't bad per se. I came back around several times and asked him different things which he always readily answered, and I gradually learned to just film him without asking questions as, extroverted by nature, he liked to perform for the camera. He helmed the boat barefoot, often steering the wheel with his toes while sitting back on his broken captain's chair which had a worn scoby-doo blanket draping to the floor.

The two deckhands felt outright unfriendly with me, and this probably contributed to my sense of alienation. On the second trip out to sea however, the new deckhands were much friendlier, and I was brave enough to put a wireless lavalier on one of them. This led to being in much better sync with the crew, as they would warn me easily, without shouting over the machinery and wind, when certain key actions were about to occur.



Darien waters: A 14-year-old deckhand swings from the ropes

But something else happened. I could also hear this deckhand breathing, burping, coiling ropes, cleaning the deck, deheading the shrimp, and more. I was sonically immersed in a way that triggered a profound shift in my experience of the boat. The acoustic linking changed what I shot and how long I shot, and created a disassociation between my immediate environment, and that of the deckhand's. This juxtaposition of two – or more – worlds was chaotic but generative in teaching me to ask new questions of my environment. I knew I had to ask Wynn or one of the deckhands to wear a lavalier when I next went out to document the jellyball fishing.

Since I had landed during shrimping season, in June, but I was really after jellyfish, I came back seven months later in January to capture the jellyfish trips.



A long-nosed spidercrab on a cannonball jellyfish

Jellyfish trips take twice as long as shrimping, and this particular ride was going to be about 24-30 hours. After the initial flurry of excitement and activity from departing the docks, the two deckhands Jack and Ack soon went to sleep as we made our way out of the marshland into the open sea. Wynn stayed in the cockpit by himself for nearly the entire trip, and the deckhands, when not working out back, stayed in the kitchen or on their cramped bunk beds. I put a lavalier on Wynn the first moment I could find and began with a more traditional conversation type interview as he drove out of the marsh, which takes about 2.5 hours. I ran out of things to ask, and headed back outside into the strong headwind, noticing the seagulls flying alongside us, smudges of white against the dark horizon. Regardless of if I was shooting Wynn, the key is that I listened to, and recorded, his lav - his sound - with headphones at all times, even when not recording with my camera.

Dawn appeared in only the way it can when out on the ocean: large, exploding with color, spectacular. Pelicans now joined the seagull colony, occasionally perching on the boat's trawling arms to rest. Right at 8am, on their second "drag" of jellyballs, Wynn prophetically mentions under his breath, "Let's see if these bags hold up is what worries me." As they're cranking the nets up, one of the two nets breaks and unravels, like a zipper being opened. Wynn loses the entire catch of jellyballs, as well as his net and his tripbell. This was a major cataclysmic event in his world, one he proceeded to narrate to every living soul on and off the boat for a good part of the morning into the afternoon. Though aware of being listened-to on some level, I think he was too carried away to care and I was able to listen to, or rather eavesdrop on, many intimate phone and short-wave radio conversations:

Lost the whole bottom part of the bag, net and all, can't catch anything. Lost my tripbell, which is \$100-120 just for that brass piece. Raggedy, piece of junk shit. This is a mickey mouse fucked up operation. I'm just so sick of it. Irritates me to no end...I spent \$50 on groceries... I got a light bill due... everything.

His asthma at this point flares up, and his breathing labors - a sound I came to know intimately over the course of the day as the slightest bit of physical exertion brought it out. The boat radio crackled "Yo Wynn how's the catch going?" asked Lester, who's dragging for jellyballs on his boat within eyesight of us. Wynn says, "I'm getting half, dog. *Half*. The last drag I lost a whole fucking bag, blew off and *gone*. Fucking gone." The litany continued to a slew of friends and family; for example, to his wife he said, "I pulled a bag off completely so now I'm dragging around with one net. Nope. Lost a whole bag completely... gone. Weight - too heavy,

old shit, raggedy, piece of fucking shit, do I need to keep going? Fucked again. Gotta love being fucked. Bent over. Big dick right in my ass. Love that shit.” The graphic cursing was constant. Phone conversations intermixed with conversations he had on his short-wave radio with some nearby boat captains.

At each iteration of retelling his catastrophic net-unzipping story, it slightly changed. At the end of one he says: “I probably would be going to the house but they just cut the cable off earlier. So I’d just sit there and stare at a blank TV screen.” Many of the retellings, though, focus on the deep precarity facing him and other commercial fisherman: “I can’t do another year like I did this year. The boat ain’t gonna hold together, just ain’t gonna do it. Now I dunno what I’m gonna do but... They want to charge me \$500 to park at the dock. Ain’t got that. Light bill’s due, water bill’s due, just cut off my cable...So I don’t know...” and his fisherman friend radios back, “I’m just one breakdown behind you, buddy. Just one breakdown behind you, that’s all. Just one breakdown and I’m out of commission.” In calling and complaining to so many people, a host of deeper themes arose around poverty and the unknown future of the commercial fishing industry. Conversely, when we did have our direct-address interview moments, I asked questions which ranged from why spider crabs lived in the jellyfish bells, to how long the jellyfish had been in these seas. These were topics that were not surfacing naturally in his conversations with peers and reflected my own set of environmental multispecies interests. But one of the important themes to come out of this long-durational interview, from the perspective of the fishermen, is how incredibly precarious this livelihood is. It is not

obvious they're always walking this thin ledge, but for Wynn and other jellyfish fishermen, it's a constant threat.



Wynn captaining the helm

After some hours, Wynn began understanding that I could hear him whether or not I was with him in the cockpit. He began giving me instructions, like: “We’re going to pick up the jellyballs now” or “come get breakfast, there’s sausages” or “you’re filming on the wrong side.” After a while however, he began to joke with me, realizing I could hear him all the time. “Hey izzy can you hear me on this? Izzybelle, izzybelle. Your gopro died. It’s dead. Poor thing.” This turned into an 18-hour monologue, where I was a displaced, sometimes visual, set of ears listening to his conversations, his phone calls, and whatever thoughts crossed his mind. The sheer durationality of this interview, and the many surprises that it yielded in terms of access, content, and sensorial knowledge, is in and of itself an expansion of the traditional interviewing process. As I mention in the introduction, durationality can be

a key to unlocking meaning in its very excess. David MacDougall describes long-duration techniques as giving us “excess meaning,” versus a tightly controlled message, “interpretive space” that allows the viewer, or listener, to supply meaning, as well as a “sense of encounter”⁷⁵ that is not already staged. This tracks with my experience. The 18 hours were a marathon. I don’t particularly like being called Izzybelle. The only reason I didn’t end it sooner was because I was stuck on this boat with no exit – and I was multitasking by shooting and recording other things at the same time.

Wynn tended to speak aloud many of his musings, thoughts, complaints, joys, losses: it was unnerving having his voice and sounds in my ear for the better part of a day narrating the landscape and his futurity. Though he was *disembodied*, a type of Chionian *acousmêtre*, I could also hear, in extreme detail, his *bodily* noises: gasps for breath as his asthma kicked in, his burps anytime he took a swig of soda, or him pissing off the side of the boat. These sounds almost supplanted my own bodily awareness. He enjoyed testing whether I was paying attention by teasing me, “What are you doing Izzy? What are you doing? It’s dark back there now. How long does the freaking battery last on this thing. How the hell do you concentrate with somebody talking in your ear all day?!” 18 hours of being sonically tied to each other created an unnatural intimacy which blurred boundaries in many directions. My hunch was confirmed, when a year later I asked him about the experience of being

⁷⁵ David MacDougall, “When Less Is Less: The Long Take in Documentary,” *Film Quarterly* 46, no. 2 (1992): 298, <https://doi.org/10.2307/1213006>.

listened to for that long, and he said: “Actually I had fun with it. I kinda liked having you at my beck and call with the mic. It felt kinda like a secret mission thing, some 007 shit, like I was wearing a wire.” This was another aspect of the durationality of the interview I learned was *not* ideal: the intimacy it generated crossed boundaries I would have rather kept intact.



Author shooting jellyfish with a GoPro and recording with a hydrophone in the hold

As I was listening to Wynn with one ear, I dropped a hydrophone in the hold (the bottom of the inside of the boat, where they store the catch) to sink into the jellyfish mass. While listening to them slurping, sloshing, oozing, I also listened to Wynn’s bodily sounds juxtaposing themselves with the jellyfish bodies. One all-permeating, constant, noise was the boat’s engine, flooding my body with its vibrations, loud enough that it was difficult to talk to the crew without yelling. The engine vibrations were also present while I was listening to the jellyfish, shaking their

bodies. As Gallagher, Kanngieser, and Prior note, everything participates in the sounding of worlds, and “The vibrational force of sound means that it acts upon entities regardless of whether those entities are consciously listening to it or not.”⁷⁶ I won’t say the jellyfish were listening to the engine, but the sound was acting upon them regardless, which Gallagher et al., argue is a form of *expanded listening*. Wynn’s stream of consciousness was subverted by my interaction with the jellyfish, flipping the foreground/background dynamic between human and more-than-human, where usually the human, especially the human *voice*, the “A-roll” asserts total dominance over a scene. For me, the jellyfish’s sounds shifted into the foreground, and therefore shifted my attunement. Actively listening to several channels of amplified sound that are from the environment I am investigating, that mix human and more-than-human phenomena, provides an incredible juxtaposition for a panesthetic attunement.

As I mentioned, all these reflections came about in part by the accidental nature of this interview – I had had no plans to keep the lavalier on him for 18 hours. I only took it off finally because I needed to sleep a few hours before we arrived back on land at the end. This film is not about this interview, though it was certainly influenced by the audio. The interview shows up only briefly in the soundtrack. Multispecies cinema, as I will shortly explain, isn’t necessarily a cinema that eschews humans, it only asks to decenter them (which is open to interpretation). The film, 22

⁷⁶ Gallagher, Kanngieser, and Prior, “Listening Geographies,” 41(5).

minutes long, is a sensorial documentary experience, a meditation on livelihood and precarity of being a fisherman in the waters of Georgia, while also exploring the ecosystem of a fishing trawler, and even going inside a jellyfish, the other revelatory surprise from this boat ride.

Expanded Close-ups: Monsters and Endoscopes

Speaking of entering a jellyfish – one of my main tools which I use across a variety of projects to reorient and recalibrate my human senses is the mighty, but quite small, endoscope. It is used by plumbers and doctors alike, to search inside tubes of all kinds. I buy ones that are around 10 feet long, and the actual camera is around 1cm wide. They have a focusing distance that is fixed anywhere between 2cm-30cm, and they are waterproof.



An endoscope on a common land snail in Santa Cruz, CA

Endoscopes give me an ability to perform a type of close-up that is impossible for the human eye. They allow me to access very small spaces, producing a surrealism of scale possible by its microcinematography. In one of my latest short films, called [When Monsters Walked the Earth](#) (2021), I filmed the endoscope shot that opens the movie from ground-level, underneath short grass and clover stalks. In [The Mississippi Multiverse](#) (2020), I begin this film as well with the underwater roots of the Black Willow tree, looking up from the bottom of the shallow riverbank through the surface of water. These shots just aren't possible with any normal cinematic equipment, and they aren't possible with the human eye (without CGI or other special effects, or building a set). These shots are, in addition, difficult to comprehend right away, and it takes some time as you're watching to orient the senses and affix meaning. None of these examples above claim a "point-of-view" but rather the shots produce a scalar interplay that reorients a human gaze.

Part of the magic of an endoscope is its nimbleness, its smallness – totally unlike a human body, or a typical cinematic apparatus. It is also, from a technical viewpoint, challenging. It's not built for cinematic use per se. I get the same kind of endoscope used by plumbers. At the mercy of mass manufacturing from China, I never quite know what I'm going to get in terms of framerates (they don't shoot 24fps, but somewhere between 10-20fps); nor do I know what I'm going to get in terms of image resolutions, or focal distance, or aperture and shutter speed. Shooting in bright sunlight, for example, isn't possible. Next, and most importantly, they're very difficult to handle. The closer you shoot to something, and the lighter the

equipment, the shakier the frame. The entire apparatus also requires, like the aerial and underwater drones I use, a separate screen set up. I ended up getting a hands-free neck-brace that held the screen, while I could use my hands at the same time. I don't always reach for the endoscope in my toolkit, but, when I do, it always reminds me of the limitations of my own gaze.



Mangrove swamp roots that are just a few centimeters high. Vieques, Puerto Rico. Captured with an endoscope.

Microcinematography is hardly new. Film theorist James Cahill, in his book on the nonhuman cinema of filmmaker Jean Painlevé, writes at length about Painlevé's surrealism of scale through microcinematography. I go in depth about Painlevé's work, and how I use it as the origins for multispecies cinema, a bit further on in this chapter. Cahill writes of Painlevé's close-ups as producing an "estranging

reorientation.”⁷⁷ Painlevé himself wrote that the close-up through microscopes allows us to “enter the unknown. In this way, the microscope gives us a reality different from our own and different from that given by our vision.”⁷⁸ Film theorist Mary Ann Doane, writing primarily about the close-up of the human face, theorizes on how the close-up is a “spectacle of scale” that transforms an image into the “gigantic and monstrous,” producing an “intense phenomenological experience of presence.”⁷⁹ She tries to decipher the power of the close-up, though she almost exclusively engages with close-ups of the human face. As Cahill notes, this “mania for ‘facial recognition’ also blinds one to other ways of seeing through cinematic enlargements.”⁸⁰ Béla Balázs, with whom Doane is in intense dialogue through her writing, also wrote extensively about the effects - and affect - of the close-up on the human face. The Belgian film critic Paul Werrie critiques Balázs’ focus however: “Why the human face? Why limit oneself to the face? The leg of a miniscule animal magnified 110,000 times, is this not a close-up?”⁸¹ As Eisenstein notes, “The laws of cinematographic perspective are such that a cockroach filmed in close-up appears on the screen one hundred times more formidable than a hundred elephants in medium-long shot.”⁸² While this is an allusion more to the “monstruous” quality produced by

⁷⁷ James Leo Cahill, *Zoological Surrealism: The Nonhuman Cinema of Jean Painlevé* (Minneapolis: University of Minnesota Press, 2019), 77.

⁷⁸ Jean Painlevé, “Du Faux Dans Le Documentaire,” *Instruire et Plaire* 1, no. 2 (1938): 25.

⁷⁹ Mary Ann Doane, “The Close-Up: Scale and Detail in the Cinema,” *Differences: A Journal of Feminist Cultural Studies* 14, no. 3 (December 1, 2003): 94, <https://doi.org/10.1215/10407391-14-3-89>.

⁸⁰ Cahill, *Zoological Surrealism*, 81.

⁸¹ Paul Werrie, “Échos: Une Belle Étude d EPaul Werrie,” *La Métropole*, Aptil 1931, AJP: Press Clippings.

⁸² S. M. Eisenstein and Jacques Aumont, *Au-Delà Des Étoiles : Essais*, 1974, 112.

the intense scale of a tiny being suddenly larger-than-life, it is also a recognition of the power of the close-up with the nonhuman.

I wanted to film such a little monster on the boat. The research that I had read on cannonball jellyfish was that they had a parasitic guest: the long-nosed juvenile spider-crabs, which live inside the bells.⁸³ They use their host for shelter and food, and are tolerant of the chemical defenses employed by cannonball jellyfish (producing a very mild skin irritant for humans). While trying to get the endoscope inside one of these jellyfish, so I could film this parasitic relationship of the crab feasting on jellyfish juices, I noticed the water getting cloudier as it excreted some kind of fluid. I was careful not to harm the jellyfish, even though it was already destined for the processing facility. It was a hard situation to shoot however. I am on a working fishing boat, so I can't just dive into the water. The boat never stops once it gets on the water, so to film these jellies I have to take one after it is fished out by a net, and I put it into a bucket of water. No crabs were inside to begin with but rather only on the outside of the bell. The others I fished out from the hold were the same. Maybe once the jellyfish are out of the water, the crabs climb out. This endoscope focused at 2cm, but the inside cavity of the jellyfish is less than 2cm wide, so my shots were all blurry. The jellyfish seemed like it was trying to move away from the endoscope in the bucket. I stopped filming after only a few minutes, feeling guilty

⁸³ James West Page, "Characterization of Bycatch in the Cannonball Jellyfish Fishery in the Coastal Waters off Georgia," *Marine and Coastal Fisheries* 7, no. 1 (2015): 197, <https://doi.org/10.1080/19425120.2015.1032456>.

that I was looking at the innards of a being who didn't welcome my intrusion, and I did not try again.⁸⁴

Later, while I was editing, these shots were fantastic even in their otherworldly blurry nature. This is in part produced by the ultra-close-up. I forget sometimes that I am sometimes in the totalizing quest of a clear image – and that an image that is not-knowable allows a productive distance that can allow for the more-than-human to flourish on screen. The close-up: large, “monstrous” and as Doane says, a “spectacle of scale,” provides a momentary, but important immersion into world-making. It gives us color, light, movement, surface, texture, spatial and temporal disorientation, and it challenges the spectator's encounter with the limits of their knowledge. This is produced in part by its scalar interplay, giving few points of reference (unlike Painlevé's cinema, where he was extremely precise in emphasizing the scale of his images). Normally an image's meaning is immediately signified. Whereas this blurry image of color and shapes and movement does not signify instantly. In fact, the encounter with this image has a kind of power: it forces the viewer to slow down, creates mystery, opens up the possibility of *not-knowing*, and

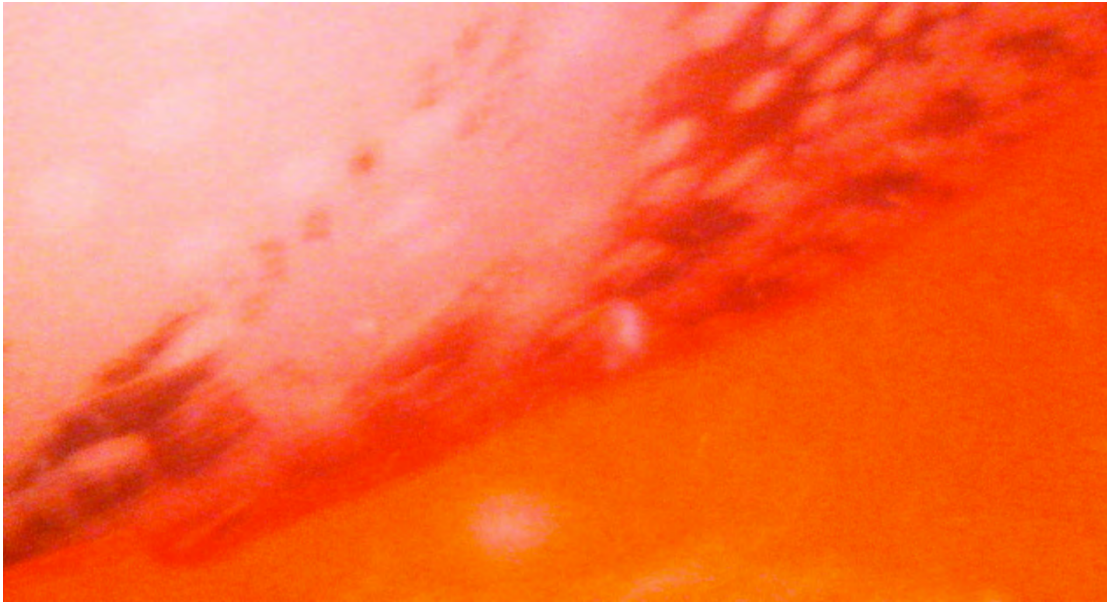
⁸⁴ I've gotten this feeling before when working with animals; it is particularly thorny when the animal in question is terribly invasive (not the case of the cannonball jellies, but it is of the golden apple snails – a local sport in Taiwan is to run them over with cars). It is also a thorny issue when the being in question is literally being fished out of its water for human consumption. While I prefer not to enter into an ethics debate here, please note, gentle reader, that I am against harming beings. However, if you have any ethical hackles that are rising, I do hope the same hackles are raised at the idea of fishing, or hunting, or any of the ways that humans justify killing or harvesting other beings for our culinary pleasure, wellbeing, or research in general. That's the real debate.

the possibility of insight. This is one of the most important ways to attune to the more-than-human.

Doane says, “As simultaneously microcosm and macrocosm, the miniature and the gigantic, the close-up acts as a nodal point... In the close-up, the cinema plays simultaneously with the desire for totalization and its impossibility.”⁸⁵ In the film, this particular endoscope shot resolves in seeing a human above the water, gesticulating, yet unfamiliar, bent out of shape. It is in this defamiliarization that the endoscope close-up is generative. It “unsettles the stability of reality produced by the human senses and potentially extended and reconfigured by the cinematic *dispositive*.”⁸⁶ The cinematic close-up of the endoscope, especially in this particular footage of the jellyfish but in other footage I’ve taken as well, implies a perceptual and spatial reorientation.

⁸⁵ Doane, “The Close-Up,” 99.

⁸⁶ Cahill, *Zoological Surrealism*, 84.



Still from the endoscope of the cannonball jellyfish

As you see the human through the water, from behind the jellyfish, it's a split second before the bell eclipses the human. It's *not* the “jellyfish’s point of view” but it does decenter the typical cinematic, anthropocentric gaze. This is why I love using the endoscope: it gets into and under things I could never reach with my body or my eyes. It can have a proximity and intimacy with spaces and bodies I could never access in my human body. Hydrophones do something of the same: as anthropologist Stefan Helmreich theorizes, technology like a hydrophone *transduces*⁸⁷ sound so that human ears can listen in a medium – water – which they are not physiologically adapted to. Human eardrums have the same density as water, and as such, sound appears omni-phonetic underwater, coming from all directions at once. Other

⁸⁷ Stefan Helmreich, “An Anthropologist Underwater: Immersive Soundscapes, Submarine Cyborgs and Transductive Ethnography,” in *The Sound Studies Reader* (Routledge, 2012), 168–85.

apparatuses also transduce the world: aerial drones give me wings, underwater drones give me fins. They stretch the limits of my human senses, providing a cinematic gaze not possible with the naked eye and a human body. These tools, and others I've used such as contact microphones, electromagnetic microphones, thermal cameras, ultraviolet lights, are all types of transducers that give us access, aurally or visually, to a spectrum, a medium, a frequency that humans are otherwise unable to perceive. Stretching the limits of human senses with these tools is essential to my own multispecies cinema, and for trying to attune to the more-than-human.

A Panesthetic Attunement

My time at sea yielded a rich new sensorium, and I took notice of the ways my senses were layering in the boat, the registers of foreground and background slippery and multiple. I was constantly refocusing my attention on different phenomena, layering my senses: the cold bite of the wind on my frozen hands, the slippery jellyfish ooze on my clothes, the sounds of the screeching ropes hauling in the catch, the particular scent from the crowded bodies of jellyfish in the hold slowly losing their water, the taste of salt on my tongue from waves splashing the boat, the little claws from the crabs slowly opening and closing as if in slow-motion. I listened, I tasted, I felt, I saw, I smelled. Senses have materiality, and they are first encountered with a body. This applies to human senses, but nonhumans senses too – whatever they may be. While resisting anthropomorphizing any of these beings, I still wondered if the spider crabs could taste salt. If the jellyfish could feel the vibrations from the boat.

If the seagulls felt cold from the wind. The human sensorium is the way I account for the materiality of the world, and as such, it is at least in this space that a human overlaps with the nonhuman. I argue that taking an account of one's senses while filmmaking is of paramount important in order to form an active correspondence with the more-than-human.

I call this form of sensory awareness in the field, these qualities of attention, a *panesthetic attunement*. By "senses" I include at least all of the human ones: hearing, touch, smell, taste, and of course the visual. Medically, "*panesthesia*" is the sum of all the sensations experienced by a person at a given moment, while "*panaesthetics*"⁸⁸ has been borrowed to refer to the study of the unity and diversity of all art forms. The Greek base *aísthêsis* is used to connote 'senses', 'perception' and to connote 'artistic beauty'. The two semantic facets of the Greek base are obviously contiguous, but nonetheless distinct. In documentary panesthetics, *-esthetic* is understood in its medical facet: the senses. Panesthetic attunement approximates the experience of accounting for multiple senses in the process of creating knowledge. The concept of attunement is also a productive reframing, and expansion, of the interview, especially when thinking about interviewing the more-than-human.

The etymology of attunement is rooted in northern-European Enlightenment philosophy with Kant and Herder, among others. According to Kant, the experience of beauty arises from an attunement of the representational powers: understanding

⁸⁸ Daniel Albright, *Panaesthetics: On the Unity and Diversity of the Arts* (New Haven: Yale University Press, 2014).

and imagination.⁸⁹ In this sense, attunement is a type of active, free play, across difference. Post-Kant, Heidegger speaks of attunement (derived from the German word *Stimmung*) as a way to tune in, or tune out, to calibrate receptivity or awareness in a human body. However this attunement is preconscious, affected by forces in an environment without a human being aware of it, “Attunements – are they not like the utterly fleeting and ungraspable shadows of clouds flitting across the landscape?”⁹⁰ and yet Heidegger denied animals of being able to attune, “The stone is “worldless,” the animal is “poor in world,” and the human being in contrast is “world forming.”⁹¹ In short, Heidegger, like many northern European philosophers since Aristotle, was caught up validating man’s singular and unique sentience, otherwise what could define a human apart from nonhumans?

Another body of work, in psychology, has to do with attunement as being a subject-oriented form of embodied relationality. Psychoanalyst Daniel Stern, as well as the work of Robert Stolorow and George Atwood, speaks on “relational theory” where the emphasis is on the continued connectedness of people, the attunement between self and other.⁹² Within this framework, connections to other living beings are the central source of human growth throughout a life span. At the center of the

⁸⁹ Julian Brigstocke and Tehseen Noorani, “Posthuman Attunements: Aesthetics, Authority and the Arts of Creative Listening,” *GeoHumanities* 2, no. 1 (January 2, 2016): 3, <https://doi.org/10.1080/2373566X.2016.1167618>.

⁹⁰ Günter Figal, ed., *The Heidegger Reader*, trans. Jerome Veith (Bloomington, IN: Indiana University Press, 2009), 85.

⁹¹ Martin Heidegger, *The Fundamental Concepts of Metaphysics: World, Finitude, Solitude*, Reprint edition (Bloomington (ind.): Indiana University Press, 2001), 177.

⁹² Daniel N. Stern, *Forms of Vitality: Exploring Dynamic Experience in Psychology and the Arts*, 1st edition (Oxford ; New York: Oxford University Press, 2010).

relational model is *attunement*: tuning into the subjective experience of another being and responding to that experience.⁹³ Social scientist Margot Lasher clarifies: “Attunement is experienced; it does not necessarily involve the act of thinking about the experience and certainly is independent of human language.”⁹⁴ Lasher takes Stern’s relational theory one step further, with the more-than-human, “The primary mode of communication between human and animal is attunement, the mutual picking up of, and responding to, the subjective state of another creature.”⁹⁵ In trying to attune with more-than-human worlds, geographer Julian Brigstocke and anthropologist Tehseen Noorani ask, “What happens when we attempt to attune ourselves to forms of agency that do not possess a conventionally recognized ‘voice’ to be amplified?”⁹⁶ And, how might a human attune to forms of agency that do not possess cochlear listening? How can a human body attune to different spatio-temporal registers, that allows an encounter with an environment, an ecosystem, a being and acknowledge their co-production of the world(s)?

I do not use the term attunement to invoke normative ideals of being in harmony with nature implied by Kant (and others). Attuning, for example, to environmental disasters, with their spatio-temporalities so different from a human’s lifespan, can exceed the limits of human perception. Brigstocke and Noorani note that

⁹³ Daniel N. Stern, *The Interpersonal World Of The Infant: A View from Psychoanalysis and Developmental Psychology*, 1st edition (New York: Basic Books, 2000).

⁹⁴ Margot Lasher, “A Relational Approach to the Human-Animal Bond,” *Anthrozoös* 11, no. 3 (September 1, 1998): 130, <https://doi.org/10.2752/089279398787000670>.

⁹⁵ Lasher, 130.

⁹⁶ Brigstocke and Noorani, 1.

“Attunements speak not only to relations, but also to the absence of relation, the demands placed on us by the wholly other. They bring us into contact with lost futures and haunted presents.”⁹⁷ These violent and haunted space-time assemblages are disorienting, uncanny, perhaps even unknowable. And yet. My entire film practice, and my scholarship, revolves around attuning to spaces and times such as these. It is why expanding the interview beyond the human is so essential, and why developing new methods to attune to the more-than-human, and the ways this world lives a shared coexistence, given the ongoing slow (and sometimes very fast) violence of the anthropocene, is of paramount importance.

In this expansion of the interview, a panesthetic attunement to more-than-human worlds requires a decentering of human authority and a deep acknowledgement of the pluriverse.

Interview Beyond the Human: *The Golden Snail Opera*

The Golden Snail Opera (2016)⁹⁸ is a film-and-text piece made in collaboration with Yen-Ling Tsai, Anna Tsing, and Joelle Chevrier, and a myriad of nonhuman collaborators (willing, neutral, or unwilling: many are cited in the credits). I was tasked with visually and sonically delving into the specific ecosystem of Yen-Ling’s rice paddy in Yilan, Taiwan, an agricultural region dealing with the complex

⁹⁷ Brigstocke and Noorani, “Posthuman Attunements,” 3.

⁹⁸ Yen-Ling Tsai et al., “Golden Snail Opera: The More-than-Human Performance of Friendly Farming on Taiwan’s Lanyang Plain,” *Cultural Anthropology* 31 (November 15, 2016): 520–44, <https://doi.org/10.14506/ca31.4.04>.

history of the invasive golden snail. I tried a series of filmic and sonic attunements that prioritized a host of relationships and senses that weren't easily accessed only through voice or explanation. I came to view being in conversation with, thinking with, and interviewing a broad array of phenomena as a series of attunements I was making to this unique ecosystem and all its complex relationships. Practicing *panesthesia* was the lodestar for the project.



Spy-camera velcroed to a large, invasive land-snail. The images produced from this situation open up *The Golden Snail Opera*

This “panesthetic attunement” does not mean to imply that attunement was achievable on its own. Yen-Ling, who is teaching anthropology in Taiwan, has a deep, historically rich, and familial connection to the land, and years of hands-on direct experience with rice farming that allowed for a unique set of observations from

which the seeds of the project arose. Yen-Ling and Joelle both work long hours every day in the rice paddy: whether planting rice, weeding, trying to make scarecrows for the birds, unknowingly interacting with the paddy ghosts, collecting the daily influx of golden apple snails by hand, or eventually harvesting the rice. In addition, they are both part of a larger farming community of old and young, that combines generations of experience with rice, water, weather, offerings to the ghosts, snails and other creatures, with more modern experimental techniques. Anna, who has decades of experience investigating, practicing, theorizing and writing about different attunements to multispecies life, not only acted as the initial connector between us all but also catalyzed a unique collaboration while the piece was coming together after the physical act of filming: while I was editing small pearls of the film to share with the rest of the team, Anna, Yen-Ling, and Joelle were writing and experimenting with the text. This wide, collaborative web of relations formed the basis for our opportunity to attune beyond the human, acknowledging the pluriverse of the paddy.

Manifesto for a Multispecies Cinema

I argue that expanding the interview to the more-than-human, expanding listening beyond the human ear, expanding the close-up beyond the human face, and practicing *panesthetic attunement* during fieldwork begins to lead to a new type of cinematic practice which I call a *multispecies cinema*. This type of cinema first and foremost engages with the pluriverse.

I draw from scholars Donna Haraway, Marisol De la Cadena, and Anna Tsing who argue for a pluriverse against a single universal reality, where these “practices do not converge to a singular knowledge of the world, but generate a world multiple—a world that is more than one integrated whole, yet less than many fragmented parts.”⁹⁹ If a landscape, or a waterscape, is an assemblage of more-than-human relations, an embodied historical accretion, then Heather Swanson argues that landscapes themselves are *multiple* because they emerge from multiple projects. As such, multispecies cinema practices an attunement with a pluriverse of more-than-human worlds, exploring the interrelationships and entanglements of an ecosystem.

Multispecies cinema comes in part out of experiments such as the early silent films of the innovative marine wildlife filmmaking team of Jean Painlevé and Geneviève Hamon starting from 1924, which feature a variety of marine species and their habitats, as well as inventive cinematic techniques. I like this starting point in part because of the twin combination of Painlevé’s scientific background, and his intent that film be a practice of “zoological Surrealism” which “takes as its point of departure animal life and biological phenomena (particularly as mediated through optical instruments).”¹⁰⁰ They created close to 200 films featuring a fantastical range of creatures, both aquatic and terrestrial, exploring what film scholar James Cahill describes as “the marvels and terrors of animal life and nonhuman worlds, the radical

⁹⁹ Omura et al., *The World Multiple*.

¹⁰⁰ Cahill, *Zoological Surrealism*, 31.

possibilities and limitations of cinematic perception, the ethics of documentation, as well as reflections on violence, vulnerability, and precarity...”¹⁰¹.

Just a few short years later came the invention of synchronized sound, and the shift from silent films to “talkies” featuring voiceovers and music produced a tendency towards anthropomorphism (much to the lament of Painlevé and Hamon, though Cahill argues they didn’t escape this tendency either).¹⁰² Of course, later advances in portable sound technology allowed for greater flexibility and experimentation in field recordings. For example, Chris Marker’s *Forest of Bliss* (1986) is an intimate, handheld film focusing on both life and death, human/more-than-human activities around the Ganges river in India with no voiceover or dialogue. This kind of more-than-human cinematic exploration has been labeled “sensory ethnography,” a mode of embodied, visceral filmmaking where meaning does not emerge only from language. This mode is exemplified in part by more recent films such as *Sweetgrass* (2009), *Single Stream* (2014), and *The Iron Ministry* (2014). However many of these works still operate within the salvage paradigm of capturing disappearing worlds,¹⁰³ and the methods employed sometimes reprise earlier methodologies from observational films such as the aforementioned *Forest of Bliss*,

¹⁰¹ Cahill, 3.

¹⁰² Julian Brigstocke and Tehseen Noorani, “Posthuman Attunements: Aesthetics, Authority and the Arts of Creative Listening,” *GeoHumanities* 2, no. 1 (January 2, 2016): 1, <https://doi.org/10.1080/2373566X.2016.1167618>. Brigstocke and Noorani, “Posthuman Attunements.”, ed. Anat Pick and Guinevere Narraway (New York, Oxford: Berghahn, 2013), 79.

¹⁰³ Balsom and Peleg, *Documentary Across Disciplines*, 57.

or experimental cinema such as Stan Brakhage's *Mothlight* (1963), Chris Welsby's *Sky Light* (1988), or Andrej Zdravic's *Riverglass* (1997).

A turn towards embodied cinema - where bodies are both humans and more-than-human - arrived with advancements in camera technology in the form of small, waterproof, inexpensive and portable cameras, often custom-made. Sam Easterson's *Animal Cams* (1998–2008) is one such example, where he attempted to gather the “point of view” of many different more-than-humans: a bison, a duck, an alligator, a pitcher plant, and a tumbleweed, to name a few. Pooja Rangan calls his cinema a “practice of surrender,”¹⁰⁴ as Easterson lets go of controlling the camera, the animal, or the frame. Though giving more-than-humans a “point of view” is anthropocentric in aim, the filmic results are not always immediately legible to a human subject, and this disorientation produces what Rangan argues is a haptic - or visually tactile - image. Haptic images play upon a type of synesthesia. This is taken to new heights in *Leviathan* (2012) with GoPro cameras, a film focusing on the ecosystem of a fishing trawler through several perspectives: the sea, the fish, the boat, and the fishermen. This list of films I've given so far, that initiate multispecies cinema, is by no means exhaustive.

While multispecies cinema builds on these prior scientific, observational, sensorial, and embodied techniques, it asks moreover if the senses are not just

¹⁰⁴ Pooja Rangan, *Immediations: The Humanitarian Impulse in Documentary* (Durham, NC: Duke University Press Books, 2017), 178.

embodied, but also *emplaced*¹⁰⁵ in a larger ecology, in an ecosystem, in a pluriverse. The myopia to slow violence can also be mitigated by cultivating a method of attunement I call a *thick emplacement*. This term makes a nod towards anthropologist Clifford Geertz' well-known theory of "thick description,"¹⁰⁶ where an observation should be made with as much context as possible, as social behavior is rooted in elaborate social and cultural settings. I combine this theory with anthropologist Sarah Pink's concept of "emplacement," where she seeks to transcend the turn in anthropology towards embodiment, towards making sure that senses have roots in a specific place. In addition, anthropologist Anna Tsing calls for a deep form of observation called "arts of noticing".¹⁰⁷ These three approaches in combination make up thick emplacement. This type of attunement situates research questions and various interventions in a larger ecology, indeed, in a pluriverse. It connects senses, thoughts, ideas to place, demanding a rich contextualization. This sometimes takes the form of a film, a sound piece, an installation, or descriptive, ethnographic writing.

One such example is Barbara Fluxa's *Testimonios Futuros* (2007), a sensorial exploration of the waste of the river Nalón in Northern Spain, once deeply contaminated by coal mining. Fluxa refocuses agency within the river's currents by launching a camera and hydrophone in a waterproof container, suspended by two

¹⁰⁵ Sarah Pink, "From Embodiment to Emplacement" *Sport Education and Society* 16, no. 3 (2011): 343–355.

¹⁰⁶ Clifford Geertz, "Thick Description: Towards an Interpretive Theory of Culture," in *The Interpretation of Cultures*, ed. Clifford Geertz (Basic Books, 1973).

¹⁰⁷ Anna Lowenhaupt Tsing, *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins* (Princeton University Press, 2015), 37.

plastic bottles and a flotation device, to float down the Nalón for eight kilometers over three days until it reaches the ocean. The apparatus included materials from the very waste she wanted to document: plastic. Sometimes the bottle-supported-camera faced up, sometimes sideways, sometimes down; it pitched, rolled, flowed, bobbed, flipped; its orientation, rhythm, and movement were not of a human gaze. The camera recorded forests, rocks on the riverbed, tree roots, bubbles, fish, autumn leaves, the surface from below, sometimes half-below and half-above, a barge passing, train tracks, vegetation, seagulls, ducks, abandoned boats and port traffic, before it eventually arrived at the sea. The title of the piece suggests a prophecy: perhaps this apparatus will still be floating along, or buried, as a piece of “future testimony” against the hubris of extractive capitalism and human exceptionalism.

Another example of attunement within multispecies cinema is *Listening to the Mississippi* (2015/2019) by Monica Haller, in collaboration with Sebastian Müllauer. They recorded sounds while traveling down the Mississippi river. The project arises from a previous work called *Can You Listen to the Same River Twice?* (2013) where a hydrophone was suspended underwater in the Mississippi, recording a live feed of river-produced sounds, which triggered pre-recorded samples then mixed live as a composition. Since then, the project has morphed in approach, content, and collaboration. I was fortunate to experience *Listening to the Mississippi* at the end of a paddling research trip called “The Anthropocene River Journey” on the Mississippi; after a few weeks on the river between Jackson to New Orleans, my own ears had already attuned themselves under and above-water. I sat down with Haller on the

river banks to interview her about the project, and, while we watched the river pass by, she reminded me, “there are multiple listenings, and multiple rivers.” The composition has no clear beginning and end, a circular soundscape. It features train horns, barge engines, fish croaks, silt rushing by in a crackle. Sometimes it emerges above ground to listen to bullfrogs, cicadas, a splash, waves hitting shore. It combines nondiegetic elements at times such as radio transmissions, a female voice singing, whispers, sometimes over a bed of violin strings mimicking cicadas interrupted by a splash. This iteration of *Listening to the Mississippi* takes the listener on an “imaginative journey down the river”¹⁰⁸ (which recalls Grierson’s original definition of documentary as a “creative treatment of actuality”). The cyclic nature of the composition considers various temporalities, ecologies, and histories: one recording site was just north of Cape Girardeau, MO, where nearly 12,000 Cherokee were forced to cross in deadly winter conditions following the Indian Removal Act of 1830. The composition features localized sounds of the river but also silence, a gap, where the absence of sound is just as notable, an attunement to the invisible/inaudible. *Listening to the Mississippi*, as Haller describes, is a “perceptual adjustment” to the river, and creates a practice of emplaced attunement to histories and futures of both humans and more-than-humans.

¹⁰⁸ Monica Haller and Sebastian Müllauer, “Listening to the Mississippi, 2019,” *The Anthropocene Curriculum*, 2019, <https://anthropocene-curriculum.org>

Perceptual Adjustments

Haller's phrasing provides a good conclusion to this chapter, which covers a lot of different methodological ground. How do these methods – the expanded interview, the endoscopic close-up, the panesthetic attunement, the thick emplacement – set the stage to allow for a larger expansion of the documentary form to attune to more-than-human life in the aftermath of environmental disasters? In part it is about a recalibration, a subtle – or radical – reorientation of the senses, in order to unsettle and challenge an anthropocentric approach. In the next two chapters, I build on these methods by centering ethnographic accounts of two water-based ecosystems, the Rio Doce and the Mar Menor lagoon. I provide examples of other watery interactive documentaries, while searching for the multispecies relationships which occur in response to, or despite, the Anthropocene. I trace the history of how an ecosystem has changed by imbricating the past, the present and the future in the inexorable accumulation of environmental violence, while also searching for a shared multispecies coexistence.

Chapter Two | Interactive Documentary for Watery Disasters

The Slow Violence of the Rio Doce Disaster

The River Runs Red (2018)

www.theriverrunsred.com



Homepage of the interface of *The River Runs Red*

So many bodies of water around the world have become wretched waters: sites of contamination with extensive mining waste, radioactive decay, pesticides, fertilizers, flame retardants, plasticizers, and other environmental devastation that is the result of centuries of “watershed colonialism”¹⁰⁹ and other anthropogenic activity.

¹⁰⁹ See: Sigma Colon, “Watershed Colonialism and Popular Geographies of North American Rivers,” *Open Rivers: Rethinking Water, Place, & Community* 8 (2017): 1.

The phrase “wretched waters” echoes Franz Fanon’s groundbreaking book *The Wretched of the Earth*. Fanon provides a psychological analysis of the dehumanizing effects of colonization on both an individual and a nation, advocating for the need for decolonization that called upon the oppressed — the wretched of the Earth — to collectively revolt against imperialism and colonialism and create a new world. I follow Jennifer Wenzel, Ros Gray, and Shela Sheikh’s pivot to reread and extend Fanon’s ideas to the more-than-human: the Earth, too, is wretched, and “in order to fully grasp the violence of colonialism upon its subjects ... it is necessary to also address the violence carried out upon the landscape and environment.”¹¹⁰ Interactive documentary methods that engage with multispecies cinema, especially projects attentive to long-term ecological crises, require a new approach to make the invisible palpable. Bodies of water — such as the Guadalquivir river, Chad Lake, the Everglade swamps, and Rio Doce — tie together entire continents, civilizations past and present, human with non-human, molecules with atoms. Waterscapes such as these launch us into a different type of world-making practice, and, as such, these bodies of water, discussed below, are prime sites to investigate representations of environmental disaster. This chapter spans the importance of thinking with water, discusses several water-based interactive sound, web, and VR projects, and ends with a thorough review of the Rio Doce disaster and the methods behind the interactive film project *The River Runs Red*.

¹¹⁰ Ros Gray and Shela Sheikh, “The Wretched Earth: Botanical Conflicts and Artistic Interventions,” Edited Journal, Third Text, September 25, 2018, 164.

This work also considers a range of water-based theoretical approaches and literacies. Echoing the concept of emplacement, media theorist Melody Jue, in thinking deeply through, with, and in the ocean, calls for a “milieu-specific analysis,” which pays attention to “the differences between perceptual environments and how we think within and through them as embodied observers.”¹¹¹ Since the sea offers immersive conditions such as three-dimensional movement and omniphonic sound, the ocean is a great milieu to re-evaluate perceptions humans have taken a priori on land. Jue shows how these “cognitive estrangements” produce the ability to see the limits of terrestrial theorizing. Karin Amimoto Ingersoll also argues for a “seascape epistemology,”¹¹² which develops an “embodied literacy of the ocean” as opposed to land-centric viewpoints to place-making. While I experienced a radical reorientation, and disorientation, of my senses when I first learned to scuba dive in the Mediterranean, my aquatic milieu for this project was the Rio Doce. As such, it was less about being submerged, and more about an encounter with the medium of the river-water itself.

Jue argues that, “specific thought forms emerge in relation to different environments, and that these environments are significant for how we form questions about the world, and how we imagine communication within it.”¹¹³ This foundational argument is precisely why so much of this chapter takes great pains to provide place-

¹¹¹ Melody Jue, *Wild Blue Media: Thinking through Seawater*, Illustrated edition (Durham: Duke University Press Books, 2020), 3.

¹¹² Karin Amimoto Ingersoll, *Waves of Knowing: A Seascape Epistemology* (Duke University Press Books, 2016).

¹¹³ Jue, *Wild Blue Media*, 5.

specific ethnographic information and history around the Rio Doce. This then contextualizes the thinking, the theory, and the practice. Water-based ecosystems launch us into a different type of world-making, where the assemblage of a lotic ecosystem generates many worlds.¹¹⁴

Multispecies cinema takes up this same call to acknowledge the world is as-yet-unfinished, needing new attunements, where life is still struggling to survive despite the deep grooves of history that shape and unshape it daily. In this chapter, I focus on Interactive or VR documentary methods within multispecies cinema, and various attempts at speculative methodologies to “think with, not about” more-than-humans. How can interactive documentary rethink narratives of slow violence, for both humans and more-than-humans?

Interactive Documentary (i-doc) examples

Interactive projects such as *Guadalquivir* (2013)¹¹⁵ look at the entire length of a river through a series of 360° soundscapes, focusing on certain species and their habitats. The user is invited to pan different landscapes in linear progression down the river and tune in to different more-than-human sounds. The Guadalquivir, whose name derives from the Arabic word for “the great river,” crisscrosses Spain, and is its only navigable river with a legendary history dating back to the Phoenicians. In 1998,

¹¹⁴ Marisol de la Cadena and Mario Blaser, eds., *A World of Many Worlds* (Durham: Duke University Press, 2018).

¹¹⁵ Alberto Fernandez, Cesar Vallejo, and Charo Marcos, *Guadalquivir*, Interactive Documentary (RTVE, 2013), <http://lab.rtve.es/guadalquivir/>.

a holding dam burst, releasing five million cubic meters of mine tailings, deeply polluting the waterway — a poignant parallel to the Rio Doce dam rupture in Brazil. Though the i-doc *Guadalquivir* unfortunately does not show its own story of environmental disaster, it does decenter the human in its observation of the natural world through both image and sound, recreating both land- and soundscapes that attempt to draw attention to the diversity of ecosystems that the Guadalquivir unites.¹¹⁶

Virtual reality projects like *Swampscapes* (2018),¹¹⁷ and *Le Lac* (2019),¹¹⁸ try to use 360° sensorial immersion in a swamp and a lake, respectively, to explore issues of long-term slow violence and environmental devastation. *Swampscapes* delves into Florida’s Everglades, one of the largest swamps in the world. In 1848, it was proposed to develop plantations in the Everglades in the quest for more profitable land to exploit with slave labor. Today over 50% of the original Everglades has been drained to increase farmland to harvest sugarcane or develop urban areas, which started a devastating ecological disequilibrium.¹¹⁹ *Swampscapes* seeks to both explore this history and also find ways to negotiate the future of this ecosystem and the web of both humans and more-than-humans which live within it. The VR piece comprises

¹¹⁶ Two more important river projects deserve a lengthier discussion: Jesikah Maria Ross and Vicki Funari’s *Troubled Waters: Tracing Waste in the Delaware River* (2014) and Brian Holmes’ and Alexander Meitin’s interactive map-based interface *Living Rivers/Rios Vivos*.

¹¹⁷ “Films | Swampscapes,” accessed March 3, 2021, <http://www.swampscapes.org/guides.html>.

¹¹⁸ Nyasha Kadandara, *Le Lac*, Interactive Documentary, 2019, <https://www.nyashakadandara.com/le-lac>.

¹¹⁹ S.E. Ingebritsen, “Florida Everglades: Subsidence Threatens Agriculture and Complicates Ecosystem Restoration,” *Land Subsidence in the United States: U.S. Geological Survey Circular 1182*, 1999.

seven local “guides” which lead us through different sites and themes such as extinction, health, and Indigenous world views. Concerned with the accessibility of the 3D VR piece,¹²⁰ director Elizabeth Miller and her team also produced a website which features 2D films, a photo gallery, an interactive “swamp symphony,” and a host of pedagogical materials to help integrate the project in classrooms. The polyphony¹²¹ of voices in the VR piece (replicated in the films) are essential in creating a mosaic of viewpoints, though the “voices” remain literally and conceptually in the realm of human instead of allowing for a larger diversity of non-linguistic attunements.

In *Le Lac*, director Nyasha Kadandara explores Lake Chad, a freshwater oasis which provides food and water to over 30 million people living in Chad, Cameroon, Niger, and Nigeria. From 1960 to 1990, the lake lost 90% of its water due to desertification, industrial irrigation practices, governmental mismanagement, and climate change. Since then, in part due to climate instability, insurgent groups such as Boko Haram have caused intense violence and conflict in the region, displacing upwards of 10 million people. In her VR piece, Kadandara explores this political upheaval and environmental instability through various landscapes around the lake with a poetic voiceover that is supposed to represent the point-of-view of the lake itself:

¹²⁰ Patrick Brodie, Lisa Han, and Weixian Pan, “Becoming Environmental,” *SYNOPTIQUE*, 2019, 6.

¹²¹ Sde: Patricia R Zimmermann, “Thirty Speculations Toward a Polyphonic Model for New Media Documentary,” *Alphaville: Journal of Film and Screen Media*, no. 15 (Summer 2018), 9–15.

A mild itch turned into what seems like a virus. Invading my shores, eating away at me. Leaving me feeling depleted, wary, and forever insecure. Boko Haram came to my shores at dusk, stealing children, burning villages, destroying everything they came across, leaving Mohammed and Nassuri vulnerable and displaced, and me? Completely helpless.

A musical soundtrack clearly spells out the emotional overtones the audience is supposed to feel while experiencing these different immersive landscapes; the voiceover is a heavy-handed addition that repeatedly reinforces in both form (a linguistic rendition of the lake) and content (the lake's supposed concerns), an anthropocentric point of view. Nevertheless, the project is an important contribution to the world of VR and interactive documentaries in exploring a region that suffers from the interaction between the political violence of the recent colonial past and current extremism, and the slow violence of environmental desertification.

The Great Animal Orchestra (2016),¹²² is a book, and an interactive web project based on Bernie Krause's 5,000 hours of recordings of natural habitats around the world — his life's work as a field recordist. The name is based on his concept of a "biophony," where animals occupy a type of unique acoustic habitat that is rooted in a collective sonority, where each animal has claimed, out of survival, their own frequency in the sonic spectrum.¹²³ The lower end is taken up usually by mammals, further up birds, further up insects, until the ultrasonics of bats. This approach to deep

¹²² *The Great Animal Orchestra*, Interactive documentary (Foundation Cartier, 2016), <https://www.legrandorchestredesanimaux.com/en>.

¹²³ Tobias Fischer and Lara Cory, eds., *Animal Music: Sound and Song in the Natural World*, 1st edition (Strange Attractor Press, 2015), 124.

multi-layered listening of an ecosystem can reveal surprising multispecies entanglements that are not “visible” in other ways. For one of his sites, Krause visited an area in the Sierra Nevada mountains, called Lincoln Meadow, both before and after a timber company had performed so-called “selective logging.” Though the forest *looked* the same when he came back, the acoustic ecology was drastically different, with a huge decrease in the density and diversity of birds and other animals. In the 25+ years since, he has revisited the area multiple times, and it still has not recovered its original sonic richness. Krause’s audio work demonstrates how a careful study of a multispecies soundscape can reveal the traces of slow violence that are otherwise imperceptible, yet so deeply important to attune to. Digital design studio Upián worked with five of Krause’s sonic ecosystems and created interactive visual soundscapes that allow the user to explore different layers of frequencies and the songs unique within each of them.¹²⁴ One of these visual soundscapes features Lincoln Meadows. The result is a highly engaging interface that both visualizes the sounds that are heard with different shapes and movements, and also helps to focus an attunement to both individual and collective sounds.

My own critical practice during my fieldwork in Brazil extends some of the gestures made in these examples, documenting the long aftermath of the Rio Doce disaster. *The River Runs Red* (2018) is an interactive documentary that is a poetic

¹²⁴ An installation version, as well as the web project of The Great Animal Orchestra, was commissioned by the corporate philanthropy arm of the Cartier diamond company, Foundation *Cartier* for Contemporary Art.

dialectic, with an open-access interface attempting to make visible and audible the slow violence of the Rio Doce disaster through nonfiction film and sound. Attempting to center the river in the project is a step towards dismantling human exceptionalism, as the i-doc brings to the fore multispecies entanglements, and highlights the interconnections within an ecosystem. Before discussing the project's fieldwork and interface, I will begin with the history which led to the Rio Doce disaster.



Two rivers merging to form the Rio Doce. Clean water on the left, the mine tailings on the right.

A Tidal Wave of Mud

On November 5th, 2015, a dam from an iron mining operation in Bento Rodrigues, Brazil, suddenly cracked and released 60 million cubic meters of toxic

sludge down the Rio Doce, “The Sweet River.” This tidal wave of mud then made a 17-day, 800-km downstream journey, rushing towards the Atlantic Ocean, submerging two towns, drowning 19 people, deeply poisoning the water, and asphyxiating fish and other living beings: effectively wiping out an entire ecosystem. Variouslly called in the media as the “Bento Rodrigues dam disaster” or the “Mariana dam disaster” from the two towns close to its epicenter, the mud tailings destroyed and remapped the entire Rio Doce watershed, and it is not only Brazil’s, but the world’s most extensive tailings¹²⁵ disaster on record. Less than a year after we finished making *The River Runs Red* (2018) in response to this catastrophe, unbelievably, the same mining company¹²⁶ had a second catastrophic dam failure on January 25, 2019, less than 60 km away from the Rio Doce, in a town called Brumadinho on the river Paraopeba. This new disaster, while “only” releasing 12 million cubic meters of tailings, drowned nearly 300 people in the mud tidal wave, making it the world’s worst tailings tragedy in terms of human loss. These are two grim world records, both of which irreversibly poisoned two entire watersheds. Though seemingly spectacular and sudden in scope, these disasters draw on a long history of slow violence that dates back to the region’s colonial mining roots.

The River Runs Red combines two core ideas. First, the site of the Rio Doce is crucial for investigating the long and multifaceted history of slow violence that spans

¹²⁵ “Tailings” are the waste product from iron mining and purification, a combination of water, fine particles, and various chemicals.

¹²⁶ Samarco, co-owned by Vale and BHP Billiton; Vale is the largest iron company in the world, while BHP, of Anglo-Australian origin, is the largest mining company in the world.

the centuries before the disaster. Second, the project proposes experimental documentary film, combined with an experimental interactive interface, as an embodied, sensorial, emplaced approach for capturing the long now of slow violence.

The Rio Doce Disaster and its Double Death

The name of the Brazilian state “Minas Gerais,” where the Rio Doce is located, means “General Mines,” and it is an accurate indicator of the region’s extractive, colonial history. In 1693, Portuguese colonists discovered gold, and a gold rush ensued.¹²⁷ Though more than a hundred Indigenous groups inhabited the state of Minas Gerais at the time, a systematic regime of kidnapping and enslavement by bands of Portuguese enslavers drastically reduced their numbers.¹²⁸ Only five major groups remain today, and I stop to name them here as a small but important practice of recognition: the Xakriabá, the Krenak, the Maxakalis, the Pataxós, and the Pankararus. The Krenak inhabit a stretch of the Rio Doce, and they were greatly affected by the disaster.

The Brazilian gold rush lasted two centuries, which provoked massive immigration from Europe and a large slave trade, with at least half a million persons kidnapped from Africa to work in the mines. Though the discovery of gold in 1693 was the trigger for European colonial invasion, mining activities expanded from gold

¹²⁷ *Norma e conflito: aspectos da história de Minas no século XVIII* (Editora UFMG, 1999).

¹²⁸ See: Oíliam José, *Indígenas de Minas Gerais* (Belo Horizonte: Edições Movimento-Perspectiva, 1965).

extraction to many mineral resources such as platinum, diamonds, palladium, silver, lead, zinc, aluminum, uranium, and iron. In fact, the region is so rich in iron that it is called the “Quadrilatero Ferrifero” or “Iron Quadrangle,” one of the largest iron-ore deposits in the world. In 1942, the Brazilian government obtained the support of the United States and of Great Britain to form the Companhia Vale do Rio Doce (Vale) to mine and export iron.¹²⁹ Vale is the largest source of iron in the world, and, additionally, it runs nine hydroelectric plants and a large network of railroads, ships, and ports to transport its products.

The Rio Doce disaster stands on the pillars of this history. Samarco Mineracao S.A., the company responsible for the disaster, is co-owned by Vale and the Anglo-Australian BHP Billiton, the world’s largest mining company. The Fundão Dam which collapsed had been holding tailings from the Germano mine, an open-pit iron-ore operation. Raw iron ore needs to be purified for use, and the resulting waste from this process is called “tailings,” which resembles a type of thick, chemical-laden sludge of fine particles which are highly toxic. Tailings are a permanent waste product, and tailings dams are meant to be the permanent “solution”: structures built to withstand “forever,”¹³⁰ provided there is constant monitoring and upkeep,¹³¹ even

¹²⁹ See: Haruf Salmen Espindola and Cláudio Bueno Guerra, “The Ongoing Danger of Large-Scale Mining on the Rio Doce: An Account of Brazil’s Largest Biocultural Disaster,” in *From Biocultural Homogenization to Biocultural Conservation*, ed. Ricardo Rozzi et al., Ecology and Ethics (Cham: Springer International Publishing, 2018), 97–108, https://doi.org/10.1007/978-3-319-99513-7_6.

¹³⁰ Gretchen Gavett, “Tailings Dams: Where Mining Waste Is Stored Forever,” *PBS FRONTLINE* (blog), July 30, 2012.

¹³¹ Samarco built the Fundão Dam in a style called “upstream dam”; some scholars debate that the upstream-style dams can be safe, but need constant monitoring.

after a mine or a mining company dissolves. Given the volatility of extractive capitalism, the only surely permanent part of that situation is the waste itself, not the mitigation of it.

Despite a leaked memo revealing that Samarco was aware of a potential breakdown of the Fundão Dam in 2013, two years before the catastrophe, the company did nothing to prevent it. It took no measures to address the problem, not even to create a basic sound alarm to warn local inhabitants in case of an emergency.¹³²¹³³

In 2013, with iron prices declining, Samarco tried to expand the area of the tailings disposal by merging neighboring dams in order to reduce costs, despite the operation being more destructive and more precarious than building a new dam. Dam failure was a known issue, with six occurrences in the state of Minas Gerais alone since 1986,¹³⁴ never mind the numerous other disasters worldwide. This disregard to

¹³² Andréa Zhouri et al., “The Rio Doce Mining Disaster in Brazil: Between Policies of Reparation and the Politics of Affectations,” *Vibrant – Virtual Brazilian Anthropology* 14, no. 2 (August 2017), 9.

¹³³ Samarco’s track record before the Rio Doce disaster reveals that, between the years of 1996 and 2015, the company had been fined at least 18 times for environmental contamination. A study by sociologist Rodrigo Salles Pereira dos Santos revealed that Brazilian environmental agencies issue new licenses all the time even to repeat offenders, as mining is considered vital to economic development. Samarco denied most of the fines, and they went largely unpaid by delaying tactics through lawsuits, as after five years the statute of limitations expires and the lawsuit is shelved. See: “Samarco Mineração S.A. Mina de Alegria e Germano,” Parecer Técnico DIMIM (FEAM, 2006).

¹³⁴ See: Bruno Milanez, Raquel Oliveira, and Clarissa Reis, “Capacidade Ambiental No Nível Subnacional: O Caso Do Estado de Minas Gerais, Brasil,” *Planejamento e Políticas Públicas* 44 (2015), 317–342.

actual, and potential, threat of lethality for the environment and for human communities matches the post-boom period of commodity prices dropping.¹³⁵

Samarco exculpates itself by declaring the Rio Doce disaster an “accident,”¹³⁶ while fewer than four years later as mentioned above, on January 25, 2019, a repeat disaster occurred less than 60 km away on the river Paraopeba, in the town of Brumadinho.¹³⁷ This new “accident” while “only” releasing 12 million m³ of tailings, instead of 60 million m³ in the Rio Doce incident, killed nearly 300 people in the mud tidal wave, which, as mentioned earlier, made it the world’s worst tailings tragedy in terms of human loss.¹³⁸ Both disasters were knowingly allowed to happen because of corporate greed; this could be called a “planned disaster,” while many have more plainly called it a crime.¹³⁹

Halfway down the Rio Doce is Indigenous Krenak land. There I met Lucia Krenak by the banks of the Rio Doce, where she and her community lived. I inquired whether Samarco was still delivering fresh water to Indigenous land, like they promised to do. She was silent a long time before answering, then explained they bring some, but none for the cattle, and none for the land, so they cannot live as they

¹³⁵ Rodrigo Santos and Bruno Milanez, “The Construction of the Disaster and the ‘Privatization’ of Mining Regulation: Reflections on the Tragedy of the Rio Doce Basin, Brazil,” *Vibrant* 14 (August 16, 2017), 9.

¹³⁶ “Results of the Independent Investigation into the Accident at Samarco’s Fundão Dam,” Corporation, Vale, August 29, 2016, www.vale.com.

¹³⁷ Marina Novaes, “Brumadinho: as últimas notícias sobre o rompimento de barragem da Vale,” *EL PAÍS*, January 28, 2019.

¹³⁸ Charles Armada, “The Environmental Disasters of Mariana and Brumadinho and the Brazilian Social Environmental Law State,” *SSRN Electronic Journal*, January 1, 2019, 4.

¹³⁹ See: Espindola and Guerra, “The Ongoing Danger of Large-Scale Mining on the Rio Doce.”

used to. Then she sang a song in Krenakan, which she ended with despair: “The river is our lives, our mother, our father. The day that dam burst they destroyed our lives.”

The Krenak, including Lucia, have already gone through several massive brutal displacements in the long, and still ongoing, suppression of Indigenous people in Brazil. However, the river has never been a death they’ve had to mourn, and yet now this is not just one but a “double death,” when “cascades of death ... curtail the future and unmake the living presence of the past.”¹⁴⁰ Put otherwise, a double death is when a damaged ecosystem loses its ability for resilience and renewal: when the fish are all gone, and the river has been buried under sediment and poisoned with toxic tailings, preventing healthy regeneration. Lucia may have despaired the day I spoke to her, yet the Krenak have no choice but to invent new futures in the face of a double death.

Fieldwork and the Cinematography of *The River Runs Red*

Making a multilinear interactive documentary seemed a natural fit with the subject material, as the disaster spanned more than 800km of water and land. It was multilinear, multi-spatial, poly-vocal, and multi-landscape by its very nature. This, combined with investigating the slow violence of the disaster for both humans and more-than-humans, led me to using both traditional and experimental filmmaking methods, set within an interactive interface’s unique capabilities, to explore the

¹⁴⁰ Deborah Bird Rose, “Double Death,” *The Multispecies Salon* (blog), November 17, 2014.

effects of a disaster on an ecosystem. Though the project is based on my dissertation research, and as such I was the director who oversaw the project from start to finish, I had a dedicated production team on the ground, and a lot of important contributions by various collaborators along the way. My co-cinematographer in the field was documentary filmmaker Lucas Bonetti, who grew up in the closest large city to the disaster, Belo Horizonte. Additionally, we had two more crew members with us, L. Assis, a film student from São Paulo, and Antonio Peluso, an American anthropology student who specializes in Brazilian Indigenous studies. Though we were a team, we each had our own experiences and approaches in the field, and as such I go back and forth in my writing between “we,” “our,” and “I”. We cultivated a relationship with MAB, or Movement of People Affected by Dams, who had a grassroots network with all the various towns and cities connected to the river, with Antonio and Assis attending many of their community meetings in Mariana for our pre-production research. Given limited funding, we decided on an intensive shooting schedule that spanned a month down the river, beginning in Bento Rodriguez and ending in Regência, with frequent stops along the river.

We were at times split in two, with Lucas and Antonio taking the lead on more traditional documentary coverage, interviewing affected residents for their testimony, whereas I made experimental filmic or sonic interventions as I encountered new assemblages around the river of humans or animals, landscapes, and other more-than-humans. For example, I made daily durational recordings of the river with a hydrophone, an underwater microphone. These recordings, made nine months

after the disaster, revealed zones of complete silence that should have been teeming with fish, the silence being the loudest evidence of the far-reaching aftermath of the chemical-laden sediments. This is a similar example to Krause's aforementioned logged field site at Lincoln Meadow, with an impoverished acoustic ecology that is likely to take decades or longer to recover. These hydrophone recordings ended up being our main sonic texture for many of our films later on, and they are the sound one hears on the homepage of our interface.¹⁴¹ I wonder what the river sounds like today in these same places I sampled recordings, now six years since my original recordings in 2016.

Echoing Easterson's *Animal Cams*, we used portable cameras to strap to a dog who wandered through Paracatu de Baixo, the second town buried in the mud tidal wave. After we left her alone for quite some time – because otherwise she kept close to us, likely from curiosity and hunger – the dog wandered through the ruins, wary of other dogs, searching for something we never discovered. Strapping a GoPro to this dog allowed us to notice – to attune – for a few hours to her paths through the landscape in a manner that was very different from a human's. The destroyed buildings she trots by were our filmmaking focus when we arrived, but the dog seems to ignore or want to bypass them, and instead pays attention to the ground, to different smells, and to what remaining life she notices (a man walking by, a lone cow, bees by a bush, other dogs). She does not enter a single building and sticks to

¹⁴¹ Additionally, I also later made a sound installation with collaborator Duane Peterson called *Songs of Mud* which features five sonic riverscapes from the Rio Doce.

the road, perhaps an echo of previous lifeways; thirsty, she laps water at the edge of the river, not knowing it is highly toxic, or perhaps in the extreme heat, not having the luxury of choice. The footage offers a very different sensorial input that goes beyond just a “dog’s point of view,” of a place where the disaster is still an open wound.

We did the same again with a cow in Santana do Deserto while she went out to pasture by the river for half the day. Again, multispecies cinema is about experimentation, speculation, and trying to attune to more-than-human ways of being – even domesticated beings that live with, and whose behavior is influenced by, humans. The cow herd is highly social, interacting with one another via sounds and gestures. They nip at each other, saddle up close to “our” cow but she seems pretty cranky – probably from this contraption we put around her head – and she headbutts them away. They vocalize different types of sounds (these have been found to be a type of language¹⁴²). It turns out this particular cow was also the bull’s favorite companion as he comes over to lick her affectionately, as well as the camera. He’s the only one she doesn’t push away with her head. The herd eventually ambles over to the river to drink the water. I was interested in this small ephemeral moment, this creature engaging in her world, and attuning to this moment – with the cows, and with *these* cows in *this* particular landscape, with its particular recent history of the disaster.

¹⁴² Alexandra Green et al., “Vocal Individuality of Holstein-Friesian Cattle Is Maintained across Putatively Positive and Negative Farming Contexts,” *Scientific Reports* 9, no. 1 (December 5, 2019), 18468.



GoPro on a cow, being licked by a bull

One woman kept a plastic jug full of scorpions who had entered her home right after the tidal wave, escaping the river for better places on land.¹⁴³ We arrived nine months after the disaster, so though we tried to find smaller creatures to attune to — no scorpions, but perhaps a snail? — none were to be found on the banks of the river, a sign that the microbiome had not recovered. Most of the fauna we saw were either previously domesticated and now abandoned (dogs) or livestock with a human caretaker (cows, chickens, mules) or birds such as terns or plovers; no fish, no amphibians, no crabs, no mollusks, etc. Granted, we did not make an extensive catalog, but I made a practice of searching out life in or by the river every day I was filming, and it was immensely difficult to find. If anything, left to meditate on the

¹⁴³ Rose Senna, *The Scorpions of the Rio Doce*, interview by Andres Camacho, March 2016.

waterway itself, I developed a type of attunement with the river as an autonomous entity, through the previously mentioned hydrophone recordings.

Just north of the small town of Bento Rodrigues, ground zero of the dam failure, sat several massive pools of water holding a concentrated amount of tailings. The town is often photographed for the story of disaster plainly written on its walls: a red line neatly meeting white, ten feet high. This testimony is repeated on the light gray bark of the trees on the banks and again in the color of these pools, a bright orange depth. A camera placed under the water found only stillness; every rock was covered by a layer of orange silt at least an inch thick. Scraping at the silt with a stick created a suspension that lasted hours, which made visible the temporal nature of the turbidity; the same silt suffocated all the fish at the onset of the disaster.



Wave crashing over a GoPro

In Regência, where the river connects with the Atlantic Ocean, I left a camera at the break. Waves crash into the device with a violent force, only to recede with the same suddenness, burying the camera in sand with each successive stroke. This sand turned black in patches, evidence of ongoing sediment deposition from the mouth of the river. Each of these examples is an attempt at Rangan's cinema of "surrender," where we purposefully let go of controlling the frame, with only the barest amount of editing afterwards, as an attempt to deanthropocentrize the narratives of the river and allow a non-linguistic attunement with the more-than-human. I want to stress that there is no magic sauce to attune to the more-than-human. In examples like these, I only attempt to show some of the trial and error that I've gone through in searching for answers to decentering the human, using speculative methods, and trying to attune to otherness. It is, in short, hard to do.

Editing and Making the Interface of *The River Runs Red*

After shooting, it took two years and many iterations for us to arrive at a working interface. Again, Lucas and I split our energies: he edited the more traditional documentary pieces, and I edited the experimental pieces while overseeing and designing the i-doc interface. Editing for me is an iterative process, where I approach the larger goal by constructing smaller parts first. I call these "pearls" to build a necklace out of. Lucas and I made 43 film-pearls. Some were based around a scene that had some kind of beginning, middle, and end. Other pearls were a mood, a feeling, ambiance, a point-of-view. These pearls then contributed to how we imaged

it being organized online. A new collaborator, Andres Camacho, was brought on to help build out the interface. As we were primarily filmmakers without advanced coding abilities on a very low budget, it was essential to use a digital storytelling interface program such as Klynt¹⁴⁴ that could provide a solid framework from which to build out the project. However, this imposed some severe limitations in our ability to be more unique and inventive with the interface. Today, *The River Runs Red* is a constellation of films arranged in a poetic multilinear dialectic. Methodologically, taking a multilinear narrative approach to documenting a disaster helps to undo the myth of one unifying story, and instead allows for a polyphony of multiple ideas, narratives and perspectives to exist at the same time. To this end, instead of a single film, the project is made up of 43 short films. The interface presents three major paths to choose from, and each film proposes a dialectic between two opposing concepts, ideas, words, or worlds.

¹⁴⁴ As of this writing, it is likely we will need to rebuild the project in a new digital storytelling program, as Klynt isn't working well any longer. Such is the fragility of online work.



Sample dialectic screen from the interface of *The River Runs Red*

Each new film is the synthesis of this dialectic, and, at the end of the short film, a new set of word choices appear, further opening up the possible paths. There are many possible combinations of the material, and a viewer may never watch all 43 films/dialectics; but, each time they revisit, they will experience a new set of films, and gain something new from the previous journey. With these, and other methodologies employed, *The River Runs Red* tries to reveal other perspectives, ontologies, and temporalities, while attending to a multispecies multilinear narrative of the Rio Doce. In short, the project attempts a portrait of an ecosystem and tries to trace how the river, the humans and more-than-humans are learning to live with one another in what futures are possible given the irreversible present.

Is it possible to move beyond the end of the Rio Doce? How can humans learn to, as Donna Haraway explains, “stay with the trouble of living and dying together on

a damaged earth” in order to “provide the means to building more livable futures”?¹⁴⁵ As I mentioned in the introduction, anthropologist Joseph Masco argues that when the atomic bomb was invented, the possibility of instantaneous total death from nuclear war caused a systemic shift in thinking that changed people’s ability to define catastrophe, such that it is difficult to configure or pay attention to a slower crisis, no matter the evidence at hand.¹⁴⁶ The Rio Doce has this same quality: a spectacular sudden event of total death is seen as the ultimate crisis, versus the slower, long-term effects. To learn how to perceive slow violence, a new attunement is needed, as well as a new set of experimental approaches. This was the lodestar for *The River Runs Red*: using multispecies cinema, I centered the river in the approach, the questions, the filmmaking methods. What worlds existed underwater, aboveground and everything in between? How could these river-worlds survive their double death, and what speculative futures could they imagine? Centering the river celebrates the possibility for ongoingness, to stay with the trouble of figuring out how the Rio Doce, and other affected rivers, can survive beyond the end of the world.

¹⁴⁵ Donna Haraway, *Staying with the Trouble: Making Kin in the Chthulucene* (Durham: Duke University Press Books, 2016), 21.

¹⁴⁶ Joseph Masco, “Catastrophe’s Apocalypse,” in *The Time of Catastrophe: Multidisciplinary Approaches to the Age of Catastrophe*, ed. Christopher Dole (Ashgate, 2015), 19–46.

Chapter Three | Uncovering the Bleeding-Through of Slow Violence

An Ethnography of the Mar Menor Lagoon

Medusa's Mirage: A Tidal Opera (2023-ongoing)

Sample: La Manga

<https://vimeo.com/764916743>

Password : marmenor

A Mirror of the Cosmos (2021/2023)

<https://vimeo.com/728825032>

Password: marmenor

Portal Blooms (2020)

<https://soundcloud.com/izaca/sets/portal-blooms>

A Mirror of the Earth (2021)

<https://vimeo.com/506331947>

Lightning drew bright zigzags in the night sky, and thunder rumbled across the ocean. The storm seemed to come from the sea. It came closer and closer, the thunder cracks snapping the air so loudly the water seemed to jump to attention. Each rumble seemed to carry a meaning. *Urgent message. Crack! Depart immediately. Prepare yourselves.* Later, I fancied that maybe the thunder was trying to warn the lagoon: *A point of no return will be reached. Evacuate.*

Andres Camacho, my assistant director, and I retreated inside, wanting to stay and watch the night unfold, having goosebumps, but we were mindful of the camera equipment. Moments later, the sky opened up and rain battered our windows. It felt like the region had been thrown through a portal to another world, the dry and arid landscape suddenly in the midst of a monsoon. This was very heavy rain, instantly

collecting into large puddles, and then rivers, the dry ground balking at the sudden water. Adding insult to injury, the mountains funneled all the water downwards to the lagoon. The rain continued until *madrugada*, the time between midnight and dawn, and then stopped as suddenly as it started. When morning came around, the streets were flooded, cars stuck in place. People on the street told me they'd not seen anything like it, though I later grew puzzled about these claims: according to climatic data on the region, torrential downpours during this time of the year is common.¹⁴⁷ How long had they actually lived there? Were these just vacationers, here for a disembodied paradise – the palm trees, the cocktails, the seafood? Tourism has no interest in histories, in memories, only in creating a dreamscape. Or perhaps it was the fault of a collective short memory with fast media narratives that focus only on the current spectacular news event. A few sunny days later, everything dried up. But as I was about to see, this first storm was just a rehearsal.

Two weeks later, in September, the big one hit. This storm, even if torrential downpours were common for the area this time of year, proved to be a record breaker. So much water fell so quickly – was it climate change? – that it streamed forcefully down the mountains like an avalanche, over the dry land into overflowing ramblas, and it all went straight to Mar Menor with little regard for what was in its path. The rush of water tore down walls and fences in a few areas, and flooded the old town of Los Alcazares, situated right on the lagoon. The next day pictures started appearing

¹⁴⁷ Pérez Ruzafa, Marcos Diego, and Gilabert Cervera, *The Ecology of the Mar Menor Coastal Lagoon*.

on social media, and though the area where we were staying was also flooded, it wasn't as bad, and we raced to Los Alcazares to witness the deluge. On the way there, the roads were eerily empty, save for helicopters using the highway to stage rescues. I filmed them lifting off to go extract people needing immediate medical attention. When we reached Los Alcazares, we could only park far away and we walked downtown. Cars were vertical, swept into the lagoon, nose in the sand, while other cars had been slammed sideways haphazardly into buildings and tunnels, blocking streets. The playground had miles of black irrigation tubing wrapped around everything, ripped from the fields. The residents were heaving out sodden muddy couches and other ruined furniture onto the street. Random everyday objects, like shoes, dolls, and plates were coated in mud on the ground. Hours later we walked back out of the town, and then saw the fields: fertile, supple soil was now caked over in hard mud. But while all this human-centric disaster played out, the real disaster was coming a month later.

The summer season was over, and the frenetic tourist mirage dissipated. The rollercoasters were being taken apart, the games in pieces. The beach huts clammed up, and the bouncy castles in the water were deflated and towed away. Gangs of cats roamed the empty parking lots. However, Mar Menor, without the throngs of tourists, actually felt more like the beachside paradise so many claim it to be. The palm leaves rustled, the water was warm, the beaches were empty, the sand twinkled in the hot sun. The tourists who stayed, off-season, and locals, who lived here year-round, rejoiced. Trust me. You want to visit this place. It feels like a postcard. Hit pause,

bring a towel, sunscreen, and a novel, listen to the soft lapping of the water against the shore, then watch the sun set over the water in bliss.



Mar Menor: a postcard from paradise

Except bliss requires ignorance. Tourism is predicated on it: an easy postcard experience to walk into and escape daily life, removed from histories of place and time. It's a great capitalist machine that turns a big profit. But sometimes the palimpsest bleeds through no matter what. One morning in October, these same tourists and locals woke up to an alarming sight: a chorus line of thousands of fish jumping out of the water on shore. The balance in the lagoon had tipped too far below needed oxygen levels in the water column, and the sudden anoxic event caused a

mass exodus. It is hard to describe in words the scene of millions of fish flinging themselves out of the water onto land, just trying to breathe. It lasted a few hours. By afternoon, there was no more movement, just bodies floating or shored up on the beach. Their apocalypse had arrived.

As I have said in the introduction, my plodding, fractal, perhaps even circular approach to uncovering the slow violence of this ecosystem suddenly seemed incredibly timely. Often “slow violence” is slow only until there is a cliff. A point of no return. Then humans pay attention. But is it too late to make changes? *Urgent. Depart immediately.* Did the warnings come too late? *Evacuate.* As is the case with climate change today, a politicized mediascape heeds the cause only when spectacular tragedy strikes, and does little else in the interim. Is it too soon to write the same words that were at the end of chapter two? This was a spectacular sudden event of total death, seen as the ultimate crisis, versus the slower, long-term effects which I was documenting. To understand why the fish died, all the layers of this watershed’s complex history need to be held together, considered as one story that has been written over many times, with multiple histories overlapping each other.

I visited Mar Menor twice. Once in March 2019 for two weeks, and then again in July-September 2019 for three months. How could this lagoon-world, and all the pluriverse of species dependent upon it in and out of water, survive their double death, and what futures could they imagine? Yet, centering the lagoon doesn’t mean to only tell the story of water. To tell the story of the lagoon, the focus must be on the

land that surrounds it, and the funnel this land creates that leads it all back to the water. Mar Menor, after all, is a basin, a great collector of many histories.

So. The fish dying was a spectacular cliff. Violence as defined in the first degree. What happened next? Was there any person, any singular event, which was primarily responsible? How could I trace the actors involved in this murder, this near-extinction? Was it mining contamination, agricultural runoff, tourism and urbanism, or invasive species? These are all core issues of the lagoon and the surrounding landscape. I marveled at the proximity of everything in this region, with so many overlapping histories in such a small space, the palimpsest made of land and beings, folded by time. These histories seemed to all converge in the making of this cliff, this point of no return, built upon centuries of slow violence.

As I mention in the introduction, a palimpsest is a piece of writing, most often on a parchment, where the original text has been erased to make room for new writing. The superimposition uses the same paper or parchment, and sometimes the earlier writing bleeds through again, depending on the process used to erase it in the first place. A palimpsest then is not necessarily just about the overwriting, but rather the *bleeding-through* of multi-layered texts and histories. For instance, in archeology, there is the “cumulative palimpsest” of place, in which “the successive episodes of deposition, or layers of activity, remain superimposed one upon the other without loss of evidence, but are so re-worked and mixed together that it is difficult or impossible

to separate them out into their original constituents.”¹⁴⁸ This is an apt metaphor to tease out the slow violence of an ecosystem, where the toxic histories of land and water bleed through to the present, creating a palimpsest, yet one that can be hard to read. The work I did in and around Mar Menor is about finding the palimpsests of landscapes and waterscapes, that reveal the long-duration slow violence of this ecosystem. This is only possible through a thick emplacement of sensorial details, aiming at creating an attunement to an ecosystem’s pluriverse.

I am advocating for this approach especially to ecosystems with toxic histories, so-called ruins, places that have been abandoned and forgotten and erased from lore. Places, like Mar Menor, where patches of the landscape have been abstracted, made a tourist site with no regard or connection to history. Teasing out the bleeding-through is a way to attune to these complex places which are multi-temporal, multi-layered, with multispecies concerns. So often, being the arrogance of human exceptionalism, the more-than-humans are relegated as an externality in discussions of slow violence. It is a shared multispecies coexistence which is at the center of an ecosystem.

Pictures and videos of the tragedy circulated around Spain, and created a groundswell of support. A month later, a protest with over 55,000 people marched down Cartagena streets. But this fish apocalypse was just the latest in a series of issues the lagoon had been going through. The actors and historical events involved in

¹⁴⁸ Bailey, “Time Perspectives, Palimpsests and the Archaeology of Time,” 12.

the environmental history of the lagoon are varied and multiple, and the genesis of this violence ends in this apocalypse are complex. Before I jump into an ethnographic murder-mystery account of the lagoon, let me say a bit more about how I approached this ecosystem through film and sound, and how these filmic methods seeded ideas for deeper attunement with this ecosystem.

Long-durational Filmmaking as Method and Practice as Mess

Film and sound work are messy. Practice of any kind is messy. It is difficult to write about mess. My audiovisual work around the lagoon occurred at multiple speeds, in patchy ways, and it went beyond just “audio” and “visual”. Like I said - I chose four big issues to focus on. And then I chose very specific visual or sonic objects to create threads between sensorial details and these macro themes. I would follow that thread as far as it would lead me, upwards, downwards, back in history or forward into the future and sideways in relationality. This created a kind of fractal method, thick with emplacement, where my sensorium could enter a place and its histories of slow violence. Remember my lone jellyfish from the introduction to this dissertation, stuck in the net put in for tourists. These nets later gathered great significance for me as they seemed to be a metaphor for mirages I encountered in the field, where I kept uncovering different types of illusions. During the storm floods, the avalanche of water entering Mar Menor swept up all these nets into massive piles of tangled balls of knots, floating and full of detritus, that later had to be hauled up out of the lagoon by crane on a barge. I filmed one of these tangles the day after the

storm, the water so cloudy I had to be within a foot of the webbing to be able to film it. After spending some time wading, I returned with my underwater drone so that I didn't have to expose my body further to the water full of toxic runoff, already irritating my skin. Then the drone's propellers promptly got stuck in the mesh and I had to go fish the drone out, entering the water again. The nets never played their role as intended. They were a remedy that ended up becoming a symbol of human incompetence (the fishermen, the government program, my own filming attempts). However, the nets also mirrored my process. You think you know what you will catch with these "nets" of knowledge, but they are full of holes, and they may catch things entirely different from what you expect. Such is practice. It is not a binary of success vs. failure, but all the in-betweens, the holes.

During my fieldwork, I employed one rigid rule during my time, that of the one-minute take. No matter what I was shooting, I would force myself to shoot it for one entire minute at least. This may sound simplistic, but when I'm trying to quickly get an impression of a place, or when I'm just shooting, say, a billboard, or a dead pelican in a tailings pond, sitting on my hands for a whole minute is torturous. It seems like nothing happens, until the wind lifts up the dust and my frame comes alive in a way that I couldn't have foreseen, revealing a connection, sometimes even a palimpsest, I hadn't realized. It makes one go beyond the immediate signifying elements of the shot – "dead bird, dusty earth, that's sad" – to a more curious attention: "that looks like a pelican...are we by the sea?...the wing looks petrified...is this a freshly dead bird? No it seems like it's been frozen.... What is that water,

actually, is that water or salt? Where am I? Is this a pond? Is this a tailings pond? Did that bird die on impact? What are those lumps behind it? More dead birds? What is that white stuff? I see mountains in the back. I see dragonflies flying over the bird. I hear cicadas. I hear traffic. I hear something small popping. I feel really hot. Now that I'm standing I don't feel so good – am I breathing fumes from this water?" Etcetera. A lot of "attunements" flourish within a minute, on-frame and off-frame. These attunements lead to a thick type of emplacement, which often lead eventually, if not immediately, to understand the palimpsest of slow violence, situated in a multispecies ecosystem, that I was after in Mar Menor.

Andres, my assistant director and sound recordist and all-around mind-melding collaborator whom I've mentioned several times, dubbed this my "cinema of commitment" one day, watching me sweat rivulets under the hot sun as I allowed every shot I chose to roll exactly one minute or more before progressing to the next. In retrospect I think it's funny he told me this, as he also recorded audio durationally, indeed for far longer than I ever recorded my shots, and in complete stillness to boot. But durational recording, of either visuals or audio, is an extremely important part of my process. I go into detail of my long-durational 18-hour interview in chapter one with Wynn, the boat captain, and the epiphany I had during and afterwards from this experience. One minute of shooting may not seem like much in comparison, but it forms the groundwork for my approach. It helps build a type of scrutiny, patience and attunement; it trains me to stop and watch *even if I think I know what I am already watching*. Anthropologist Joseph Masco argues when the atomic bomb detonated and

the possibility for instantaneous total death occurred, humans became unable to pay attention to slower violence.¹⁴⁹ Long-durational shots and sound recordings are one way to slow down my attention, to open the possibility to think in a better modality to capture the slow violence of a place.

One day, we were hiking down the mountain right above Llano del Beal (a cancer hotspot I go into later on). There were some old mining ruins on either side of the narrow road we were initially interested to see. We came upon a part of the road where there had clearly been a noble, or foolish, attempt at replanting trees, only for them all to have died before they even grew to be saplings. I found this telling. They were clearly planted on what seemed to be a miniature slag heap. The waste appeared untreated, so the trees seemed destined to die – another good example of a mirage. As I was shooting the dead little not-quite-saplings, waiting for my full minute to pass, my attention was drawn to the only thing moving: ants. I refocused my frame, with a macro lens now, on the ants, picking one out in particular that seemed to be dragging another, bigger ant. I stayed with this ant for over ten minutes, filming its trajectory as it dragged the bigger, barely-alive ant over and under and around gravel. It would sometimes leave the bigger ant behind and then return for it. I couldn't understand the behavior, but I stayed with it. The sun was blazing and it drove me under the shade, leaving the ant and its journey. Later on, this footage was seen by my editor Duane Peterson, who remarked that the bigger ant may have been the queen. If the queen is

¹⁴⁹ Masco, "Catastrophe's Apocalypse."

in trouble, the colony will do everything it can to save her, as when she dies it often means the collapse of the colony. We tried to get some ant experts to confirm the footage, but they were noncommittal: maybe it was, maybe it wasn't, hard to say. But it gave a different perspective to the slag heap. Perhaps it was a welcome home for ants, life despite capitalist ruins, or perhaps the tailings killed them like they killed the trees. Either way, it was slowing down my shooting that allowed me to attune to the ants.

Oftentimes what results from long-duration filmmaking, or long-duration sound work, is more subtle. It's a mood, a feeling, an attunement that isn't nameable that I gain from elongating a shot, yet it isn't possible from just a snapshot. David MacDougall describes long-duration techniques as giving us "excess meaning,"¹⁵⁰ versus a tightly controlled message, "interpretive space" that allows the viewer (or listener) to supply meaning, as well as a "sense of encounter"¹⁵¹ that is not already staged. If the "film becomes shorter, the analysis becomes cruder."¹⁵² Whereas long takes permit several kinds of contextualization and fewer opportunities to signify: they allow for "ambiguities, interruptions, and competing centers of attention."¹⁵³ My current work-in-progress is also a long-duration piece, a 12-hour three-channel film

¹⁵⁰ I have made several long-duration sound pieces to date that attempt this kind of excess meaning: *Songs of Mud* (2019) which are five long unfiltered tracks of my daily practice of listening to the Rio Doce, and *The River in 24/7* (2020) which is a 24 hour durational piece featuring the underwater world of the Mississippi River.

¹⁵¹ David MacDougall, "When Less Is Less: The Long Take in Documentary," *Film Quarterly* 46, no. 2 (1992): 298, <https://doi.org/10.2307/1213006>.

¹⁵² MacDougall, 299.

¹⁵³ MacDougall, 302.

on Mar Menor, called *Medusa's Mirage: A Tidal Opera*. I say more about this work-in-progress, and its use of hyperdurationality in the service of uncovering the palimpsest of slow violence in Mar Menor, in the conclusion of this dissertation.

As for Mar Menor, on the first day I came back in July, I started where everyone starts when they first come here: walking on the sand by the beach and stopping for a cold drink at a beach hut.

Lagoon Geology (37°42'00" N, 00°47'00" W)

As I mentioned, Mar Menor is labeled a beachside paradise. Family friendly, it is immensely popular during the summer, with beaches packed to the gills.



The Mar Menor beach scene

The sea has a famous seahorse *Hippocampus guttulatus* that capriciously shows up in hidden parts of the shore, clinging with its little tail around the seagrass.

Most have never seen it, but it's taken up as a theme all around the lagoon: benches, overhangings, railings, posts, menus, all built in a seahorse shape. The only real seahorse I saw was in an aquarium in nearby Murcia, which I filmed, while it held on to a piece of green plastic.

Mar Menor is located on the southwestern coast of Spain, in between the cities of Cartagena and Murcia, and is the largest saltwater lagoon in Europe. It is a hypersaline, shallow lagoon around 4 meters deep on average, with sections up to 6 meters.¹⁵⁴ The lagoon closed in on itself away from its big sister, the Mediterranean, starting the process millions of years ago and likely finishing the enclosure in the last 500-5000 years. This is a big question on some level, because right now there is a debate on if the lagoon is "Mediterraneanizing" itself due to the opening of the Estacio channel (which now connects Mar Menor with the Mediterranean Sea). So just when did Mar Menor become Mar Menor? When it became self-enclosed. When did that happen? No one knows for sure.¹⁵⁵

It was a slow process, carving its place out on the coast of Spain. Its name is derived from this same sisterly relationship: the minor sea "Mar Menor" to the larger sea, "Mar Mayor". A spit of sand sits between the two bodies of water that is around

¹⁵⁴ Héctor M. Conesa and Francisco J. Jiménez-Cárceles, "The Mar Menor Lagoon (SE Spain): A Singular Natural Ecosystem Threatened by Human Activities," *Marine Pollution Bulletin* 54, no. 7 (July 1, 2007): 839–49, <https://doi.org/10.1016/j.marpolbul.2007.05.007>.

¹⁵⁵ The geologic origin and evolution of the Mar Menor lagoon have been influenced by a host of factors, including: the changing levels of the sea since the Tortonian period (11-7 million years ago), the volcanic activity during the Pliocene epoch (5-2.5 million years ago), which formed small islands in the lagoon's basin, and the Quaternary compressive system (2.58 million years ago to today) which helped shift the sandy barrier that encloses Mar Menor.

22km long, and less than a 1 km wide, called “La Manga” or “the sleeve.” This land was once upon a time dangerous to settle for both ecological and sociological reasons: prone to storms and high winds, and prone to pirates. Now-derelict towers still dot the landscape all around the lagoon, built to spot the marauders and give ample warning to the villages. This sand bar has five small openings called *golas* which are less than a meter deep, so there is still some natural exchange between the two seas, but Mar Menor’s extreme salinity was its real natural barrier. Salt is its immune system.



The Mar Menor lagoon. Source: Map data © 2022 Google Earth.

In Search of the Real Bloom

A few days later, I took a break from the beaches and colorful umbrellas, feeling upset the jellyfish weren't around, so I headed for the fields in between the lagoon and the mountains. Though there were no jellyfish blooms this summer to my disappointment, there was another kind of bloom brewing, and a far more menacing one. I was interested to see if I could film the source of this other kind of bloom.

A cloud passed over, ominous and slow-moving, darkening the tractor. Dust billowed out from behind the wheels, invisible until the sun returned and pierced through a cloud of yellow earth. At my feet, flies circle death, loud and uncaring, covering a carcass glistening in blue: a lizard flattened to a thin sheet in an unlikely place, at the crossroads of a dirt track and a *rambla*. This word, *rambla*, makes me think of my father's country: in Uruguay, *rambla* means a "walkway by the sea," where people stroll with their maté gourds and yerba and thermoses, but here in Spain it means a dry riverbed. Dry, until a storm passes through a few times a year, and then the *rambla* fills suddenly with water, its intended purpose coming to life: overflowing, torrential, powerful, explosive. There are seven major *ramblas* that feed Mar Menor. But like a dormant volcano, they only like to overwhelm the sea a few times a year, an onslaught of freshwater love and lava. The rest of the time, the *ramblas* ought to sit empty, gathering dust.

I say "ought" because a so-called "revolution" in agriculture in the 1970s changed many of the *ramblas*. Now they dribble water, feeding Mar Menor a regular diet of pesticides, fertilizers, especially nitrates – and just as dangerous – *fresh* water.

The hyper saline lagoon of Mar Menor thrives on salt as I mentioned, and fresh water weakens its immune system. I wanted to see if I could spot how a farm was contributing to the water flow ending up in the lagoon.

Temperatures reach up to 40 degrees Celsius (104F). This far south, with such constant harsh sun, historically only rain-fed agriculture was practiced, with varieties of olives and almonds that could survive on little water. But as the region gets around 300 days of sun a year, it has a unique advantage: as the Southern-most region of Europe, it could produce vegetables and citrus, when no one else can... if it only had more fresh water. Francisco Franco, Spain's decades long dictator from 1939-1975, went to great lengths to make a "transvase": a huge engineering project criss-crossing Spain, rerouting fresh water from the Tajo River, 400km North, to the region of Murcia through a gigantic system of overland cement aqueducts or open-air canals.¹⁵⁶
¹⁵⁷ This hydro-infrastructure is key to the touristic and agricultural development of the region. Fresh water arrived where it didn't belong, and big agriculture companies set up shop with euros for eyes, a new cash cow covered in rows of plastic. Lettuce, in need of such great amounts of water, is now grown everywhere. Citrus trees, also very thirsty creatures, sprawl over the landscape in rows endless to the eye, with little dots of orange or yellow during the right months. Many of these citrus farms sport tall fences to keep intruders out, a detail I found unexplainable given the sheer quantity of

¹⁵⁶ Pérez Ruzafa, Marcos Diego, and Gilabert Cervera, *The Ecology of the Mar Menor Coastal Lagoon*, 405.

¹⁵⁷ Erik Swyngedouw, *Liquid Power: Contested Hydro-Modernities in Twentieth-Century Spain* (Cambridge, Massachusetts: The MIT Press, 2015), 152.

citrus groves, and their relative inaccessibility in rural areas. Was this a leftover of desperate times during an economic recession? I am not sure.

José Matias, a geochemist-turned-whistleblower, won't touch the produce grown and sold locally, as he's tested the lettuce leaves, the tomatoes, the cucumbers. He says they contain loads of chemicals from bad big-business agricultural practices. In addition, the produce is being grown on contaminated soil, and being washed over by the open-pit mountain water several times a year during the storm season.

Most days of the year do not feature storms, and today is no exception. I hear, more than see, sun scorched earth cracked bone dry as the cicadas drone. The cicadas' wings grind a song almost too hot to listen to – a sound I talk at length over in chapter one. Uncannily, they sound like the ghosts of mining machines past, churning slurry to get zinc. Though few speak on the subject, heavy metals have dispersed everywhere in this region: in the ground, in the water of the lagoon, in the air, in human bodies, and even in the jellyfish, a surprising connection.

This led Andres and I to develop a sonic practice to listen for sounds that evoked hauntings, creating a type of speculative soundscape. Andres often comments that “sounds sound like other sounds”: it is this plasticity with the real that enables a speculative play not as possible with the image. For example, the sound of wind, recorded with a contact microphone on the metal fence posts surrounding toxic mine tailings, channeled ghosts. We would try and find sonic objects that might be used as sonic portals to enter into the multiple temporalities of slow violence. Eventually this led us to create an interactive installation called [*Portal Blooms*](#) (2020) for the 2020

Manifesta Biennial. We designed an interactive listening booth where visitors encounter a radio they can tune to various stations, each tethered to an imagined future soundscape in Mar Menor. One soundscape imagines: what if cicadas took over the world? Another: what if sea levels rose and La Manga went underwater?

Coming back to the fields, and the source of the blooms: though they were everywhere, it was difficult to access the agricultural fields of Mar Menor to film. One farm just off the edge of the lagoon had sheep roaming through the land one day. We stopped by to speak to the sheep herder and ended up filming. Yet, not 20 minutes after we had started, a manager of the farm showed up in his black SUV and demanded we leave his private property, saying we were not to shoot the fields as they had “enough troubles” with the media. Mar Menor had a massive eutrophication event in 2016 (and again in 2019, and 2022) and became dubbed as a “green soup” for the algae overgrowth, caused by the nitrate runoff.¹⁵⁸ This summer (2019) was the repeat bloom, and I was seeing it happen live – the water getting more opaque by the day. Farmers like this one were featured in the media as the main culprits, though what is wrong with Mar Menor is a far more complex issue than just the nitrate runoffs from these farms. It is also about the way the land funnels everything back into the lagoon. To understand the story of Mar Menor, it is needed to start higher up, with the mountains first.

¹⁵⁸ Fernando Molina and Sara Ramos, “La ‘sopa verde’ sigue asfixiando al Mar Menor: estas son las previsiones para este verano,” May 24, 2022, sec. Noticias, https://www.lasexta.com/noticias/medio-ambiente/sopa-verde-que-sigue-asfixiando-mar-menor-cuales-son-previsiones-este-verano_20220524628cbc8acd1524000106453f.html.

Thousands of Years of Mining

The mountains that surround half of Mar Menor are called “The Sierra Mineras”. The name is apt as it literally translates to “The Mining Mountain Range,” indicative of the extensive mining history of the region. It makes me wonder what these mountains were called before they were mined, but the name seems lost to history. Rich in minerals, the mountains have been a bounty of silver, lead, galena, pyrite, mercury, copper, iron and other minerals for many thousands of years, dating back at least to the Phoenicians in the 7th century BC, around 2700 years ago. The earliest known settlement that seems dedicated to exchanging goods – specifically mined in the mountains – has been found in Los Nietos in the 4th century BC. Today it is a sleepy beachside village located right on the edge of Mar Menor, but it was at the time an impressive Iberian settlement. There is an archeological record of Greek goods, such as pots, exchanged for mining products.¹⁵⁹

¹⁵⁹ Carlos García Cano, “Informe Sobre El Poblado Ibérico De La Loma Del Escorial, Los Nietos (Cartagena),” *Memorias de Arqueología*, 1996, 127–40.



Mar Menor relative to the Sierra Mountain Range. Source: Map data © 2022 Google Earth.

Given that these mountains have been mined in some shape or form for the last 3000 years added a surprising dimensionality to the puzzle I was putting together of the lagoon: here was a well-documented history of the slow violence in the region that went back thousands of years.

The range of the Sierra Minera extends along 26km of coastline from the city of Cartagena to the west side of Mar Menor, reaching at its highest point an altitude of 430 meters.¹⁶⁰ These mountains arose originally from the collision of two overlapping tectonic plates, but the rich mineral deposits can be ascribed to a different origin: around seven million years ago, the region was a volcanic hotspot, which

¹⁶⁰ “El Relieve - Atlas Global de La Región de Murcia,” October 6, 2014, <https://web.archive.org/web/20141006104851/http://www.atlasdemurcia.com/index.php/secciones/2/el-relieve/3/>.

lasted up until around a million years ago.¹⁶¹ Proud locals of Mar Menor point to the islands in the middle of Mar Menor such as Isla Grosa, or Isla del Baron, and tell me these used to be volcanoes. The only hill I can find that's right next to the lagoon for a bit of height to film the sea is El Carmolí, also an extinct volcano. No one mentioned the volcanic activity stretched to the mountains behind me however, but it is the very reason for their rich veins of metallic minerals, resulting from powerful hydrothermal processes. Water and dissolved minerals from the earth's core, under incredible temperatures and pressure, shot out into the faults and cavities of the mountains, giving rise to the many mineral deposits tapped into over the last 3000 years.¹⁶²

It is unique to be able to access records this far back in time in relation to a very specific parcel of landscape. It connected this lagoon – a sleepy backwater for most of the year until tourist season – to major historical events that greatly affected the tide of human history. The main mineral mined during the Phoenicians and Roman times was silver, contained in the silver-laden galena rock. Lead was also extracted from galena, but slags of it were left behind, not considered terribly valuable until the 19th century. The silver mined from the Sierra Minera led to enormous political changes in the area, and archeologist Adolf Schulten states that the establishment of modern-day Cartagena, named *Qart Hadasht*, or “New City” by the

¹⁶¹ Antonio Ramo, “Los Volcanes de Murcia-Episodios Volcánicos - Región de Murcia Digital,” Region de Murcia Digital, accessed July 12, 2022, https://www.regmurcia.com/servlet/s.SI?sit=c,365,m,108&r=ReP-23822-detalle_reportajespadre.

¹⁶² Ramo.

Carthaginians in 227 BC, had the main objective to control the wealth from the silver mines.¹⁶³ The accumulated riches from the silver mines, combined with the significant naval harbor, and geographical advantage of a direct sea crossing to Africa made it a highly sought-after area.¹⁶⁴ Twenty years later, in 209 BC, within the framework of the second Punic War, Rome conquered the city and renamed it the “Carthago Nova” after its mother city Carthago in Africa.

A century later, the ancient Greek historian and geographer Strabo paraphrases Polybius’s description of how the silver was extracted from the galena rock: an arduous crushing and water filtration process, often done by women with baskets in rivers, then smelting to separate the lead out to retain pure silver.¹⁶⁵¹⁶⁶ I’m struck by the detail of the women, with baskets, surely kneeling by the river or standing in it, and how important water was to the process of mining already during these ancient times. Then I pause: what river are Strabo and Polybius even talking about? Did Strabo misquote Polybius? All the ramblas in this area would have been dry unless there was a major storm. There is no body of water close to these mines save for Mar Menor, Portmán Bay, or the Mediterranean.

¹⁶³ Adolf Schulten, *Fontes Hispaniae antiquae, publicadas bajo los auspicios y a expensas de la Universidad de Barcelona* (Barcelona A. Bosch, 1922), <http://archive.org/details/fonteshispaniaea02schuuoft>.

¹⁶⁴ Adrian Goldsworthy, *The Punic Wars* (London: Cassell, 2001).

¹⁶⁵ Horace Leonard Jones, *Strabo, Geography, Books 1-17 in 8 Volumes (Loeb Classical Library)*, Book III, accessed July 12, 2022, <http://archive.org/details/Strabo08Geography17AndIndex>.

¹⁶⁶ Benito Morón Clemente, “Las Tierras de Alicante y Murcia Según la Geografía de Estrabon,” *Revista Murgetana* 61 (1981): 27.

Though these mining operations probably ranged from small one-room artisanal efforts to large behemoth operations, Strabo mentions 40,000 slaves mining an area of around 75km.¹⁶⁷ One mining area I hiked up to, called *Cabezo Rajao* (split head), dates back to this time. The vein of galena, from which silver is derived, was right in the middle of this mineral-rich and excavated so thoroughly that this hill then appeared “split” in two, which is likely the etymology of the term “Cabezo Rajao”. I climbed through this crevasse, trying to make my way to the other side to give me some much-needed height to see Mar Menor. Thorny brambles and loose rocks made it slow going, and once I tuned in to the buzzing, I grew wary of aggressive-looking wasps. I had already been stung elsewhere and didn’t wish to repeat the experience. Finally on the other side, I was able to see a hazy Mar Menor on the horizon, and, much closer, the sprawl of the old mining town La Unión. Right underneath me, down the cliff’s side, lay a farmer’s fields coming right up to the edge of the hill. I thought about the rain flowing down this precipice during a storm, what must be a steady stream of lead-laden silt covering all those crops – never mind the wind blowing the same dusty particles most of the year.

This mineral-rich hill had been re-exploited many times since the Romans, and the debris and abandoned structures laying around were mostly from the modern-day operations of the 19th century. Though exploited by the Phoenicians, Carthaginians and Romans, it was most intensively mined from 1930 to 1980. On my

¹⁶⁷ Clemente, 27.c

way back through the crevasse, I heard a yelp from below: Andres had been stung, and confirmed my growing fear of the wasps. I slowed down even further, trying to be extra careful not to break an ankle on the loose stones (that I now understand were a slag heap, or the broken remains of the silver and galena mining) or surprise a wasp. I noticed a fine layer of dust accumulating on my clothes and my skin, my sweat making tracks on my white linen shirt. Dimly I thought, this is also entering my lungs and my bloodstream, especially now knowing I was standing on rocks crushed for silver and lead. Finally, stumbling out of the brambles unscathed, I ran with relief to the open part of the hill, away from the wasps and the thorns and the crevasse and into the wind. The breeze calmed my nerves while I noticed, squinting, that I could just see a slice of Escombreras in the distance through the valley of two mountains, the oldest petrochemical hub of Spain. Again, I marveled at the proximity of everything in this region, so many overlapping histories in such a small space, the palimpsest made of land and beings, of wasps and fig trees, folded by time. In front of me was Escombreras, La Unión behind me, multiple mining histories underneath my feet, and Mar Menor a faint blue on the horizon. These histories converge in the making of the present, Escombreras being an excellent example.



Escombreras, Spain's oldest petrochemical port, nearby Mar Menor

Escombreras Valley: the Petrochemical port

“Escombreras Valley” was established under Franco in the 1950s as Spain’s premiere petrochemical hub. It is boxed in between the Sierras Mineras, and the Cartagena coastline, so there is not much room for growth. Nevertheless, due to its proximity to Cartagena’s famous deep-water port, it is well situated for international shipping routes. Today, Escombreras officially features natural gas plants, oil refineries, and a lubricant plant.¹⁶⁸ However, what is produced, processed, and shipped from there is much more extensive: fertilizer, a power plant, hydrochloric and

¹⁶⁸ “Asociación de Empresas Del Valle de Escrombreras (AEVE),” Aeve, n.d., <http://www.aeve.org/en/escombreras-valley-aeve.html>.

sulphuric acid, explosives, graineries, etc. A study in 2017 measured the effect of these different industrial activities on heavy metal concentrations in topsoil and road dust, and unsurprisingly, found evidence of all sorts of chemicals.¹⁶⁹ Reports of health problems abound in the nearby neighborhoods, and José Matias, my geochemist interlocutor, credits Escombreras as one of the ongoing polluters of the area on both the Sierra Minera, La Unión, Llano del Beal, and the Mar Menor lagoon. The mining materials once collected through the Sierra Mineras were partly either processed, stored, or shipped through Escombreras; and today, the very materials that traffic through Escombreras not only seep out into the surroundings, but are actively used in this landscape. For example, Mar Menor farmers process their crops with nitrates, and other pesticides and fertilizers produced in Escombreras. Or, oil from the refineries are funneled into the local REPSOL gas stations, etc.

¹⁶⁹ M. Gabarrón, A. Faz, and J. A. Acosta, “Effect of Different Industrial Activities on Heavy Metal Concentrations and Chemical Distribution in Topsoil and Road Dust,” *Environmental Earth Sciences* 76, no. 3 (February 4, 2017): 129, <https://doi.org/10.1007/s12665-017-6449-4>.



Maria Elena dancing flamenco on top of Cabezo Rajao

On a subsequent visit to Cabezo Rajao, closer to sunset, Escombreras' refinery fires light up the horizon. We had come back to film a dance sequence with local flamenco dancer Maria Elena amidst the ruins. Maria Elena turned to me and explained that every so often, a big boom can be heard and sometimes even felt from Escombreras in La Unión. I looked at her with alarm, aghast this was the first time I was hearing of this. One of the larger "accidents" she was referring to happened in 2002, when a silo combusted containing several tons of nitrogen, phosphorus and potassium, from a fertilizer company called Fertiberia. The resulting toxic cloud spread over the entire neighboring region, and authorities asked the population not to leave their houses or turn on their heating.¹⁷⁰

¹⁷⁰ Antonio Aguilar, "Una nube tóxica pone en situación de emergencia la zona de Cartagena," *El País*, January 27, 2002, sec. Sociedad, https://elpais.com/diario/2002/01/28/sociedad/1012172401_850215.html.

Returning to the hilltop of Cabezo Rajao from where I had spied Escombreras, after a pause in the breeze, I then retreated from the hot sun inside one of the abandoned buildings for shade. I found a makeshift camp and a pot inside a black firepit, along with simple graffiti on the walls. More than just passersby came here as mining ruins are also a refuge for the homeless or otherwise marginal and desperate. Later, at another abandoned smelter outside Cartagena, I met husband and wife Fernando and Ana Belem camping out after having been evicted from their apartment. Fernando had been a guard while the lead smelter was in operation decades ago, and driven to desperation had remembered it as a potential refuge when they were evicted from their home. Other buildings in both of these locations held old mining equipment like giant iron wheels, flotation tanks, milling and grinding machines, rusted chains, piles of tailings, and 40-foot-tall smelting chimneys indicating how large lead-smelting operations both these places had once been.

40,000 Iberians Enslaved for Silver

As mentioned, the Sierra Minera was noted by Strabo to have been worked by 40,000 Iberians enslaved. Diodorus Siculus, another contemporary of Polybius and Strabo, made a careful study of the coerced labor and terrible conditions of the enslaved, worked to death without care by the Romans:

The slaves who are engaged in the working of silver produce for their masters revenues in sums defying belief, but they themselves wear out their bodies both by day and by night in the diggings under the earth, dying in large numbers because of the exceptional hardships they endure. For no respite or pause is

granted them in their labors, but compelled beneath blows of the overseers to endure the severity of their plight.¹⁷¹

Coerced labor is often at the root of tremendous wealth, and reading about the slaves and their conditions of labor draws many parallels to the colonization of the Americas, and how the American empire has also been based upon millions of enslaved men and women and their coerced labor. Standing on the hill, I had a hard time imagining the place crawling with that many workers, and realized I was probably missing a labyrinthine underworld beneath my feet. How far down did the mining mazes run? Had they collapsed? Sebastian Salgado's famous photographs of the gold mines in Brazil, taken in 1986, were the closest I could come to understanding how this hill might have looked with that many laborers: thousands of nearly naked ants carrying rocks on their shoulders while scurrying up and down long ladders, defying gravity. The shots he took of the mine pit of 50,000 workers are mind-boggling given it was just a few short decades ago. They carried up to 60kgs up and down ladders on a cliff for as many as 60 trips in a day (and apparently paid 20 cents for each of these journeys, a short shuffle from slavery).

I later learned what was immediately beneath my feet was, unsurprisingly, likely quite toxic. The tailings, soil, and water from Cabezo Rajao – whose industrial operations ended over 30 years ago – have been sampled and analyzed for

¹⁷¹ Siculus Diodorus, *Bibliotheca historica*, vol. 5 (Stuttgartiae : In aedibus B.G. Teubneri, 1964), 38. 1-4. 201, <http://archive.org/details/bibliothecahisto0002diod>.

concentrations of lead, zinc, cadmium, copper, and arsenic.¹⁷² These metals are shown to have been dispersed both by wind and water, especially after rainfalls, all over the region. Soil samples collected in Mar Menor, as well as nearby agricultural soils, food crops, and stream systems, were found to contain high levels of lead and zinc as well.¹⁷³ I stared at a fig tree growing at an odd angle on top of the plateau in front of me, and realized that figs were in season. Besides this one tree, and the brambles, there isn't much else in the way of vegetation on Cabezo Rajao. This has meant the hill, with its numerous tailings and slag heaps, has been particularly prone to erosion which reinforces the dispersal of contaminants to Mar Menor.

Walking over to the fig tree, I spotted a few figs that seemed ready but out of my reach in the crown. The ripe ones within reach had already been picked. I wondered what kinds of concentrations of metals lay within the folds of the fig. What a poisoned fruit it now was. I marveled that it could grow in such compacted soil, but later learned that this was precisely the type of soil conditions it preferred, and fig trees often mark the opening of mines for this very reason. In fact, the wasps I had been avoiding, were probably likely pollinators for the fig tree. In general, each fig species can be pollinated by only one wasp species, as well as the reverse. Making these metals bioavailable in its fruit for the ecosystem, I regarded all fig trees after

¹⁷² M. C. Navarro et al., "Abandoned Mine Sites as a Source of Contamination by Heavy Metals: A Case Study in a Semi-Arid Zone," *Journal of Geochemical Exploration*, Trace elements in soils: Baseline levels and imbalance, 96, no. 2 (February 1, 2008): 183–93, <https://doi.org/10.1016/j.gexplo.2007.04.011>.

¹⁷³ Navarro et al.

this one with equal parts lust and mistrust, succumbing once in a while to a fruit despite myself, thinking of all the other beings thriving on the same fruit but not having the same informed choice.

During the first century, the silver began to be exhausted, and lower profits led the Roman state to abandon the direct exploitation of the mines, and instead lease them to private entities. This further decreased returns, and, combined with labor shortages apparently due to the absence of wars,¹⁷⁴ mining came to end in the latter half of the second century. The effects on Cartagena were a rapid decline in population, with half of the city being abandoned. Nearly 1400 years would go by before mining would be taken up again. But I have to wonder how much these mining operations set the stage for what came later. Would the second two mining periods have been as extensive without this first excavation, this first precedent which left so much infrastructure behind?

The Goldrush, and Flamenco *Minerías* : Songs Encoding Slow Violence

In 1825, the king Fernando VII decided to enact a mining law that liberalized the sector and allowed mining activities to be taken up without a special license from the king.¹⁷⁵ Old Roman mining shafts were reopened, new industrial technologies allowed for better processing of slag to extract more lead and silver, and discoveries

¹⁷⁴ Lillo Carpio, "El Poblamiento Ibérico En Murcia," in *Memorias de Arqueología*, 9 (Murcia, 1981), 224-35.

¹⁷⁵ Maria Teresa Estevan Senís, "Explotación Minera de La Sierra de Cartagena (1840-1919)," *Saitabi: Revista de La Facultat de Geografia i Història (Universitat de Valencia)* 17 (1967): 213.

of new veins of ore led to a veritable gold rush in Southeast Spain, especially in the Sierra Minera.¹⁷⁶ This mining boom changed the face of the region on many levels. New towns arose, such as El Llano del Beal, which I will dive into, El Garbanzal, now abandoned, and it reinvented Portmán bay. A map from 1907 by Carlos Lanzarote shows over 1100 active mines over the Sierras.

New port infrastructures were created, new train lines installed, and a huge influx of immigrant labor, mainly from the north in Andalusia, occurred. This new immigrant labor is responsible for the arrival of flamenco music to the region and led to the eventual rise of the flamenco genre *minerías*, which are songs of sorrow and lament over the extremely harsh conditions of mines. This musical genre nearly died out, but was revived in the 1950s in part by a woman who was described to me as the “patron saint of minería songs,” Encarnation Fernandez. Her son, a well-known flamenco guitarist, Antonio Muñoz Fernandez, appears in my film, playing next to a slag heap in Llano del Beal.

An annual festival was started, called *Cante de las Minas* (song of the mines), and I was able to secure a pass to film this annual festival in La Unión, the highlight of which was a concert underground in an actual pyrite mine. *Minerías* are usually in five-line stanzas, often only one verse long, with a lot of flexibility for improvisation. They are gut-wrenching and violent, full of grief and lamenting over the hardship of

¹⁷⁶ Patricia Esteve-Guirao et al., “Análisis Integral de los Usos del Territorio para el Desarrollo de Zonas Degradadas por la Minería: El Entorno de Portmán (La Unión).,” *Revista de Estudios Andaluces*, no. 34 (July 25, 2017): 89–119, <https://doi.org/10.12795/rea.2017.i34.04>.

mining. They strike me as documenting yet another marker of slow violence, coded in song. As local author Fiona Pitt-Kethley observes, “There is nothing about hitting a rich vein of metal, only the horrors of darkness and closeness to death.”¹⁷⁷ Here is one *minería* she loosely translated:

*I won't complain about the mines.
They never did me harm. It's time
To quit the job. I need to rest.
I feel so old. I'm past my best.*

*If you should go to heaven first, friend,
I have a message I would send:
Grandad, where did you stash your tools,
The earth-stained bag and the pick you used?*

*Lady, don't shrink back in fear
From the singing miner here.
The rattle in my throat you hear
Comes from the fumes I breathed down there.*

I use various *minerías* during many sections of my feature film. They haunt the film, really. I was introduced to an old miner, Antonio, who's known for his singing. We hiked up to just above Llano del Beal to film right by the black slagheaps. In a gravelly voice that isn't all that refined, he sings his heart out. The scene juxtaposes so much in the frame, I let it roll for a long time in the film. Of note, I also use some of the dance performances I filmed during *Cante de las Minas*, notably a male dancer at the end of the film, to bring together a collage of shots that enters a surreal register that mirrors a philosophical discussion around the future of Mar Menor. This spectacular dance sequence I filmed of Maria Elena on top of

¹⁷⁷ Fiona Pitt-Kethley, *Washing Amethysts in the Bidet* (forthcoming, n.d.).

Cabezo Rajao, with a drone during the sunset, didn't make the final cut, but these types of musical/dance stagings were a part of my repertoire for the film as carriers of metaphor, mirage, poetry, and layers of meaning.

At a more intimate flamenco concert, held in an old garden, I bumped into a woman with a feathered hat in a long multi-layered skirt reaching the floor and a long-sleeved primly buttoned shirt with an oval gemstone encased in silver pinned to the nape of her high-necked blouse. Being nearly 90F degrees that night with no breeze, I stared at her aghast...was this a costume? I searched around the room and my eye landed on several other dressed-up men and women, one man in particular standing out with a cream-colored three-piece-suit, a flat-topped straw hat, and a cigar in his mouth. The cigar appeared unlit. I made my way over to him under an intuition he was the leader of this group, and indeed, he was. He gave me his card and explained they were an organization called "Los Modernistas de Cartagena," a loose aggregation of people longing for a bygone age of Cartagena that seemed vaguely to land in the 1920s. They organized outings in full regalia with fun activities planned such as beach days, or special dances in the main square. I asked what period they were exactly reenacting, and he said, "oh you know, the golden age." He meant when a well-heeled bourgeoisie lived in beautiful architectural art-deco houses. With the wealth generated by the mining activity, a powerful upper social class arose in Cartagena, and they invested in grand buildings and Art Nouveau style architecture in the city. Once again, the face of the city changed with mining wealth, some 1800 years after the Romans.

But this bourgeoisie was made possible by the mines, the cheap labor from Andalusia, and the profits that resulted from poor pay, dangerous conditions, and general exploitation of its workforce. This nostalgia for the “golden age” does not recognize the roots of its wealth, a yearning for a history that is full of holes, like the underwater nets. I didn’t mind the dancing, but the general aristocratic pomp they seemed to embrace was tone-deaf, reminding me very strongly of plantation tours along the Mississippi river that glorify plantation owners and their fancy houses instead of focusing on how the plantation model could not have existed without the coerced, enslaved labor of men and women, ruled by terror. Like historian Sven Beckert argues, capitalism was first founded on the brutal coercion of labor.¹⁷⁸ The minerías encode and remind us of this brutal exploitation in the mines in song-form, much like some of the spirituals from the enslaved in the United States. The contrast at this performance was stark: lament and misery in song form, watched by a crowd idolizing the aristocracy.

This idolized moment of history, the goldrush and accompanying capitalistic accumulation of wealth in Cartagena, began to decline after the end of WWI, when the demand for lead for weapons plummeted. With the economic crisis of 1929 and the ensuing Spanish civil war, mining operations nearly disappeared, and the bourgeoisie floundered.

¹⁷⁸ Sven Beckert, *Empire of Cotton: A Global History*, Reprint edition (New York, NY: Vintage, 2015).

Seeking Out the Mirage

These small moments of juxtaposition gave rise to the idea that Mar Menor was seeped in mirages, which, as natural phenomena, are illusions that defy what is possible, echoing that very line Arsenjuk articulates of the im/possible. Mirage comes from the Latin *mirari* meaning “to look at, to wonder at” which might describe filmmaking at its simplest register, though the extended definition of mirage became integral to my practice in the lagoon:

1. An optical phenomenon that creates the illusion of water, often with inverted reflections of distant objects
2. Something illusory or insubstantial

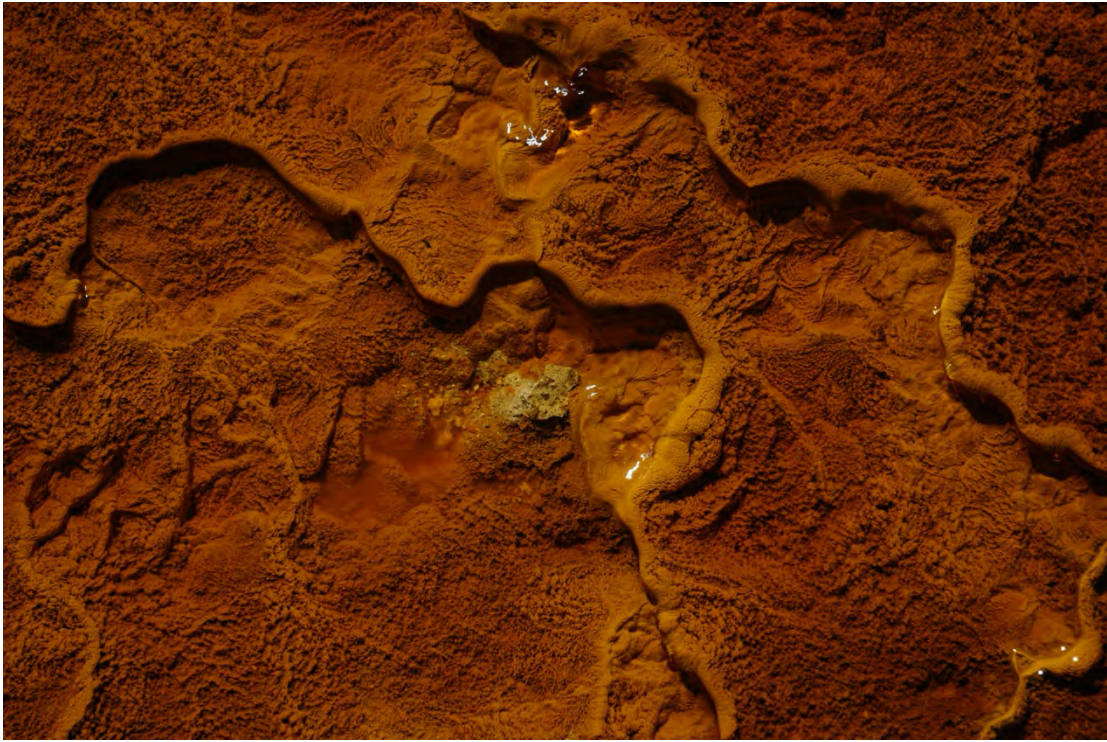
While desert heat around Mar Menor often created “literal” mirages of small pools of water in the distance, I explored the concept of mirage in a more symbolic realm. Often things I saw were facades, “illusory and insubstantial,” put up to invert a reality. A lot of the “covering up” of environmental disaster results in facades, leading to a dense layering of mirages. This calls to mind a palimpsest. The nets – to separate jellyfish from tourists – were in actuality full of holes and trapping jellyfish inside, instead of outside the mesh. A pyrite-mine-turned-tourist-attraction with sounds of pickaxes and a fake “boom!” explosion sound simulates mining conditions for the visitors. A vivid red hydrochloric acid pond at the end of the tour is then billed as a backdrop for pictures. The fig trees dripping with ripe figs, yet all full of contaminants. Cinema is poised as a great medium to reveal these mirages, often through some kind of juxtaposition: the right angle, the right audio, or two scenes put back-to-back, etc. Juxtaposition has me thinking back to a palimpsest. For example,

in Portmán bay, there is a billboard that features condos with pretty red shutters and a pool, saying “Real Spain in the heart of the sunshine coast” with a price tag. Right behind this billboard is the source of one of the biggest environmental disasters in Spain, an abandoned lead-and-zinc processing center in Portman Bay (I go in depth about this later on this this chapter). The billboard shows a site that is placeless, yet claims it is the “Real Spain.” I wondered about this phrasing until I met a British couple, who look much like the couple in the lower right-hand corner of the billboard, who also called this area “Real Spain” as opposed to the “kiss-me-quicks” British enclaves on other parts of the coast. “Aha,” we said, “but are you aware of the disaster you walk over every day?” Are you aware your condo is built in an area where mothers cannot use their breastmilk to feed their babies?



Billboard of “Real Spain in the heart of the sunshine coast”

This *billboard* is a type of palimpsest in and of itself: layers of paper glued on top of the other, revealing the layers underneath once the paper cracks, or gets too wet. The *picture* of this scene is a type of palimpsest, capturing an image whose layers take unpacking once a “thick emplacement” of contextual information is understood: the billboard’s irony of being in front of the ruins in the upper left-hand side of the picture. The *landscape* is a type of palimpsest of slow violence: once fertile ground featuring a paradisiacal bay, the town became the staging ground for a lead-and-zinc operation, extracting crushed rocks from the mountains. Today, after years of an unimaginable amount of unfiltered tailings dumped straight into the bay, the town is highly contaminated. The toxicity from this time seeps up from the ground and the water and has been found in the bodies of children and adults. Speculators, trying to erase the past, reinscribe the space, build condos over the toxic ground, and market to British tourists looking for a getaway. The land, the water, and bodies then fold on each other, the “text” of mine tailings, otherwise forgotten and erased, comes back to reinscribe itself over the present.



Close-up of hydrochloric acid tailings at an abandoned mining site

The majority of my fieldwork occurred during the hottest months of the year, in a semi-arid region where temperatures were not only their highest of the year but their highest ever due to climate change. I remember walking on the main street of La Unión, the dusty mining town, during the middle of the day and seeing a marquee for a pharmacy flash that it was 42C (107F). The heat was all pervasive, the sun constant, and the sound that came to so clearly represent this feeling were the drone of the cicadas, who sang with their wings through the heat no matter how arid, or toxic, the space. I have already written about the cicadas in chapter one, but it is worth mentioning again: they were a vibrant chorus to the sights of destruction, yet also strangely machine-like, undaunted, perhaps even ventriloquizing ghosts. And by phantoms, I mean those of the human or the nonhuman ilk. The cicadas seemed to

tune with each other and then detune, fall into and then out of chorus, evoking Brigstock and Noorani's concept I discuss in chapter one, that sometimes the effort of attunement is actually one of detuning.¹⁷⁹ This is especially applicable to my wanderings through open-pit mining ruins in the next section.

Lunarscapes and Open-Pit Mining

And now, let's turn to the third and final wave of mining. They are to me the most suspect character in this murder mystery, providing the thickest layer of slow violence. In the 1950s, a shift occurred to big industrial mining techniques. Mines went from smaller, underground, local affairs to becoming behemoth operations again – mirroring the scale of operations from the Roman times. The French multinational company called “The Mining and Metallurgical Society of Peñarroya,” already operating in the region since 1881, took over the most productive mines in the region. This move was combined with introducing new industrial technology. Their open-pit mining practices beheaded the mountains and replaced them with deep pits, creating new mountains of dark black tailings. Nothing grows on top of these hills of regurgitated earth. The pits, or *canteras* as they're locally known, fill up with water and turn orange-red from the hydrochloric acid still present in the tailings. For lead and zinc mining, the methods used for milling, flotation, smelting, and leaching are

¹⁷⁹ Brigstocke and Noorani, “Posthuman Attunements.”

all used in conjunction with sulfuric or hydrochloric acid.¹⁸⁰ The slag heaps are unstable and have been slowly disintegrating, washed away a little more every time there is a heavy rain.

I heard several rumors that the caretaker of the graveyard of La Unión was killed by a landslide from one of these slag heaps. On my very last day of shooting, I went to this cemetery to check out this story to see if it was true. A young man covered in tattoos saw me wandering around and called me over to ask why I was filming. I explained the story and at first he frowned – explaining to me he was slowly taking over as the new caretaker and maybe didn't know all the lore – but then a morsel of a memory came back to him, and he showed me the back right wall, “Can you see where it has been repaired? I think that's where the landslide entered.” He wasn't sure however where the caretaker's grave was located.

I discovered an obscure local researcher in La Unión, Rogelio Mouzo Pagan, armed with an old-school blog, who has uploaded scans of all kinds of archival images from the various newspaper reports at the time of this unfortunate event. The landslide was actually a much bigger event than the rumors described, and it reminded me eerily of my project on the Rio Doce tailings dam disaster, described in the previous chapter. On the 21st of October, 1972, the headlines read,

LA UNIÓN CEMETERY DEVASTATED BY A FLOOD OF MUD: the slag heap of the Brunita mine burst and thousands of tons of mud overflowed. The caretaker of the cemetery has disappeared. The Cartagena

¹⁸⁰ Frederick Weiss et al., “Chemical Pollution in Low- and Middle-Income Countries: Mining Industry Pollutants” (Switzerland: Eawag: Swiss Federal Institute of Aquatic Science and Technology, 2016), 68, <https://www.eawag.ch/en/departement/sandec/publications/chemical-pollution/>.

Highway is cut off as the mud reached three meters in height. More than 100 graves were destroyed.¹⁸¹ (translated)

Crosses and coffins were unearthed, tombs flooded, the dead performing a literal double death. There was only one live casualty: the aforementioned caretaker's body could not be found. Apparently more than 60% of the existing homes in the region were affected by the sludge, leaving some uninhabitable and its residents homeless. Crops were drowned, fishing grounds polluted in Mar Menor. The city council declared La Unión as a catastrophic zone and asked for compensation for damages and for changes to infrastructure so this would never happen again. A week later, the *La Verdad* newspaper cited concerns of a new rupture in the Brunita enclosure that could lead to another mudslide (in an interesting juxtaposition, right below this is a contrasting headline announcing the opening of the new golf course "La Manga Campo de Golf"). Finally, nine days after the initial spill, the caretaker's body was found and entombed in a zinc casket. Zinc being one of the main metals produced from the mines, a circle was completed. The caretaker of the dead joined them by tragedy. The mining company never paid for damages.

¹⁸¹ Rogelio Mouzo, "Crónicas Mineras de Rogelio Mouzo Pagán: El Cementerio de La Unión, Aterrado Por Los Fangos de La Mina Brunita. El Ayuntamiento Solicita Declaracion de Zona Catastrofica. Efemeride de 1972," *Crónicas Mineras de Rogelio Mouzo Pagán* (blog), October 29, 2012, <http://cronicasmineras.blogspot.com/2012/10/inundaciones-en-la-sierra-minera-de.html>.

Planned Disasters

Seeing the photos, and the extensive damage caused by the improper storage of tailings, made me think – would the people of Rio Doce and Rio Paraopeba in Brazil suffer the same memory lapse in 40 years? This was a major cataclysmic event and I stumbled upon the information through an unpublished memoir of a woman (Fiona, the local author I mentioned) I met selling gemstones on the street who somehow knew of this singular blog full of archival materials not easily found anywhere else. This is the issue with slow violence. Memories are short. Media narratives move on. It is hard to stay attuned with the temporality needed to understand the true cost of an environmental disaster to an ecosystem and all its relations, human or more-than-human. At the same time, the parallels between these disasters, though different in scope, are striking: tailings from an industrial open-pit mining operation are shored up, unstable, unmonitored. They collapse. They bury towns, people, animals, and it becomes a superspreader event for contamination: into the air, into the soil, into the water. It is impossible to clean up. It is irreversible. The mining entity and part of the media frames it as a disaster, yes, but an accident, when it is no accident. These are planned disasters.



An open-pit mine leaching acid, surrounded by agricultural fields, less than a kilometer from Mar Menor

These tailings still exist today, though some have been “disassembled” to a lesser height to prevent such a catastrophe from happening again. The heaps look like a monster has driven its nails down the side of a mountain, creating narrow and deep unnatural wrinkles in the land. Perversely, many marvel at how it all looks, dubbing the place a “lunarscape.” However the craters formed by the open-pit mines are wounds that continue to infect the local population. One town, called Llano del Beal, is infamous for two facts: it is located a few feet away from a now-abandoned lead-and-zinc open-pit mining operation, and the town is riddled with cancer. And so, every time it rains, these tailing heaps leech and color the water red (from the hydrochloric acid, a component of the residue) and bless the land again with mistakes from corporations long-gone, cancer flourishing in its wake.



Hydrochloric acid puddle after rainfall in Llano del Beal, with Mar Menor in the background

The Whistleblower for Llano del Beal

José Matias Castejón, the geochemist-turned-whistleblower, introduced me to the town of Llano del Beal. As a child he remembers Cartagena as very polluted, where the air, full of smog, was so foul that there was a curfew for non-working inhabitants. This experience, coupled with stories about how his grandfather worked the mines in Llano del Beal, and died an untimely death from silicosis (a disease of the lungs) before José was born, fueled his fascination with the effects of mining. At around 12 years old, he was introduced to the concept of an ecosystem in flux, and he started to make connections between the mining companies and the environmental trouble he was seeing around him. He came across a thesis in the library that detailed

how to recover lead and silver from galena ore, and, with a simple chemistry kit he bought at the drugstore and additional found items, he reproduced a small functional lab all by himself. Not fully understanding the dangers of the process, he ended up intoxicating himself while trying to melt lead, the fumes killing his pet parakeet and landing him in the hospital. His parents threw everything out and forbade him from any further experiments. He smiled at me and said, “Surprise surprise, I then dedicated my life to these lands and minerals.”



Jose Matias Castejón, showing us an abandoned processing site for lead and zinc

While studying for his geochemist degree at the university, he wanted to demonstrate the traceability of pollutants from the source as they radiate out into an ecosystem and affect people’s health. He focused especially on a process he calls “salt crake” which is when chemical byproducts produce sulfates, which are soluble like cooking salt. When they erode, they end up being dispersed by the wind, or

through the water, and they can be inhaled or ingested through the mouth, and enter directly into your bloodstream. Some of the effects of these chemicals are carcinogenic, but also neurotoxic. He started taking samples from all of the abandoned mining sites, but also radiating outwards. He took samples all around Mar Menor, in both rural and urban areas. He was particularly intrigued by the high cancer rates being anecdotally reported from Llano del Beal, and decided to take samples from the small town and its surroundings to test for chemical traces. Llano del Beal had been at one time a sprawling town with tens of thousands of miners and their families though today it is a shell of what it once was with just 2000 residents.

His results were shocking. The surrounding vegetation was off the charts for contamination at nearly 300 times higher than acceptable levels for arsenic, cadmium, zinc and lead.¹⁸²

With this information, he asked for public health data of the town, but was stonewalled, “So we did a little bit like Erin Brockovich¹⁸³, and went from house to house. We made a map of all the cases of cancer, all the cases of neuropathy, and that’s when we found that the cancer rate of Llano del Beal was 7.8% versus the regional rate of .4%.”¹⁸⁴ All of the affected residents were from Llano del Beal and

¹⁸² Jose Matias Peñas Castejón, “Interaction between Soils, Mining Waste and the Dynamics of Supergene Mineral Phases in Metal Mining Environments of SE Spain” (Doctoral dissertation, Spain, Universidad Politecnica de Cartagena, 2017).

¹⁸³ Erin Brockovich is an environmental activist who, despite her lack of education in the law, was instrumental in building a case against Pacific Gas & Electric Company (PG&E) involving groundwater contamination in a town in California in 1993 through intensive house-to-house interviews for an eventually successful lawsuit.

¹⁸⁴ José Matias Peña, Cancer Rates in Llano del Beal, Audio, 21 2019.

had lived in the area all their lives. He then wanted to see if there was a direct correlation between the concentrations he found in the ecosystem and the high cancer rates showing up in the town residents – especially children who are much more vulnerable to chemical exposure. He tested their nails, blood, hair, and urine, and found concentrations so high that he went to the media to help expose the issue as soon as possible. In José’s words, “What is happening in Llano del Beal is murder in plain sight.” But then, the university disagreed with the decision to publicize his findings without further peer review, a fight ensued, and José was asked to leave the university entirely. Losing an institutional home meant he could not easily publish academically, though he tells me, now doing a post-doc, that he’s finally publishing the results soon – but the university’s smear campaign did not help to legitimize the results, now years late in being published. As I finish writing this thesis, José contacted me with surprising news: he has just won a lawsuit against the University of Cartagena, and they’ve been ordered to pay him 15,000 euros in damages – to his reputation and his research.¹⁸⁵

¹⁸⁵ Jose Alberto Gonzalez, “La UPCT, condenada por vulnerar el honor de José Matías Peñas Castejón,” *La Verdad*, November 10, 2022, sec. murcia/cartagena, <https://www.laverdad.es/murcia/cartagena/upct-condenada-vulnerar-20221110002154-ntvo.html>.



Maria showing me the open-pit mine a few steps from Llano del Beal

I spoke to many of the town residents as well, and they confirmed the story of cancer from another perspective. Maria for example took me for a walk around the town, and on one street she points to a row of houses and says, “This one has cancer. That one. That one. That house too...and none of them have ever smoked. Actually this whole block has cancer.” For example, the town’s pharmacist, also named José, told me he’d never seen such high rates of medications in such a small population for both physical and psychological issues, and that the prevalence of miscarriages alone was extremely concerning.

Many of the residents referred fondly to the last time they stood up to the corporations in 1988, when Peñarroya decided to expand their mining operations into the town and wanted to displace the residents. Fiercely protective of their houses and

land, the town fought back. The army was sent in, bullets shot; but still the town took a stand and ended up winning.



Army, with guns, guarding the mines against the town's protest

They built a commemorative town center, where today every wall is plastered in photos from the year-long struggle. The photographer was a Llano resident named José Miguel, who is still alive but struggling with bone cancer. He passed me a videocassette tape with some protest footage and other news coverage on the mining operations at the time. One striking moment is from a protest song, sung by a flamenco singer in the *minería* style, with lyrics that feature a timely update to encode the violence in the region:

*They are amassing such a fortune
They are amassing such a fortune
Peñarroya and their bandits*

*They are taking the minerals
And their mills are loud
For Llano del Beal*

Though the town won, a few years later things shifted again. An economic crisis, combined with the increase in oil prices and depletion of deposits, led to a closure of most of the mines. In addition, the cost of metals fell so precipitously that it wasn't profitable to keep the mines open, and by 1992, Peñarroya, who owned most of the mining operations around Mar Menor, closed shop and sold the rights to the mines to a Spanish real estate developer called Portmán Golf. Promises of cleaning up and restoring the environment ensued, but only superficial solutions were applied. They would plant trees on the slag heaps, only for them to die. What they're really interested in is developing luxury housing on parts of the slag heaps to sell to foreigners. This tactic has already worked in Portmán Bay, a disaster of monumental proportions on just the other side of the mountain from Llano del Beal and Mar Menor. Before I dive into Portman, I want to touch on one of the most surprising facts I stumbled across while research Llano del Beal. I had seen the lovely, colorful murals upon entering the town. Woolly mammoths and saber tooth tigers with the word: PLEISTOCENO written underneath. I hadn't understood the connection until later.

Cueva Victoria: The Oldest Piece of Human Remains Ever Found?

What's amazing about Llano del Beal is how *fast* it became contaminated, in just a few short decades. Yet it is also the site of an incredible archeological

discovery. Cueva Victoria is an old mine-turned-archeological site, considered to be one of the most important paleontological sites in Europe. A Hominid phalanx, or pinky finger, of *Homo sp.*, was found that is 1.3 million years old, from the Pleistocene era.¹⁸⁶ This evidence suggests that prehistoric hominids first made their way to Europe by crossing the Strait of Gibraltar from Africa, rather than the Middle East. It is one of the oldest human remains found in Europe, and some even claim it is the oldest. The cave also contains an extremely diverse amount of animal bones, as it seems to have been a hyena lair. Some of these bones were seen by the miners who dug and blasted the original section of this cave out, though it wasn't brought to the attention of paleontologists until decades later.

This rocked the foundations of my project. This suddenly plunged my understanding of the region around Mar Menor to *millions* of years ago. *Homo sp.* had lived in this site as early as *1.3 million years ago*, chosen for its location and proximity to water, food, and shelter. Yet, in *36 short years*, open-pit mining by the Peñarroya corporation rendered this region unlivable and deeply contaminated, the evidence of which lies in the residents of Llano de Beal, riddled with cancer. The contrast between the timelines is stark, and because of this I made a short 14-minute film concerning only Llano del Beal, called [A Mirror of the Earth](#) (2021).

Andres and I also brainstormed for one of the tracks of our *Portal Blooms* (2020) radio to be about temporal resonances. Andres [created this track in response to](#)

¹⁸⁶ Francesc Ribot, Carles Ferràndez-Cañadell, and Luis Gibert Beotas, “Los Primates de Cueva Victoria,” *Mastia* 11–13 (January 1, 2015): 433–52.

[Cueva Victoria](#), using sounds we recorded in the cave among other sound layers captured in the field and elsewhere. A future version of the Cueva Victoria track would ideally extend it to be a multi-day sound piece, sitting outside the edge of human attention spans but nodding towards a different temporality of the space, broadcasted in the cave as an installation, using its natural resonance.

Portmán Bay: Postcard from the future



Aerial map showing Portmán Bay. Source: Map data © 2022 Google Earth.

In *A Mirror of the Cosmos*, one of the scenes people most often refer to as being jaw-dropping is the “scene with the British couple.” I’ve mentioned them above in reference to the billboard. Two British expats on a merry stroll in Portmán passed by us while we were filming José collecting salt crake samples. Curious folk, they

asked what we were up to, and then there ensued a rather unbelievable conversation. They recounted their arrival story to the region, and of wanting to buy a house where “real Spaniards lived,” away from other British expats such as themselves. Portmán apparently fit the bill, and they bought a condo with pool access, despite the massive disaster right in front of their noses. Portmán is a small town that is arranged around a bay, nestled into low lying mountains on both sides. From afar it almost appears to be a pirate cove straight out of a novel, the azure water twinkling in the sun. But get close enough, and it is clear that the bay is in massive trouble, with the local beach having sand as black as night – and not because of any natural causes. Peñarroya had one of its major zinc flotation operations, “Lavado Roberto” situated in Portmán between 1957 and 1987. A huge pipe dumped millions of pounds of tailings into the bay, every day for decades. In total it amounts to 57 million tons of waste into the bay, a volume equivalent to 130 times a sports stadium that has a capacity of 100,000 people.¹⁸⁷ It is unthinkable this happened, but it did.

¹⁸⁷ Autonomous University of Barcelona, “Tailings Dumped into Portman Bay Continue to Release Metals into the Sea 25 Years Later,” accessed December 2, 2021, <https://phys.org/news/2019-10-tailings-dumped-portman-bay-metals.html>.



Archival image of Lavado Roberto dumping tailings straight into the Mediterranean. Source: Jose Matias personal archive.

The bay is so deeply contaminated, the fishermen's pier was buried and relocated on the other side of the mountain in Cabo de Palos, right off Mar Menor. Twenty-five years later, studies show that these tailings in Portmán continue to release contaminants.¹⁸⁸ A study found that the breast milk of women in Portmán contain much higher quantities of heavy metals than is normal, surpassing the World Health Organization's recommendations. They are advised to use alternative forms of

¹⁸⁸ Barcelona.

feeding their babies due to the impact it would have.¹⁸⁹ As a breastfeeding mother myself, I was aghast at finding this out, and it drives home the level of contamination the area suffers, the *bleeding-through* of the palimpsest of slow violence.

Various people have asked me, why are you focusing on Portmán? It's a known disaster. It's old news. It's close by, but not on Mar Menor. Well, my answer is that they're connected in more ways than one would think. For one thing, research continues to reveal Portmán tailings are toxic. In contrast, Llano del Beal has not registered yet on a national level in the same way. There hasn't been nearly as much scientific research focusing on Llano as there has been in Portmán; José's findings in his thesis, as mentioned, had been blocked for years. There has been no breastfeeding study on Llano del Beal. Yet they are contaminated with the same mining deposits. Portmán is a good indicator of the slow violence of this type of contamination, a postcard from the future for Mar Menor to read and apply lessons from.

Saving Mar Menor in Exchange for Portman

Coming back to the other side of the mountain, let's follow the flow of water. Down from Llano del Beal is a dry riverbed called Rambla del Beal which essentially connects Llano with Mar Menor. I'm including a map below to make extra clear the proximity of the town, full of cancer, to the lagoon. It is just a short waterslide down.

¹⁸⁹ "Heavy Metals Found in Breast Milk from Portman Mothers," accessed December 2, 2021, https://spanishnewstoday.com/heavy-metals-found-in-breast-milk-from-portman-mothers_1660854-a.html.

There is no doubt the same heavy metals are in the lagoon. Around rambla del Beal, nothing grows. It is a great expanse of truly barren earth. Not even a bush, or stray stalks of grass. You can access it by a road, and the distance from the road to the lagoon looks like a moonscape.



The flow of water between Llano del Beal to Rambla del Beal. Source: Map data © 2022 Google Earth.

Very close to this eerie place is the rambla del Albuñón, which is a dry riverbed that isn't dry at all: full of tall green reeds, it obviously has water, and right at the mouth of it where it connects with Mar Menor there is an overgrowth of green algae. If salt was Mar Menor's immunity, La Manga her skin, the ramblas were her arteries. Clogged arteries – by mining waste first and then subsequently by massive nutrient, pesticide, and fertilizer runoff from industrial farming. Nowadays the nearby

fields, called as a whole *El Campo de Cartagena*, have 30,000 ha in intensive agriculture, made up of citrus, other fruits, and vegetables, as mentioned earlier.¹⁹⁰



El Campo de Cartagena. Source: Map data © 2022 Google Earth.

The increase in irrigation has lowered the groundwater level. In addition, because of the scarcity of water in the region, many farms have made hackneyed desalinization plants. These have generated a new problem as they dump the brine, rich in salts and high concentration of nitrates, back into the ramblas. The problem is

¹⁹⁰ Conesa and Jiménez-Cárceles, “The Mar Menor Lagoon (SE Spain).”

so severe, there are regular police raids on farms hiding illegal desalinization operations, and it is being called an “environmental crime” in the courts.¹⁹¹

During this group tour I was part of, Ángel Pérez Ruzafa, ecologist and president of the scientific committee of Mar Menor, wanted to point out the eutrophication issues due to agricultural runoff. To access the part where this was visible in the water of the lagoon, we had to walk through la rambla del Beal.

I noticed the earth was strangely compacted, dusty, cracked and fissured under the hot sun. As I mentioned, nothing grew here. I was expecting him to explain this landscape too, but he walked in silence. Curious. I saw a small dust cloud behind him and heard the aggressive revving of engines. Teenagers, with an old minivan, were doing tricks and skidding in the dust, going around in circles on one wheel while the van was tipped. It reminded me of the type of entertainment I had seen from young men in Qatar out in the desert during my time living there. Ángel became very upset with the kids and went to ask them to stop being foolish. I supposed it interfered with his sense of professionalism, or, perhaps, he knew that the dust contained a lot of heavy metals and that kicking it up in clouds made it more bioavailable for us to breathe in.

¹⁹¹ Alex Trelinski, “Judge Reveals Evidence of ‘environmental Crime’ in Mar Menor Pollution Investigation in Spain,” *Olive Press News Spain* (blog), December 1, 2021, <https://www.theolivepress.es/spain-news/2021/12/01/judge-reveals-evidence-of-environmental-crime-in-mar-menor-pollution-investigation-in-spain/>.



Teenagers doing wheelies on toxic ground in front of Mar Menor

Andres, who's got a talent to connect with anyone, went over after Angel scolded them to get their number so we could film them another time. It turned out they were immigrant teens mostly from Morocco who didn't speak Spanish very well, whose families lived in La Unión – the main mining town. I focus on Llano del Beal, but there's a lot to be said about La Union. Given that the town is extremely economically depressed with more than 50% unemployment (statistics which I'm sure are the same or worse in Llano), it was unsurprising to find out it also contained a large population of immigrants needing cheap housing to survive. Some of the teenager's relatives worked in the very agricultural fields around Mar Menor which were polluting the lagoon with nitrates. I felt like we had pulled a thread from a spider's web, and the whole thing came with it.

I quizzed Angel on the barren earth we crossed, pushing for more information. He told me an interesting story. Peñarroya in the 1950s initially had wanted to build

its washing station on this side, with the tailings to be dumped into Mar Menor. It seems like the tailings waste was initially dumped on this side of the mountain, with the result that this section of land was still terribly infertile. Another palimpsest, another *bleeding-through*. But his grandfather had been part of a group in Llano del Beal who stood against the plan and convinced the company to settle their washing station elsewhere – and it turns out, this elsewhere was in Portmán. Essentially, he was implying that while Mar Menor was “saved,” Portmán was sacrificed. In one of his articles I later found, he says:

Waste from the barren mining lands was emptied into watercourses flowing into the south side of Mar Menor until 1950. It was then diverted to silt Portmán Bay... Although mining waste to the Mar Menor was stopped more than 50 years ago, the heavy metal concentration in the sediment, especially at the southern part of the lagoon, remains high and constant.¹⁹²

Yet, a few days after meeting him, I heard him come over the radio while I was driving, claiming “heavy metals are a part of the nature of the Sierra Minera itself and that there has not been a health problem in 2000 years.”¹⁹³ For the supposed president of the scientific committee for Mar Menor, this statement is highly concerning given the amount of evidence to the contrary – in Llano del Beal especially – and evidence he cites in his own past publications. His statement caused a furor in the scientific and activist community, with many denouncing his position¹⁹⁴

¹⁹² Pérez Ruzafa, Marcos Diego, and Gilabert Cervera, *The Ecology of the Mar Menor Coastal Lagoon*, 402.

¹⁹³ *Angel Perez-Ruzafa on Local Radio* (Mar Menor, 2019).

¹⁹⁴ Unidas Podemos IU Equo 1 de septiembre de 2019, “Critican las declaraciones de Ruzafa sobre los metales pesados que llegan al Mar Menor,” *El Algar Los Urrutias de Hoy*, September 2019, <https://www.elalgarlosurrutiasdehoy.com/index.php/los-urrutias/44490-critican-las-declaraciones-de->

and José Matias issued an official statement saying that having such a prominent member totally ignore the findings of cancer was painful and unfair to the residents of Llano del Beal and pointed towards political machinations. I thought back to Angel's silence as we crossed the land, his focus rather on pointing out the latest crime in a string of environmental crimes to the lagoon, the nitrate runoff.

In Angel's publication I cite above, he includes a figure of where the concentrations of heavy metals are mostly found in Mar Menor. I inspected this with alarm, realizing that most of the metals came down by the two large ramblas we had been standing on – but that the *spread* of this waste in the water, due to currents, was concentrated where I had been living that summer, right on the southern part of the lagoon in a small town called Playa Honda. It brought new awareness to what I was exposing myself to while filming underwater right outside my door in my small patch of water.



Andres posing in a contamination suit on Rambla del Beal

Heavy Metals in Mar Menor

This journey on toxic barren lands and poisoned lives around Mar Menor brings us back to jellyfish, the improbable beginning to this project. A thesis and subsequent articles published by the marine biologist Ana Muñoz-Vera found very high levels of iron, zinc, arsenic, tin and lead in two kinds of jellyfish which now live in the lagoon.¹⁹⁵ Her conclusion is that the jellyfish are good biomonitors for heavy

¹⁹⁵ Ana Muñoz-Vera, Gregorio García, and Antonio García-Sánchez, “Metal Bioaccumulation Pattern by *Cotylorhiza Tuberculata* (Cnidaria, Scyphozoa) in the Mar Menor Coastal Lagoon (SE Spain),” *Environmental Science and Pollution Research* 22, no. 23 (December 1, 2015): 19157–69, <https://doi.org/10.1007/s11356-015-5119-x>.

metals.¹⁹⁶ But whereas they are not eaten, all the other large fish in Mar Menor are. The mining waste had already been found to form deposits of more than three meters in thickness in the *ramblas* (the dry riverbeds). With the recurrent autumnal torrential rains typical of the region, the tailings are washed into the lagoon, relocating large volumes of material from these sites into the sea.¹⁹⁷ Simonneau estimated there are 25 million tons of mining sediments in Mar Menor.¹⁹⁸ Since the mining giant Peñarroya started operations in 1957, more than 360 million tons of rocks were mobilized and some 90 tailing ponds and 360 slag heaps have been created that still exist today which contain about 170 million cubic meters of sterile materials. In spite of these high levels of metal pollution, no studies of bioavailability or metal uptake have been carried out in nearby agricultural areas and very few studies, save for ones like Ana's, have been done in the lagoon itself. In an interesting twist, a study shows that the invasive seagrass *Caulerpa prolifera*, which has taken over 95% of the sea floor of Mar Menor, absorbs nitrates, so it may have contributed to the reason Mar Menor has retained crystalline waters, until the "green soup" event of 2016. *Caulerpa* might also be actually fixing some of these metals and could make for a good biomonitor of the potential bioavailability of metals in the food chain.¹⁹⁹ This same study looked at

¹⁹⁶ Ana Muñoz-Vera, Jose Matias Castejon, and Gregorio Garcia, "Patterns of Trace Element Bioaccumulation in Jellyfish *Rhizostoma Pulmo* (Cnidaria, Scyphozoa) in a Mediterranean Coastal Lagoon from SE Spain," *Marine Pollution Bulletin* 110 (July 1, 2016), <https://doi.org/10.1016/j.marpolbul.2016.06.069>.

¹⁹⁷ Conesa and Jiménez-Cárceles, "The Mar Menor Lagoon (SE Spain)."

¹⁹⁸ J. Simonneau, "Mar Menor: évolution sédimentologique et géochimique récente du remplissage." (Université de Toulouse, 1973).

¹⁹⁹

bivalves, which show high metal concentrations especially for lead. This made me recall a day when I wanted to take out José Matias to lunch. He refused to eat fish at any of the restaurants in Mar Menor, claiming we were better served in Cartagena, and we went to a specific restaurant where he knew the fish was sourced from elsewhere. I remember thinking he was being overly cautious, and I continued to eat *arroz caldero*, a briny rice dish with mullet caught in Mar Menor, served with aioli on the side and brought to the table in a black cast-iron cauldron. But this was an easy choice for me since my time there was limited.

Removal of the polluted sediments is the solution, but very difficult with potentially huge impacts on the ecosystem of the lagoon in other ways. At the very least, the ramblas and their role in spreading the waste ought to be addressed by cleaning the riverbeds and preventing the slag heaps and other tailings from leaching further in any form. But all of that costs money, and capitalism is never interested in paying the cost of “externalities,” with no short-term profits in sight.

The Steal of La Manga

If you were to arrive to Mar Menor today, chances are you’d be likely to get a hotel room on La Manga, or perhaps a private villa. It is the touristic hub of this region, a playground of hotels between two seas, boasting views and access to the lagoon and to the Mediterranean at the same time. Your street might even be called “Cayman Islands” or some other echo to another international paradise destination.

From 1958 to 1972, Franco and his government decided to stimulate foreign investment into Spain through developing touristic sites destined for rich foreigners.

Local businessman and lawyer Tomás Maestre Aznar, called the “father of La Manga del Mar Menor” by some, decided to pitch the development of “the land of two seas” to Franco. Tomás is a descendent of a mining baron called Miguel Zapata Sáez, “El Tío Lobo” (“Uncle Wolf”). El Tío Lobo not only owned many of the mining deposits in the Sierra Minera but was also a partner in Peñarroya. Though the Maestro family apparently lost some of their mining holdings after the civil war, it is the foundation of their real estate wealth.²⁰⁰ It is important to note that it is not accidental that the influence of mining, and its associated wealth, extends in many directions. The wealth generated from mining these mountains is responsible for tremendous changes in the lagoon, perhaps most starkly seen through the development of La Manga.

According to local legend, told to me one afternoon at a restaurant on stilts over Mar Menor by resident and Mar Menor historian Antonio Zapata, Tomás was very sneaky. He advertised in the newspaper that if anyone could prove the land was theirs with a deed, he would buy it from them. Apparently, no one came forward, and he claimed part of La Manga under his name. He bought the northern part from his uncle, and the southern part from another man whom he also litigated. There are

²⁰⁰ “Adiós al padre de La Manga del Mar Menor,” *El Mundo*, July 18, 2013, <https://www.elmundo.es/elmundo/2013/07/18/suvienda/1374157942.html>.

mentions that he even litigated his own family.²⁰¹ Then in 1963, La Manga was labeled by Franco's government as a Center of Touristic Interest, which cleared the way for development.

In the 1950s this spit of sand was wild, devoid of human architecture. This narrow space encloses Mar Menor and is called "the sleeve" or "La Manga." Five shallow communication channels of around one meter depth or less, locally known as *golas*, allow some exchange of water between Mar Menor and the Mediterranean, and are navigable by shallow fisherman boats.



Mar Menor is to the left, the Mediterranean to the right, and La Manga in the middle

Historically, La Manga was largely a barrier land against marauders and pirates who would come to raid the towns inland. These Berber pirates, along with poor environmental conditions, caused the towns around Mar Menor to be set back

²⁰¹ "Adiós al padre de La Manga del Mar Menor."

from the sea.²⁰² This distance from the coast would allow the population time to escape from the pirates. This is in great contrast to how La Manga is today, overbuilt with beach condos or hotels right to the water's edge. Globally, having property close to water is a status symbol, where ocean-views triples property values, and beach-front-access is coveted. But this wasn't always so. Author Amitav Ghosh traces the lineage of older port cities with a healthy distance from the ocean, such as London, Amsterdam, Lisbon, Surat, Dhaka, and Hangzhou among many others. In the age of colonial European expansion in the 17th century, something changed. Colonial cities founded on seafronts, like Mumbai, New York, Charleston, became the norm, where proximity to the water "represents power and security, mastery and conquest... incorporated into the very foundations of middle-class patterns of living across the globe."²⁰³ In a micro fashion, La Manga follows this pattern. Populations were set back from the sea for thousands of years, where La Manga and Mar Menor itself were protective barriers, not only against pirates, but likely storm surges and other climate phenomena. Today I stand on the shores, and imagine an increase in sea levels. I look behind me, where I can see Mar Menor, reachable in 20 steps. These two sisters will reconnect.

Curiously, in the year of 1266, King Alfonso X made a command that the neighbors in Murcia would be obligated to help rescue the peasants and fishermen if

²⁰² Víctor León et al., *Mar Menor: Una Laguna Singular y Sensible. Evaluación Científica de Su Estado*, 2016, 20.

²⁰³ Amitav Ghosh, *The Great Derangement: Climate Change and the Unthinkable*, 1 edition (University of Chicago Press, 2017), 37.

there were pirates spotted, which was signaled by smoke from the towers around the sea to the church of Santa Catalina in the center of Murcia.²⁰⁴ If you look closely at the following old atlas map, you can see the watch towers on the sandbar, as well as dotting around the inland part of Mar Menor.



The oldest map found of Mar Menor. Anonymous manuscript. Archive of the Real Chancillería de Granada. Source: R. Baragaño Alvarez (Ed.) y S. Alonso Navarro (Dir.) in the Gran Enciclopedia de la Región de Murcia. Murcia. Ayalga Ediciones. 1992, t. 3, p. 105.

In another of the oldest documents of the region, in 1588, there was a letter written to King Phillip II asking if the residents could chop down the small forest at the start of La Manga, as pirates would avoid the sandy open parts and disembark and

²⁰⁴ León et al., 20.

hide in the trees before attacking. The king granted permission, and the trees have been gone ever since. Anthropogenic activity has reshaped this lagoon. It is small, cumulative actions like this that have changed the face of Mar Menor; though of course much more brutal actions, like the mining, the agricultural runoff, and the urbanization of La Manga, have had far deeper implications.



Archival images of La Manga from the 1960s. Source: Dominguez, Jose Luis. *De Cabo De Palos A La Manga Del Mar Menor Del Siglo Xv Al Xx*. Edlibrix. 2016.

Scientist Victor Dias-del-Rio Español describes the perseverance of La Manga as nearly miraculous for its tenacity and survival through winter storms, sea level rises and drops, and other climate changes. It is a wonder given it is a fragile bar of sand. It is also entirely responsible for creating the unique set of conditions of Mar Menor and its incredible biodiversity. I've tried to nail down a specific geologic date for when La Manga totally enclosed Mar Menor, but this has proven impossible. For

some, La Manga totally enclosed Mar Menor 5000 years ago,²⁰⁵ but for other scientists and locals it formed around 500 years ago. I think the former is much more plausible given that there is physiographic evidence of the lagoon starting to form in the neo-Quaternary period. 500 years seems a great long time in the temporality of humans, but it is just a heartbeat for geology. On the other hand, many drastic changes can happen in a very short time span when humans are involved.

Today, La Manga has built up like a shadow of Miami beach: a playground of apartment buildings, shops, bouncy castles, and small rollercoasters for kids. A toy train on wheels carts tourists up and down the sleeve, a strange artifact overtly connecting the lagoon with the mining history of the mountains, when otherwise nothing in La Manga wants you to think about the connective tissue between the two. The train rolls by businesses named “Restaurant Hawaii” or “de la Martinique,” “Hotel Seychelles” or “Café Bar Las Vegas,” a propaganda invoking well-known luxury tourist destinations from the other side of the world. Little bursts of graffiti tags mar the illusion every few steps. It wasn’t always meant to be this busy.

²⁰⁵ José Miralles i García and Salvador Garcia-Ayllon, “The Urban Metamorphosis of La Manga and the ‘Mediterraneanisation’ Process of the Mar Menor (Spain),” vol. 169, 2013, 53–64, <https://doi.org/10.2495/CP130051>.



A tourist floating in Mar Menor

Tomás Maestro had had a very different vision for the place. A famous architect, Antonio Bonet, had been hired to develop blueprints for a luxury resort, a “pharaonic project”²⁰⁶ spanning the entire sandbar, that would limit the amount of people that could vacation or live there. A half-hour government-produced commercial, by Franco’s personal TV channel “No-Do” (Noticias y Documentales), gives a good accounting of the vision: cocktails in hand by a hotel pool, frolicking in the waves on their waterskis, playing golf, hunting pigeons, well-trained white horses trotting in the waves with their mane flapping about in the wind. This vision fell flat as Maestro quickly fell into debt. He sold off much smaller patches of land, and La Manga became tightly packed to the gills, now hosting upwards of 250,000 people in the summer. Isabel Rubio, longtime resident of La Manga and founder of activist

²⁰⁶ “Adiós al padre de La Manga del Mar Menor.”

organization *El Pacto por el Mar Menor* (The Pact for Mar Menor) showed me how she couldn't even walk the inner shore anymore without wading deep into the water as houses were built out too far over the water, claiming their little parcel of sand to the extreme.

The urbanization process has changed the coastal ecosystem quite a bit: some of the *golas* became filled in, and other channels expanded. The main one is the Estacio channel. In 1972, to allow the passage of yachts, the channel was dredged and widened. The associated port of yachts is called "Tomás Maestre," a small historical trace of the man on La Manga, though most have no idea who he is. A study demonstrates that the opening of the channel, in combination with having built over all the natural sand dunes, has drained the sand's flows from the sea to the lagoon, prompting the constant intervention of having to import sand to fill out the beaches of La Manga on the Mediterranean side for tourists.²⁰⁷ And though very little attention is given to the other side of La Manga, facing Mar Menor, what Isabel Rubio was complaining about above was not just due to greedy construction but also a steady loss of sand-flow from year to year, as the sand is no longer able to be replenished naturally. But the biggest changes from the urbanization of La Manga and the opening of the Estacio channel have been around Mar Menor's water salinity, dropping precipitously²⁰⁸, and the introduction of new species, including the invasive

²⁰⁷ Miralles i García and Garcia-Ayllon, "The Urban Metamorphosis of La Manga and the 'Mediterraneanisation' Process of the Mar Menor (Spain)," 59–60.

²⁰⁸ Miralles i García and Garcia-Ayllon, 61.u

sea grass *Caulerpa prolifera* (now occupying 95% of the sandy bottom of Mar Menor) and the American blue crab *Callinectes sapidus*. As mentioned, the seagrass may have benefited Mar Menor, but the crab has not.

What is the future of La Manga? Well *Mar Menor's* future hangs on it. Like many coastal places, it is not surprising that La Manga may be ephemeral in the long run, and therefore Mar Menor. Of course, anthropogenic pressures in combination with rising sea levels from climate change will precipitate this ecological future much sooner.

What's Salt Got to Do With It?

It is really otherworldly to walk into a body of water, sit, and just float. I did this in the dead sea, on the Jordanian side, years ago. Lots of men, fully dressed, watched me from shore and while I had a brief moment of euphoria, it was followed by feeling really uncomfortable under their gaze. But I still remember floating without trying. Mar Menor isn't that saline, but it used to be close. For a tourist, it is a gravity defying experience. For a more-than-human, that much salt in water is really inhospitable.

Mar Menor's salinity was described to me as its immune system. In 1878 an artificial channel called Marchamalo was opened for fishermen.²⁰⁹ This resulted in a significant decrease in salinity, and more introductions of species. This was again

²⁰⁹ Pérez Ruzafa, Marcos Diego, and Gilabert Cervera, *The Ecology of the Mar Menor Coastal Lagoon*, 406.

accelerated with the much wider Estacio channel in 1972. With a decrease in salinity, species that crossed over from the Mediterranean were now able to survive in water that was previously too salty – and too hot, for the drop in salinity also now decreased the temperature of Mar Menor. This includes the aforementioned fried-egg jellyfish *Cotylorhiza tuberculata* and barrel jellyfish *Rhizostoma pulmo*, as well as the aptly named algae seagrass *Caulerpa prolifera*, and more recently and most concerning, the American blue crab *Callinectes sapidus*.

When I first arrived to Mar Menor, it was in March, and it was still in the grips of winter. No one was entering the water as it was too cold. So, I went to the fish market, to see at least what was being sold from the lagoon. To my great surprise, I saw blue crabs for sale, all trying to escape the shallow white Styrofoam trays they'd been put into for sorting. My surprise stemmed in part because blue crabs are native to where I grew up in Maryland, a delicacy served up in crab shacks across the state, replete with hammers to crack open the shells, old bay spice, and newspapers underneath to clean the mess up. How had the blue crab gotten into Mar Menor?

Blue crabs appeared in the Mediterranean sea in 1947, probably introduced by ballast water, and since then it has greatly expanded its range.²¹⁰ Either it just hadn't yet reached the coast of Spain, or it hadn't been able to get into Mar Menor until the Estacio channel was dredged, or it hadn't been able to survive in the hyper-saline

²¹⁰ Giorgio Mancinelli, Roberta Bardelli, and Argyro Zenetos, "A Global Occurrence Database of the Atlantic Blue Crab *Callinectes Sapidus*," *Scientific Data* 8, no. 1 (April 16, 2021): 111, <https://doi.org/10.1038/s41597-021-00888-w>.

waters. However, evidence of its wide range points towards a high adaptability of different kinds of waters and environments. Either way, the first crab collected by a fisherman in Mar Menor was in 2015.

The fish market wasn't for browsing, but rather for virtual bidding from all over Spain. A marquee unrolled the catch, the weight, the price, and a short, silent, bidding war unfolded. Ana, the woman who wrote the thesis on the heavy metals being found in jellyfish, came out to meet me. She was now the main fisheries advisor and gave me a tour of the port. I had come to talk about invasive jellyfish, fouling up the fishermen nets and scaring away tourists. Both kinds, *Rhizostoma pulmo* and *Cotylorhiza tuberculata* had been seasonal visitors to Mar Menor, sporadically seen during the summer months only. But starting from 1993-on, massive blooms started occurring in Mar Menor. Three years later in 1996, most stages of the life cycle had been documented within Mar Menor, proving their establishment. Where the polyps of *Cotylorhiza* reside in the lagoon remains unknown, as, like many other jellyfish species, the 1-2mm nearly transparent polyps are exceedingly hard to find. I wanted to find these polyps but dropped this fool's errand when the water turned cloudy from the eutrophication.

As adult medusa, these jellyfish eat phytoplankton, microzooplankton, as well as being direct predators on oyster larvae and probably other fish larvae. The massive and continuous input of nitrates from the industrial agriculture into Mar Menor, which then causes overgrowth of phytoplankton, has also helped their populations thrive. A long-term study over 20 years replicated the life cycle of these two species

in a lab setting and tested for many variables that imitated conditions in Mar Menor. Unsurprisingly, different levels of salinity and temperature, low or high, reduce or stop the growth of polyps (called “strobilation”).²¹¹ However, Mar Menor’s current salinity and temperature are the ideal conditions for the polyps, which, as stated, were not the lagoon’s normal conditions until the past few decades of anthropogenic intervention. The larvae of the jellyfish tended to colonize substrate with lots of light – and given Mar Menor’s many hours of sunshine, the lagoon is an ideal spot. This leads me to believe that the increasing eutrophication from the agricultural inputs – while feeding the adult medusa well – adversely affects the polyps’ ability to reproduce due to the resulting lack of light at the bottom of the lagoon. This may partially account for why the year I arrived there were little to no jellyfish. Ana also theorized that the winter temperatures had been much colder, so this also affected the polyp’s ability to strobilate. In summary, the survival and blooms of these two species occurred with Mar Menor’s drop in salinity, its colonization through the Estacio canal, and the overgrowth of plankton due to agricultural chemicals. In an interesting twist, one scientist theorized that these two species may also play an important role in controlling the consequences of eutrophication, but this remains unconfirmed.²¹²

²¹¹ Ignacio Franco, “20 Years of Research and Monitoring Jellyfish Populations in the Mar Menor: Laboratory Experiments,” in *Mar Menor: Una Laguna Singular y Sensible. Evaluación Científica de Su Estado*, 2016, 151.

²¹² J. Velasco et al., “Nutrient And Particulate Inputs Into The Mar Menor Lagoon (Se Spain) From An Intensive Agricultural Watershed,” *Water, Air, and Soil Pollution* 176, no. 1 (October 1, 2006): 37–56, <https://doi.org/10.1007/s11270-006-2859-8>.

The jellyfish had gotten so plentiful that a program, creatively called MEDUSA, had obtained funding from the government to employ a team of fishermen to haul out the jellies throughout the summer. These jellyfish piles then withered away under the hot sun on the tarmac of a military aviation place right off the lagoon. This kept the fishermen and tourists happy, but reducing the adult jellyfish population might have actually made the conditions of Mar Menor worse as they no longer ate the phytoplankton due to the nitrate inputs from agricultural runoff. Either way, the summer I shot in 2019, there were record lows for jellyfish, and record highs for eutrophication, once more Mar Menor being dubbed the “green soup” part II. My hopes to film a jellyfish bloom were dashed, though I discovered plenty of other invasive species while researching the jellies, like the crab.²¹³

²¹³ León et al., *Mar Menor*.



Callinectes sapidus, or the American Blue Crab on the shore of Mar Menor

Ana turns back to me, pointing at fishermen unloading their catch for the morning: “Currently, the real invader we’re worried about is *Callinectes sapidus*. It eats everything!” Blue crabs have back pincers that are adapted especially for fast swimming. It’s an omnivore, eating both plants and animals, like bivalves, small fish, annelids, plants, even carrion, other blue crabs, and animal waste. Female crabs can produce up to 2 million eggs per brood. But at the same time the local fishermen don’t want to call it invasive, otherwise they will not be able to catch it, as it is illegal in Spain to sell invasive species. After it was first detected in 2015, in a few short years it had doubled, tripled, and exponentially expanded its population. The scientist in charge of monitoring the population, Miguel Vivas, has a few specimens delivered to him daily in order to inspect their stomach contents, to monitor what they’re eating.



Miguel Vivas dissecting *Callinectes sapidus*

He methodically dissected and measured a male crab in front of me, and then analyzed its stomach contents, “Now this is a bit better – this structure here is a molar, the jaw of a decapod. And this here is the antenna... Ah see, this is a very clear example of the remains of a prawn.” Miguel told me, “The blue crab in our ecosystem behaves like an ecological terrorist, but it is not a bad species, it is just in the wrong place”²¹⁴ Perhaps if Mar Menor’s immune system were healthier – saltier and hotter, with less entry points – the crabs might not have been able to survive.

Much of the story of Mar Menor hinges on what flows into her – from water, wind, and gravity. Mar Menor is, after all, a basin. She’s the great collector of everything. And, perhaps, like Mar Menor, all of this feels like a lot. The mining, the nitrate runoffs, Llano del Beal, cancer, and invasive species to boot. But it is meshing

²¹⁴ Miguel Vivas, Miguel Vivas and *Callinectes sapidus*, Film, September 29, 2019.

this kind of thick description, a *thick emplacement*, that allows for an attunement to the more-than-human to flourish.



Callinectes sapidus underwater in Mar Menor, filmed with an endoscope

Reorienting My Senses Underwater

It was late August, the end of a hot summer. The water had gotten so opaque from eutrophication issues, I could barely film anything but the opacity itself which becomes monotonous after a while, so I went less and less into the water, and more and more turned to the land around Mar Menor, with one exception. I had done my Open Water scuba diving certification on the Mediterranean side, right off Cabo de Palos, but all scuba diving trips in Mar Menor had been called off due to the eutrophication. Still, the scuba diving experience had left me reeling, giving me important cues for a new orientation of my senses in Mar Menor. I learned things like

objects appear 33% closer underwater; that water absorbs color, and red was the first color to go – which is why if one wants true whites underwater, filters need to be put in front of the lens to “add” the colors back in. Water is 800 times more dense than air, and sound underwater travels five times as fast. The first time I went in I was filled with all of these facts. When I put the respirator in my mouth – breathing from the tanks on my back instead of air – I started feeling a sense of dread. Following my instructor, I released the air in my diving jacket, and a foot or so underwater proceeded to have an anxiety attack. I kicked right back up to the surface, ripped out my respirators and inhaled large gulping breaths of unmediated air. I was ready to quit immediately. This wasn't for me. Sometimes you realize you're a fish out of water, and in my case, I was a human in water and drowning was imminent in my future. My instructor, the bon-vivant Claudio who was surely a pirate in another lifetime, swam to shore with me and made me stand on hard ground, progressively re-entering the water. He made me cringe-laugh several times, and to his credit, I calmed down and re-entered the depths, submerging myself entirely. Not a great beginning.

The next 20 minutes however completely reoriented my senses. Suddenly I could move in space in any direction, entering into a different relationship with gravity. Movement was sluggish yet fluid. I felt so far out of my element, so deeply alien to the underwater world. I had a deep sense of marvel for this new environment I thought I knew, but realized I didn't know anything about it at all. One of the problems with scuba diving, as I knew well from a documentary I had worked on years ago in Nicaragua on exploited lobster divers, is that, if one comes up through

the water column too fast, nitrogen bubbles could form in your blood, leading to instant paralysis. Knowing I could not escape quickly if a problem arose, but instead had to lazily drift up the water column giving my body time to adjust, produced a great appreciation for living on land with my two legs. The master scuba diver must always remain calm. A measure of their meditative mastery is how much oxygen they consume from their tanks on a given dive. I blew through mine in record time during my first dive.

One of the many drills we practiced was to always dive with a partner, and if one's air stopped working, how to share your oxygen and mouthpiece, taking turns to breathe. Slowly, calmly, one has to realize one cannot breathe – personally that would cause my adrenaline to spike – and then slowly paddle over to one's partner and ask for them to share through universal sign language of slicing a hand across your neck (“I'm out of air” although this motion invokes another meaning for me of “I'm going to kill you”). This partner undoes their mouthpiece, closes their mouth (now full of water), while one spits the water one's collected out in the mouthpiece-contraption before one can inhale and take a breath. The first time I tried this drill I swallowed water and did, actually, want to die. Swallowing water while you're underneath 20 feet of water is not a good time. Claudio saw my eyes go wide and blew the rest of his air out as bubbles to remind me to spit out. After I desperately inhaled air again, correctly, he asked me if I was okay. The sign for “I'm okay” underwater is to join the thumb and index fingers to form an “O” and extend the rest of the fingers out as a fan. Claudio asks me if I'm OK, and I answer apparently “End the Dive” with a

thumbs-up. Knowing I messed up, he grabs my hand, and bites my thumb. This startled me out of more air. Then he fixes my fingers to say “OK” the right way. I then reluctantly gave back his air, thinking I wouldn’t mind if he ran out of it.

In sum, Claudio’s antics aside, it was truly the most otherworldly experience I’d ever been through to date.

These newly developed senses of how to move, act, think underwater didn’t have much time to strengthen unfortunately: the practice part of this class only lasted four dives on the Mediterranean side (where the water was clear and full of colorful fish), after which I refocused on Mar Menor and never dived again due to the green soup effect. Scuba diving is often described as a transcendental experience, and I now understood why. Ingersoll’s “seascape epistemology” and Jue’s “milieu-specific analysis” I mention in the introduction made a lot more sense. I did however gain an appreciation for how to get comfortable in the water on the Mar Menor side in a way I hadn’t felt before. I borrowed from the school a belt full of the right amount of lead weights, I secured rocks to my tripod, I had secured a better underwater camera (the Olympus TG6 with its underwater case, an armature, and good quality underwater lights) and for a few days afterwards I filmed better than I ever had underwater. After having been under 10-20 feet of water, Mar Menor’s few feet seemed natural and calming, and I could hold my breath now over a minute after some practice, which gave me enough time to set my gear up correctly before kicking back to the surface. I also had bought an underwater drone, which did not replace the type of stable tripod

durational filming I wanted to do, but it did come in handy a number of times when I wanted to explore a part of the lagoon from a spot I couldn't wade in.

Then the storm hit. Lightening, thunder, *Evacuate!*, which a short month later led to an apocalypse of sorts, with hundreds of thousands of fish dying. It was cataclysmic, spectacular, and incredibly politically galvanizing.

The First Ecosystem in Europe to Gain Full Legal Rights

Prior to the fish die-off event, I remember interviewing Isabel Rubio about her organization *El Pacto del Mar Menor*, and had asked her how many members were a part of her group. She had avowed only a few core ones, and that mostly she felt like she wasn't gaining as much traction as she would have liked on issues with the lagoon. I regarded her as this sort of lagoon-keeper, like the riverkeeper I had met in Darien, a die-hard activist around an issue few seemed to care about as long as they could have their sunny vacations on the water. But then the fish die-off happened.

The activism generated by this event continued past the march of 55,000 people in Cartagena, even despite covid in 2020. I remain part of some WhatsApp groups that share photos and videos of the lagoon, and the various issues they're documenting, every day. In October 2021, the sequence of events repeated itself. Massive storm. Eutrophication. Fish die-off. New protests, with masks, occurred, and twice they formed a 70,000 line of people surrounding Mar Menor in a virtual "hug"

to the lagoon.²¹⁵ The protests call for political change in policies, especially around agriculture, but there is also a movement to obtain legal rights for the lagoon. The Legal Clinic of the Faculty of Law at the University of Murcia, propelled by university students, built a framework for this eventuality, and published its results in a local newspaper.²¹⁶ This move would follow in the footsteps of other legal rights attributed to bodies of water, such as the Whanganui River in New Zealand and the Ganges and Yamuna river in India.²¹⁷ As long as there are great financial hurdles to protecting Mar Menor, it is too soon to say whether steps like these will have an effect on the situation.

However, much to my surprise, as I was working on the draft of this thesis, on April 5th, 2022, Spain’s Congress of Deputies proposed a law that would grant Mar Menor full legal rights.²¹⁸ It was then ratified in October 2022. Gaining personhood in this way will guarantee the lagoon protections not otherwise available under the current legal system. This makes Mar Menor the first ecosystem in Europe to gain legal rights, an astounding turn of events.

²¹⁵ Anonym, “Thousands of People Give a Symbolic Hug to the Mar Menor to Demand Its Recovery | Tellerreport.Com,” accessed December 15, 2021, <https://www.tellerreport.com/news/2021-08-28-thousands-of-people-give-a-symbolic-hug-to-the-mar-menor-to-demand-its-recovery.H1wJmN2vbY.html>.

²¹⁶ Redacción España, “From a Class at the University to the Congress. The History of the Rights of Nature in Mar Menor,” *Pressenza*, March 15, 2022, <https://www.pressenza.com/2022/03/from-a-class-at-the-university-to-the-congress-the-history-of-the-rights-of-nature-in-mar-menor/>.

²¹⁷ Erin O’Donnell and Julia Talbot-Jones, “Creating Legal Rights for Rivers: Lessons from Australia, New Zealand, and India,” *Ecology and Society* 23, no. 1 (January 15, 2018), <https://doi.org/10.5751/ES-09854-230107>.

²¹⁸ “Spanish MPs Vote to Give Mar Menor Lagoon Personhood and Rights,” *News, Spanish News Today*, April 6, 2022, https://spanishnewstoday.com/spanish-mps-vote-to-give-mar-menor-lagoon-personhood-and-rights_1759340-a.html.

In summary, reading through the issues of Mar Menor feels like a litany of horrors. I wish it wasn't. There is just *so much* to describe in terms of environmental history and devastation, the kind which is invisible and hard to show, or hear. This background begins to reveal the mirage of a present-day hubris. This thick emplacement allows us to see how the palimpsest of land, beings, mining, cancer, forests being chopped down, and openings made to the Mediterranean all *bleed-through* to the present, despite what appears to be a collective erasure of memory.

Conclusion

In both theory and practice, this study intersects the fields of film studies and production, multispecies anthropology, and environmental science. As such, my work as an experimental filmmaker has focused in part on expanding the documentary form to attune to more-than-human life in the context of deleterious human agency in environmental calamities. I argue that developing new filmic methodologies is needed in order to, first, challenge human exceptionalism, decenter the human and practice attuning to the pluriverse, and, second, to take into account the temporality of environmental changes as man-made disasters which last far beyond a human lifespan.

At the heart of this dissertation is a new mode of filmmaking, called *multispecies cinema* which centers the more-than-human through several methodological expansions. While rooted in hard science and ethnographic fieldwork methods, it calls for acts of speculation which attempt a reorientation and recalibration of the senses: to relearn different ways to see, to hear, to know, to feel and to understand an ecosystem in flux and the long-now of these ecological crises in the so-called Anthropocene. The Anthropocene, however, is not a monolithic event, but rather an ongoing patchy, emplaced aggregation of slow violence that is *bleeding-through* to the present – and future.

An essential frame for the dissertation is provided by a trio of writers, and disciplines: the ground-breaking research and narrativization of how environmental violence bleeds-through to human bodies by marine biologist and environmental

activist Rachel Carson. Humanities scholar Robert Nixon coins “slow violence” as a way to codify the inaction, the inertia, and the inability humans have to pay sustained attention to a place-based nonspectacular violence, which poses challenges of representation with its relative invisibility, slowness, and collectivity. Finally, anthropologist Joseph Masco gives a possible reason why humans have been unable to pay sustained attention. It is through a spectacular, man-made possibility – total atomic annihilation – that humans have become myopic to man-made environmental violence. I argue that filmmaking – as a field working method as well as a representational instrument – can be an essential tool to (re)learn how to perceive slow violence using new experimental methods that engage a multispecies coexistence. Film can make slow violence visible and audible. Film can produce experiences of accumulation, useful for discerning the accretion of slow violence. Film can provide a temporal ellipsis to address the different temporalities of environmental disaster. Film can be non-linguistic, which can help bridge to the more-than-human. Film can juxtapose multiple layers of history and reveal the ways slow violence bleeds-through to the present.

Chapter one considered how a multispecies cinema requires new techniques to challenge human exceptionalism and practice attuning to the pluriverse. Using a combination of film studies, media theory, geography, and anthropology, this chapter explored expanding the interview beyond the human, expanding the act of listening beyond the human ear, and expanding the close-up beyond the human face. It was discussed how different technological transducers – the term borrowed from

anthropologist Stefan Helmerich – help to provide a reorientation and recalibration to the more-than-human. The myopia to slow violence can also be mitigated by cultivating a method of attunement I called a *thick emplacement*. This term makes a nod towards anthropologist Clifford Geertz’ well-known theory of “thick description,”²¹⁹ where an observation should be made with as much context as possible as social behavior is rooted in elaborate social and cultural settings. I combined this theory with anthropologist Sarah Pink’s concept of “emplacement,” where she seeks to transcend the turn in anthropology towards embodiment, towards making sure that senses have roots in a specific place, and that they are, in essence, *emplaced*. It connects senses, thoughts, ideas to place, demanding a rich contextualization. This sometimes takes the form of a film, a sound piece, an installation, or descriptive, ethnographic writing. In tandem, I developed another core practice of attunement called *panesthesia*. It promotes an awareness of all human senses in order to form an active correspondence with the more-than-human. In sum, decentering the human open doors that allows for new experiences and representations in the aftermath of slow violence, proving that cinema can be a potential world-making instrument.

Building on these place-based methods, I argued in chapter two, alongside media theorist Melody Jue’s *milieu-specific analysis*, that waterscapes launch us into a different type of world-making practice, and are a prime site to investigate the

²¹⁹ Geertz, “Thick Description.”

bleeding-through of slow violence. Using film studies and new media theory, the chapter examined i-docs focusing on lotic ecosystems, and how multilinear narrative structures provide new opportunities to decenter the human in the representation of environmental catastrophe. The main case study was *The River Runs Red* (2018), an i-doc which showcases the world's largest tailings disaster on the Rio Doce in Brazil, and attunes to the river's more-than-human ghosts to challenge an anthropocentric, totalizing narrative around the aftermath of the disaster and the river's many stories.

These methods culminated in chapter three with a deep ethnographic and environmental history of the ecological collapse of the Mar Menor lagoon in Southeast Spain. This chapter traced the *bleeding-through* of slow violence on the land, water, and the bodies of humans and nonhumans. It was discussed how taking stock of the accumulation of environmental disasters is a way to attune to the slow violence in these complex places which are multi-temporal, multi-layered, with multispecies concerns. This chapter also explored the process and development of two major projects based on the lagoon: the feature film *A Mirror of the Cosmos* (2022) and a 12-hour, 3-channel installation called *Medusa's Mirage: A Tidal Opera* (ongoing). The works, along with the writing, center the lagoon, celebrating the possibility for ongoingness, to stay with the trouble of figuring out how the Mar Menor, and any ecosystem suffering from a cumulative set of anthropogenic actions, can survive beyond the end of the world.

I had a long lazy afternoon one day, the kind I don't have time for anymore with children, with local artist Antonio José García Cano, eating seafood at a little

beach hut while watching the lagoon. He makes a lot of wonderful film and theoretical work on rivers through experimental cartography. One thing he said stayed with me: “If you show a river *in movement* across time, a place as a process, like a snake moving across centuries, people will feel more attached and able to act.” The image of a “snake moving across centuries” echoes the form of a river, and the ways it morphs and changes over time. The lagoon, as a basin, is in the shape of a rounded triangle. It, too, has changed and morphed over the centuries, in movement across time and place. It is through trying to sit with, attune, listen-to, listen-with, and watch the more-than-human (which includes bodies of water) that understanding other world-making possibilities and futures becomes possible – which I argued repeatedly in the dissertation is essential to engendering a new approach to understanding slow violence.

A work that I started to envision only recently, based on Mar Menor but really embedding all of the thinking of this dissertation, is *Medusa’s Mirage: A Tidal Opera* (forthcoming). It is an eco-surrealist three-channel film installation unfolding over the time period of a single tidal cycle of twelve hours. This version seeks to deeply think through the concept of “slow violence” in content, approach, length, aesthetics. At a hyperdurational length of 12 hours, this piece refuses to be easily digested in one sitting, much like the nature of toxicity and slow violence. Resting just outside the realm of human perception, this installation offers a radical recalibration to nonhuman environmental temporalities. As a formal structure, three screens decenters any sense of singularity, fracturing the audience’s perspective. The panorama affords a prism of

polyvocality, evoking multiple versions of the past, present and future. It also invokes the concept of a screen-based palimpsest: a layering of time and space through three frames that are in continuous parallel, which allow me to bring to life my argument of the *bleeding-through* of slow violence. I imagine this piece, instead of a movie theater or art gallery screening venue, to be placed inside the lagoon, three screens on stilts in the water. The audience would watch from the beach or inside the water, swimming in front, around, or behind the screen, with the reflections of the three screens blurring into each other in the water. In addition, the work would be accompanied by a guide of sorts with prompts and exercises to attune to the more-than-humans, and consider the multiple possible futures that Mar Menor holds. The work, emplaced in the lagoon, would create an entirely different set of experimental relationships and connective tissue between place, time and audience. Twelve hours on a beach is also a very different proposition than in a sterile setting; one can live, breathe, stretch, eat, get wet, dry off, and deeply feel the connections the film tries to conjure by already being emplaced in the ecosystem it speaks of. The logistics to make this work come to life are formidable, nevermind installing it in the lagoon. Nevertheless, I am building it slowly with the hope it can be realized one day.

Humans and more-than-humans live, willingly or unwillingly, in a common ecosystem. A common pluriverse. A pluriverse acknowledges that multiple ontologies coexist, and that humans and more-than-humans are all negotiating life and death in relation to one another in a constant entangled evolution. Yet, as author Rebecca Solnit notes, “People have always been good at imagining the end of the

world, which is much easier to picture than the strange sidelong paths of change in a world without end.”²²⁰ What futures are possible in the Anthropocene, however, is a shared decision, a consensus for which a multispecies cinema can have a pivotal role.

²²⁰ Rebecca Solnit, *Hope in the Dark: Untold Histories, Wild Possibilities*, Second edition (Chicago, Illinois: Haymarket Books, 2016), 35.

Appendix of audiovisual works

listed in reverse chronological order

Medusa's Mirage: A Tidal Opera (2022-ongoing)

Format: three channel film installation

TRT: 12 hours

Sample: La Manga

<https://vimeo.com/764916743>

Password : marmenor



Medusa's Mirage: A Tidal Opera. Sample screening space with three-channel installation.

Medusa's Mirage: A Tidal Opera is an eco-surrealist three-channel film installation unfolding over the time period of a single tidal cycle of twelve hours. This work explores how the Mar Menor lagoon, a beachside paradise in southeastern Spain, is also the site of accumulating and devastating environmental violence. Bringing together original footage, archival and animated media collage, experimental sound design and music, this work challenges its viewers to “stay with the trouble”—to learn to attune to a type of slow violence, to decenter the human, and rethink different possible futures.

As a microcosm of anthropogenic climate change and environmental catastrophe, Mar Menor, a hyper-saline lagoon located on the Mediterranean coast of southeastern Spain, demonstrates a waterscape of intersecting histories. With this twelve hour, three-channel film installation, viewers are invited to consider how this place, considered by many as a beachside paradise, hides a long history of the unintended consequences of human activity over the past 2,500 years. The lagoon has witnessed mining, industrial agriculture, jellyfish and algae blooms, invasive blue crabs, and most recently a near-total fish die-off. This multi-screen film seeks to center the more-than-human and deeply think through the concept of “slow violence” in content, approach, length, aesthetics, and bring to life a multispecies coexistence through a most extraordinary body of water.

This is documentation of a recent trial of this installation that is single-channel, on a 6-meter screen in the right size space. This is an old plane hangar called Aeroclub, in Lake Como, Italy.



October 22, 2022 installation of “La Manga” chapter of *Medusa’s Mirage* in the Aeroclub of Como, Italy



October 22, 2022 installation of “La Manga” chapter of *Medusa’s Mirage* in the Aeroclub of Como, Italy. Lake Como in the background.

A Mirror of the Cosmos (2021/2023)

Format: feature film

TRT: 85mins

Link: www.amirrorofthecosmos.com

English subtitles (Spanish-audio): <https://vimeo.com/728825032>

Spanish subtitles (Spanish-audio): <https://vimeo.com/481238084>

French subtitles (Spanish-audio): <https://vimeo.com/479872224>

Password for all three: marmenor



Andres posing in a contamination suit in Mar Menor

A Mirror of the Cosmos is a feature-length sci-fi documentary which explores how the Mar Menor lagoon, located in southeastern Spain and considered a utopian paradise, went to the brink of extinction and beyond. Opening with a conversation between the moon and the sea about environmental violence, the film explores how the unlikely relationships between invasive blue crabs, nitrates, and mining deposits in Mar Menor deeply intertwine to tell the larger story of capitalism's extractive, cumulative effects on the environment over time. The lagoon is a microcosm of the so-called Anthropocene, or 'the Age of Man'. Ultimately, it asks what kinds of futures are possible, and can humans adapt?

A Mirror of the Earth (2021)

Format: short film

TRT: 15 mins

Link: <https://vimeo.com/506331947>



Close-up of “moon-milk” a type of mine-tailing residue flowing down to Mar Menor

A small mining town in Southern Spain is riddled with cancer from just 36 years of open-pit mining. Telling the larger story of capitalism’s cumulative effects on an environment over time, Llano del Beal is a microcosm of slow violence and the so-called Anthropocene, or ‘the Age of Man’. And yet, it is also the site of what may be the oldest human remains in existence, anywhere in the world. Ultimately, the film asks what kinds of futures are possible, and can humans adapt? This short film is based on a feature-length work called *A Mirror of the Cosmos*.

When Monsters Walked the Earth (2021)

Format: short film

TRT: 4 mins

Link: English subtitles: <https://vimeo.com/638068105>

Spanish subtitles: <https://vimeo.com/638378640>



A grasshopper shot with a macro lens

Through the collective memory of a 250 million year old species, structures of exploitation, industrial monoculture, and interspecies relations are reframed through the plantationocene.

The River in 24/7 (2020)

Format: sound piece

TRT: 24 hours

Link: 3-hour excerpt <https://soundcloud.com/anthropocenecurriculum/24-hours-excerpt>



Foam created by either the DOW chemical plant across the river, or a nearby sugarcane processing facility. Ants ate this foam avidly.

What might 24 hours of listening to the Mississippi waters sound like? Can this goods superhighway, which connects to local contexts down the length of North America with global commodity flows, be made legible in sound? A durational soundpiece, *The River in 24/7* takes on these questions, with the work's seemingly impossible-to-apprehend 24-hour length echoing the scale at which the Mississippi operates according to anthropogenic demands. Included below is a three-hour long extract of the work.

The Mississippi River flows 3782 km from its source at Lake Itasca through the center of the continental United States to the Gulf of Mexico. It is a superhighway of goods: 78% of the world's exports in feed grains and soybeans travel down the Mississippi, though shipping at the lower end of the river is comprised mostly of petroleum and its derivatives such as pesticides and plastics. This lower section of the river is called the "chemical corridor" or the "cancer alley" of the Mississippi. What might 24 hours of listening to this chemically-laden water sound like? What sets of sonic relations is made possible in these waters? *The River in 24/7* is a hyperdurational audio recording of the Mississippi river and, while impossible to listen in the museum in one sitting, the fact that a visitor has to walk away from it at some point, knowing it is playing before they arrived and will continue to do so after they leave, extends a temporal understanding of the sheer magnitude of the anthropogenic use of this waterway.

The Mississippi Multiverse (2020)

Format: Short film

TRT: 26 mins

Link: <https://vimeo.com/582151336>



Ants using a twig as a bridge over to river foam to eat

As meandering sources of life and arteries of the earth, rivers bridge land and water, and are crucial for life to flourish. Yet so many rivers have become wretched waters: sites of extensive mining waste, hydroextraction, oil refineries, pulp mills, radiation poisoning, and other irreversible environmental disasters. Over the last one hundred years, the Mississippi has amassed its own particular history that can be roughly sketched as a site that has gone from plantations to petrochemicals, with a stretch famously dubbed as “cancer alley” for the exponentially high rates of cancer in local communities. Rivers are fractal connectors, tying together entire continents, civilizations past and present, human with nonhuman, sediment with atoms. They’re a rich site to explore the far-reaching effects of climate change.

Entering these worlds has been my main collaborative research focus for the last five years, using experimental film methods to attune to these nonhuman stories. In my particular filmmaking approach and methods, I think critically through a type of embodied sensorial practice that focuses on encounters between humans and nonhumans. In doing so, I ask: what possibilities emerge for taking on complex space-time assemblages in the Mississippi that connect indigenous lifeworlds, colonialism, slavery, waterscapes, chemical legacies, invisible harm, and other long-lasting effects of various disasters? Every scene in *The Mississippi Multiverse* carries a multispecies narrative: whether it be the watery invasive water hyacinth fields, or the boat radio captain’s reading of the riverscape, or the procession of ants carrying foam from the water—right across from the DOW chemical plant.

Portal Blooms (2020)

Format: multiple sound pieces, and a repurposed radio with hand-made electronics to randomize and “tune” the various tracks

TRT: 9 tracks at around 3 minutes each

Link: <https://soundcloud.com/izaca/sets/portal-blooms>



The radio installation in use in a sample installation space

Portal Blooms is an interactive listening booth where visitors encounter a radio they can tune to various stations, each tethered to an imagined future in Mar Menor. Lagoons like Mar Menor are fractal connectors, tying together entire continents, civilizations past and present, humans with nonhumans, sediments with atoms. Water-based ecosystems launch us into a different type of world-making, where the assemblage of a lotic ecosystem generates many worlds. As such, Mar Menor is a prime site for multiple portals to other worlds, other ways of thinking, other futures. A portal can bridge two worlds, can weave history with the future, but it can also be a rupture.

Polyps are a Pluriverse (2020)

Format: short film

TRT: 5 mins

Link: <https://vimeo.com/397251421>



Aurelia or “moon jellyfish” polyps, filmed with an endoscope in an aquarium in Piran, Slovenia

Moon jellyfish polyps are latching onto natural gas platforms in the Adriatic Sea, using them as stepping stones to secure a footing in a marine environment otherwise too sandy for their proliferation. Bringing giant jellyfish blooms, these polyps are opportunistic world-builders glimpsing a coming multispecies age inadvertently inaugurated by fossil-fuel infrastructure. Featuring a fishing port in Chioggia, Italy, a marine biology station in Piran, Slovenia, and the vast sea in between, this film offers a non-linguistic experiment in sensory attunement to developing more-than-human submarine regions, approximating an Anthropocene surrealism. By following polyps, the film opens portals linking not just underwater geographies, but also a pluriverse of times, spaces, and potential futures.

Songs of Mud (2019)

Format: sound piece

TRT: varies per track

Link: none



Author listening to one of the river channels. Installation at the Poetics and Politics conference in Santa Cruz, CA.

Songs of Mud builds on the interactive idoc *The River Runs Red* (2018) and is a sound installation which decenters the human, dives into the river, and looks at the more-than-human livability possible in the anthropocene. Listeners are invited to explore the post-disaster world of the Rio Doce through five soundscapes created from a daily practice of “listening” to the river with a hydrophone. One word is given to intersect with each specific soundscape yet resisting logocentrism by submerging the verbal with the nonverbal.

***The Camel Race* (2018)**

Format: short film

TRT: 24 mins



The Camel Race poster; camels just breaching the finishing line

A more-than-human & animal sensorial experience in four takes of the sport of camel racing in Qatar, complete with robot jockeys. During Qatar's economic boom in the 1970s, camels became eclipsed by cars. In 1974, in a bid to preserve his culture, the Emir of Qatar launched camel racing as an official organized sport with prizes. In 2005, after a human rights outcry over the use of slave-Sudanese child jockeys, human jockeys were banned altogether from the sport. As a result, robot jockeys were invented. Humans and nonhumans converge, fusing Qatar's heritage, modern Bedouin identity, and technology in a reinvented twist on tradition.

The Blessed Assurance (2018)

Format: short film

TRT: 21 mins

Link: <https://vimeo.com/289791862>



The Blessed Assurance poster with festival screenings and awards

Every winter off the Georgia coast, fishermen reel in jellyfish from the same waters where shrimp once flourished. *The Blessed Assurance* is a sensorial documentary experience, a meditation on livelihood exploring both man and jellyfish in the otherworldly ecosystem found on an American trawl boat. Visceral images and sounds immerse us in a primordial world, de-centering the human and even going inside a jellyfish.

***The River Runs Red* (2018)**

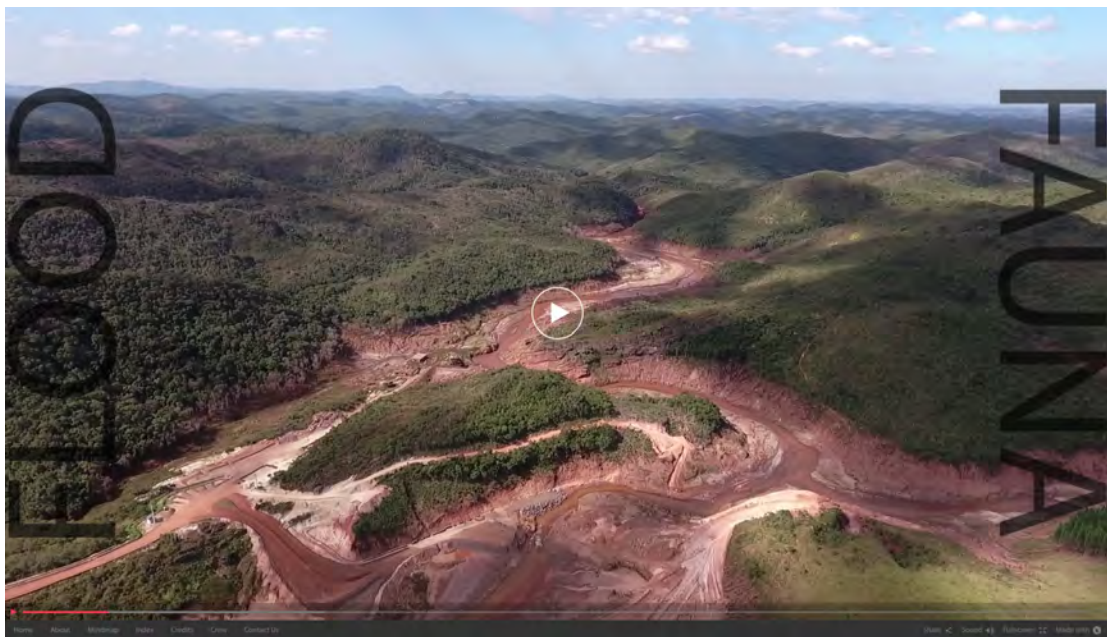
Format: 43 short films on a web interface, using Klynt

TRT: n/a

Link: theriverrunsred.com



Homepage of *The River Runs Red*, with each word being a link



Sample dialectic screen from the interface of *The River Runs Red*



GoPro on a mule, about to drink water from the Rio Doce

The River Runs Red is an award-winning interactive documentary which decenters the human and looks at the more-than-human livability in a post-disaster landscape. What is suffering for the more-than-human in a post-disaster landscape? Is a disaster of these proportions ever truly quantifiable?

On November 5, 2015, the world's worst tailings disaster occurred: the foundations of an iron ore tailings dam from an iron-ore mine in Bento Rodrigues, Brazil, suddenly cracked. Located at the top of a river, 60 million cubic meters of toxic sludge rushed downstream until it spilled into the Atlantic Ocean. Deeply poisoning the water, the disaster effectively remapped an entire ecosystem. The dam is owned by the Australian BHP Billiton, the world's largest mining company. In many ways this is the classic example of environmental "disaster": sudden, brutish, toxic, preventable, man made.

There is no "whole story" to this disaster. There is no "one story" or one character which can represent it. Taking a fragmentary, indeterminate approach to answer the initial question, "What is suffering in a post-disaster landscape?" opens up the possibility of knowing other worlds, even creating a new way of knowing the world, instead of a narrow, single representation from one human character or ideology. We were especially interested in deconstructing linear narratives and making a multilinear project that would embed indeterminacy - the instability of the river, the instability of suffering, of compensation, and all the river's post-disaster inhabitants, human or non human - in its very fabric. Through a poetic dialectic, different themes are explored in which the two opposing words on the screen are in conversation with each other, and the media in the middle is a type of "synthesis" that brings the two together. A "synthesis" menu then appears which leads into different possible dialectics.

***Golden Snail Opera: The More-than-Human Performance of Friendly Farming on Taiwan's Lanyang Plain* (2016)**

Format: Film + text performance and interface

Link: <https://journal.culanth.org/index.php/ca/article/view/ca31.4.04>



The Golden Snail Opera poster. Two images blended together that show the snail's "POV" combined with the rice paddy they so often reside in.



Original interface conceived for the Cultural Anthropology Journal. This is now no longer active.

The Golden Snail Opera combines video and performance-oriented text into a genre-bending *o-pei-la*. This piece is a multispecies enactment of experimental natural history considering the “golden treasure snail,” imported to Taiwan in 1979, which is now major pest of rice agriculture. Whereas farmers in the Green Revolution’s legacy use poison to exterminate snails, a new generation of “friendly farmers” attempts to insert farming as one among many multispecies life ways within the paddy. This film was co-created and published as a film and text piece for the *Cultural Anthropology* journal. This means it is supposed to be viewed while reading an article alongside.

Bibliography

- “6×9: A Virtual Experience of Solitary Confinement.” n.d. 360 Virtual Reality Documentary. The Guardian. Accessed April 23, 2018.
<https://www.theguardian.com/world/ng-interactive/2016/apr/27/6x9-a-virtual-experience-of-solitary-confinement>.
- Abrams, Matthew Jeffrey. n.d. “In Search of Lost Words: The Work of Sky Hopinka.” Los Angeles Review of Books. Accessed April 17, 2018.
<https://lareviewofbooks.org/article/in-search-of-lost-words-the-work-of-sky-hopinka/>.
- Adams, Vincanne. 2013. *Markets of Sorrow, Labors of Faith: New Orleans in the Wake of Katrina*. Durham and London: Duke University Press Books.
- Aguilar, Antonio. 2002. “Una nube tóxica pone en situación de emergencia la zona de Cartagena.” *El País*, January 27, 2002, sec. Sociedad.
https://elpais.com/diario/2002/01/28/sociedad/1012172401_850215.html.
- Akomfra, John, dir. 2017. *Sublime Seas*. Installation.
- Alcolea Rubio, Luis Alberto. n.d. “Geoavailability of Ni, Cu, Zn, As, Cd, and Pb in the Sierra de Cartagena – La Unión (SE Spain).” Dr., Spain: Universidad Politecnica de Cartagena (Spain). Accessed May 31, 2022.
<http://www.proquest.com/docview/1734473895/abstract/EA5CF3A9064E8EPQ/1>.
- Alexievich, Svetlana. 2006. *Voices from Chernobyl: The Oral History of a Nuclear Disaster*. Translated by Keith Gessen. 1 edition. New York: Picador.
- Allen, Paula Gunn. 1995. *Voice of the Turtle*. New York, NY: One World/Ballantine.
- Allison, Leanne, and Jeremy Mendes. 2012. “Bear 71.” Interactive Documentary. 2012. <http://bear71.nfb.ca/#/bear71>.
- Alter, Nora. 2002. *Projecting History: German Nonfiction Cinema, 1967-2000*. Ann Arbor: University of Michigan Press.
- Alter, Nora M. 1996. “The Political Im/Perceptible in the Essay Film: Farocki’s ‘Images of the World and the Inscription of War.’” *New German Critique*, no. 68: 165–92. <https://doi.org/10.2307/3108669>.

- . 2007. “Translating the Essay into Film and Installation.” *Journal of Visual Culture* 6 (1): 44–57. <https://doi.org/10.1177/1470412907075068>.
- Altés Arlandis, Alberto, and Oren Lieberman. 2013. “Interventions, Durations, Effects : Architecting the City and the World.” <https://core.ac.uk/display/20358934>.
- Altwater, Elmar, Eileen C. Crist, Donna J. Haraway, Daniel Hartley, Christian Parenti, and Justin McBrien. 2016. *Anthropocene or Capitalocene?: Nature, History, and the Crisis of Capitalism*. Edited by Jason W. Moore. 1 edition. Oakland, CA: PM Press.
- Amazing Jellies: Jewels of the Sea*. 2004. 1 edition. Charlestown, Mass: Bunker Hill Publishing Inc.
- Anderson, Benedict. 2016. *Imagined Communities: Reflections on the Origin and Spread of Nationalism*. Revised edition. London New York: Verso.
- Anderson, Virginia DeJohn. 2006. *Creatures of Empire: How Domestic Animals Transformed Early America*. 1 edition. Oxford ; New York: Oxford University Press.
- Angel Perez-Ruzafa on Local Radio*. 2019. Mar Menor.
- Anonym. n.d. “Thousands of People Give a Symbolic Hug to the Mar Menor to Demand Its Recovery | Tellerreport.Com.” Accessed December 15, 2021. <https://www.tellerreport.com/news/2021-08-28-thousands-of-people-give-a-symbolic-hug-to-the-mar-menor-to-demand-its-recovery.H1wJmN2vbY.html>.
- archyde. 2020. “The Government Increases Surveillance in the Mar Menor and Doubles the Number of Files for Illegal Irrigation.” *Archyde* (blog). January 23, 2020. <https://www.archyde.com/the-government-increases-surveillance-in-the-mar-menor-and-doubles-the-number-of-files-for-illegal-irrigation/>.
- Ardevol Piera, Elisenda. 1996. “Representación y Cine Etnográfico.” *Quaderns de l'ICA*, no. 10.
- Arendt, Hannah, and Margaret Canovan. 1998. *The Human Condition, 2nd Edition*. 2nd edition. Chicago: The University of Chicago Press.
- Armada, Charles. 2019. “The Environmental Disasters of Mariana and Brumadinho and the Brazilian Social Environmental Law State.” *SSRN Electronic Journal*, January. <https://doi.org/10.2139/ssrn.3442624>.

- Arsenjuk, Luka. 2016. “‘To Speak, to Hold, to Live by the Image’: Notes in the Margins of the New Videographic Tendency.” In *The Essay Film: Dialogue, Politics, Utopia*, edited by Elizabeth Papazian and Caroline Eades, 216. Wallflower Press.
- Arthur, Paul. 2003. “Essay Questions: From Alain Resnais to Michael Moore.” *Film Comment* 39 (1).
- . 2016. “Jargons of Authenticity.” In *The Documentary Film Reader: History, Theory, Criticism*, edited by Jonathan Kahana, 1 edition, 890–900. Oxford ; New York: Oxford University Press.
- Ashadu, Karimah, dir. 2015. *Makoko Sawmill*. Experimental.
- Asimeng-Boahene, Lewis. 2010. “Counter-Storytelling with African Proverbs: A Vehicle for Teaching Social Justice and Global Understanding in Urban, U.S. Schools.” *Equity & Excellence in Education* 43 (4): 434–45.
- “Asociación de Empresas Del Valle de Escrombreras (AEVE).” n.d. Corporation. Aeve. <http://www.aeve.org/en/escombreras-valley-aeve.html>.
- Aston, Judith, and Sandra Gaudenzi. 2012. “Interactive Documentary: Setting the Field.” *Studies in Documentary Film* 6 (2): 125–39. https://doi.org/10.1386/sdf.6.2.125_1.
- Aston, Judith, Sandra Gaudenzi, and Mandy Rose, eds. 2017. *I-Docs: The Evolving Practices of Interactive Documentary*. Reprint edition. London New York: Wallflower Press.
- Aufderheide, Patricia. 2014. “Ethical Challenges for a Documentarians in a User-Centric Environment.” In *New Documentary Ecologies: Emerging Platforms, Practices and Discourses*, edited by C. Hight and C. Summerhayes, 2014 edition. Basingstoke, Hampshire New York, NY: Palgrave Macmillan.
- Augoyard, Jean-François, and Henri Torgue. 2006. *Sonic Experience: A Guide to Everyday Sounds*. Montreal ; Ithaca: McGill-Queen’s University Press.
- Bahrani, Ramin, dir. 2009. *The Plastic Bag*. Documentary.
- Baichwal, Jennifer, dir. 2006. *Manufactured Landscapes*. Documentary.
- Bailey, Elisabeth Tova. 2010. *The Sound of a Wild Snail Eating*. 1st edition. Chapel Hill, N.C: Algonquin Books.

- Bailey, Geoff. 2007. "Time Perspectives, Palimpsests and the Archaeology of Time." *Journal of Anthropological Archaeology* 26 (2): 198–223. <https://doi.org/10.1016/j.jaa.2006.08.002>.
- Balsom, Erika, and Hila Peleg, eds. 2016. *Documentary Across Disciplines*. Cambridge, MA: The MIT Press.
- Banks, Marcus, and Jay Ruby, eds. 2011. *Made to Be Seen: Perspectives on the History of Visual Anthropology*. Chicago ; London: University Of Chicago Press.
- Barad, Karen. 2007. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Second Printing edition. Durham: Duke University Press Books.
- Barausse, A., A. Michieli, E. Riginella, L. Palmeri, and C. Mazzoldi. 2011. "Long-Term Changes in Community Composition and Life-History Traits in a Highly Exploited Basin (Northern Adriatic Sea): The Role of Environment and Anthropogenic Pressures." *Journal of Fish Biology* 79 (6): 1453–86. <https://doi.org/10.1111/j.1095-8649.2011.03139.x>.
- Barbash, Ilisa, and Lucien Taylor. 1997. *Cross-Cultural Filmmaking: A Handbook for Making Documentary and Ethnographic Films and Videos*. University of California Press.
- Barcelona, Autonomous University of. n.d. "Tailings Dumped into Portman Bay Continue to Release Metals into the Sea 25 Years Later." Accessed December 2, 2021. <https://phys.org/news/2019-10-tailings-dumped-portman-bay-metals.html>.
- Barker, Debi. 2002. "Globalization and Industrial Agriculture." In *Fatal Harvest: The Tragedy Of Industrial Agriculture*, edited by Andrew Kimbrell, 1 edition, 252–63. Washington: Foundation for Deep Ecology.
- Barthes, Roland. 1983. *Empire of Signs*. Translated by Richard Howard. New York: Hill and Wang.
- . 2009. *The Grain of the Voice: Interviews 1962-1980*. Northwestern University Press.
- Baumbach, Nico. 2010. "Jacques Rancière and the Fictional Capacity of Documentary." *New Review of Film and Television Studies* 8 (1): 57–72. <https://doi.org/10.1080/17400300903529356>.

- Baviskar, Amita. 2005. *In the Belly of the River: Tribal Conflicts over Development in the Narmada Valley*. 2 edition. Delhi ; New York: Oxford University Press.
- Bazin, André, Dudley Andrew, and Francois Truffaut. 2004. *What Is Cinema?: Volume II*. Translated by Hugh Gray. First edition. Berkeley: University of California Press.
- Bazin, Andre, Jean Renoir, and Dudley Andrew. 2004. *What Is Cinema? Vol. 1*. Translated by Hugh Gray. Second edition. Berkeley: University of California Press.
- Bear, Laura. 2015. *Navigating Austerity: Currents of Debt along a South Asian River*. 1st edition. Stanford, California: Stanford University Press.
- Beckert, Sven. 2015. *Empire of Cotton: A Global History*. Reprint edition. New York, NY: Vintage.
- Benjamin, Walter. 1973. "The Author as Producer." In *Understanding Brecht*, 84–101. London: Verso.
- Berlant, Lauren. 2011. *Cruel Optimism*. 29906th edition. Durham: Duke University Press Books.
- Bernard, Sheila Curran. 2010. *Documentary Storytelling: Creative Nonfiction on Screen*. 3rd edition. Amsterdam ; Boston: Focal Press.
- Bernstein, Osnat Trabelsi, and Yousef Atwa. 2008. "Gaza Sderot - Life in Spite of Everything." October 26, 2008. <http://gaza-sderot.arte.tv/>.
- Berwald, Juli. 2017. *Spineless: The Science of Jellyfish and the Art of Growing a Backbone*. First Edition first Printing. New York: Riverhead Books.
- Blackbourn, David. 2007. *The Conquest of Nature: Water, Landscape, and the Making of Modern Germany*. Reprint edition. New York, NY: W. W. Norton & Company.
- Bland, Alastair. 2014. "Southern Fishermen Cash In On Asia's Taste For Jellyfish." News. NPR.Org. January 31, 2014. <http://www.npr.org/sections/thesalt/2014/01/28/267836803/southern-fishermen-cash-in-on-asias-taste-for-jellyfish>.
- Blessner, Barry, and Linda-Ruth Salter. 2009. *Spaces Speak, Are You Listening?: Experiencing Aural Architecture*. Illustrated edition. Cambridge, Mass: MIT Press.

- Bogue, Mike. 2017. *Apocalypse Then: American and Japanese Atomic Cinema, 1951-1967*. Illustrated edition. Jefferson, North Carolina: McFarland & Company.
- Bonifazio, Paola. 2014. "United We Drill: ENI, Films, and the Culture of Work." *Annali d'Italianistica* 32: 329–50.
- Boo, Katherine. n.d. "On Not 'Giving Voice to the Voiceless.'" The Pulitzer Prize. Accessed April 8, 2021. <https://www.pulitzer.org/article/not-giving-voice-voiceless>.
- Borowiak, Craig, Vicky Funari, Jesikah Ross, and Helen White. 2017. "Troubled Waters: Tracing Globalization and Waste in the Delaware River." *PS: Political Science & Politics* 50 (January): 193–98. <https://doi.org/10.1017/S1049096516002420>.
- Bourdieu, Pierre. 2002. *Masculine Domination*. Translated by Richard Nice. 1st edition. Stanford, Calif: Stanford University Press.
- Bousé, Derek. 2000. *Wildlife Films*. Philadelphia: University of Pennsylvania Press.
- Brackage, Stan, dir. 1963. *Mothlight*. Experimental.
- Braidotti, Rosi. 2013. *The Posthuman*. 1 edition. Cambridge, UK ; Malden, MA, USA: Polity.
- Brasier, Hannah, Karelle Arsenault, Liz Burke, Gerda Cammaer, Nicholas Hansen, John Hughes, Adrian Miles, Kim Munro, Max Schleser, and Franziska Weidle. 2018. "Docuverse: Approaches To Expanding Documentary." Zenodo. <https://doi.org/10.5281/zenodo.1211520>.
- Braun, Christina. 2018. *Thomas Hirschhorn: A New Political Understanding of Art?* Hanover, New Hampshire: Dartmouth.
- Brigard, Emilie. 1995. "The History of Ethnographic Film." In *Principles of Visual Anthropology*, edited by Paul Hockings. Berlin: De Gruyter Mouton.
- Brigstocke, Julian, and Tehseen Noorani. 2016. "Posthuman Attunements: Aesthetics, Authority and the Arts of Creative Listening." *GeoHumanities* 2 (1): 1–7. <https://doi.org/10.1080/2373566X.2016.1167618>.
- Brodie, Patrick, Lisa Han, and Weixian Pan. 2019. "Becoming Environmental." *SYNOPTIQUE*, 6.

- Brown, Kate. 2015. *Plutopia: Nuclear Families, Atomic Cities, and the Great Soviet and American Plutonium Disasters*. Reprint edition. Oxford New York: Oxford University Press.
- Bruno, Giuliana. 2014. *Surface: Matters of Aesthetics, Materiality, and Media*. Illustrated edition. Chicago ; London: University of Chicago Press.
- Bruno, Pedro María Egea. 1986. *El distrito minero de Cartagena en torno a la primera Guerra Mundial (1909-1923)*. [Murcia], [Cartagena]: Universidad de Murcia, Secretariado de Publicaciones.
- Bryant, David, George Davidson, and Georgia Sea Grant. 2003. *Georgia's Amazing Coast: Natural Wonders from Alligators to Zoegas*. Athens: University of Georgia Press.
- Burke, Edmund. 2010. *A Philosophical Inquiry into the Origin of Our Ideas of the Sublime and Beautiful*. Digireads.com.
- Burt, Jonathan. 2004. *Animals in Film*. London: Reaktion Books.
- Burton, Kevin Lee, and Alicia Smith. 2011. "God's Lake Narrows." NFB/Interactive Documentary. Godslake. 2011. <http://godslake.nfb.ca/#/godslake>.
- Cadena, Marisol de la, and Mario Blaser, eds. 2018. *A World of Many Worlds*. Durham: Duke University Press.
- Cadena, Marisol de la, Robert J. Foster, and Daniel R. Reichman. 2015. *Earth Beings: Ecologies of Practice across Andean Worlds*. Durham: Duke University Press Books.
- Caduff, Carlo. 2015. *The Pandemic Perhaps: Dramatic Events in a Public Culture of Danger*. 1 edition. University of California Press.
- Çağlayan, Emre. 2018. *Poetics of Slow Cinema: Nostalgia, Absurdism, Boredom*. Softcover reprint of the original 1st ed. 2018 edition. Palgrave Macmillan.
- Cahill, James Leo. 2013. "Anthropomorphism and Its Vicissitudes: Reflections on Hommesick Cinema." In *Screening Nature: Cinema beyond the Human*, edited by Anat Pick and Guinevere Narraway, 304. New York, Oxford: Berghahn.
- . 2019. *Zoological Surrealism: The Nonhuman Cinema of Jean Painlevé*. Minneapolis: University of Minnesota Press.

- Calder, Dale R. 1982. "Life History of the Cannonball Jellyfish, *Stomolophus Meleagris* L. Agassiz, 1860 (Scyphozoa, Rhizostomida)." *Biological Bulletin* 162 (2): 149. <https://doi.org/10.2307/1540810>.
- Calvo Rebollar, Miguel. 1996. "La Unión; Mineralogía." In *Bocamina*, 14–35.
- Campbell, Eileen. 1992. *A Guide to the World of the Jellyfish*. Monterey, CA: Monterey Bay Aquarium.
- Cano, Carlos García. 1996. "Informe Sobre El Poblado Ibérico De La Loma Del Escorial, Los Nietos (Cartagena)." *Memorias de Arqueología*, 127–40.
- . 2005. "Un Tachón de Escudo de Bronce Procedente de La Necrópolis Ibérica de Los Nietos (Cartagena)." In *Mastia: Revista Del Museo Arqueológico Municipal de Cartagena*, 155–74. 4.
- Carbonell, Isabelle. 2015. *Tomo/Veillance*. Sound installation.
- . 2018a. "Coming to Our Senses Beyond the Talking-Head: the Panesthetic Documentary Interview." *Conexión: Departamento de Comunicaciones de la PUCP* 7 (9): 83–108.
- , dir. 2018b. *The Camel Race*. Experimental.
- . 2019. "A Correspondence of the Senses: Panesthesia as Research Method." Anthropology. Society for Cultural Anthropology. February 11, 2019. <https://culanth.org/fieldsights/a-correspondence-of-the-senses-panesthesia-as-research-method>.
- , dir. 2020a. *Polyps Are a Pluriverse*. Experimental.
- . 2020b. "Polyps Are a Pluriverse." Edited by Anna Tsing, Jennifer Deger, Alder Saxena Keleman, and Feifei Zhou. *Feral Atlas: The More-Than-Human Anthropocene*, 0. <https://doi.org/10.21627/2020fa>.
- , dir. 2020c. *The Mississippi Multiverse*. Experimental.
- . 2020d. "The Panesthetic River." *Anthropocene Curriculum | HKW* (blog). 2020.
- . 2020e. *The River in 24/7*. Sound installation.
- , dir. 2021a. *A Mirror of the Earth*. Documentary.
- . 2021b. "A Story on Story: Camel Races, Robot Jockeys, and Filmmaking." *World Records Journal* 5 (Beyond Story): 29–34.

- . 2021c. “Multispecies Cinema in Wretched Waters: The Slow Violence of the Rio Doce Disaster.” In *The Routledge Companion to Contemporary Art, Visual Culture, and Climate Change*, edited by T. J. Demos, Emily Eliza Scott, and Subhankar Banerjee. New York ; Abingdon, Oxon: Routledge.
- , dir. 2022a. *A Mirror of the Cosmos*. Documentary.
- . 2022b. “Interactive Multispecies Documentary Methods.” In *Interactive Documentary: Decolonizing Practice-Based Research*, edited by Kathleen Marie Ryan and David Staton, 258. Routledge.
- , dir. n/d. *Medusa’s Mirage: A Tidal Opera*. Installation.
- Carbonell, Isabelle, and Lucas Bonetti. 2016. Lucia KrenakHD Video.
- , dirs. 2018. *The River Runs Red*. Interactive Documentary.
- Carbonell, Isabelle, Andres Camacho, and Steven Trimmer. 2020. *Portal Blooms*. Sound installation.
- Carbonell, Isabelle, and Sarah Cannon, dirs. 2018. *The Blessed Assurance*. Documentary.
- Carbonell, Isabelle, Anna Lowenhaupt Tsing, and Yen-Ling Tsai. 2021. “Expanding the Interview: A Panesthetic Attunement to More-Than-Human Worlds.” *Fieldsights*. <https://culanth.org/fieldsights/attunements>.
- Carbonell, Isabelle M. 2016. “The Ethics of Big Data in Big Agriculture.” *Internet Policy Review* 5 (1). <https://policyreview.info/articles/analysis/ethics-big-data-big-agriculture>.
- Carbonell, Isabelle, and Duane Peterson. 2019. *Songs of Mud*. Sound installation.
- Carbonell, Isabelle, Duane Peterson, and Jamie Jover, dirs. 2021. *When Monsters Walked the Earth*. Documentary.
- Carbonell, Isabelle, and Steven Trimmer. 2020. *A Digital Reincarnation: The O’o*. Sound installation.
- Carnazzi, Stefano. 2001. “Petrolchimico Di Marghera. Tutti Assolti.” Gaia Italia. November 2, 2001. http://gaiaitalia.it/sito2002/_BREAKING_NEWS/petrolkimiko2001.html.
- Carpio, Lillo. 1981. “El Poblamiento Ibérico En Murcia.” In *Memorias de Arqueología*, 224–35. 9. Murcia.

- Carson, Rachel. 2002. *Silent Spring*. Anniversary edition. Boston: Mariner Books.
- Castejon, Jose Matias. 2019. "Salt Crake in SE Spain." Spain: Universidad Politecnica de Cartagena (Spain).
- Castejón, Jose Matias Peñas. 2017. "Interaction between Soils, Mining Waste and the Dynamics of Supergene Mineral Phases in Metal Mining Environments of SE Spain." Doctoral dissertation, Spain: Universidad Politecnica de Cartagena.
- Certeau, Michel de. 2011. *The Practice of Everyday Life*. Translated by Steven Rendall. Third edition. Berkeley, Calif.: University of California Press.
- Chakrabarty, Dipesh. 2009. "The Climate of History: Four Theses." *Critical Inquiry* 35 (2): 197–222.
- Chatman, Seymour. 1980. *Story and Discourse: Narrative Structure in Fiction and Film*. New edition. Ithaca: Cornell University Press.
- Chion, Michel. 1999. *The Voice in Cinema*. Translated by Claudia Gorbman. New York: Columbia University Press.
- Cizek, Katerina. 2009. "Highrise." Interactive Documentary. 2009. <http://highrise.nfb.ca/>.
- . 2015. "Universe Within: Digital Lives in the Global Highrise." Interactive Documentary. NFB. 2015. <http://universewithin.nfb.ca/desktop.html#index>.
- Clark, Laurie Beth. 2015. "Ruined Landscapes and Residual Architecture." *Performance Research* 20 (3): 83–93. <https://doi.org/10.1080/13528165.2015.1055084>.
- Clemente, Benito Morón. 1981. "Las Tierras de Alicante y Murcia Según la Geografía de Estrabon." *Revista Murgetana* 61: 11.
- Coffman, Elizabeth. 2014. "Spinning a Collaborative Web." In *New Documentary Ecologies: Emerging Platforms, Practices and Discourses*, edited by C. Hight and C. Summerhayes, 2014 edition. Basingstoke, Hampshire New York, NY: Palgrave Macmillan.
- Cole, Donald. 2003. "Where Have the Bedouin Gone?" *Anthropology Quarterly* 76 (2): 235–67.
- Collier, John, Malcom Collier, and Edward T. Hall. 1986. *Visual Anthropology: Photography as a Research Method*. Revised&Enlarged edition. Albuquerque: University of New Mexico Press.

- Colon, Sigma. 2017. "Watershed Colonialism and Popular Geographies of North American Rivers." *Open Rivers: Rethinking Water, Place, & Community* 8. <https://doi.org/10.24926/2471190X.3412>.
- Colwell, Chip. 2022. "A Palimpsest Theory of Objects." *Current Anthropology* 63 (2): 129–57. <https://doi.org/10.1086/719851>.
- Condon, Robert H., Carlos M. Duarte, Kylie A. Pitt, Kelly L. Robinson, Cathy H. Lucas, Kelly R. Sutherland, Hermes W. Mianzan, et al. 2013. "Recurrent Jellyfish Blooms Are a Consequence of Global Oscillations." *Proceedings of the National Academy of Sciences* 110 (3): 1000–1005. <https://doi.org/10.1073/pnas.1210920110>.
- Conesa, Héctor M., and Francisco J. Jiménez-Cárceles. 2007. "The Mar Menor Lagoon (SE Spain): A Singular Natural Ecosystem Threatened by Human Activities." *Marine Pollution Bulletin* 54 (7): 839–49. <https://doi.org/10.1016/j.marpolbul.2007.05.007>.
- Conesa, Héctor M., Rainer Schulin, and Bernd Nowack. 2008. "Mining Landscape: A Cultural Tourist Opportunity or an Environmental Problem?: The Study Case of the Cartagena–La Unión Mining District (SE Spain)." *Ecological Economics* 64 (4): 690–700. <https://doi.org/10.1016/j.ecolecon.2007.06.023>.
- Conversi, Alessandra, Serena Fonda Umami, Tiziana Peluso, Juan Carlos Molinero, Alberto Santojanni, and Martin Edwards. 2010. "The Mediterranean Sea Regime Shift at the End of the 1980s, and Intriguing Parallelisms with Other European Basins." *PLOS ONE* 5 (5): e10633. <https://doi.org/10.1371/journal.pone.0010633>.
- Coover, Roderick, and Lucien Taylor. 2008. "Making Forest of Bliss: Intention, Circumstance, and Chance in Nonfiction Film." *American Anthropologist* 104 (January): 651–53. <https://doi.org/10.1525/aa.2002.104.2.651>.
- Costello, John H., Sean P. Colin, and John O. Dabiri. 2008. "Medusan Morphospace: Phylogenetic Constraints, Biomechanical Solutions, and Ecological Consequences." *Invertebrate Biology* 127 (3): 265–90.
- Court, Maria, and Rosemarie Lerner. n.d. "The Quipu Project." Quipu Project. Accessed April 22, 2018. <http://interactive.quipu-project.com>.
- Cragoe, Nicholas G. 2017. "Narrating Indigenous Boundaries: Postcolonial and Decolonial Storytelling in Northern Minnesota." *Nationalism and Ethnic Politics* 23 (2): 182–202.

- Crane, Peter. 2013. *Ginkgo: The Tree That Time Forgot*. 1st edition. New Haven: Yale University Press.
- Crawford, Peter, and David Turton, eds. 1992. *Film as Ethnography*. Manchester ; New York : New York: Manchester University Press.
- Crosby, Alfred W. 2004. *Ecological Imperialism: The Biological Expansion of Europe, 900-1900*. 2nd edition. Cambridge: Cambridge University Press.
- Crutzen, Paul J., and E.F. Stoermer. 2000. "The 'Anthropocene.'" *Global Change Newsletter*, 2000, 41 edition, sec. 17.
- Cunningham, Megan. 2005. *The Art Of The Documentary: Ten Conversations With Leading Directors, Cinematographers, Editors, And Producers*. Berkeley, CA: New Riders Pub.
- Daniel, Sharon. 2007. "Public Secrets." Interactive Documentary. 2007. <http://vectors.usc.edu/issues/4/publicsecrets.html>.
- . 2012. "Palabras." In *Abécédaire Du Web: 26 Concepts Pour Comprendre La Création Sur Internet*. Les Presses de l'Université du Québec.
- . 2014. "Systems and Subjects: Redefining Public Art." In *Context Provider: Conditions of Meaning in Media Arts*, edited by Margot Lovejoy, Christiane Paul, and Victoria Vesna. Bristol, United Kingdom: Intellect Books Ltd. <http://ebookcentral.proquest.com/lib/ucsc/detail.action?docID=718851>.
- Daston, Lorraine, and Gregg Mitman, eds. 2006. *Thinking with Animals: New Perspectives on Anthropomorphism*. New Ed edition. Chichester: Columbia University Press.
- "Database || Archive: Editors' Introduction." n.d. Database | Narrative | Archive: Seven Interactive Essays on Digital Nonlinear Storytelling edited by Matt Soar & Monika Gagnon. Accessed May 8, 2018. <http://dnaanthology.com/anvc/dna/editorial-statement>.
- Davies, Char. 1995. "Osmose." Virtual Reality Documentary. 1995. <http://www.immersence.com/osmose/>.
- Davis, Heather, and Zoe Todd. 2017. "On the Importance of a Date, or, Decolonizing the Anthropocene." *ACME: An International Journal for Critical Geographies* 16 (4): 761–80.
- Davis, Kord, and Doug Patterson. 2012. "Big Data, Big Impact." In *Ethics of Big Data*. O'Reilly Media, Inc.

<http://proquest.safaribooksonline.com.oca.ucsc.edu/book/-/9781449314873/firstchapter>.

- De Carvalho Cabral, Diogo. 2015. "Into the Bowels of Tropical Earth: Leaf-Cutting Ants and the Colonial Making of Agrarian Brazil." *Journal of Historical Geography* 50 (October): 92–105.
- Deane-Drummond, Celia. 2014. *The Wisdom of the Liminal: Evolution and Other Animals in Human Becoming*. Wm. B. Eerdmans Publishing.
- Deleuze, Gilles. 2013. *Cinema II: The Time-Image*. Reprint edition. London ; New York: Bloomsbury Academic.
- Demos, T. J. 2017. *Against the Anthropocene: Visual Culture and Environment Today*. Berlin: Sternberg Press.
- Demos, T.J. n.d. "On Terror and Beauty: John Akomfrah's Vertigo Sea." *Atlántica. Journal of Art and Thought*, no. 56. Accessed May 21, 2018. <http://www.revistaatlantica.com/en/contribution/on-terror-and-beauty-john-akomfrahs-vertigo-sea/>.
- Dent, Alexander. 2009. *River of Tears: Country Music, Memory, and Modernity in Brazil*. Illustrated edition. Durham: Duke University Press Books.
- Derrida, Jacques. 2008. *The Animal That Therefore I Am*. Edited by Marie-Louis Mallet. Translated by David Wills. 1 edition. New York: Fordham University Press.
- Despret, Vinciane. 2021. *Living as a Bird*. Translated by Helen Morrison. 1st edition. Cambridge ; Medford, MA: Polity.
- Diodorus, Siculus. 1964. *Bibliotheca historica*. Vol. 5. Stutgardiae : In aedibus B.G. Teubneri. <http://archive.org/details/bibliothecahisto0002diod>.
- Diouf, Sylviane A. 2016. *Slavery's Exiles: The Story of the American Maroons*. Reprint edition. New York: NYU Press.
- Doane, Mary Ann. 2003. "The Close-Up: Scale and Detail in the Cinema." *Differences: A Journal of Feminist Cultural Studies* 14 (3): 89–111. <https://doi.org/10.1215/10407391-14-3-89>.
- Dolar, Mladen, Alenka Zupancic, and Slavoj Žižek. 2006. *A Voice and Nothing More*. Cambridge, Mass: The MIT Press.
- Dominguez, Jose Luis. 2016. *De Cabo De Palos A La Manga Del Mar Menor Del Siglo Xv Al Xx*. 1st ed. Murcia: Edlibrix.

- Dovey, Jon, and M. Rose. 2013. "This Great Mapping of Ourselves' – New Documentary Forms Online." In *The Documentary Film Book*, edited by Brian Winston and British Film Institute. Houndmills, Basingstoke, Hampshire ; New York: Palgrave Macmillan on behalf of the British Film Institute.
- Downs, Anthony. 2016. "Up and down with Ecology—the 'Issue-Attention Cycle.'" In *Agenda Setting: Readings on Media, Public Opinion, and Policymaking*, edited by David Protess and Maxwell E. McCombs. Routledge.
- Duarte, Carlos, Kylie Pitt, Cathy Lucas, Jennifer Purcell, Shin-ichi Uye, Kelly Robinson, Lucas Brotz, et al. 2013. "Is Global Ocean Sprawl a Cause of Jellyfish Blooms?" *Frontiers in Ecology and the Environment* 11 (March): 91–97. <https://doi.org/10.2307/23470528>.
- Dushaw, Brian. 2001. "A Day in the Life of a Tomography Mooring." April 24, 2001. <http://staff.washington.edu/dushaw/mooring/picture-010.html>.
- . 2008. "Observing the Ocean in the 2000s: A Strategy for the Role of Acoustic Tomography in Ocean Climate Observation." In *Observing the Oceans in the 21st Century*, edited by C.J. Koblinsky, 391–418. Melbourne, Australia: GODAE Project Office/Bureau of Meteorology.
- Duvall, John A. 2017. *The Environmental Documentary: Cinema Activism in the 21st Century*. New York: Bloomsbury Academic.
- Dyson, Frances. 2014. *The Tone of Our Times: Sound, Sense, Economy, and Ecology*. Cambridge, Massachusetts: The MIT Press.
- Eames, Charles, and Ray Eames, dirs. 1977. *Powers of Ten*.
- Easterling, Keller. 2014. *Extrastatecraft: The Power of Infrastructure Space*. London ; New York: Verso.
- Easterson, Sam, dir. 2011. *Animal-Cams*. Digital. Experimental. Video Data Bank. <http://www.vdb.org/titles/animal-cams>.
- Echavarría, Juan Manuel, dir. 2004. *Bocas de Ceniza / Mouths of Ash*. Documentary. http://jmechavarría.com/gallery/video/gallery_video_bocas_de_ceniza.html.
- "Economic Anthropology: Capitalism the Best Economic System?" 2017. *Living Anthropologically* (blog). April 8, 2017. <https://www.livinganthropologically.com/anthropology-2017/is-capitalism-the-best-economic-system/>.

- Eder, Donna. 2007. "Bringing Navajo Storytelling Practices into Schools: The Importance of Maintaining Cultural Integrity." *Anthropology & Education Quarterly* 38 (August): 278–96.
- Egoyan, Atom, and Ian Balfour, eds. 2004. *Subtitles: On the Foreignness of Film*. Cambridge, Mass: The MIT Press.
- Eisenstein, S. M., and Jacques Aumont. 1974. *Au-Delà Des Étoiles : Essais*.
- El Algar Los Urrutias de Hoy*. 2019. "Critican las declaraciones de Ruzafa sobre los metales pesados que llegan al Mar Menor," September 2019. https://www.elalgarlosurrutiasdehoy.com/index.php/los-urrutias/44490-critican-las-declaraciones-de-ruzafa-sobre-los-metales-pesados-que-llegan-al-mar-menor?cookie_85926a43bbaf2643dbb8e25c5490b798=accepted.
- El Mundo*. 2013. "Adiós al padre de La Manga del Mar Menor," July 18, 2013. <https://www.elmundo.es/elmundo/2013/07/18/suvienda/1374157942.html>.
- "El Relieve - Atlas Global de La Región de Murcia." 2014. October 6, 2014. <https://web.archive.org/web/20141006104851/http://www.atlasdemurcia.com/index.php/secciones/2/el-relieve/3/>.
- Elliott, Denielle, and Dara Culhane, eds. 2016. *A Different Kind of Ethnography: Imaginative Practices and Creative Methodologies*. Illustrated edition. North York, Ontario, Canada: University of Toronto Press.
- Emerson, Darren, dir. 2015. *Witness 360: 7/7*. 360 Virtual Reality Documentary. <https://www.jauntvr.com/title/cd566a941f>.
- Endresen, Øyvind, Hanna Lee Behrens, Sigrid Brynstad, Aage Andersen, and Rolf Skjong. 2004. "Challenges in Global Ballast Water Management." *Marine Pollution Bulletin* 48 (May): 615–23. <https://doi.org/10.1016/j.marpolbul.2004.01.016>.
- Engelbrecht, Beate, ed. 2007. *Memories of the Origins of Ethnographic Film*. 1 edition. Peter Lang Pub Inc.
- "ENI Sustainability: Development and Sustainable Energy." 2016. Corporation. ENI Sustainability. May 12, 2016. https://www.eni.com:443/en_IT/sustainability.page.
- España, Redacción. 2022. "From a Class at the University to the Congress. The History of the Rights of Nature in Mar Menor." *Pressenza*. March 15, 2022. <https://www.pressenza.com/2022/03/from-a-class-at-the-university-to-the-congress-the-history-of-the-rights-of-nature-in-mar-menor/>.

- Espindola, Haruf Salmen, and Cláudio Bueno Guerra. 2018. "The Ongoing Danger of Large-Scale Mining on the Rio Doce: An Account of Brazil's Largest Biocultural Disaster." In *From Biocultural Homogenization to Biocultural Conservation*, edited by Ricardo Rozzi, Roy H. May Jr., F. Stuart Chapin III, Francisca Massardo, Michael C. Gavin, Irene J. Klaver, Aníbal Pauchard, Martin A. Nuñez, and Daniel Simberloff, 97–108. Ecology and Ethics. Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-99513-7_6.
- Estevan Senís, Maria Teresa. 1967. "Explotación Minera de La Sierra de Cartagena (1840-1919)." *Saitabi: Revista de La Facultat de Geografia i Història (Universitat de Valencia)* 17: 212–34.
- Esteve-Guirao, Patricia, Isabel Banos-González, Pedro Baños-Páez, Pedro Perez-Cutillas, Emilio Diez de Revenga-Martinez, Magdalena Martínez-Pedrero, and María Lluna-Díaz. 2017. "Análisis Integral de los Usos del Territorio para el Desarrollo de Zonas Degradadas por la Minería: El Entorno de Portmán (La Unión)." *Revista de Estudios Andaluces*, no. 34 (July): 89–119. <https://doi.org/10.12795/rea.2017.i34.04>.
- Fabbri, Fabrizio. 2003. *Porto Marghera e la laguna di Venezia. Vita, morte, miracoli*. Milano : Isola del Piano: Jaca Book.
- Fanon, Frantz, and Adolfo Gilly. 1994. *A Dying Colonialism*. Translated by Haakon Chevalier. 12/15/93 edition. New York, NY: Grove Press.
- Fanon, Frantz, Jean-Paul Sartre, and Homi K. Bhabha. 2005. *The Wretched of the Earth*. Translated by Richard Philcox. Reprint edition. New York: Grove Press.
- Feld, Steve, and Donald Brenneis. 2004. "Doing Anthropology in Sound." *American Ethnologist* 31 (4): 474.
- Feld, Steven. 1996. "Waterfalls of Song: An Acoustemology of Place Resounding in Bosavi, Papua New Guinea." In *Senses of Place*, edited by Steven Feld and Keith H. Basso. Santa Fe, N.M. : Seattle: School for Advanced Research Press.
- Felman, Shoshana, and Dori Laub. 2013. *Testimony: Crises of Witnessing in Literature, Psychoanalysis and History*. Routledge.
- Felman, Shoshana, and Dori Laub MD. 1991. *Testimony: Crises of Witnessing in Literature, Psychoanalysis and History*. New York: Routledge.

- Fendig, Bruce. 1998. *Brunswick: The Ocean Port of Georgia*. Darien, Ga.: Darien Printing & Graphics.
- Ferguson, Frances. 1984. "The Nuclear Sublime." *Diacritics* 14 (2): 4–10.
<https://doi.org/10.2307/464754>.
- Fernandes, Sujatha. 2017. *Curated Stories: The Uses and Misuses of Storytelling*. 1st edition. New York: Oxford University Press.
- Fernandez, Alberto, Cesar Vallejo, and Charo Marcos, dirs. 2013. *Guadalquivir*. Interactive Documentary. RTVE. <http://lab.rtve.es/guadalquivir/>.
- Ferrari, Pepita. 2008. "Capturing Reality: The Art of Documentary." Interactive Documentary. NFB. 2008. <http://films.nfb.ca/capturing-reality/?detectflash=false>.
- Ferreira, Denise, and Arjuna Neuman, dirs. 2016. *Serpent Rain*. Experimental.
- Figal, Günter, ed. 2009. *The Heidegger Reader*. Translated by Jerome Veith. Bloomington, IN: Indiana University Press.
- "Film Quarterly." n.d. Accessed April 6, 2021.
<https://publishing.cdlib.org/ucpressebooks/view?docId=ft5h4nb36j&chunk.id=d0e5582&toc.depth=1&brand=ucpress>.
- Fischer, Tobias, and Lara Cory, eds. 2015. *Animal Music: Sound and Song in the Natural World*. 1st edition. Strange Attractor Press.
- Fischetti, Mark. n.d. "Brilliantly Glowing Jellyfish Terrorize the Black and Caspian Seas." Scientific American Blog Network. Accessed July 11, 2022.
<https://blogs.scientificamerican.com/observations/brilliantly-glowing-jellyfish-terrorize-the-black-and-caspian-seas-video/>.
- Fitch, Chris. n.d. "Is the New Suez Canal Encouraging the Spread of Invasive Species? - Geographical." Accessed March 15, 2018.
<http://geographical.co.uk/nature/oceans/item/1696-the-new-suez-canal>.
- FitzGerald, Holly. 2017. *Ruthless River: Love and Survival by Raft on the Amazon's Relentless Madre de Dios*. First Edition. New York: Vintage.
- Forster, Ian, and Nick Ravich, dirs. 2015. *Thomas Hirschhorn: "Gramsci Monument"*. Art21.
<https://www.youtube.com/watch?v=O5yyegM2u88&t=194s>.
- Fortibuoni, Tomaso, Simone Libralato, Enrico Arneri, Otello Giovanardi, Cosimo Solidoro, and Saša Raicevich. 2017. "Fish and Fishery Historical Data since

- the 19th Century in the Adriatic Sea, Mediterranean.” *Scientific Data* 4 (September): 170104. <https://doi.org/10.1038/sdata.2017.104>.
- Foucault, Michel. 1975. *Discipline and Punish: The Birth of the Prison*. New York: Random House.
- Franco, Ignacio. 2016. “20 Years of Research and Monitoring Jellyfish Populations in the Mar Menor: Laboratory Experiments.” In *Mar Menor: Una Laguna Singular y Sensible. Evaluación Científica de Su Estado*, 133–55.
- Fricke, Ron, dir. 1992. *Baraka*. 35mm. Documentary.
- Fuller, Errol. 1988. *Extinct Birds*. First Edition edition. New York, N.Y: Facts on File.
- Furtado, Jorge, dir. 1989. *Ilha Das Flores*. Documentary.
- Gabarrón, M., A. Faz, and J. A. Acosta. 2017. “Effect of Different Industrial Activities on Heavy Metal Concentrations and Chemical Distribution in Topsoil and Road Dust.” *Environmental Earth Sciences* 76 (3): 129. <https://doi.org/10.1007/s12665-017-6449-4>.
- Galbraith, Kate. 2015. “Delivering Unwelcome Species to the Mediterranean.” *The New York Times*, March 4, 2015, sec. Energy & Environment. <https://www.nytimes.com/2015/03/05/business/energy-environment/delivering-unwelcome-species-to-the-mediterranean.html>.
- Galeano, Eduardo. 2001. *El libro de los abrazos*. 5. ed edition. México, D.F: Siglo XXI.
- Gallagher, Michael. 2015a. “Field Recording and the Sounding of Spaces.” *Environment and Planning D: Society and Space* 33 (3): 560–76. <https://doi.org/10.1177/0263775815594310>.
- . 2015b. “Sounding Ruins: Reflections on the Production of an ‘Audio Drift.’” *Cultural Geographies* 22 (3): 467–85. <https://doi.org/10.1177/1474474014542745>.
- Gallagher, Michael, Anja Kanngieser, and Jonathan Prior. 2017a. “Listening Geographies: Landscape, Affect and Geotechnologies.” *Progress in Human Geography* 41 (5): 618–37. <https://doi.org/10.1177/0309132516652952>.
- . 2017b. “Listening Geographies: Landscape, Affect and Geotechnologies.” *Progress in Human Geography* 41 (5): 618–37. <https://doi.org/10.1177/0309132516652952>.

- Gambis, Alexis, dir. 2020. *Sons of Monarchs*. Fiction.
- Garcia, Gregorio, José Manteca, and Jose Matias Castejon. 2007. "Leaching and Transport of Zn through Soil Profiles in a Seasonal River of a Mining Area in SE Spain." *GlobalNEST International Journal* 9 (November).
- Gaudenzi, Sandra. 2013. "The Living Documentary: From Representing Reality to Co-Creating Reality in Digital Interactive Documentary." London: University of London, Goldsmiths.
https://research.gold.ac.uk/7997/1/Cultural_thesis_Gaudenzi.pdf.
- . 2014. "Strategies of Participation: The Who, What and When of Collaborative Documentaries." In *New Documentary Ecologies: Emerging Platforms, Practices and Discourses*, edited by C. Hight and C. Summerhayes, 2014 edition. Basingstoke, Hampshire New York, NY: Palgrave Macmillan.
- Gavett, Gretchen. 2012. "Tailings Dams: Where Mining Waste Is Stored Forever." *FRONTLINE* (blog). July 30, 2012.
<https://www.pbs.org/wgbh/frontline/article/tailings-dams-where-mining-waste-is-stored-forever/>.
- Geertz, Clifford. 1973. "Thick Description: Towards an Interpretive Theory of Culture." In *The Interpretation of Cultures*, edited by Clifford Geertz. Basic Books.
- . 1977. *The Interpretation Of Cultures*. F First Edition. New York: Basic Books.
- "GEOLOGÍA-Zonas Internas - Región de Murcia Digital." n.d. Accessed July 12, 2022. https://www.regmurcia.com/servlet/s.SI?sit=c.365,m.108&r=ReP-16260-DETALLE_REPORTAJESPADRE.
- Georgia Posavec, Lupi. 2016. *Dear Data*. London UK: Penguin UK.
- "Georgia, Savannah Shrimpers Catch Hardship, Hope." n.d. Savannahnow.Com. Accessed June 22, 2017. <http://savannahnow.com/news/2011-07-31/georgia-savannah-shrimpers-catch-hardship-hope>.
- Gershwin, Lisa-ann. 2016. *Jellyfish: A Natural History*. Chicago: University Of Chicago Press.
- Gershwin, Lisa-ann, and Sylvia Earle. 2013. *Stung!: On Jellyfish Blooms and the Future of the Ocean*. Chicago: University Of Chicago Press.

- Geyrhalter, Nikolaus, dir. 2005. *Our Daily Bread/Unser Taglich Brot*. PAL. Documentary. ICA Films.
- Ghosh, Amitav. 2016. *The Great Derangement: Climate Change and the Unthinkable*. 1st edition. Chicago: University of Chicago Press.
- Gill, Tom, David H. Slater, and Brigitte Steger, eds. 2015. *Japan Copes with Calamity*. 2 edition. Oxford: Peter Lang Ltd, International Academic Publishers.
- Giraldez, Arturo. 2001. "The World That Trade Created: Society, Culture, and the World Economy, 1400 to the Present (Review)." *Journal of World History* 12 (2): 482–85. <https://doi.org/10.1353/jwh.2001.0032>.
- Gish, Melissa. 2016. *Jellyfish: Living Wild*. Place of publication not identified: Creative Paperbacks.
- Goldsworthy, Adrian. 2001. *The Punic Wars*. London: Cassell.
- Gonzalez, Jose Alberto. 2022. "La UPCT, condenada por vulnerar el honor de Jos Matas Penas Castejn." *La Verdad*, November 10, 2022, sec. murcia/cartagena. <https://www.laverdad.es/murcia/cartagena/upct-condenada-vulnerar-20221110002154-ntvo.html>.
- Goody, Esther N. 1978. *Questions and Politeness: Strategies in Social Interaction*. Cambridge; New York: Cambridge University Press.
- Grano, Simona. 2016. "Toxic Canals." *Toxic News*, August 3, 2016. <https://toxicnews.org/2016/08/03/toxic-canals/>.
- Gray, Ros, and Shela Sheikh. 2018. "The Wretched Earth: Botanical Conflicts and Artistic Interventions." Edited Journal. *Third Text*. September 25, 2018. <https://www.tandfonline.com/toc/ctte20/32/2-3?nav=toCList>.
- Green, Alexandra, Cameron Clark, Livio Favaro, Sabrina Lomax, and David Reby. 2019. "Vocal Individuality of Holstein-Friesian Cattle Is Maintained across Putatively Positive and Negative Farming Contexts." *Scientific Reports* 9 (1): 18468.
- Greenfield, Patrick. 2016. "Story of Cities #6: How Silver Turned Potos into 'the First City of Capitalism.'" *The Guardian*. March 21, 2016. <http://www.theguardian.com/cities/2016/mar/21/story-of-cities-6-potosi-bolivia-peru-inca-first-city-capitalism>.

- Gregory, Sam. 2016. "Immersive Witnessing: From Empathy and Outrage to Action." *Witness* (blog). August 2, 2016. <https://blog.witness.org/2016/08/immersive-witnessing-from-empathy-and-outrage-to-action/>.
- Grieverson, Lee, and Haidee Wasson, eds. 2008. *Inventing Film Studies*. First Edition edition. Durham: Duke University Press Books.
- Griffiths, Jay. 2002. *A Sideways Look at Time*. New York: Tarcher.
- Grimshaw, Anna. 2001. *The Ethnographer's Eye: Ways of Seeing in Anthropology*. Cambridge, UK ; New York: Cambridge University Press.
- Grimshaw, Anna, and Amanda Ravetz. 2009. *Observational Cinema: Anthropology, Film, and the Exploration of Social Life*. Bloomington: Indiana University Press.
- Grove, A. T., and Oliver Rackham. 2003. *The Nature of Mediterranean Europe: An Ecological History*. New edition edition. New Haven, Conn. London: Yale University Press.
- Guilford, Gwynn, and Gwynn Guilford. n.d. "A Natural Gas Boom in the Adriatic Has Created Teeming Nurseries of Self-Cloning Jellyfish." *Quartz* (blog). Accessed March 15, 2018a. <https://qz.com/1044786/a-jellyfish-population-surge-in-the-adriatic-sea-can-be-traced-back-to-a-natural-gas-boom/>.
- . n.d. "How Humans Are Helping to Create a Nightmarish Jellyfish Invasion." *Quartz* (blog). Accessed March 15, 2018b. <https://qz.com/290657/jellyfish-are-stepping-up-their-ocean-invasions-and-humans-are-helping-them/>.
- Gumbs, Alexis Pauline, and adrienne maree brown. 2020. *Undrowned: Black Feminist Lessons from Marine Mammals*. Chico: AK Press.
- Gutsell, James S. 1928. "The Spider Crab, *Libinia Dubia*, and the Jelly-Fish, *Stomolophus Meleagris*, Found Associated at Beauford, North Carolina." *Ecology* 9 (3): 358. <https://doi.org/10.2307/1932377>.
- h, David is a member of the Lumbee Tribe of North Carolina He is also associate professor of anthropology at Biola University His Twitter. 2018. "AGU: My Concern with the Anthropocene." *Anthro{dendum}* (blog). February 9, 2018. <https://anthrodendum.org/2018/02/08/agu-my-concern-with-the-anthropocene/>.
- Haller, Monica. 2019. The Making of "Listening to the Mississippi" Interview by Isabelle Carbonell. Audio/Written notes.

- Haller, Monica, and Sebastian Müllauer. 2019. "Listening to the Mississippi, 2019." The Anthropocene Curriculum. 2019. <https://anthropocene-curriculum.org/project/mississippi/field-stations/field-station-1-sediment-settlement-sentiment/listening-to-the-mississippi>.
- Hammersley, Martyn, and Paul Atkinson. 2007. *Ethnography: Principles in Practice*. 3 edition. London ; New York: Routledge.
- Hampe, Barry. 1997. *Making Documentary Films and Reality Videos: A Practical Guide to Planning, Filming, and Editing Documentaries of Real Events*. 1st edition. New York: Holt Paperbacks.
- Haraway, Donna. 2003. *The Companion Species Manifesto: Dogs, People, and Significant Otherness*. Edited by Matthew Begelke. Chicago: Prickly Paradigm Press.
- . 2007. *When Species Meet*. Minneapolis: University Of Minnesota Press.
- . 2016. *Staying with the Trouble: Making Kin in the Chthulucene*. Durham: Duke University Press Books.
- Hardt, Michael, and Antonio Negri. 2005. *Multitude: War and Democracy in the Age of Empire*. Penguin.
- Harper, Matthew. 2014. *Jellyfish: A Fascinating Book Containing Jellyfish Facts, Trivia, Images & Memory Recall Quiz: Suitable for Adults & Children*. CreateSpace Independent Publishing Platform.
- Harris, Christopher, dir. 2001. *Still/Here*. Experimental.
- Harris, Jonathan. 2013. "I Love Your Work." Interactive Documentary. 2013. <http://iloveyourwork.net>.
- Hartigan, John. 2017. *Care of the Species: Races of Corn and the Science of Plant Biodiversity*. 1 edition. Minneapolis: University Of Minnesota Press.
- Harvey, David Oscar. 2012. "The Limits of Vococentrism: Chris Marker, Hans Richter and the Essay Film." *SubStance* 41 (2): 6–23.
- Hayward, Eva. 2012. "Sensational Jellyfish: Aquarium Affects and the Matter of Immersion." *Differences: A Journal of Feminist Cultural Studies* 23 (3): 228.
- "Heavy Metals Found in Breast Milk from Portman Mothers." n.d. Accessed December 2, 2021. https://spanishnewstoday.com/heavy-metals-found-in-breast-milk-from-portman-mothers_1660854-a.html.

- Heidegger, Martin. 2001. *The Fundamental Concepts of Metaphysics: World, Finitude, Solitude*. Reprint edition. Bloomington (ind.): Indiana University Press.
- Heider, Karl G. 1976. *Ethnographic Film*. Austin: University of Texas Press.
- . 2006. *Ethnographic Film: Revised Edition*. Revised edition. Austin: University of Texas Press.
- Helmreich, Stefan. 2009. *Alien Ocean: Anthropological Voyages in Microbial Seas*. First edition. Berkeley: University of California Press.
- . 2012a. “An Anthropologist Underwater: Immersive Soundscapes, Submarine Cyborgs and Transductive Ethnography.” In *The Sound Studies Reader*, 168–85. Routledge.
- . 2012b. “Underwater Music: Tuning Compositions to the Sounds of Science.” In *The Oxford Handbook of Sound Studies*, 152–74. Oxford University Press.
- Hersey, John. 1989. *Hiroshima*. Reprint edition. New York, NY: Vintage.
- Hess, Stephen. 1981. “Washington Reporters.” *Society* 18 (4): 55–66. <https://doi.org/10.1007/BF02701352>.
- Hight, Craig. 2017. “Software as Co-Creator in INteractive Documentary.” In *I-Docs: The Evolving Practices of Interactive Documentary*, edited by Judith Aston, Sandra Gaudenzi, and Mandy Rose, Reprint edition. London New York: Wallflower Press.
- Hillerman, Tony. 1988. “Old Knowledge From the New World : INDIAN GIVERS : How the Indians of the Americas Transformed the World by Jack Weatherford (Crown: \$17.95; 288 Pp.)” *Los Angeles Times*, December 11, 1988. http://articles.latimes.com/1988-12-11/books/bk-144_1_indian-knowledge.
- Hockings, Paul, ed. 1995. *Principles of Visual Anthropology*. 2nd Reprint 2012 ed. edition. Berlin ; New York: De Gruyter Mouton.
- Hoese, H. Dickson. 1960. “Biotic Changes in a Bay Associated with the End of a Drought.” *Limnology and Oceanography* 5 (3): 326–36.
- “Home | Emodnet Biology.” n.d. Accessed March 15, 2018. <http://www.emodnet-biology.eu/>.
- Honigmann, Heddy, dir. 2011. *Heddy Honigmann: In Focus*. Hilversum: Nederlands Instituut voor Beeld en Geluid.

- Horace Leonard Jones. n.d. *Strabo, Geography, Books 1-17 in 8 Volumes (Loeb Classical Library)*. Accessed July 12, 2022.
<http://archive.org/details/Strabo08Geography17AndIndex>.
- Howes, David, ed. 2004. *Empire of the Senses: The Sensual Culture Reader*. Oxford ; New York: Berg Publishers.
- Hubot N, Lucas, CH Lucas, and S Piraino. n.d. “Environmental Control of Asexual Reproduction and Somatic Growth of Aurelia Spp. (Cnidaria, Scyphozoa) Polyps from the Adriatic Sea.” *PLoS ONE* 12 (6). Accessed March 15, 2018.
<https://doi.org/10.1371/journal.pone.0178482>.
- Hughes, Helen. 2014. *Green Documentary: Environmental Documentary in the 21st Century*. Bristol Chicago: Intellect Ltd.
- Hume, Julian P., and Michael Walters. 2012. *Extinct Birds*. London: T. & A. D. Poyser.
- “Iberian Necropolis of the Grandsons-Chronology - Region of Murcia Digital.” n.d. Accessed July 12, 2022.
https://www.regmurcia.com/servlet/s.SI?sit=c,522,m,165&r=CeAP-7910-R_592_DETALLE_REPORTAJES.
- Idhe, Don. 1979. “Introduction: Towards a Philosophy of Technology.” In *Technics and Praxis*. Vol. 130. Dordrecht: Holland/Boston: D. Reidel Publishing Company.
- Ingebritsen, S.E. 1999. “Florida Everglades: Subsidence Threatens Agriculture and Complicates Ecosystem Restoration.” *Land Subsidence in the United States: U.S. Geological Survey Circular 1182*.
<https://pubs.usgs.gov/circ/circ1182/pdf/12Everglades.pdf>.
- Ingersoll, Karin Amimoto. 2016. *Waves of Knowing: A Seascape Epistemology*. Duke University Press Books.
- Ingold, Tim. 2016. *Lines: A Brief History*. 1 edition. London ; New York: Routledge.
- . n.d. “Foreword.” In *Non-Representational Methodologies: Re-Envisioning Research*, edited by Phillip Vanninni, vii–x. New York: Routledge.
- Jackson, Wes. 2002. “Farming in Nature’s Image.” In *Fatal Harvest: The Tragedy Of Industrial Agriculture*, edited by Andrew Kimbrell, 1 edition, 65–75. Washington: Foundation for Deep Ecology.

- “Jellyfish.” n.d. Nordic Food Lab. Accessed March 15, 2018.
<http://nordicfoodlab.org/blog/2015/8/11/jellyfish>.
- Johnson, Chris. 2011. “Question Bridge.” Transmedia Project. 2016 2011.
<http://questionbridge.com/>.
- Johnson, Daniel McDonald. 2014. *Mr. McIntosh’s Family: The Mackintosh Clan and the McIntosh Family in the Jacobite Risings, the Settlement of Darien, Georgia, and the Struggle for the Colonial American Southern Frontier*. CreateSpace Independent Publishing Platform.
- Johnson, Whitney. 2021. “The Emancipated Listener Embodied Perception and Expanded Discourse.” *Resonance* 2 (3): 334–52.
<https://doi.org/10.1525/res.2021.2.3.334>.
- Jongsma, Eline, and Kel O’Neill. 2013. “Empire: The Unintended Consequences of Colonialism.” Interactive Documentary. Empire. 2013.
<http://www.pbs.org/pov/empire/>.
- José, Oiliam. 1965. *Indígenas de Minas Gerais; aspectos sociais políticos e etnológicos*. Belo Horizonte: Edições Movimento-Perspectiva.
- Jr, Charles Colcock Jones. 2000. *Gullah Folktales from the Georgia Coast*. Revised ed. edition. Athens: University of Georgia Press.
- Jue, Melody. 2020. *Wild Blue Media: Thinking through Seawater*. Illustrated edition. Durham: Duke University Press Books.
- Kääpä, Pietari, and Tommy Gustafsson, eds. 2013. *Transnational Ecocinema: Film Culture in an Era of Ecological Transformation*. Bristol: Intellect Ltd.
- Kadandara, Nyasha, dir. 2019. *Le Lac*. Interactive Documentary.
<https://www.nyshakadandara.com/le-lac>.
- Kahana, Jonathan, ed. 2016. *The Documentary Film Reader: History, Theory, Criticism*. Illustrated edition. Oxford ; New York: Oxford University Press.
- Kahn, Douglas. 2013. *Earth Sound Earth Signal: Energies and Earth Magnitude in the Arts*. First edition. New York: University of California Press.
- Karel, Ernst, Toby Lee, and Pawel Wojtasik, dirs. 2014. *Single Stream*. Documentary.
- Khalil, Adam. 2018. “CDAR Presents Filmmaker Adam Khalil with INAATE / SE / and Anti-Ethnography.” University of California, Santa Cruz, April 9.

- Khalil, Adam Khalil & Zack. n.d. "The Rhird Rail Quarterly." *The Third Rail*. Accessed April 17, 2018. <http://thirdrailquarterly.org/>.
- Khalil, Adam, and Zack Khalil, dirs. 2016. *INAATE/SE/ [It Shines a Certain Way. To a Certain Place/It Flies.Falls.]*. Experimental.
- Kimmerer, Robin Wall. 2015. *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants*. First Paperback edition. Minneapolis, Minn: Milkweed Editions.
- Kirksey, Eben, ed. 2014. *The Multispecies Salon*. Durham: Duke University Press Books.
- Kirksey, S. Eben, and Stefan Helmreich. 2010. "The Emergence of Multispecies Ethnography." *Cultural Anthropology* 25 (4): 545–76. <https://doi.org/10.1111/j.1548-1360.2010.01069.x>.
- Kirsch, Stuart. 2014. *Mining Capitalism: The Relationship between Corporations and Their Critics*. First edition. Oakland, California: University of California Press.
- Klein, Naomi. 2016. "Let Them Drown - The Violence of Othering." Lecture presented at the Edward W Said London Lecture, Southbank Center, London, May 4. <https://www.lrb.co.uk/the-paper/v38/n11/naomi-klein/let-them-drown>.
- Kohn, Eduardo. 2007. "How Dogs Dream: Amazonian Natures and the Politics of Transspecies Engagement." *American Ethnologist* 34 (1): 3–24. <https://doi.org/10.1525/ae.2007.34.1.3>.
- . 2013. *How Forests Think: Toward an Anthropology Beyond the Human*. First edition. Berkeley: University of California Press.
- Kolbert, Elizabeth. 2014. *The Sixth Extinction: An Unnatural History*. First Edition edition. New York: Henry Holt and Co.
- Koolhaas, Rem, Stefano Boeri, Sanford Kwnter, Nadia Tazi, and Hans Ulrich Obrist. 2000. *MUTATIONS*. First Edition. Barcelona: ACTAR, Arc-en-Rêve.
- Kramer, Mark, and Wendy Call, eds. 2007. *Telling True Stories: A Nonfiction Writers' Guide from the Nieman Foundation at Harvard University*. 1st edition. New York: Plume.
- Krause, Bernie. 2013. *The Great Animal Orchestra*. Reprint edition. Back Bay Books.

- Kubota, Tyson. 2016. "New Encounters with the Sublime." *Film Comment; New York* 52 (5): 24–25.
- Kuperus, Gerard. n.d. "Attunement, Deprivation, and Drive: Heidegger and Animality," 23.
- Kurlansky, Mark. 2003. *Salt: A World History*. New York: Penguin Books.
- Lang, Luciana. 2015. "Living on the Edge: The Resilience of Marginal Beings in Environmentally Precarious Times." *Etnofoor* 27 (1): 53–74.
- Langfur, Hal. n.d. "The 'Prohibited Lands': Conquest, Contraband, and Indian Resistance in Minas Gerais," 25.
- Larson, Brendon. 2014. *Metaphors for Environmental Sustainability: Redefining Our Relationship with Nature*. Yale University Press.
- Lasher, Margot. 1998. "A Relational Approach to the Human-Animal Bond." *Anthrozoös* 11 (3): 130–33. <https://doi.org/10.2752/089279398787000670>.
- Latour, Bruno. 1755. *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford University Press.
- . 1993. *The Pasteurization of France*. Translated by Alan Sheridan and John Law. Cambridge, Mass.: Harvard University Press.
- . 2017. *Facing Gaia: Eight Lectures on the New Climatic Regime*. 1 edition. Cambridge, UK ; Medford, MA: Polity.
- Law, John. 2015. "What's Wrong with a One-World World?" *Distinktion: Journal of Social Theory* 16 (1): 126–39. <https://doi.org/10.1080/1600910X.2015.1020066>.
- Lebow, Alisa. 2017. "We Are Dead and We Are Going to Die: Homo Sapiens (Nikolaus Geyrhalter, 2016) and the Apocalypse Documentary." In , 7. Buenos Aires, Argentina: unpublished.
- Legare, John Girardeau. 2012. *The Darien Journal of John Girardeau Legare, Ricegrower*. Edited by Buddy Sullivan. Athens; London: University of Georgia Press.
- Leimbacher, Irina. 2017. "Hearing Voice(s): Experiments with Documentary Listening." *Discourse: Journal for Theoretical Studies in Media and Culture* 39 (3). <https://digitalcommons.wayne.edu/discourse/vol39/iss3/2>.

- León, Víctor, Jose Bellido, Angel Perez-Ruzafa, Concepción Marcos, Francisco Oliva-Paterna, Ana Ruiz-Navarro, M. Torralva, et al. 2016. *Mar Menor: Una Laguna Singular y Sensible. Evaluación Científica de Su Estado*.
- Leppäkoski, Erkki. 2008. "Scientific Aspects on Biopollution and Ballast Water." In *Rolim, MH The International Law on Ballast Water – Preventing Biopollution*, 15–21. Leiden: Martinus Nijhoff Publishers.
- Levitin, Jacqueline. 2016. "Gaza Sderot': Personifying the Conflict." *Jump Cut: A Review of Contemporary Media*, no. No. 57 (Fall).
<https://www.ejumpcut.org/currentissue/-LevitinGaza/index.html>.
- Lewis, Mark, dir. 1987. *Cane Toads: An Unnatural History*. Documentary.
- Lewis, Simon L., and Mark A. Maslin. 2015. "Defining the Anthropocene." *Nature* 519 (7542): 171–80.
- Liang, Zhao, dir. 2015. *Behemoth*. Documentary.
- Lidström, Susanna, Simon West, Tania Katzschner, M. Isabel Pérez-Ramos, and Hedley Twidle. 2015. "Invasive Narratives and the Inverse of Slow Violence: Alien Species in Science and Society." *Environmental Humanities* 7 (1): 1–40.
- Lien, Marianne. n.d. *Becoming Salmon*. Accessed February 6, 2018.
<https://www.ucpress.edu/book.php?isbn=9780520280571>.
- Lindstrom, Martin, and Chip Heath. 2016. *Small Data: The Tiny Clues That Uncover Huge Trends*. New York City: St. Martin's Press.
- Lins, Consuelo. 2003. "Eduardo Coutinho, Cómplice de La Realidad Filmada." In *Cine Documental En América Latina*, edited by Paulo Antonio Paranaguá and José Carlos Avellar, 1. ed. Signo e Imagen 75. Madrid: Cátedra.
- Liotta, Jeanne, dir. 2014. *Soon It Would Be Too Hot*. Experimental.
- Lipari, Lisbeth. 2009. "Listening Otherwise: The Voice of Ethics." *International Journal of Listening* 23 (1): 44–59.
<https://doi.org/10.1080/10904010802591888>.
- Lippit, Akira Mizuta. 2002. "The Death of an Animal/ Electric Animal." *Film Quarterly*, University of California Press, 56 (1): 12–13.
- "Lng Supply For Ships In Marghera - The Medi Telegraph." 2018. The Medi Telegraph: Shipping & Intermodal Transport. January 17, 2018.

<http://www.themeditelegraph.com/en/shipping/shipowners/2018/01/17/Ing-supply-for-ships-marghera-k5d5mmCaTSEgH7QTWLEdaL/index.html>.

- Loizos, Peter. 1993. *Innovation in Ethnographic Film: From Innocence to Self-Consciousness, 1955-1985*. 1 edition. Chicago: University of Chicago Press.
- Lopate, Phillip. 1992. "In Search of the Centaur: The Essay-Film." *The Threepenny Review*, no. 48: 19–22.
- Lorimer, Jamie. 2010. "Moving Image Methodologies for More-than-Human Geographies." *Cultural Geographies* 17 (2): 237–58.
<https://doi.org/10.1177/1474474010363853>.
- Lu, Sheldon, and Jiayan Mi, eds. 2009. *Chinese Ecocinema: In the Age of Environmental Challenge*. Hong Kong: Hong Kong University Press.
- Lynch, Jonathan, and Greg Mannion. 2021. "Place-Responsive Pedagogies in the Anthropocene: Attuning with the More-than-Human." *Environmental Education Research* 0 (0): 1–15.
<https://doi.org/10.1080/13504622.2020.1867710>.
- Macdonald, Nicole, dir. 2014. *A Park for the City*. Documentary.
- MacDonald, Scott. 2013. *American Ethnographic Film and Personal Documentary: The Cambridge Turn*. Berkeley: University of California Press.
- MacDougall, David. 1992. "When Less Is Less: The Long Take in Documentary." *Film Quarterly* 46 (2): 36–46. <https://doi.org/10.2307/1213006>.
- . 1998. *Transcultural Cinema*. Edited by Lucien Taylor. 1st edition. Princeton, N.J.: Princeton University Press.
- . 2005. *The Corporeal Image: Film, Ethnography, and the Senses*. Princeton, N.J.: Princeton University Press.
- Macfarlane, Robert. 2016. *Landmarks*. Reprint edition. London: Penguin Books.
- Madden, Thomas F. 2013. *Venice: A New History*. Reprint edition. New York, US: Penguin Books.
- Madsen, Michael, dir. 2010. *Into Eternity*. Documentary.
- Magnason, Andri Snær. 2021. *On Time and Water*. Translated by Lytton Smith. Rochester, NY: Open Letter.

- “Major Mines & Projects | Alegria | Germano Mine.” n.d. Mining News. Mining Data Online. Accessed October 20, 2019. <https://miningdataonline.com/property/1521/Alegria-%7C-Germano-Mine.aspx#Geology>.
- “Making the Interactive Documentary ‘Oil to Die For.’” n.d. Ochre. Accessed April 23, 2018. <http://ochre.is/inspiration/oil-to-die-for/>.
- Malej, Alenka, and Andreja Ramsak. 2012. “Blooms and Population Dynamics of Moon Jellyfish in the Northern Adriatic.” *Cahiers de Biologie Marine* 53 (January): 337–42.
- Malej, Alenka, Valentina Tirelli, D Lučić, Paolo Paliaga, Martin Vodopivec, Alenka Goruppi, Sara Ancona, et al. 2017. “Mnemiopsis Leidy in the Northern Adriatic: Here to Stay?” *Journal of Sea Research* 124 (May). <https://doi.org/10.1016/j.seares.2017.04.010>.
- Malinowski, Bronislaw. 1984. *Argonauts of the Western Pacific*. Reprint edition. Prospect Heights, Ill: Waveland Pr Inc.
- Malm, Andreas. 2016. *Fossil Capital: The Rise of Steam Power and the Roots of Global Warming*. London ; New York: Verso.
- Mancinelli, Giorgio, Roberta Bardelli, and Argyro Zenetos. 2021. “A Global Occurrence Database of the Atlantic Blue Crab *Callinectes Sapidus*.” *Scientific Data* 8 (1): 111. <https://doi.org/10.1038/s41597-021-00888-w>.
- Manna, Jumana, dir. 2018. *Wild Relatives*. Documentary.
- Mannino, Ilda, Eniel Ninka, Margherita Turvani, and Marian Chertow. 2015. “The Decline of Eco-Industrial Development in Porto Marghera, Italy.” *Journal of Cleaner Production* 100 (August): 286–96. <https://doi.org/10.1016/j.jclepro.2015.03.054>.
- Marcorelles, Louis. 1973. *Living Cinema; New Directions in Contemporary Film-Making*. New York: Praeger.
- Margulis, Lynn, and Rene Fester, eds. 1991. *Symbiosis as a Source of Evolutionary Innovation: Speciation and Morphogenesis*. 1st edition. Cambridge, Mass: The MIT Press.
- Marín-Guirao, L., A. Cesar, A. Marín, and R. Vita. 2005. “Assessment of Sediment Metal Contamination in the Mar Menor Coastal Lagoon (SE Spain): Metal Distribution, Toxicity, Bioaccumulation and Benthic Community Structure.” *Ciencias Marinas* 31 (2): 413–28. <https://doi.org/10.7773/cm.v31i2.53>.

- Marks, Laura U. 2000. *The Skin of the Film: Intercultural Cinema, Embodiment, and the Senses*. 1st edition. Durham: Duke University Press Books.
- Martin, Anthony J. 2013. *Life Traces of the Georgia Coast: Revealing the Unseen Lives of Plants and Animals*. Illustrated edition. Indiana University Press.
- Martin, T., Ed McRoberts, and Michael Davies. 2002. "A Tale of Four Upstream Tailings Dams," January.
- Marubbio, M. Elise. 2017. "INAATE/SE/ [It Shines a Certain Way. to a Certain Place/It Flies. Falls./]." *Native American Film Series* (blog). August 29, 2017. <http://www.augsburg.edu/filmseries/2017/08/29/inaatase-shines-certain-way-certain-placeit-flies-falls/>.
- Masco, Joe. 2015. "Catastrophe's Apocalypse." In *The Time of Catastrophe: Multidisciplinary Approaches to the Age of Catastrophe*, edited by Christopher Dole. Ashgate.
- Masco, Joseph. 2006. *The Nuclear Borderlands: The Manhattan Project in Post-Cold War New Mexico*. Princeton, N.J: Princeton University Press.
- Masco Joseph. 2008. "'Survival Is Your Business': Engineering Ruins and Affect in Nuclear America." *Cultural Anthropology* 23 (2): 361–98. <https://doi.org/10.1111/j.1548-1360.2008.00012.x>.
- Mason, Margie. n.d. "Global Supermarkets Selling Shrimp Peeled by Slaves." AP Explore: Seafood from Slaves. Accessed June 22, 2017. <http://www.ap.org/explore/seafood-from-slaves/global-supermarkets-selling-shrimp-peeled-by-slaves.html>.
- Mathews, Andrew. 2016. "Ghostly Forms and Forest Histories." In *Arts of Living on a Damaged Planet: Stories from the Anthropocene*. Island Press.
- Mathews, Andrew S. 2011. *Instituting Nature: Authority, Expertise, and Power in Mexican Forests*. 1st edition. Cambridge, Mass: The MIT Press.
- Maxakali, Isael, Sueli Maxakali, Carolina Gangucu, and Roberto Romero, dirs. 2020. *Essa Terra é Nossa!* Documentary.
- McComas, Katherine, and James Shanahan. 1999. "Telling Stories About Global Climate Change: Measuring the Impact of Narratives on Issue Cycles." *Communication Research* 26 (1): 30–57. <https://doi.org/10.1177/009365099026001003>.

- McMillon, Elaine. 2013. "Hollow." Interactive Documentary. 2013.
<http://www.hollowdocumentary.com>.
- McNeill, J. R. 2010. *Mosquito Empires: Ecology and War in the Greater Caribbean, 1620-1914*. 1 edition. New York: Cambridge University Press.
- McPhie, P. 1975. "The Origin of the Alkaline Inactivation of Pepsinogen."
Biochemistry 14 (24): 5253–56.
- Melby, Todd. 2013. "Oil To Die For." Interactive Documentary. 2013.
<http://blackgoldboom.com/oil-to-die-for/>.
- Melville, Elinor G. K. 1997. *A Plague of Sheep: Environmental Consequences of the Conquest of Mexico*. Cambridge: Cambridge University Press.
- Mendelson III, Joseph. 2002. "The Health and Environmental Hazards of Genetically Engineered Foods." In *Fatal Harvest: The Tragedy Of Industrial Agriculture*, edited by Andrew Kimbrell, 1 edition, 148–60. Washington: Foundation for Deep Ecology.
- Michael, Mike. 2017. *Actor-Network Theory: Trials, Trails and Translations*. 1 edition. Thousand Oaks, CA: SAGE Publications Ltd.
- Milanez, Bruno, Raquel Oliveira, and Clarissa Reis. 2015. "Capacidade Ambiental No Nível Subnacional: O Caso Do Estado de Minas Gerais, Brasil."
Planejamento e Políticas Públicas 44: 317–42.
- Miles, Adrian. 2014. "Interactive Documentary and Affective Ecologies." In *New Documentary Ecologies: Emerging Platforms, Practices and Discourses*, edited by K. Nash, C. Hight, and C. Summerhayes, 2014 edition. Basingstoke, Hampshire New York, NY: Palgrave Macmillan.
- Milk, Chris, dir. n.d. *How Virtual Reality Can Create the Ultimate Empathy Machine*. Accessed May 21, 2018.
https://www.ted.com/talks/chris_milk_how_virtual_reality_can_create_the_ultimate_empathy_machine?language=en.
- Miller, Elizabeth, dir. 2019. *Swampscapes*. VR. Documentary.
<http://www.swampscapes.org/guides.html>.
- Miller, Elizabeth (Liz). 2018. "The Shore Line: A Storybook for a Sustainable Future." *The Conversation*, January 8, 2018. <http://theconversation.com/the-shore-line-a-storybook-for-a-sustainable-future-89159>.

- Miller, Liz. 2017. "The Shore Line." Interactive Documentary. 2017.
<http://theshorelineproject.org/>.
- . 2018. "The Shore Line and the Practice of Slow Resilience." *Frames Cinema Journal*. <http://framescinemajournal.com/article/the-shore-line-and-the-practice-of-slow-resilience/>.
- Minh-Ha, Trinh T. 1990. "Documentary Is/Not a Name." *The MIT Press*, October, 52 (Spring): 76–98.
- Minh-ha, Trinh T. 1991. *When the Moon Waxes Red: Representation, Gender and Cultural Politics*. 1 edition. New York: Routledge.
- Minh-ha, Trinh T. 1993. "The Totalizing Quest of Meaning." In *Theorizing Documentary*, edited by Michael Renov, 261. Psychology Press.
- Minh-Ha, Trinh T. 2013. "Documentary Is/Not a Name." In *Documentary*, edited by Julian Stallabrass, 68–77. London : Whitechapel Gallery ; Cambridge, Massachusetts: The MIT Press.
- Mintz, Sidney W. 1986. *Sweetness and Power: The Place of Sugar in Modern History*. Reprint edition. New York: Penguin Books.
- Miralles i García, José, and Salvador Garcia-Ayllon. 2013. "The Urban Metamorphosis of La Manga and the 'Mediterraneanisation' Process of the Mar Menor (Spain)." In , 169:53–64. <https://doi.org/10.2495/CP130051>.
- Mirzoeff, Nicholas. 2016. "It's Not The Anthropocene, It's The White Supremacy Scene; or, The Geological Color Line." *After Extinction*.
<https://nyuscholars.nyu.edu/en/publications/its-not-the-anthropocene-its-the-white-supremacy-scene-or-the-geo>.
- Misrach, Richard, and Kate Orff. 2014. *Petrochemical America by Richard Misrach and Kate Orff*. 2nd Revised edition edition. New York: Aperture.
- Mol, Annemarie. 2003. *The Body Multiple: Ontology in Medical Practice*. Durham: Duke University Press.
- Molina, Fernando, and Sara Ramos. 2022. "La 'sopa verde' sigue asfixiando al Mar Menor: estas son las previsiones para este verano," May 24, 2022, sec. Noticias. https://www.lasexta.com/noticias/medio-ambiente/sopa-verde-que-sigue-asfixiando-mar-menor-cuales-son-previsiones-este-verano_20220524628cbc8acd1524000106453f.html.

- Moore, Alexander. 1988. "The Limitations of Imagist Documentary: A Review of Robert Gardner's 'Forest of Bliss.'" *SVA Newsletter* 4 (2): 1–2. <https://doi.org/10.1525/var.1988.4.2.1>.
- Moore, Jason W. 2015. *Capitalism in the Web of Life: Ecology and the Accumulation of Capital*. New York: Verso.
- . 2017. "The Capitalocene, Part I: On the Nature and Origins of Our Ecological Crisis." *The Journal of Peasant Studies* 44 (3): 594–630. <https://doi.org/10.1080/03066150.2016.1235036>.
- Morekis, Jim. 2010. *Moon Spotlight Savannah & the Georgia Coast*. Second Edition edition. Berkeley, CA: Avalon Travel Publishing.
- Morley, Simon, ed. 2010. *The Sublime*. London : Cambridge, Mass: The MIT Press.
- Moser, Susanne C. 2010. "Communicating Climate Change: History, Challenges, Process and Future Directions." *WIREs Climate Change* 1 (1): 31–53. <https://doi.org/10.1002/wcc.11>.
- Mouzo, Rogelio. 2012. "Crónicas Mineras de Rogelio Mouzo Pagán: El Cementerio de La Unión, Aterrado Por Los Fangos de La Mina Brunita. El Ayuntamiento Solicita Declaracion de Zona Catastrofica. Efemeride de 1972." *Crónicas Mineras de Rogelio Mouzo Pagán* (blog). October 29, 2012. <http://cronicasmineras.blogspot.com/2012/10/inundaciones-en-la-sierra-minera-de.html>.
- Muñoz-Vera, Ana, Jose Matias Castejon, and Gregorio Garcia. 2016. "Patterns of Trace Element Bioaccumulation in Jellyfish *Rhizostoma Pulmo* (Cnidaria, Scyphozoa) in a Mediterranean Coastal Lagoon from SE Spain." *Marine Pollution Bulletin* 110 (July). <https://doi.org/10.1016/j.marpolbul.2016.06.069>.
- Muñoz-Vera, Ana, Gregorio García, and Antonio García-Sánchez. 2015. "Metal Bioaccumulation Pattern by *Cotylorhiza Tuberculata* (Cnidaria, Scyphozoa) in the Mar Menor Coastal Lagoon (SE Spain)." *Environmental Science and Pollution Research* 22 (23): 19157–69. <https://doi.org/10.1007/s11356-015-5119-x>.
- Murch, Walter, and Francis Ford Coppola. 2001a. *In the Blink of an Eye: A Perspective on Film Editing, 2nd Edition*. 2nd edition. Los Angeles: Silman-James Press.
- . 2001b. *In the Blink of an Eye: A Perspective on Film Editing, 2nd Edition*. 2nd edition. Los Angeles: Silman-James Press.

- Murcia Today*. n.d. "A History of Cartagena, Part 1: From Prehistory to the Argaric Culture." Accessed August 10, 2022. https://murciatoday.com/a-history-of-cartagena-part-1-from-prehistory-to-the-argaric-culture_5849-a.html??town=4&town_search=true.
- Murray, Robin L., and Joseph K. Heumann. 2017. *Ecocinema in the City*. 1 edition. New York: Routledge.
- Naidus, Beverly. 2009. *Arts for Change: Teaching Outside the Frame*. First Edition. Oakland, Calif: New Village Press.
- Narayan, Kirin. 2012. *Alive in the Writing: Crafting Ethnography in the Company of Chekhov*. Illustrated edition. Chicago: University of Chicago Press.
- Nash, K. 2014. "Strategies of Participation." In *New Documentary Ecologies: Emerging Platforms, Practices and Discourses*, edited by C. Hight and C. Summerhayes, 2014 edition. Basingstoke, Hampshire New York, NY: Palgrave Macmillan.
- Nash, K., C. Hight, and C. Summerhayes, eds. 2014. *New Documentary Ecologies: Emerging Platforms, Practices and Discourses*. 2014 edition. Basingstoke, Hampshire New York, NY: Palgrave Macmillan.
- Nash, Kate. 2014a. "An Interview with Florian Thalhoffer, Media Artist and Documentary Maker." In *New Documentary Ecologies: Emerging Platforms, Practices and Discourses*, edited by C. Hight and C. Summerhayes, 2014 edition. Basingstoke, Hampshire New York, NY: Palgrave Macmillan.
- . 2014b. "Clicking on the World: Documentary Representation and Interactivity." In *New Documentary Ecologies: Emerging Platforms, Practices and Discourses*, edited by C. Hight and C. Summerhayes, 2014 edition. Basingstoke, Hampshire New York, NY: Palgrave Macmillan.
- . 2017a. "I-Docs and the Documentary Tradition: Exploring Questions of Citizenship." In *I-Docs: The Evolving Practices of Interactive Documentary*, edited by Judith Aston, Sandra Gaudenzi, and Mandy Rose, Reprint edition. London New York: Wallflower Press.
- . 2017b. "Virtual Reality Witness: Exploring the Ethics of Mediated Presence." *Studies in Documentary Film* 0 (0): 1–13. <https://doi.org/10.1080/17503280.2017.1340796>.
- Navarro, M. C., C. Pérez-Sirvent, M. J. Martínez-Sánchez, J. Vidal, P. J. Tovar, and J. Bech. 2008. "Abandoned Mine Sites as a Source of Contamination by Heavy Metals: A Case Study in a Semi-Arid Zone." *Journal of Geochemical*

- Exploration*, Trace elements in soils: Baseline levels and imbalance, 96 (2): 183–93. <https://doi.org/10.1016/j.gexplo.2007.04.011>.
- Newman, Kim. 2000. *Apocalypse Movies: End of the World Cinema*. 1st edition. New York: St Martins Pr.
- Nichols, Bill. 1983. “The Voice of Documentary.” *Film Quarterly* 36 (3): 17–30. <https://doi.org/10.2307/3697347>.
- . 1991. *Introduction to Documentary*. First edition. Bloomington: Indiana University Press.
- . 2017. *Introduction to Documentary*. Third edition. Bloomington: Indiana University Press.
- Nick, Christophe, Alexandre Brachet, and Margaux Missika. 2016. “Génération Quoi ? – La Grande Enquête Sur Les 18-34 Ans Dans Toute l’Europe.” Interactive Documentary. Generation Quoi. 2016. <http://generation-quoi.rtbf.be/>.
- Nieukirk, Sharon. 2013. “Understanding Ocean Acoustics.” National Ocean and Atmospheric Administration. August 26, 2013. <http://oceanexplorer.noaa.gov/explorations/sound01/background/acoustics/acoustics.html>.
- Nixon, Rob. 2009. “Neoliberalism, Slow Violence, and the Environmental Picaresque.” *MFS Modern Fiction Studies* 55 (3): 443–67.
- . 2013. *Slow Violence and the Environmentalism of the Poor*. 1st edition. Cambridge, Mass.: Harvard University Press.
- . 2015. “31 Slow Violence, Gender, and the Environmentalism of the Poor.” *Postcolonial Studies: An Anthology*, 515.
- Novaes, Marina. 2019. “Brumadinho: as últimas notícias sobre o rompimento de barragem da Vale.” EL PAÍS. January 28, 2019. https://brasil.elpais.com/brasil/2019/01/27/politica/1548585862_966480.html.
- O’Donnell, Erin, and Julia Talbot-Jones. 2018. “Creating Legal Rights for Rivers: Lessons from Australia, New Zealand, and India.” *Ecology and Society* 23 (1). <https://doi.org/10.5751/ES-09854-230107>.
- Ogden, Laura A., Billy Hall, and Kimiko Tanita. 2013. “Animals, Plants, People, and Things: A Review of Multispecies Ethnography.” *Environment and Society* 4 (1): 5–24. <https://doi.org/10.3167/ares.2013.040102>.

- Oliveira, Andre Novais, dir. 2010. *Fantasmas*. Fiction.
- Omura, Keiichi, Grant Jun Otsuki, Shiho Satsuka, and Atsuro Morita, eds. 2018. *The World Multiple: The Quotidian Politics of Knowing and Generating Entangled Worlds*. 1 edition. Abingdon, Oxon ; New York, NY: Routledge.
- Ostashev, Valdimir. 2009. "Recent Progress in Acoustic Travel-Time Tomography of the Atmospheric Surface Layer." *Meteorologische Zeitschrift* 18 (2): 125–33. <https://doi.org/10.1127/0941-2948/2009/0364>.
- Owens, Delia. 2018. *Where the Crawdads Sing*. Later Printing edition. New York: G.P. Putnam's Sons.
- Page, James West. 2015. "Characterization of Bycatch in the Cannonball Jellyfish Fishery in the Coastal Waters off Georgia." *Marine and Coastal Fisheries* 7 (1): 190–99. <https://doi.org/10.1080/19425120.2015.1032456>.
- Painlevé, Jean. 1938. "Du Faux Dans Le Documentaire." *Instruire et Plaire* 1 (2).
- , dir. 1993. *Seahorse*. Documentary.
- "Palimpsest | The Chicago School of Media Theory." n.d. Accessed October 27, 2022. <https://lucian.uchicago.edu/blogs/mediatheory/keywords/palimpsest/>.
- Palmer, A. Laurie. 2015. *In the Aura of a Hole: Exploring Sites of Material Extraction*. Illustrated edition. London, UK: Black Dog Press.
- Papazian, Elizabeth, and Caroline Eades. 2016. *The Essay Film: Dialogue, Politics, Utopia*. Columbia University Press.
- Parker, Anthony W. 2002. *Scottish Highlanders in Colonial Georgia: The Recruitment, Emigration, and Settlement at Darien, 1735-1748*. Reprint edition. Athens: University of Georgia Press.
- Parreñas, Juno Salazar. 2015. "Multispecies Ethnography and Social Hierarchy." *Engagement* (blog). September 15, 2015. <https://aesengagement.wordpress.com/2015/09/15/multispecies-ethnography-and-social-hierarchy/>.
- Parry, Jonathan. 2008. "A Comment on Robert Gardner's Forest of Bliss." *Visual Anthropology Review* 4 (January): 4–7. <https://doi.org/10.1525/var.1988.4.2.4>.
- "Paura a Marghera fuga di gas dal petrolchimico - la Repubblica.it." n.d. Archivio - la Repubblica.it. Accessed March 15, 2018. <http://ricerca.repubblica.it/repubblica/archivio/repubblica/2001/04/01/paura-marghera-fuga-di-gas-dal-petrolchimico.html>.

- Paxson, Heather. 2008. "POST-PASTEURIAN CULTURES: The Microbiopolitics of Raw-Milk Cheese in the United States." *Cultural Anthropology* 23 (1): 15–47. <https://doi.org/10.1111/j.1548-1360.2008.00002.x>.
- Peck, Julia. 2018. "Landscape Photography in the Web of Life: Olaf Otto Becker's Documentary Sublime." In *Northern Light: Landscape, Photography and Evocations of the North*, edited by Chris Goldie and Darcy White. transcript Verlag.
- Peña, José Matias. 2019. Cancer Rates in Llano del Beal Audio.
- Pérez Ruzafa, Ángel, Concepción Marcos Diego, and Francisco Javier Gilabert Cervera. 2005. *The Ecology of the Mar Menor Coastal Lagoon: A Fast Changing Ecosystem under Human Pressure*. CRC Press. <https://repositorio.upct.es/handle/10317/10309>.
- Petryna, Adriana. 2013. *Life Exposed: Biological Citizens after Chernobyl*. With a New introduction by the author edition. Princeton, NJ: Princeton University Press.
- Pick, Anat, and Guinevere Narraway. 2013a. *Screening Nature: Cinema beyond the Human*. New York, Oxford: Berghahn.
- , eds. 2013b. *Screening Nature: Cinema beyond the Human*. 1st edition. New York: Berghahn Books.
- Pieplow, Nathan. 2009. "Sounds of Extinct Birds." *Earbirding: Recording, Identifying, and Interpreting Bird Sounds* (blog). June 24, 2009. <http://earbirding.com/blog/archives/316>.
- Pink, Sarah. 2001. *Doing Visual Ethnography: Images, Media and Representation in Research*. First edition. London ; Thousand Oaks, Calif: SAGE Publications Ltd.
- . 2006. *The Future of Visual Anthropology: Engaging the Senses*. 1 edition. London ; New York: Routledge.
- . 2007. *Doing Visual Ethnography*. SAGE.
- . 2009. *Doing Sensory Ethnography*. 1 edition. London ; Thousand Oaks, CA: SAGE Publications Ltd.
- . 2011. "From Embodiment to Emplacement: Re-Thinking Competing Bodies, Senses and Spatialities." *Sport Education and Society* 16 (3): 343–55. <https://doi.org/10.1080/13573322.2011.565965>.

- . 2013. *Doing Visual Ethnography*. Third Edition edition. SAGE Publications Ltd.
- Pitt-Kethley, Fiona. n.d. *Washing Amethysts in the Bidet*. forthcoming.
- Planet, Lonely. n.d. “Venice Celebrates 100 Years of Its Hidden Industrial Hub.” Lonely Planet News. Accessed March 15, 2018.
<https://www.lonelyplanet.com/news/2017/10/04/venice-100-years-porto-marghera/>.
- “Porto Marghera dallo sviluppo al disastro.” 2011. *Lo Straniero* (blog). April 29, 2011. <http://lostraniero.net/porto-marghera-dallo-sviluppo-al-disastro/>.
- Price, Eugenia, Suzanne McIntosh, and Georgia Conservancy. 1993. *A Guide to the Georgia Coast: The Georgia Conservancy*. Edited by Gwendolyn McKee. 2 Revised edition. Savannah, GA: Longstreet Pr.
- Prince, Stephen. 2021. *Apocalypse Cinema*. New Brunswick: Rutgers University Press.
- Rabiger, Michael. 2020. *Directing the Documentary*. 7th edition. London ; New York: Routledge.
- Raffles, Hugh. 2011. *Insectopedia*. Reprint edition. New York: Vintage.
- Ralph, Julian. 1903. *The Making of a Journalist*. Harper & brothers.
- Ramo, Antonio. n.d. “Los Volcanes de Murcia-Episodios Volcánicos - Región de Murcia Digital.” Region de Murcia Digital. Accessed July 12, 2022.
https://www.regmurcia.com/servlet/s.SI?sit=c.365,m.108&r=ReP-23822-detalle_reportajespadre.
- Rangan, Pooja. 2017a. *Immediations: The Humanitarian Impulse in Documentary*. Durham: Duke University Press Books.
- . 2017b. “Audibilities: Voice and Listening in the Penumbra of Documentary: An Introduction.” *Discourse: Journal for Theoretical Studies in Media and Culture* 39 (3). <https://digitalcommons.wayne.edu/discourse/vol39/iss3/1>.
- Rascaroli, Laura. 2008. “The Essay Film: Problems, Definitions, Textual Commitments.” *Framework: The Journal of Cinema and Media* 49 (2): 24–47.
- Ray, Janisse. 2000. *Ecology of a Cracker Childhood*. Reprint edition. Minneapolis; Emeryville, CA: Milkweed Editions.

- Ray, Janisse, and Nancy Marshall. 2013. *Drifting into Darien: A Personal and Natural History of the Altamaha River*. 1st edition. Athens: University of Georgia Press.
- “Recurrent Jellyfish Blooms Are a Consequence of Global Oscillations.” n.d. Accessed June 21, 2017. <http://www.pnas.org/content/110/3/1000.abstract>.
- Redfield, Peter. 2013. *Life in Crisis: The Ethical Journey of Doctors Without Borders*. 1 edition. Berkeley: University of California Press.
- Reik, Theodor. 1983. *Listening with the Third Ear*. Macmillan.
- “Residue | Somatosphere.” n.d. Accessed April 26, 2018. <http://somatosphere.net/2018/01/residue.html>.
- “Results of the Independent Investigation into the Accident at Samarco’s Fundão Dam.” 2016. Corporation. Vale. August 29, 2016. <http://www.vale.com/samarco/EN/Pages/results-independent-investigation-accident-samarcos-fundao-dam.aspx>.
- results, search. 2014. *Panaesthetics: On the Unity and Diversity of the Arts*. New Haven: Yale University Press.
- “Review - Mosquito Empires: Ecology and War in the Greater Caribbean, 1620-1914.” n.d. *E-International Relations* (blog). Accessed May 1, 2018. <http://www.e-ir.info/2014/09/17/review-mosquito-empires-ecology-and-war-in-the-greater-caribbean-1620-1914/>.
- Revill, George. 2016. “How Is Space Made in Sound? Spatial Mediation, Critical Phenomenology and the Political Agency of Sound.” *Progress in Human Geography* 40 (2): 240–56. <https://doi.org/10.1177/0309132515572271>.
- Ribot, Francesc, Carles Ferràndez-Cañadell, and Luis Gibert Beotas. 2015. “Los Primates de Cueva Victoria.” *Mastia* 11–13 (January): 433–52.
- Riisgård, Hans Ulrik, Per Andersen, and Erik Hoffmann. 2012. “From Fish to Jellyfish in the Eutrophicated Limfjorden (Denmark).” *Estuaries and Coasts* 35 (3): 701–13. <https://doi.org/10.1007/s12237-012-9480-4>.
- Riisgård, Hans Ulrik, and Josephine Goldstein. 2014. “Jellyfish and Ctenophores in Limfjorden (Denmark)—Mini-Review, with Recent New Observations.” *Journal of Marine Science and Engineering* 2 (4): 593–615. <https://doi.org/10.3390/jmse2040593>.

- Ritzenhoff, Karen A., and Angela Krewani, eds. 2015. *The Apocalypse in Film: Dystopias, Disasters, and Other Visions about the End of the World*. Lanham: Rowman & Littlefield Publishers.
- Robin, Marie-Monique, dir. 2008. *The World According to Monsanto*. Documentary.
- Rony, Fatimah Tobing. 1996. *The Third Eye: Race, Cinema, and Ethnographic Spectacle*. Durham, NC: Duke University Press Books.
- . 2003. “The Quick and the Dead: Surrealism and the Found Ethnographic Footage Films of Bontoc Eulogy and Mother Dao: The Turtlelike.” *Camera Obscura* 18 (1): 129–55.
- Rosaldo, Renato. 1980. *Ilongot Headhunting, 1883-1974: A Study in Society and History*. 1st edition. Stanford, Calif: Stanford University Press.
- Rose, Deborah Bird. 2004. *Reports from a Wild Country: Ethics for Decolonisation*. Sydney, NSW: UNSW Press.
- . 2014. “Double Death.” Academic. *The Multispecies Salon* (blog). November 17, 2014. <http://www.multispecies-salon.org/double-death/>.
- Rose, Mandy. 2017. “Not Media About, But Media With.” In *I-Docs: The Evolving Practices of Interactive Documentary*, edited by Judith Aston, Sandra Gaudenzi, and Mandy Rose, Reprint edition. London New York: Wallflower Press.
- Rosen, Rebecca J. 2013. “The Wait We Carry: Using Data Visualization to Capture America’s Failure to Take Care of Its Veterans.” *The Atlantic*, June 24, 2013. <https://www.theatlantic.com/technology/archive/2013/06/the-wait-we-carry-using-data-visualization-to-capture-americas-failure-to-take-care-of-its-veterans/277127/>.
- Rothman, William, ed. 2009. *Three Documentary Filmmakers: Errol Morris, Ross McElwee, Jean Rouch*. SUNY Press.
- Rouch, Jean, and Steven Feld. 2003. *Cine-Ethnography*. First edition edition. Minneapolis: Univ Of Minnesota Press.
- Rózański, Szymon Łucjan, Jose Matias Peñas Castejón, and Donald G. McGahan. 2021. “Child Risk Assessment of Selected Metal(Loid)s from Urban Soils Using in Vitro UBM Procedure.” *Ecological Indicators* 127: 107726. <https://doi.org/10.1016/j.ecolind.2021.107726>.

- RRHelm. 2018. "Time-Lapse Video of Jellyfish Metamorphosis." *JellyBiologist* (blog). March 6, 2018. <https://jellybiologist.com/2018/03/06/time-lapse-video-of-jellyfish-metamorphosis/>.
- Rubenstein, Richard L. 1975. *The Cunning of History*. Pymble, NSW; New York, NY: Harper Perennial.
- Ruby, Jay. 1975. "Is an Ethnographic Film a Filmic Ethnography?" *Studies in Visual Communication* 2 (2): 104–11.
- . 1989. "The Emperor and His Clothes: A Comment." *SVA Newsletter* 5 (1): 9–11. <https://doi.org/10.1525/var.1989.5.1.9>.
- . 2000. *Picturing Culture: Explorations of Film and Anthropology*. 1st edition. Chicago: The University of Chicago Press.
- Russell, Catherine. 1999a. *Experimental Ethnography: The Work of Film in the Age of Video*. Duke University Press.
- . 1999b. *Experimental Ethnography: The Work of Film in the Age of Video*. Illustrated edition. Durham, NC: Duke University Press Books.
- Rust, Stephen, Salma Monani, and Sean Cubitt, eds. 2012. *Ecocinema Theory and Practice*. 1 edition. New York: Routledge.
- Said, Edward W. 2014. *Orientalism*. 1st Vintage Books ed edition. Vintage.
- "Samarco Mineração S.A. Mina de Alegria e Germano." 2006. Parecer Técnico DIMIM 062. FEAM.
- Sansour, Larissa, and Søren Lind, dirs. 2019. *In Vitro*. Fiction.
- Santiago Muñoz, Beatriz, dir. 2014. *La Cabeza Mató a Todos*. Experimental.
- Santos, Rodrigo, and Bruno Milanez. 2017. "The Construction of the Disaster and the 'Privatization' of Mining Regulation: Reflections on the Tragedy of the Rio Doce Basin, Brazil." *Vibrant* 14 (August): 127–49. <https://doi.org/10.1590/1809-43412017v14n2p127>.
- Sarlin, Paige. 2022. "Interview-Work: The Genealogy of a Cultural Form." *Paige Sarlin* (blog). December 13, 2022. <https://paigesarlin.info/work-in-progress/interview-work-the-genealogy-of-a-media-form/>.
- Satz, Aura. 2021. "The Listening Cobweb." Show, Exhibition or Event. The Contemporary Journal. Nottingham, UK: Nottingham Contemporary. June 1,

2021. <https://thecontemporaryjournal.org/strands/sonic-continuum/the-listening-cobweb>.
- Sauper, Hubert, dir. 2004. *Darwin's Nightmare*. Documentary. Celluloid Dreams. <http://www.darwinsnightmare.com/>.
- Saussure, Ferdinand de. 1959. *Course in General Linguistics Edited by Charles Bally and Albert Sechehaye Translated from the French by Wade Baskin*. First American edition. Philosophical Library.
- Schafer, R. Murray. 1993. *The Soundscape*. Rochester, Vt. : United States: Destiny Books.
- Schiariti, Agustin, Valentina Melica, Tjaša Kogovšek, and Alenka Malej. 2015. "Density-Dependent Effects Control the Reproductive Strategy and Population Growth of *Aurelia Aurita* s.l. Scyphistomae." *Marine Biology* 162 (8): 1665–72. <https://doi.org/10.1007/s00227-015-2704-y>.
- Schrimshaw, Will. 2013. "Non-Cochlear Sound: On Affect and Exteriority." In *Sound, Music, Affect: Theorizing Sonic Experience*, edited by Ian Biddle and Marie Thompson, 27–43. London and New York: Bloomsbury Academic.
- Schudson, Michael. 1994. "Question Authority: A History of the News Interview in American Journalism, 1860s–1930s" 16 (October). <https://doi.org/10.1177/016344379401600403>.
- Schulten, Adolf. 1922. *Fontes Hispaniae antiquae, publicadas bajo los auspicios y a expensas de la Universidad de Barcelona*. Barcelona A. Bosch. <http://archive.org/details/fontehispaniaea02schuuoft>.
- SEAMON, Roger. 1992. "The Uneasy Sublime : Defiance and Liberal Melancholy in Jeff Wall's Documentary Spectacle." In .
- Senna, Rose. 2016. The Scorpions of Rio Doce Interview by Andres Camacho.
- Shaw, Philip. 2017. *The Sublime*. 2 edition. London ; New York: Routledge.
- Shibata, Haruka, Hiroshi Miyake, Goto, Aya Adachi, and Sho Toshino. 2015. "Wild Polyps of the Blooming Jellyfish *Aurelia Limbata* (Brandt, 1838) (Cnidaria: Scyphozoa) Found on Deep-Sea Debris off Sanriku, Japan." *Plankton and Benthos Research* 10 (May): 133–40. <https://doi.org/10.3800/pbr.10.133>.
- Simonneau, J. 1973. "Mar Menor: évolution sédimentologique et géochimique récente du remplissage." Université de Toulouse.

- Singh, Bhri Gupta. 2015. *Poverty and the Quest for Life: Spiritual and Material Striving in Rural India*. University of Chicago Press.
- Slaughter, T. 1976. "MBO without the Headaches." *Modern Healthcare*. [Short-Term Care Ed.] 5 (1): 68.
- Smith, Cauleen, dir. 2013. *Songs for Earth and Folk*. Animation.
- , dir. 2015. *Crow Requiem*. Experimental.
- Soar, Matt, and Monika Gagnon, eds. 2013. *Database | Narrative | Archive: Seven Interactive Essays on Digital Nonlinear Storytelling*.
<http://dnaanthology.com/anvc/dna/index>.
- Sobchack, Vivian. 1992. *The Address of the Eye: A Phenomenology of Film Experience*. Princeton, N.J: Princeton University Press.
<https://press.princeton.edu/titles/5045.html>.
- Solnit, Rebecca. 2016. *Hope in the Dark: Untold Histories, Wild Possibilities*. Second edition. Chicago, Illinois: Haymarket Books.
- Solomon, Ben C., dir. 2016. *The Fight For Falluja*. 360 Virtual Reality Documentary. The New York Times VR.
https://www.youtube.com/watch?v=_Ar0UkmID6s.
- Souza, Laura de Mello e. 1999. *Norma e conflito: aspectos da história de Minas no século XVIII*. Editora UFMG.
- "Spanish MPs Vote to Give Mar Menor Lagoon Personhood and Rights." 2022. News. Spanish News Today. April 6, 2022.
https://spanishnewstoday.com/spanish-mps-vote-to-give-mar-menor-lagoon-personhood-and-rights_1759340-a.html.
- Spivak, Gayatri Chakravorty. 1994. "Can the Subaltern Speak?" In *Colonial Discourse and Post-Colonial Theory*. Routledge.
- Springer, Anna-Sophie, and Etienne Turpin, eds. 2021. *Land & Animal & Nonanimal*. Germany: Haus der Kulturen der Welt.
https://www.hkw.de/en/media/publikationen/2015_1/2015_publication_land_animal_nonanimal.php.
- St. Denis, Brian. 2015. "Katerina Cizek on the Final Chapter of HIGHRISE." *Point of View Magazine*, February 17, 2015.
<http://povmagazine.com/blog/view/katerina-cizek-on-the-final-chapter-of-highrise>.

- Stallabrass, Julian, ed. 2013. *Documentary*. London : Whitechapel Gallery ; Cambridge, Massachusetts: The MIT Press.
- Steffen, Will, Wendy Broadgate, Lisa Deutsch, Owen Gaffney, and Cornelia Ludwig. 2015. "The Trajectory of the Anthropocene: The Great Acceleration." *The Anthropocene Review* 2 (1): 81–98.
<https://doi.org/10.1177/2053019614564785>.
- Steffen, Will, Paul J. Crutzen, and John R. McNeill. 2007. "The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature." *AMBIO: A Journal of the Human Environment* 36 (8): 614–21.
- Steinfeld, Henning, Pierre Gerber, T. Wassenaar, V. Castel, Mauricio Rosales, and C. de Haan. 2006. "Livestock's Long Shadow." *Food and Agriculture Organization of the United Nations*.
<http://www.fao.org/docrep/010/a0701e/a0701e00.HTM>.
- Stengers, Isabelle. 2012. "Reclaiming Animism." *E-Flux Journal* 36 (July).
- Stern, Daniel N. 2000. *The Interpersonal World Of The Infant: A View from Psychoanalysis and Developmental Psychology*. 1st edition. New York: Basic Books.
- . 2010. *Forms of Vitality: Exploring Dynamic Experience in Psychology and the Arts*. 1st edition. Oxford ; New York: Oxford University Press.
- Stern, Lesley. 2020. *Diary of a Detour*. Durham: Duke University Press Books.
- Sterne, Jonathan. 2003a. "Machines to Hear for Them." In *The Audible Past: Cultural Origins of Sound Reproduction*, 31–85. Durham and London: Duke University Press.
- . 2003b. *The Audible Past: Cultural Origins of Sound Reproduction*. Durham: Duke University Press Books.
- , ed. 2012. *The Sound Studies Reader*. 1 edition. New York: Routledge.
- Story, Brett, dir. 2019. *The Hottest August*. Documentary.
- Streeby, Shelley. 2018. *Imagining the Future of Climate Change: World-Making through Science Fiction and Activism*. First edition. Oakland, California: University of California Press.
- Sullivan, Buddy. 2000. *Darien and McIntosh County*. First Edition edition. Charleston, SC: Arcadia Publishing.

- Suwichakornpong, Anocha, dir. 2009. *Old Heart*. Documentary.
- , dir. 2016. *By the Time It Gets Dark*. Fiction.
- Swanson, Heather. 2018. *Salmon in Hokaido in Japan, and the Relationship between Pacific Northwest and Other Ocean*.
- Swyngedouw, Erik. 2015. *Liquid Power: Contested Hydro-Modernities in Twentieth-Century Spain*. Cambridge, Massachusetts: The MIT Press.
- Taussig, Michael. 1991. *Shamanism, Colonialism, and the Wild Man: A Study in Terror and Healing*. Reprint, 1997 edition. Chicago: University of Chicago Press.
- Taylor, Lucien. 1996. "Iconophobia." *Transition*, no. 69: 64–88.
<https://doi.org/10.2307/2935240>.
- Thalhofer, Florian, and Berke Bas. 2017. "Planet Galata – a Filmic Portrait of a Bridge in Istanbul." Interactive Documentary. November 2017.
<http://planetgalata.com/>.
- Tharp, Twyla, and Mark Reiter. 2006. *The Creative Habit: Learn In and Use It for Life*. 1st edition. New York: Simon & Schuster.
- The Great Animal Orchestra*. 2016. Foundation Cartier.
<https://www.legrandorchestredesanimaux.com/en>.
- Thein, Htun, Hideki Ikeda, and Shin-ichi Uye. 2012. "The Potential Role of Podocysts in Perpetuation of the Common Jellyfish <Emphasis Type="Italic">Aurelia Aurita</Emphasis> s.l. (Cnidaria: Scyphozoa) in Anthropogenically Perturbed Coastal Waters." *Hydrobiologia* 690 (1): 157–67. <https://doi.org/10.1007/s10750-012-1045-9>.
- Thibodeaux, Anna. 2019. "Slave Cemeteries Remain Unmarked, Underwater in the Spillway." *St. Charles Herald Guide* (blog). March 25, 2019.
<https://www.heraldguide.com/news/slave-cemeteries-remain-unmarked-underwater-in-the-spillway/>.
- Thiranagama, Sharika, and Gananath Obeyesekere. 2013. *In My Mother's House: Civil War in Sri Lanka*. Philadelphia: University of Pennsylvania Press.
- Thompson, Kirsten Moana. 2007. *Apocalyptic Dread: American Film at the Turn of the Millennium*. Albany: State University of New York Press.
- Thuesen, Erik V., and James J. Childress. 1994. "Oxygen Consumption Rates and Metabolic Enzyme Activities of Oceanic California Medusae in Relation to

- Body Size and Habitat Depth.” *Biological Bulletin* 187 (1): 84.
<https://doi.org/10.2307/1542168>.
- Tinta, Tinkara, Alenka Malej, Maja Kos, and Valentina Turk. 2010. “Degradation of the Adriatic Medusa <Emphasis Type="Italic">Aurelia</Emphasis> Sp. by Ambient Bacteria.” *Hydrobiologia* 645 (1): 179–91.
<https://doi.org/10.1007/s10750-010-0223-x>.
- Tomaru, Akiko, Ryota Sasaki, Hidekazu Miyahara, Akitoshi Okino, Nobuhiro Ogawa, and Koji Hamasaki. 2014. “Settlement of Planulae of the Moon Jellyfish *Aurelia Aurita* onto Hydrophilic Polycarbonate Plates Modified by Atmospheric Plasma Treatment.” *PLOS ONE* 9 (1): e85569.
<https://doi.org/10.1371/journal.pone.0085569>.
- Toronto, Point of View Magazine • 392-401 Richmond Street West •, and ON • M5V 3A8 • Canada • 639-0653 • Send us an email. n.d. “Draw Me Close – Point of View Magazine.” Accessed April 22, 2018.
<http://povmagazine.com/articles/view/draw-me-close>.
- Toussaint, Sandy. 2004. The Anthropology of Water Interview by Brigitte Seega. Audio. <http://www.abc.net.au/radionational/programs/ockhamsrazor/the-anthropology-of-water/3374748>.
- Trelinski, Alex. 2021. “Judge Reveals Evidence of ‘environmental Crime’ in Mar Menor Pollution Investigation in Spain.” *Olive Press News Spain* (blog). December 1, 2021. <https://www.theolivepress.es/spain-news/2021/12/01/judge-reveals-evidence-of-environmental-crime-in-mar-menor-pollution-investigation-in-spain/>.
- Tsai, Yen-Ling. 2016. Golden Apple Snail “Invasion” in Taiwan: preliminary fieldwork Interview by Isabelle Carbonell. Film.
- Tsai, Yen-Ling, Isabelle Carbonell, Joelle Chevrier, and Anna Tsing. 2016. “Golden Snail Opera: The More-than-Human Performance of Friendly Farming on Taiwan’s Lanyang Plain.” *Cultural Anthropology* 31 (November): 520–44.
<https://doi.org/10.14506/ca31.4.04>.
- Tsing, Anna. 2017. “What Is History? Or, the Life and Times of Water Hyacinth.” In . unpublished.
- Tsing, Anna Lowenhaupt. 2005. *Friction: An Ethnography of Global Connection*. Princeton, N.J: Princeton University Press.
- . 2015. *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins*. Princeton University Press.

- . 2017. “A Threat to Holocene Resurgence Is a Threat to Livability.” In *The Anthropology of Sustainability*, 51–65. Palgrave Studies in Anthropology of Sustainability. Palgrave Macmillan, New York. https://doi.org/10.1057/978-1-137-56636-2_3.
- Tsing, Anna Lowenhaupt, Nils Bubandt, Elaine Gan, and Heather Anne Swanson. 2016. *Arts of Living on a Damaged Planet: Stories from the Anthropocene*. Island Press.
- , eds. 2017. *Arts of Living on a Damaged Planet: Ghosts and Monsters of the Anthropocene*. 3rd ed. edition. Minneapolis: Univ Of Minnesota Press.
- Tsiokos, Basil, and Basil Tsiokos. 2010. “FUTURES | ‘Return’ Filmmaker Liza Johnson.” *IndieWire* (blog). June 11, 2010. <http://www.indiewire.com/2010/06/futures-return-filmmaker-liza-johnson-245326/>.
- “Una tesis doctoral de la UPCT revela concentraciones muy altas de metales en el Mar Menor.” n.d. Accessed December 6, 2021. <http://www.murciaconfidencial.com/2016/11/una-tesis-doctoral-de-la-upct-revela.html>.
- Uncertain Commons. 2013. *Speculate This!* Duke University Press.
- “Up and down with Ecology—the ‘Issue-Attention Cycle.’” n.d. Accessed November 26, 2022. https://www.nationalaffairs.com/public_interest/detail/up-and-down-with-ecologythe-issue-attention-cycle.
- Varenaya. n.d. “Death of Venice: The Industrial Port of Marghera.” *HubPages* (blog). Accessed March 15, 2018. <https://hubpages.com/politics/Death-of-Venice-the-industrial-port-of-Marghera>.
- Velasco, J., J. Lloret, A. Millan, A. Marin, J. Barahona, P. Abellan, and D. Sanchez-Fernandez. 2006. “Nutrient And Particulate Inputs Into The Mar Menor Lagoon (Se Spain) From An Intensive Agricultural Watershed.” *Water, Air, and Soil Pollution* 176 (1): 37–56. <https://doi.org/10.1007/s11270-006-2859-8>.
- Vesna, Victoria. 2007. *Database Aesthetics: Art in the Age of Information Overflow*. Minneapolis, UNITED STATES: University of Minnesota Press. <http://ebookcentral.proquest.com/lib/ucsc/detail.action?docID=326384>.
- Vilar, J.B., and P.M. Egea-Bruno. 1989. *La Minería Murciana Contemporánea (1840–1930)*. Spain: Cajamurcia, Universidad de Murcia.

- Vilar, Juan Bautista. 1985. *La minería murciana contemporánea, 1840-1930*. Murcia: Departamento de Historia Moderna y Contemporánea, Universidad de Murcia.
- Vint, Sherryl. 2013. *Animal Alterity: Science Fiction and the Question of the Animal*. Reprint edition. Liverpool: Liverpool University Press.
- Vivas, Miguel. 2019. Miguel Vivas and Callinectes sapidusFilm.
- Viveiros de Castro, Eduardo, and Déborah Danowski. 2018. “Humans and Terrans in the Gaia War.” In *A World of Many Worlds*, edited by Marisol de la Cadena and Mario Blaser, 172–204. Durham: Duke University Press.
- Vodopivec, Martin, Álvaro J. Peliz, and Alenka Malej. 2017. “Offshore Marine Constructions as Propagators of Moon Jellyfish Dispersal.” *Environmental Research Letters* 12 (8): 084003. <https://doi.org/10.1088/1748-9326/aa75d9>.
- Wagner, John R., ed. 2013. *The Social Life of Water*. 1st edition. New York ; Oxford: Berghahn Books.
- Warner, Rick. 2018. *Godard and the Essay Film: A Form That Thinks*. Northwestern University Press.
- “Water — Cultural Anthropology.” n.d. Accessed February 1, 2017. https://culanth.org/curated_collections/10-water.
- Weight, Jenny. 2011. *The Participatory Documentary Cookbook: Community Documentary Using Social Media*. RMIT University.
- Weisman, Alan. 2008. *The World Without Us*. Reprint edition. New York, NY: Picador.
- Weiss, Frederick, Marianne Leuzinger, Christian Zurbrügg, and Rik Eggen. 2016. “Chemical Pollution in Low- and Middle-Income Countries: Mining Industry Pollutants.” Switzerland: Eawag: Swiss Federal Institute of Aquatic Science and Technology. <https://www.eawag.ch/en/department/sandec/publications/chemical-pollution/>.
- Wenzel, Jennifer. n.d. “Waste.” *Somatosphere*. Accessed April 26, 2018. <http://somatosphere.net/2017/10/waste.html>.
- Werrie, Paul. 1931. “Échos: Une Belle Étude d EPaul Werrie.” *La Métropole*, April 1931. AJP: Press Clippings.
- “When Oceans Give You Jellyfish Blooms, Turn Them Into Tasty Chips.” n.d. Accessed March 15, 2018. <https://www.opb.org/news/article/npr-when-oceans-give-you-jellyfish-blooms-turn-them-into-tasty-chips/>.

- White, Kristopher D. 2013. "A Geographical Perspective on the Aral Sea Crisis: Three Interpretations of an Image." *Bulletin of Geography. Socio-Economic Series* 21 (21). <https://doi.org/10.2478/bog-2013-0026>.
- Whitman, Edward C. 2005. "SOSUS The 'Secret Weapon' of Undersea Surveillance." *Undersea Warfare: The Official Magazine of the U.S. Submarine Force* 7 (2). http://www.navy.mil/navydata/cno/n87/usw/issue_25/sosus.htm.
- Wiehl, Anna. 2016. "Database Aesthetics, Modular Storytelling, and the Intimate Small Worlds of Korsakow Documentaries," July.
- . 2017. "Documentary as Co-Creative Practice." In *I-Docs: The Evolving Practices of Interactive Documentary*, edited by Judith Aston, Sandra Gaudenzi, and Mandy Rose, Reprint edition. London New York: Wallflower Press.
- Winston, Brian. 2019. *The Documentary Film Book*. 1st edition. British Film Institute.
- Wohlleben, Peter. 2016. *The Secret Life of Trees*. 1st edition.
- Wolf, Eric R., and Thomas Hylland Eriksen. 2010. *Europe and the People Without History*. 2 edition. Berkeley: University of California Press.
- Wolfe, Cary. 2003. *Zoontologies: The Question Of The Animal*. First edition edition. Minneapolis, MN: Univ Of Minnesota Press.
- Worster, Donald. 1985. *Rivers of Empire: Water, Aridity, and the Growth of the American West*. Oxford University Press.
- Wright, Mark Peter. 2013. Ernst Karel. <https://earroom.wordpress.com/2013/02/14/ernst-karel/>.
- Xavier, Ismail. 2012. "Ways of Listening in a Visual Medium." *New Left Review*, II, , no. 73: 97–116.
- "You Searched for Adriatic Sea." n.d. *Offshore Technology* (blog). Accessed March 15, 2018. <http://www.offshore-technology.com/search/adriatic+sea/>.
- Yue, Genevieve. 2022. "Field Notes \ Programming Experimental Documentary - World Records." *World Records Journal, The Exceptions*, 6 (04). <https://worldrecordsjournal.org/field-notes-programming-experimental-documentary/>.

- Yusoff, Kathryn. 2018. *A Billion Black Anthropocenes or None*. Minneapolis: Univ Of Minnesota Press.
- Zabala, Santiago. 2019. *Why Only Art Can Save Us: Aesthetics and the Absence of Emergency*. Reprint edition. Columbia University Press.
- Zehle, Soenke. 2008. "Dispatches from the Depletion Zone: Edward Burtynsky and the Documentary Sublime." *Media International Australia* 127 (1): 109–15. <https://doi.org/10.1177/1329878X0812700114>.
- Zhan, Mei. 2009. *Other-Worldly: Making Chinese Medicine through Transnational Frames*. Durham: Duke University Press Books.
- Zhour, Andréa, Raquel Oliveira, Zucarelli, Marcos, and Max Vasconcelos. 2017. "The Rio Doce Mining Disaster in Brazil: Between Policies of Reparation and the Politics of Affectations." *Vibrant – Virtual Brazilian Anthropology* 14 (2): 1–21. <http://dx.doi.org/10.1590/1809-43412017v14n2p081>.
- Zimmerman, Michael E. 1994. *Contesting Earth's Future: Radical Ecology and Postmodernity*. Text is Free of Markings edition. Berkeley: University of California Press.
- Zimmermann, Patricia R. 2018. "Thirty Speculations Toward a Polyphonic Model for New Media Documentary." *Alphaville: Journal of Film and Screen Media*, no. 15 (Summer): 9–15.
- Zimmermann, Patricia R, and Helen De Michiel. 2013. "Documentary as Open Space." In *The Documentary Film Book*, edited by Brian Winston, pp.355-365. Palgrave Macmillan. <https://www.amazon.com/Documentary-Film-Book-Brian-Winston/dp/1844573419>.
- Zimmermann, Patricia R., and Helen De Michiel. 2017. *Open Space New Media Documentary: A Toolkit for Theory and Practice*. 1 edition. New York, NY: Routledge.
- Zonta, Roberto, Margherita Botter, Daniele Cassin, Roberto Pini, Mario Scattolin, and Luca Zaggia. 2007. "Sediment Chemical Contamination of a Shallow Water Area Close to the Industrial Zone of Porto Marghera (Venice Lagoon, Italy)." *Marine Pollution Bulletin*, Measuring and Managing Changes in Estuaries and Lagoons, 55 (10): 529–42. <https://doi.org/10.1016/j.marpolbul.2007.09.024>.
- Zydler, Nancy, and Tom Zydler. 2001. *The Georgia Coast : Waterways and Islands*. New and Updated edition. Port Washington, WI: Seaworthy Publications, Inc.