Submergence

Environmental Justice and the Specter of Chemical Pollution

by

Sebastian Lundsteen

Thesis submitted in fulfilment of
the requirements for the degree of
PHILOSOPHIAE DOCTOR
(PhD)

Faculty of Arts and Education
Department of Cultural Studies and Language
2024

University of Stavanger
NO-4036 Stavanger
NORWAY
www.uis.no

©2024 Sebastian Lundsteen

ISBN: 978-82-8439-258-5
ISSN: 1890-1387
PhD: Thesis UiS No. 778

Acknowledgements

The present work has been a journey attesting that no research is carried out alone. I am humbled and inspired by so many people, in which I will name a few. My apologies if I have missed someone.

I would like to extend a heartfelt thank you to my family: Mom and Dad, my sister Charlotte and her gang, Nick, Tilde, Nanna, Luis & Felix – thank you for letting me be me, and I am so sorry for all the missed birthdays. I will make it up, I promise! To Anne, Olav, Lucas, and Maria for hosting me during my trips to Oslo – I always enjoyed our conversations.

My supervisors: Finn Arne Jørgensen and Hugo Reinert for their guidance through this difficult but formative process.

My PhD-cohort at UiS and the Greenhouse: Mehdi Torkaman, Aster Hoving, Jonas Taudal Bækgaard, Miso Bækgaard-Hoving, Gitte Westergaard, Jacob Tom & Endre Kvangreven. Thank you for accompanying me, your work is important and has inspired me.

I wish to thank the Greenhouse/UiS affiliates Melina Buns, Charlotte Wrigley, Mica Jorgenson, Dolly Jørgensen, Ellen Arnold, Malin Graesse, and Siddharth Sareen. A special appreciation goes out to my podcast co-host Anders Riel Müller and the Spatial Justice Network.

I cannot understate the importance of meeting people through my research: First and foremost, Bjarne Hansen and Flemming Madsen, but also Dorthe Schmidt, Søren and Gudrun Wium-Andersen. To the interviewees, thank you for taking your time. The authors Johanne Mygind and Liv Nimand Duvå - I appreciate your enthusiasm and our reading group.

My friends, new and old, for teaching me so many things – I have learned a lot from you. The dissertation is dedicated to those not being

here anymore - particularly my brother CBHP - I tried to be a light in your life, but you could not bear the weight of the world. I will carry you with me everywhere I go.

The Stavanger-Moist Bois and Rødt Kort Gjengen: Håvard, Andy, Aslak, and Jakob Haakon– you turned this place into Stamaica and I will never look back in Stavanger.

Copenhageners who have meant so much to me. A specific appreciation for Niklas Olsen who provided a kind of support I cannot put a price on. To Tim Flohr Sørensen for Spiritual Healing, and Nina Toudal Jessen for the many great conversations. Andy Lautrup for being in the Michelle Murphy Fan Club with me, and Rachel Douglas Jones for being an awesome person and an academic who walks the walk. My former MA supervisor Dorthe Gert Simonsen for always giving me good advice. Henrik Hvenegaard remains an anthropological inspiration. Mads Ejsing at CApE for the work you do, and the CSF crew: Signe, Katy, Frida, and Nathalia.

I would like to express sincere gratitude to Simone Müller for being so fantastic, generous, and inclusive. Jen Telesca who I really connected to and inspired me in so many ways. My mentor at UPenn/Penn Program for Environmental Humanities Bethany Wiggin. To Gwen Ottinger I appreciated our conversations during my time in Philadelphia. Additionally, a thank you to Sarah Elkind for being so helpful.

The "Troubled Waters" graphic novel project: Caroline Ektander for making all this possible, my friend, collaborator, and talented artist Asbjørn Skou. To my new acquaintances Michael Baers and Mikkel Sauzet. I am looking so much forward to our journey.

Wet Weirdo's group – so many but here are a few: Marianna Dudley for the great swims, Giulia Champion for adapting to the cold water, Hans Baumann for contacts, natural wine, and sharing playlists,

Estraven Lupino-Smith for being my academic doppelganger from across the pond – Up the punx! And of course, Johan Cederqvist for proving that I do not understand Swedish AT ALL.

Thank you, Kim Menage, – my mountain buddy, Elizabeth Hameeteman for sharing ideas and thoughts, and Leonoor Borgesius for hanging out at conferences.

Lastly, and most importantly, Thank you to my two babes, Jannet and Miff, for their patience, unconditional love, and support. Truly, I am nothing without them.

Summary

This Ph.D. dissertation examines the Danish chemical manufacturer “Cheminova,” its multiple cases of chemical pollution, and the community’s experiences of living in a contaminated area. By exploring chemical pollution through the interface between industry, state, and citizens in the Nordic Region, it examines the historical causes of environmental issues. Furthermore, the dissertation focuses on communities' experiences of living in a contaminated area, which is crucial for understanding contemporary environmental crises. Additionally, the dissertation situates the field of environmental justice in the Nordic Region and opens critical discussions of existing narratives of the region as egalitarian environmental frontrunners.

The dissertation consists of four independent research articles. The first article shows how Cheminova constructed specific narratives about pollution. The second article explores environmentalist's ambivalent emotions during a remediation process. The third article examines rumors about pollution. The fourth article engages with the regulatory and scientific depictions of the underground as an ideal space for storing chemical waste and tries to think about the subsurface differently.

All four articles integrate an explicit environmental justice perspective that emphasizes other ways of knowing, understanding, and relating to pollution. The dissertation introduces and develops the concept of “submergence” to elucidate how specific discourses around pollution dominate others and how these discourses affect the local community. By situating its research through “field history” as a distinct method, the thesis stresses the importance of an engaged environmental history in contemporary environmental issues.

Opsummering

Denne Ph.d.-afhandling undersøger den danske kemikalieproducent ”Cheminova,” dens mange tilfælde af kemisk forurening, samt lokalsamfundets oplevelse af at bo i et kraftigt forurenet område. Ved at udforske kemisk forurening i grænsefladen mellem industri, stat og borger i Norden, undersøger afhandlingen de historiske årsager af centrale miljøspørgsmål. Afhandlingen fokuserer på lokalbefolkningens oplevelser af at leve i et forurenet område, som er essentielle for at forstå samtidens miljøkriser. Derudover, ved at placere *miljøretfærdighed* i Norden, åbner der sig en række perspektiver som problematiserer eksisterende narrativer af regionen som egalitære miljøfrontløbere.

Afhandlingen består af fire selvstændige forskningsartikler. Den første artikel viser hvordan Cheminova konstruerede specifikke narrativer omkring forurening. Den anden artikel udforsker miljøforkæmperes ambivalens ved en oprensningsproces. Den tredje artikel undersøger rygter omkring forurening. Den fjerde artikel undersøger lovgivningsmæssige og naturvidenskabelige fremstillinger af undergrunden som et ideelt sted for at opbevare kemisk affald, og forsøger at gentænke undergrunden anderledes.

Alle fire artikler integrerer et udtalt miljøretfærdighedsperspektiv, der fremhæver andre måder at vide, forstå og relatere til forurening. Afhandlingen introducerer og udvikler konceptet ”submergence,” der belyser hvordan specifikke diskurser omkring forurening dominerer andre, og hvordan disse diskurser har konsekvenser for lokalbefolkningen. Ved at situere forskningen igennem ”field history” som en særpræget metode, understreger afhandlingen miljøhistoriens vigtige rolle i nuværende miljøspørgsmål.

Contents

Acknowledgements iii

Summary vi

Opsummering vii

Table of Figures ix

Introduction 1

Literature 16

Actors and Materials 35

Methodology 43

Ethics 51

Theory 54

Article I: Shadow Places, Environmental Justice and the Submergence of Pollution 63

Article II: In Praise of Ambivalence: Reflections on Experiences of Pollution and Remediation 107

Article III: Not True, but Also, Not Not True: Rumors about Pollution in Denmark 146

Article IV: A Pump, a Depot, and Some Amber: Submerged Histories and the Specter of Chemical Pollution 193

Conclusion 236

Bibliography 245

Appendix 1 271

Appendix 2 272

Table of Figures

1. A factory 9.

2. An archive 39.

3. A lost website 40.

4. A sign 58.

5. A monument 61.

6. A molecule 63.

7. A meeting 107.

8. A fence 146.

9. A plant 189.

Introduction

On December 16th, 2023, Danish police began redirecting traffic because of the dangers posed by a landslide of contaminated soil. The toxic mass came from "Nordic Waste," a remediation facility outside Randers, Jylland. Describing the situation as "critical," the local law enforcement was dispatched "to prevent it from developing into an environmental catastrophe" as the enormous amounts of dirt approached nearby roads and the stream Allinge Å.[1] *Nordic Waste and the municipality had insisted there was no cause for alarm despite early warnings from former employees, local politicians, neighboring residents, and local journalists.*[2] *Neither the fact that the facility was placed on top of a hill, that the import of noxious soil exceeded its capacities, that initial signs of a landslide began in 2021, nor that toxic sewage from Nordic Waste had previously polluted Alling Å had alerted the authorities.*[3] *As was eventually discovered, Nordic Waste operated with the municipality's approval. When massive amounts of rain in the wettest year ever recorded in Denmark created a two-thousand-ton moving, contaminated landslide, it was already too late. Three days later, the company resigned from its task of preventing the environmental disaster – they could not stop the coming catastrophe.*

[1] "Politiet advarer om jordskred efter massiv regn i Randers | Nyheder," *DR*, December 16, 2023, https://www.dr.dk/nyheder/seneste/politiet-advarer-om-jordskred-efter-massiv-regn-i-randers.

[2] "Genstart | På giftig grund | DR LYD," accessed January 19, 2024, https://www.dr.dk/lyd/special-radio/genstart/genstart-2024/genstart-paa-giftig-grund-11802450022.

[3] "Nordic Waste blev varslet påbud: Nu giver de lyd fra sig," *TV2 Østjylland*, accessed January 19, 2024, https://www.tv2ostjylland.dk/randers/nordic-waste-blev-varslet-paabud-nu-giver-de-lyd-fra-sig; "Jordlavine kan oversvømme hel by – men kommune afviste risikoen," *TV2 Østjylland*, accessed January 19, 2024, https://www.tv2ostjylland.dk/randers/jordlavine-kan-oversvoemme-hel-by-men-kommune-afviste-risikoen; Kristian Svennevig et al., "Jordskredsaktivitet ved Nordic Waste, Randers Kommune" (Danmarks og Grønlands Geologiske Undersøgelse Rapport 2024/6, January 22, 2024).

On January 19th, 2024, "Nordic Waste" filed for bankruptcy, while its owner, multibillionaire Torben Østergaard-Nielsen, refused any responsibility. Meanwhile, the residents of the nearby town of Ølst were left at risk of being buried beneath five meters of contaminated soil.[4]

Jåhkågaska tjiellde is a community of indigenous Sámi people residing in the ancestral territory of Gállok in Northern Sweden. For over a decade, the community has battled international mining corporations, the municipality, the Swedish government, and state institutions to protect their area and the right to reindeer herd - a crucial part of their heritage.[5] *Despite resistance, the "mine-enthusiast" and Minister of Business Kart-Petter Thorwaldsson granted permissions for mining iron-ore deposits in 2022 because the area is considered a part of an extractive frontier and thus a unique opportunity for making profits.*[6] *The British mining company "Beowulf," who obtained the permission, argued that economic incentives would alleviate any problems, which was a position shared by the Swedish government. Furthermore, the mining company held that the reindeer could easily move around an obstacle like a mine.*[7] *The mining plans are another example of the*

[4] "Nordic Waste har indgivet konkursbegæring," *DR*, January 19, 2024, https://www.dr.dk/nyheder/seneste/nordic-waste-har-indgivet-konkursbegaering.

[5] "The Official Site of Jåhkågasskas Resistance against a Mine in Gallok/Kallak!," accessed January 19, 2024, https://www.gallok.se/en-gb/; "Sweden: Ongoing Road Blockade Against Mining in Saami Territory | Intercontinental Cry," accessed January 20, 2024, https://intercontinentalcry.org/sweden-ongoing-road-blockade-against-mining-in-saami-territory-19953/.

[6] Georgia de Leeuw, "The Virtue of Extraction and Decolonial Recollection in Gállok, Sápmi," in *Coloniality and Decolonization in the Nordic Region*, by Adrián Groglopo and Julia Suárez-Krabbe (London: Routledge, 2023), 70–71.

[7] Daniel Boffey, "Greta Thunberg Condemns UK Firm's Plans for Iron Mine on Sami Land," *The Guardian*, February 11, 2022, sec. Environment, https://www.theguardian.com/environment/2022/feb/11/sami-people-said-no-british-firms-plans-open-pit-mine-divide-sweden-greta-thunberg; Richard, "Indigenous Sami Rights under Attack from Swedish State and UK Mining Company," *London Mining Network*, June 21, 2022, https://londonminingnetwork.org/2022/06/indigenous-sami-rights-under-attack-from-swedish-state-and-uk-mining-company/; "Sweden Gives

encroachment on Sámi people and their territories, as forestry, hydropower, and infrastructural technologies have become increasingly present in the area. As the reindeer migratory trails depend on access to water and foraging spaces, the prospect of increasing activity supported by economic arrangements dependent on growth will most likely result in a complete erasure of reindeer herding. Moreover, climate change adds insult to injury as a radically changing environment will affect the community disproportionately. [8]

Since 2006, Førdefjorden, in the western part of Norway, has been a site of contest between a mining company and the Norwegian government on the one side, and residents supported by environmental organizations on the other. The controversy involves a prospective mining site at Engebøfjellet, containing rare metals such as garnet and rutile. An initial concession was granted to "Nordic Mining" in 2010, which filed for permission to dump mine tailings in Førdefjorden. The local municipality approved the plans despite objections from several environmental institutions. Environmental experts cautioned against the many uncertainties connected to the project, including the potential environmental damage to marine ecosystems caused by dumping tailings. However, "Nordic Mining" sowed doubts about potential contamination, while in 2015, the Norwegian Environmental Protection Agency altered its position to favor the mining prospect. Increasing resistance from local organizations, residents, and activists followed, culminating in a massive lawsuit by "Naturvernforbundet" and "Natur og Ungdom." They held that the permission was illegal according to EU law – which is binding according to Norway's EEA arrangement. On January 10th, 2024, a court verdict favored the Norwegian state, to great disappointment from environmental organizations that observed

Qualified Go-Ahead for Northern Kallak Iron Ore Mine," *Reuters*, March 22, 2022, sec. World, https://www.reuters.com/world/sweden-gives-qualified-go-ahead-northern-kallak-iron-ore-mine-2022-03-22/.

[8] "Sami Parliament viewpoint on Gállok/Kallak," *Sametinget*, accessed January 20, 2024, https://www.sametinget.se/164992.

"severe weaknesses and errors in how the bureaucracy governs and manages nature."[9]

"Uraani? Namik" - the text decorates the yellow signs and posters featuring a red sun. The signs are an aesthetic vestige of the 1960s anti-nuclear movement and became a popular symbol during the 2021 election in Greenland. "Uraani? Namik" is Greenlandic for "Uranium? No Thanks," a theme that has reanimated debates about the perils of nuclear power. The local concern became a national movement mobilizing significant public resistance against uranium mining in Kuannersuit, a giant plateau in southern Greenland. One issue was the bureaucratic clearance given to the Australian company formerly "Greenland Minerals" and now "Energy Transition Minerals." Greenland, still having colonial ties to Denmark, sees mining as a way of gaining independence through a strong economy based on resource extraction. As such, financial prospects have transformed sentiments of mining in Greenland to mining for Greenland. The resistance against uranium mining and other rare metals is not because of the mining itself but rather the unfathomable environmental consequences of dumping mining tailings, imposing major and severe negative consequences for the ecosystem and the nearby town of Narsaq.[10] *In 2021, this resistance played a vital role in breaking the political monopoly of Inuit Ataqatigiit, which has been in*

[9] Håvard Nyhus, "Rettssak om gruveavfall i Førdefjorden: Dommen fell i dag," *NRK*, January 10, 2024, https://www.nrk.no/vestland/rettssak-om-gruveavfall-i-fordefjorden_-dommen-fell-i-dag-1.16708548; Håvard Nyhus, "Overraskande vending: Dommen i fjordsøksmålet vert utsett," *NRK*, November 20, 2023, https://www.nrk.no/vestland/overraskande-vending_-dommen-i-fjordsoksmalet-vert-utsett-1.16644864; Håvard Nyhus, "I dag startar rettssaka om gruveslam i fjorden – dette er striden," *NRK*, September 18, 2023, https://www.nrk.no/vestland/i-dag-startar-rettssaka-om-gruveslam-i-fjorden-_-dette-er-striden-1.16559043.

[10] "Giftigt stof fra Kvanefjeld i Grønland kan forurene drikkevand og elve - Danwatch," March 26, 2021, https://danwatch.dk/perspektiv/giftigt-stof-fra-kvanefjeld-i-groenland-kan-forurene-drikkevand-og-elve/; "Jagten på Grønlands sjældne jordarter - Danwatch," March 20, 2021, https://danwatch.dk/undersoegelse/jagten-paa-de-sjaeldne-jordarter-i-groenland/.

power since Greenland achieved political sovereignty in 1971 and favored the mining project. Despite a record-high price of the material, the parliament decided to abandon uranium mining, thus dismantling corporate dreams of unbounded profit.[11] *However, the mining corporation filed a lawsuit of no less than 750 billion DKK, thus severely compromising the prospect of complete independence from Denmark.*

The four vignettes capture and frame a set of broad themes that concern this dissertation. First, they challenge the idea of the Nordic Region as uniquely green and exceptional. Exceptionalism is by no means restricted to the Nordic Region, but as Melina Buns and Dominic Hinde show, it is recognized as a distinct and performed ideological project framed as moderate, egalitarian, and environmentally progressive.[12] The vignettes disrupt this image by showcasing radical and violent interventions in landscapes and the experiences of the communities that are subjected to these intrusions. Moreover, the vignettes illuminate the intimate association between the state and corporations and how the former is complicit, or forced to comply, in protecting the latter's interests. As such, the examples elucidate how environmental politics are structured around economic reasoning and how the consequences - the environmental injustice - of such politics are experienced differently outside of political-regulatory spheres than within them.

[11] "Mineselskab taber radioaktiv kamp om Grønlandsk fjeld. Men slaget er ikke ovre - Danwatch," November 18, 2021, https://danwatch.dk/mineselskab-taber-radioaktiv-kamp-om-groenlandsk-fjeld-men-slaget-er-ikke-ovre/.

[12] The most prominent example of another exceptionalism is "American Exceptionalism." For a Nordic (green) exceptionalism see: Melina Antonia Buns and Dominic Hinde, "Green States in a Dirty World: 1975 and the Performance of Nordic Green Modern," in Nordic Media Histories of Propaganda and Persuasion, ed. Fredrik Norén, Emil Stjernholm, and C. Claire Thomson (Cham: Springer International Publishing, 2023), 244–46; Synnøve Bendixsen, Mary Bente Bringslid, and Halvard Vike, eds., Egalitarianism in Scandinavia (Cham: Springer International Publishing, 2018).

Secondly, the vignettes highlight the ways in which parts of a scientific community support and shape political and regulatory decisions. Environmental clearances and bureaucratic permissions hinge on a large body of expertise that produces specific knowledge about the environment. Experts play a crucial role in environmental issues, as the weight of their knowledge typically has the power to decide the outcome or legitimize decisions. These types of expertise are situated in a matrix that must negotiate its knowledge with financial reasonings, societal concerns, and industry-produced information. As scholars like Isabelle Stengers and Lorraine Daston show, the emergence of particular types of science and the epistemic virtues they are loyal to have specific consequences.[13]

A third emerging theme is the management of industrially produced pollution and hazardous waste. The four vignettes display how regimes of growth create large-scale residues and are depicted as inevitable. The necessity of economic wealth, a way of measuring societal success, means that the residues have to go somewhere, ultimately leading to solution-type models structured around externalization processes, such as removal or thresholds. Several scholars have troubled the notion of "away," for instance by looking at sinks and hazardous waste trade.[14]

[13] By historicizing chemistry, Bernadette Bensaude-Vincent and Isabelle Stengers show how the discipline has fallen to prey for exploitation in the pursuit of economic growth, in its claim for scientific virtues, without moral considerations accentuated by insisting on being culturally and societally separated. Moreover, I take epistemic virtues from Lorraine Daston and Peter Galison, who describe it as "distinct as ideals (…), as historically specific ways of investigating and picturing nature." Bernadette Bensaude-Vincent and Isabelle Stengers, A History of Chemistry (Cambridge, Massachusets: Harvard University Press, 1996), 258; Daston Lorraine and Peter Galison, Objectivity (New York, New York State; Zone Books, 2007), 28.

[14] Jennifer Gabrys, "Sink: The Dirt of Systems," *Environment and Planning D: Society and Space* 27 (August 2009): 666–81; Joel A. Tarr, *The Search for the Ultimate Sink: Urban Pollution in Historical Perspective*, (Akron, Ohio: University of Akron Press, 1996); Kate Brown, "The Last Sink: The Human Body as the Ultimate Radioactive Storage Site; Simone M. Müller, "Hidden Externalities: The Globalization of Hazardous Waste," *Business History Review* 93, (2019): 51–74; Angeliki Balayannis, "Toxic Sights: The Spectacle of Hazardous Waste Removal,"

Max Liboiron offers a pressing reminder that pollution thresholds are alleviation technologies that allow pollution up to a specific limit so that industries can continue their businesses in the name of economic prosperity. Societal concerns are usually economic concerns, also in the Nordic Region, and pollution is an unpleasant factor that disturbs ideas of well-being. It is vital, then, for a regulatory framework to figure out the exact point where environmental damage is tolerable while making as much profit as possible.[15] However, the communities who live in the place of "away" or experience the negative outcomes of these estimations do not always share the same perspectives. As such, the scientific and economic production of an "away" does not necessarily imply what it suggests, but is instead produced through infrastructures, bureaucracies, expertise, technologies, and discourses. Combined, these factors dominate local communities either by omitting, ignoring, or silencing them.

The paradoxical relationship between visibility and invisibility is a final common theme that spans the four vignettes and extends into this dissertation. The ongoing depictions of environmental degradation framed as a spectacle have become integral to a sensational and saturated media landscape. Together with benign and concerned politicians, the media plays a role where environmental conflicts in the Nordic region have achieved a state of either normalization or exception. In this way, continual political attention and media exposure have yet to provide alleviation or redemption but instead served to obscure the injustices. Cases of environmental injustice are continual but rendered singular, while the structural reasons embedded in the

Environment and Planning D: Society and Space 38, (August 2020): 772–90; Simone M. Müller, *The Toxic Ship: The Voyage of the Khian Sea and the Global Waste Trade* (Seattle: University of Washington Press, 2023).

[15] For work on thresholds and structures and the production of away see: Max Liboiron, *Pollution Is Colonialism* (Durham: Duke University Press, 2021), 4–5; 38–39; Max Liboiron and Josh Lepawsky, *Discard Studies: Wasting, Systems, and Power* (Cambridge, Massachusetts: The MIT Press, 2022), 21.

injustices are seldom addressed. If the structural and historical causes fail to be addressed, the environmental injustices signified in the vignettes are likely to re-occur albeit in a different time, space, and shape.

This dissertation takes a prismatic approach by engaging with three perspectives – industry, bureaucracy, and communities – through an environmental justice lens.[16] Specifically, I explore how the pesticide manufacturer Cheminova managed to create three of the most severe, extensive, and costly contaminated sites in Danish history while avoiding larger responsibility for its actions. For example, the company has been subject to regulations, restrictions, and legal trials but avoided the general "polluter pays principle," and thus is yet to face larger repercussions. The three contaminated sites came into existence by burying a vast amount of chemical waste in the 1950s, and they remain submerged today. Moreover, despite its owner, Aarhus University, selling the factory in 2014 for 8.5 billion Danish kroner, neither Cheminova nor Aarhus University have taken direct responsibility for contaminating the three sites.[17] This thesis provides a history of an area contaminated with toxic chemical waste by showing the complex interaction between a corporate actor, regulatory regimes, and expertise while including the people affected by these interactions.

[16] For a prismatic approach see: Jen Bagelman and Sarah Marie Wiebe, "Intimacies of Global Toxins: Exposure & Resistance in 'Chemical Valley,'" Political Geography 60 (September 2017): 78–79.

[17] Ove Kusnitzoff, "Cheminova er blevet solgt for 8,5 milliarder kroner," *Politiken*, September 8, 2014, https://politiken.dk/oekonomi/virksomheder/art5536046/Cheminova-er-blevet-solgt-for-85-milliarder-kroner.

Figure 1- A photograph of Cheminova taken outside of its premises with a disposable camera during fieldwork. Photo by Sebastian Lundsteen

By investigating pollution - specifically the relationship between chemical waste and harm - through different perspectives, I hope to overcome simple binaries of good/bad, invisible/spectacle, and victim/perpetrator.[18] Although certain actors actively pursued specific interests, I aim to provide a nuanced analysis that explores how an area became and remains heavily polluted. Furthermore, I add another layer by forwarding an analytical commitment to what Jen Bagelman and Sarah Wiebe call the "intimacies" of chemical pollution. Intimacies are experiences that can help "develop a more fulsome account of the lived impacts of toxic exposure," i.e., emotional, relational, and embodied, including resistance.[19]

[18] I primarily examine the relationship between chemical waste and harm, although in Article 1, I consider aspects of harm between Cheminova's pesticides and end-users.
[19] Bagelman and Wiebe, "Intimacies of Global Toxins," 77.

The scope of the dissertation is Cheminova, but its claims exceed the boundaries of the case by making a larger argument about environmental injustices in the Nordic Region. By providing a historical account of chemical pollution and how it unfolds today, I hope to explicate that contrary to the contemporary nature of the vignettes, there are deeper historical roots of environmental injustices in the Nordic Region that extend into the present.

In seeking to contribute to current research and provide a better understanding of the interplay between these actors, I pursue the following main research question:

How does the history of Cheminova and the material, cultural, scientific, and bureaucratic production of chemical waste nuance our understanding of pollution and environmental justice in the Nordic Region?

To answer this question, I activate four sub-questions explored in each article, which together contribute to answering the main question.

1: In what ways did Cheminova construct particular narratives around its chemicals, waste, and harmful effects? To what extent did environmentalists, politicians, and scientists challenge these narratives, and how did they change over time and across space?

2: How can emotions such as ambivalence illuminate our understanding of environmental injustices, and what is the role of historically lived and unfolding experiences of pollution in shaping community engagements in environmental issues?

3: To what extent do examinations of rumors illuminate knowledge and power structures in cases of pollution, and in what ways can rumors advance our understanding of evidence, truth, and facts in environmental justice?

4: What was Cheminova's and bureaucratic actors' role in making underground waste storage the ideal way of handling chemical pollution? Additionally, how can the concept of "submergence" help nuance the submergence and re-emergence of waste and discourses?

The initial main question is what guides this dissertation, seeking to encapsulate the general analytical interest and provide coherence to the dissertation. The question focuses on the multiple perspectives and engagements involved in Cheminova's pollution and traces these engagements and perspectives over time. The question is aimed at a broader analytical exploration of the continuation and change of pollution, which is key for understanding the historical and structural conditions that create environmental injustices in the Nordic Region. Moreover, the question holds a second part that introduces the concept of "submergence" to show how pollution and discourses are dominant but never stable.

The following questions are designed to explore perspectives from each actor to provide an extensive engagement. The first sub-question focuses on Cheminova's role in creating certain depictions of pollution and how these depictions were challenged. The second subquestion examines local environmentalists and their historically conditioned responses to a remediation process. The third subquestion explores rumors to help better grasp the integration of facts and certainty in knowledge hierarchies. The fourth and final subquestion aims at understanding how the underground is depicted as the ideal place for depositing unwanted and dangerous materials such as toxic waste. Each article includes the local community, thus actively orienting the field of Environmental Justice to accentuate marginalized perspectives. The dissertation uses a method I have termed "field history" and a concept I term "submergence." The method and the concept aim to address knowledge/power structures and amplify otherwise silenced voices. I will elaborate on field history in the methods section but allow me to meditate a bit on "submergence."

Generally, the task of "submergence" is to develop an adequate vocabulary that lends itself to describing pollution, including how we speak about it, and understand it which ultimately has effects on our engagements with it. Granted, "submergence" is by no means universal and does not explain everything but terms a specific set of relations and actions.

Broadly defined, "submergence" is a concrete act of burial or inundation, which is accompanied by a figurative dimension denoting suppression or exclusion. The concept functions as a heuristic device derived and conceived from a set of observations, allowing for an analytical exploration of aspects of hazardous waste and chemical pollution. "Submergence" is an additional foray into discursive formations surrounding the creation and management of pollution. Here, I follow Michel Foucault's conception of discursive formations, as the relationship between objects, statements, concepts, and thematic

choices within an enunciative system that ultimately expresses the power to make something true, normal, or universally accepted.[20]

Consider the four vignettes and how they signify the relationship between surface and depth in more than one way. For example, the underground is imagined as a limitless and inert space, that is ripe for unbounded extraction. It is a realm where the pursuit of rare metals and new energy forms has caused a financial boom for particular industries while states see economic opportunities. However, these industries create problems of waste - problems that require active solutions. Solutions might be dumping mine tailings in other depths, like a fjord. Alternatively, companies like Nordic Waste become a part of the solution by removing toxic waste from oil refining or previously buried minks that were feared to be contaminated with COVID-19.[21] Furthermore, the town next to Nordic Waste is in a very concrete manner at risk of being submerged by toxic soil. As such, "submergence" attends to the relationship between surface and depth, conceived as an away, but focuses on how the underground becomes an ideal space for extraction and depositing.

However, as the examples illustrate these processes are accompanied by scientific and discursive domains surrounding the creation and management of toxic waste. In the vignettes, different actors invisibilize, relativize, and normalize the destructive forces associated with mining and waste management. While groups, organizations, and individuals might be outraged and object, their voices seldom surface and if they do, they rarely remain vocal. With the participation of the industry, expertise, and institutions, pollution has become normalized

[20] Michel Foucault, *Archaeology of Knowledge*, Routledge Classics (London; New York: Routledge, 2002), 38;107;117.
[21] Henrik Vinther Nielsen, "Mystik om jord på Nordic Waste: Hvad er der i de 26 procent 'andet'? Ingeniøren," January 25, 2024, https://ing.dk/artikel/mystik-om-jord-paa-nordic-waste-hvad-er-der-i-de-26-procent-andet; Line Henriksen, "Ecohauntology," *Critical Posthumanism Network*, May 20, 2021, https://criticalposthumanism.net/ecohauntology/.

or rendered inevitable. In this way, "submergence" captures how some voices are submerged, while others are dominant. "Submergence" assists in exploring themes that orbit epistemic regimes and virtues, discourses around pollution, the nature of information, and the production of knowledge, including facts, science,[22] and expertise.

Importantly, "submergence" also suggests a re-emergence of the submerged – whether it be material objects like waste or counter-discourses like critical voices. The fluid boundaries of the concept emphasize the instability of submerging materials or discourses. The waste, the pollution, and the critical voices always have the potential of a return.

The rest of this introductory chapter proceeds in the following way: First, I will provide an extensive introduction to the three fields I engage with - environmental history, environmental justice, and Danish history. I will do so to give a good overview of the current research and explain my contributions to each field. I will then proceed by describing the relevant actors, followed by an outline of my materials and approaches before I move on to introduce and discuss field history as a central method. Next, I will engage in a brief conversation about ethics and "damage-based research" before ending the introductory chapter with a description of my conceptual framework, "submergence."

The second part of the dissertation contains four independent research articles, accompanied by an image and a short introductory text that serves as a reflective explanation of my core arguments, method, and contributions. In this way, I hope to have prioritized the flow and coherence of an otherwise fragmented format, which an article-based

[22] Specific sciences, not all sciences. See: Karen Michelle Barad, *Meeting the Universe Halfway, Quantum Physics and the Entanglement of Matter and Meaning* (Durham, N.C: Duke University Press, 2007); Isabelle Stengers, *Another Science Is Possible: A Manifesto for Slow Science* (Cambridge; Medford, Massachusets: Polity, 2018).

dissertation inevitably is. In the final section, I will discuss each article's arguments and contributions in light of the research questions and reflect on future directions.

Literature

Environmental History

Environmental history is many things to many people.[23] This rather elusive description by J.R. McNeill in 2003 nevertheless illustrates the futility of any strict characterization of the field as it concerns anything related to the environment. Furthermore, the loose portrayal points to the way that environmental history has continually and rhizomatically spread to include an ever-expanding range of themes and approaches.[24] Initially and importantly, the field emerged with a strong political ethos that included a desire to make progressive change inspired by the environmental movement from the 1960s and 1970s.[25] However, McNeill observed in the same article from 2003 that environmental history had steadily declined from activist-based research commitments - a position he maintained in 2010.[26]

Nevertheless, environmental history finds itself amidst a global, but uneven, predicament that has begun to reveal the consequences of a 150-year growth regime. The accelerating environmental degradation produced by particular geographies and industries on a permanently polluted planet has come to characterize substantial parts of the contemporary environmental situation.[27] "Late Industrialism," as Kim

[23] J. R. McNeill, "Observations on the Nature and Culture of Environmental History," *History and Theory*, (2003): 6.
[24] For a recent overview of environmental history see: Emily O'Gorman et al., eds., The Routledge Handbook of Environmental History, Routledge International Handbooks (Abingdon, Oxon; New York, NY: Routledge, 2024), 1–14.
[25] J.R. McNeill, "The State of the Field of Environmental History," *Annual Review of Environment and Resources* 35, no. 1 (November 21, 2010): 349.
[26] McNeill, "Observations on the Nature and Culture of Environmental History," 34; McNeill, "The State of the Field of Environmental History," 359–60.
[27] Christophe Bonneuil and Jean-Baptiste Fressoz, The Shock of the Anthropocene: The Earth, History and Us, trans. David Fernbach, (New York, NY: Verso, 2017); John Robert McNeill and Peter Engelke, The Great Acceleration - An Environmental

Fortun terms it, presents a new situation where "natural, technical, political-economic, social, and political systems" have achieved a normalization of environmental destruction and securing a business as usual.[28] As such, the demand to scrutinize the historical causes that have provoked a planetary retaliation in what some, not unproblematically, term the "Anthropocene" has been renewed and increased.[29]

Traditionally, environmental history has forwarded highly sophisticated historical analyses of industrially produced chemicals, toxic waste, and pollution. For example, the work of Nancy Langston has shown the failure of regulating endocrine-disrupting chemicals because they failed to "fit within traditional risk paradigms" defying previous understandings about toxicity, such as thresholds, dose, age, and timing.[30] Linda Nash follows a similar argument but places the body in the landscape and through a cultural history of the environment. Nash traces the different perceptions between health and the environment and asks how chemical exposure became pervasive and invisible while

History of the Anthropocene Since 1945 (Cambridge, Massachusetts: Harvard University Press, 2014).

[28] Kim Fortun, "From Latour to Late Industrialism," *HAU: Journal of Ethnographic Theory* 4, (June 2014): 310.

[29] By using the word retaliation, I do not mean to suggest that the planet has its own will and acts as a concerted agency, but rather retaliation as a consequence of the actions of a specific group of people and a specific economic and structural arrangement. The universalizing tendencies and the "anthro" in Anthropocene as a form of exceptionalism obscures the unequal distribution of environmental violence connected with climate change. See: Donna J. Haraway, Staying With the Trouble: Making Kin in the Chthulucene, (Durham: Duke University Press, 2016); Andreas Malm and Alf Hornborg, "The Geology of Mankind? A Critique of the Anthropocene Narrative," The Anthropocene Review 1, (April 2014): 62–69; Donna Haraway, "Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin," Environmental Humanities 6 (2015); Jason W. Moore, Anthropocene or Capitalocene? Nature, History, and the Crisis of Capitalism (Oakland, CA: PM Press, 2016).

[30] Nancy Langston, *Toxic Bodies: Hormone Disruptors and the Legacy of DES* (New Haven: Yale University Press, 2010), 5–6.

focusing on the entanglements between land and body.[31] These two major contributions belong to a large body of research that explores the epistemologies of pollution by looking at the scientific and bureaucratic aspects.[32] What characterizes this strand of research, is the ways in which science and bureaucracy either fail or neglect to adequately regulate chemical pollution.

While corporate polluters have been critically scrutinized, the temporal complexities of chemicals have been instructive in furthering our understanding of pollution.[33] Taken together, this scholarship has radically changed our perception of pollution. By attending to

[31] Linda Lorraine Nash, *Inescapable Ecologies: A History of Environment, Disease, and Knowledge* (Berkeley: University of California Press, 2006), 5–8.

[32] I would emphasize these historical works as specifically important to my understanding of pollution: Michelle Murphy, Sick Building Syndrome and the Problem of Uncertainty: Environmental Politics, Technoscience, and Women Workers (Durham: Duke University Press, 2006); Michelle Murphy, "Chemical Infrastructures of the St. Clair River," in Toxicants, Health and Regulation since 1945, ed. Soraya Boudia and Nathalie Jas (New York, NY: Routledge, Taylor & Francis Group, 2013), 103–17; Michelle Murphy, "Chemical Regimes of Living," Environmental History 13, (2008): 695–703; Gregg Mitman, Michelle Murphy, and Christopher Sellers, eds., Landscapes of Exposure: Knowledge and Illness in Modern Environments, (Chicago, Ill: University. of Chicago Press, 2004); Evan Hepler-Smith, "Molecular Bureaucracy: Toxicological Information and Environmental Protection," Environmental History 24, no. 3 (July 1, 2019): 534–60; Soraya Boudia and Nathalie Jas, "Introduction: Risk and 'Risk Society' in Historical Perspective," History and Technology 23, (December 2007): 317–31; Soraya Boudia et al., "Residues: Rethinking Chemical Environments," Engaging Science, Technology, and Society 4 (June 28, 2018): 165–78; Frederick Rowe Davis, Banned: A History of Pesticides and the Science of Toxicology (New Haven: Yale University Press, 2014).

[33] Benjamin Ross and Steven Amter, The Polluters: The Making of Our Chemically Altered Environment (Oxford: Oxford University Press, 2010); Simone M. Müller, "Corporate Behaviour and Ecological Disaster: Dow Chemical and the Great Lakes Mercury Crisis, 1970–1972," Business History 60, (April 3, 2018): 399–422; Gregg Mitman, Empire of Rubber: Firestone's Scramble for Land and Power in Liberia (New York: The New Press, 2021); Bartow J. Elmore, Seed Money: Monsanto's Past and Our Food Future (New York, NY: W.W. Norton & Company, 2021); Simone M. Müller and May-Brith Ohman Nielsen, eds., Toxic Timescapes: Examining Toxicity across Time and Space (Athens: Ohio University Press, 2022); Barbara Adam, Timescapes of Modernity: The Environment and Invisible Hazards (London : New York: Routledge, 1998).

numerous actors, structures, and phenomena, the field has problematized the nature/culture and land/body dichotomy, challenged perceptions of an "away," and shown the entanglements of science, politics, and power - while illuminating the uncertain and evasive properties of chemicals as an achievement.[34]

While much of this research has had a profound impact on environmental history in general, newer research has implicitly or explicitly aligned with a more active and justice-based agenda.[35] For example, Simone Müller introduces a "toxic commons" that challenges environmental historians to rewrite the history of environmental justice in ways that are attuned to the shared but uneven condition of living on a permanently polluted planet.[36] Marco Armiero's work on the "Wasteocene" critically asks whether historians have participated in making a "narrative infrastructure" that has erased environmental injustices and perpetuated a distinct othering as wasted.[37] In this way, Armiero frames history and the historian as inevitably active in maintaining certain narratives, despite whether the discipline frames itself as apolitical or not. This idea resonates with Stefania Barca,

[34] Michael Egan, "Chemical Unknowns: Preliminary Outline for an Environmental History of Fear," in *New Natures: Joining Environmental History with Science and Technology Studies*, ed. Dolly Jørgensen, Finn Arne Jørgensen, and Sara B. Pritchard (Pittsburgh, Pennsylvania: Pittsburgh University Press, 2013), 124–38; Iris Borowy, "Making Sense of the History of Toxicity: How Poisonous Pasts May Have Touched Me and Everybody Else," *Environmental History* 26, (July 17, 2021): 411–24; Michelle Mart, *Pesticides, a Love Story: America's Enduring Embrace of Dangerous Chemicals.* (Lawrence, Kansas: University Press of Kansas, 2018).

[35] Environmental History and environmental justice are not strangers, and I do want to acknowledge to great and inspirational work of environmental historians such as Martin Melosi. Martin V. Melosi, "Equity, Eco-Racism and Environmental History," *Environmental History Review* 19 (1995); Martin V. Melosi, "Environmental Justice, Political Agenda Setting, and the Myths of History," *Journal of Policy History* 12, no. 1 (January 2000): 43–71.

[36] Simone M. Müller, "Toxic Commons: Toxic Global Inequality in the Age of the Anthropocene," *Environmental History* 26, no. 3 (July 17, 2021): 448.

[37] Marco Armiero, *Wasteocene: Stories from the Global Dump*. (Cambridge, UK: Cambridge University Press, 2021), 17–18.

whose work demonstrates an explicit commitment to a justice-based approach and critiquing "mainstream narratives."[38] While the critique is prevalent in all of these literatures, they are dedicated to overcoming an apocalyptic "lullaby of finitude" and look to "how it can be otherwise."[39] For example, Michelle Murphy's concept of "alterlife," acknowledges that "life forged in ongoing chemical violence is also open to becoming something else (…) within oneself and each other, here in the damage now."[40] "Alterlife," engages with the important task of examining the historical circumstances that acknowledge the present situation, but integrates the political temporal project of imagining other futures,

This dissertation builds on the current body of research and contributes by examining the relationship between industry and authorities, but with an explicit emphasis on the local community. As such, I am interested in understanding the historical circumstances of chemical pollution through an exploration of Cheminova and the regulating authorities through archival research. I reinforce this strategy by sitting with the community and learning their histories and perspectives. As each article demonstrates, research within communities opens alternate aspects of pollution that can help understand the complexities of environmental issues.

---

[38] Stefania Barca, "Telling the Right Story: Environmental Violence and Liberation Narratives," *Environment and History* 20, (November 1, 2014): 541; Stefania Barca, *Forces of Reproduction: Notes for a Counter-Hegemonic Anthropocene* (Cambridge University Press, 2020), 42–51.

[39] Elizabeth A. Povinelli, On Biopolitics And The Anthropocene: Elizabeth Povinelli, interviewed by Kathryn Yusoff and Mat Coleman, interview by Kathryn Yusoff and Mat Coleman, accessed February 27, 2024, https://www.societyandspace.org/articles/on-biopolitics-and-the-anthropocene; Elizabeth A. Povinelli, *Geontologies: A Requiem to Late Liberalism* (Durham: Duke University Press, 2016); Elizabeth A. Povinelli, "The Will to Be Otherwise/The Effort of Endurance," *South Atlantic Quarterly* 111, (July 1, 2012): 453–75.

[40] Michelle Murphy, "Alterlife and Decolonial Chemical Relations," *Cultural Anthropology* 32, (November 18, 2017): 501.

I found it imperative to include other types of knowing for two reasons. First, to avoid writing a "fundamentally pessimistic" environmental history that has dominated the discipline.[41] Although there is certainly much room for criticizing the chemical industry, its pollution, and its regulation - and there are plenty of things to be pessimistic about - including other perspectives is helpful in exceeding a mere critique.

Secondly, working with and within communities can teach valuable lessons about knowledge and expertise, which leads to my second motive for including other ways of knowing.[42] Turning to actors other than conventional understandings of experts, I seek to destabilize general assumptions about expertise by asking questions about justice and dominant narratives. I aim to pluralize and surface perspectives that challenge reigning epistemologies and ontologies that surround and pervade discourses of pollution. In this way, I seek to activate and utilize environmental history in the "ongoing aftermath" of chemical pollution by situating the research in a community living in a contaminated area.[43]

The thesis responds to new directions in environmental history, which demand "critical self-reflexivity and engagements."[44] As stated in the recent Handbook of Environmental History, the field "can no longer

[41] Finn Arne Jørgensen et al., "Entangled Environments: Historians and Nature in the Nordic Countries," *Historisk Tidsskrift* 92, (March 26, 2013): 10,; Bo Fritzbøger, "Miljøhistorie - Er Der Noget Nyt under Solen?," in *Miljöhistoria Över Gränser*, ed. Fredrik Björk, Per Eliasson, and Bo Fritzbøger (Malmö: Malmö högskola, 2006), 23, J.R. McNeill, "The State of the Field of Environmental History," *Annual Review of Environment and Resources* 35, (November 21, 2010): 345–74.

[42] The relationship between academia and activism including the flow of concepts and slogans are explored by EJ scholar Joan Martinez-Alier See: Joan Martinez-Alier and Stanislav Shmelev, "Between Activism and Science: Grassroots Concepts for Sustainability Coined by Environmental Justice Organizations," *Journal of Political Ecology* 21, (December 1, 2014): 47–48.

[43] Murphy, "Alterlife and Decolonial Chemical Relations," 500.

[44] Cintia Velázquez-M et al., "Future Directions in Environmental History," in *The Routledge Handbook of Environmental History*, ed. Emily O'Gorman et al., 2024, 418.

operate under the same assumptions, epistemologies, and methodological and systematic approaches as it has in the past."[45] As such, the dissertation re-positions itself to McNeill's observation that environmental history has experienced a decline in societal or activist engagement. As the collective "Historians for Future" reminds us, history is much more than passive knowledge production; it is an active engagement and commitment to present affairs by contributing to a different future.[46]

Environmental Justice

Despite a seemingly bleak contemporary environmental situation, a wide range of actors, old and new environmentalists, neighbors and artists, indigenous peoples and academics have joined in "unlikely alliances" that aim to build better and more just futures.[47] An important field that associates and actively pursues such research agendas is environmental justice (EJ).[48] Originating in a North American context, EJ originally and predominantly focused on waste and toxicity and how racism manifested through unequal distributions of environmental harms. Methodically, the field transformed conjectural hypotheses into a larger pattern that showed structural discrimination.[49] Given its

[45] Ibid., 414.

[46] I am a part of the group, that has persistently had conversations about the nature and future of environmental history. "History Happens Now – A Response to 'Is History History?'" August 22, 2022, https://historiansforfuture.org/history-happens-now-a-response-to-is-history-history/. Although the group is now more or less defunct, the friendships and collaborations remain.

[47] I am inspired by one of my mentors Bethany Wiggin's explorations of the" unlikely," in relation to environmental issues. For one example, see "Unlikely Comparisons" in Nikhil Anand et al., "Enduring Harm: Unlikely Comparisons, Slow Violence and the Administration of Urban Injustice," *International Journal of Urban and Regional Research* 46, (July 2022): 651–59.

[48] Martinez-Alier and Shmelev, "Between Activism and Science"; Joan Martinez-Alier et al., "Is There a Global Environmental Justice Movement?" *The Journal of Peasant Studies* 43, (May 3, 2016): 731–55.

[49] Robert D. Bullard, *Dumping in Dixie: Race, Class, and Environmental Quality*, 3. ed (Westview Press, 2000); United Church of Christ and Commission for Racial

context, the focus on racism and structural oppression of marginalized peoples remains a substantial part of the current field. However, akin to environmental history, EJ is facing rapid expansion both geographically, thematically, and conceptually, while it is still being written.[50]

Although the field is proliferating, a tentative overview indicates that a Nordic EJ is yet to be developed.[51] There might be unstated research interests, different vocabularies addressing the same themes, or overlap with the field of political ecology, but an explicit commitment and engagement with the field of environmental justice is yet to be seen. In the fall of 2022, I co-organized a workshop gathering early career

Justice, "Toxic Wastes and Race in the United States," 1987; Dorceta E. Taylor, *Toxic Communities: Environmental Racism, Industrial Pollution, and Residential Mobility* (New York: New York University Press, 2014); David Schlosberg, *Defining Environmental Justice* (Oxford University Press, 2007); Robert D Bullard, "Environmental Justice: It's More Than Waste Facility Siting," *Social Science Quarterly*, no. 3 (1996); Laura Pulido, "A Critical Review of the Methodology of Environmental Racism Research," *Antipode* 28, (April 1996): 142–59.

[50] Paul Mohai, David Pellow, and J. Timmons Roberts, "Environmental Justice," *Annual Review of Environment and Resources* 34, (November 1, 2009): 405–30; David N. Pellow, *What Is Critical Environmental Justice?* (Medford, MA, USA: Polity Press, 2018); Alice Mah and Thom Davies, *Toxic Truths: Environmental Justice and Citizen Science in a Post-Truth Age.* (Manchester UK: Manchester University Press, 2020), 2–4; Julian Agyeman and Bob Evans, "'Just Sustainability': The Emerging Discourse of Environmental Justice in Britain?," *The Geographical Journal* 170, (2004): 155–64; David Schlosberg, "Theorising Environmental Justice: The Expanding Sphere of a Discourse," *Environmental Politics* 22, (February 2013): 37–55.

[51] My tentative overview has included these articles. While there are overlaps with political ecology, there has yet to be a formalized environmental justice field. See: Heike Köckler et al., "Environmental Justice in Western Europe," in *The Routledge Handbook of Environmental Justice* (London; New York: Routledge, Taylor & Francis Group, 2018), 627–41; "EJAtlas," accessed August 25, 2022, http://www.envjustice.org/ejatlas/; Tor A. Benjaminsen and Paul Robbins, "Nordic Political Ecologies," *Norsk Geografisk Tidsskrift - Norwegian Journal of Geography* 69, (August 8, 2015): 191–96; Karen Bell, *Achieving Environmental Justice: A Cross-National Analysis*. (Bristol University Press, 2014): 119-140.

researchers working on EJ in the Nordic Region.[52] The workshop demonstrated how an increasing body of scholars is seeking to develop the field of environmental justice in the Nordic Region. As a critical tool, EJ holds the potential for challenging assumptions of Nordic exceptionalism by pointing to the injustices manifested through environmental discrimination. As such, EJ confronts traditional perceptions of the environment, by arguing that the environment is where we live and not necessarily a pristine space or enchantment.[53]

Despite the North American influence on EJ, a Nordic EJ does not automatically entail an analytical replication of settler colonialism or racism, but neither does it foreclose them. For example, while it would be incorrect to suggest that this dissertation is about settler colonialism, the vignettes introducing this thesis clearly demonstrate the existence of colonialism in the Nordic Region. Moreover, scholars like May-Britt Öhman and Hugo Reinert, have repeatedly and admirably shown the colonial logics and environmental discrimination of indigenous communities in the Nordic Region.[54]

This dissertation focuses on a Danish case and provides only one example of environmental injustice that nevertheless shows structural aspects at the root of the injustices. Arguably the distributional politics

[52] "Presenting the Greenhouse Green Transitions Programme | University of Stavanger," November 10, 2022, https://www.uis.no/en/research/presenting-the-greenhouse-green-transitions-programme.

[53] Cecilie Rubow, "The Indoor People's Enchanted Ecologies," *Environmental Humanities* 14, (July 1, 2022): 475–93; Bell, *Achieving Environmental Justice*; Schlosberg, *Defining Environmental Justice*.

[54] May-Britt Öhman, "The Ski or the Wheel?," in *Routledge Handbook of Critical Indigenous Studies*, by Brendan Hokowhitu et al. (Abingdon, Oxon; New York, NY: Routledge, 2020), 431–46; May-Britt Öhman, "TechnoVisions of a Sámi Cyborg: Reclaiming Sámi Body-, Land-, and Waterscapes After a Century of Colonial Exploitations in Sábme," in *Illdisciplined Gender*, ed. Jacob Bull and Margaretha Fahlgren (Cham: Springer International Publishing, 2016), 63–98; Hugo Reinert, "The Midwife and the Poet," *Environmental Humanities* 11, (May 1, 2019): 137–51; Hugo Reinert, "The Skulls and the Dancing Pig: Notes on Apocalyptic Violence," *Terrain*, no. 71 (April 11, 2019).

in Denmark might have been comparatively more fair than elsewhere, and it is not necessarily evident that pollution is structurally targeting marginalized groups. A pattern might emerge with more research incorporating a justice-based agenda, but it is too premature to make any conclusions. For example, a provisional overview of waste sites does not indicate structural environmental discrimination, but investigations of gender, ethnicity, the relationship to Greenland through an environmental prism, and urban pollution might show otherwise. As Francois Verges, among others, has shown, infrastructures of (environmental) discrimination thrive on being invisible.[55] I consider this thesis as a step towards a more exhaustive analysis of environmental injustices in Denmark.

Placing EJ in a Nordic regional context calls for heightened sensitivity in terms of comparison and scale. Environmental harms are not the same nor do they have the same intensity everywhere – in some places, they might seem banal or mild, while in others, they constitute a life-threatening situation.[56] However, it remains a crucial task to recognize the entanglements of a seemingly benign actor in a convivial and affluent geography like Denmark and place it in larger structures of environmental violence. As environmental injustices follow globalized patterns, Environmental Justice must be seen as a relationship between places.[57] Recalling Simone Müller's "Toxic Commons" is a call for an

[55] Françoise Vergès, "Capitalocene, Waste, Race, and Gender," *E-Flux*, June 10, 2019, https://www.e-flux.com/journal/100/269165/capitalocene-waste-race-and-gender/.

[56] Nathalia Brichet terms the Anthropocene in Denmark a "mild apocalypse" while Heather Swanson identifies a mundane or banality in convivial places that are nevertheless entangled in violent structures: Nathalia Brichet, "Mild Apocalypse (2016)," 2016, https://anthropocene.au.dk/exhibitions/mild-apocalypse-2016/; Heather Anne Swanson, "The Banality of the Anthropocene," *Society for Cultural Anthropology*, February 22, 2017, https://culanth.org/fieldsights/the-banality-of-the-anthropocene.

[57] I learned this important lesson from Val Plumwood, David Nguib Pellow, and Laura Pulido: Val Plumwood, "Shadow Places and the Politics of Dwelling," *Australian Humanities Review*, (2008),

examination of a "paradoxical we," that grapples with the unevenness and complicity of planetary environmental degradation.[58] By considering larger structures in which the Nordic Region is implicated and participates a Nordic EJ aims a place the region within a global frame of justice.

Furthermore, this dissertation contributes by speaking to two important developments in the field. First, EJ has recently begun questioning the nature of evidence, data, and participation as a guarantee of justice.[59] Environmental Data Justice, for example, is a radically new development that challenges the very premise of data production. Information and evidence are produced with the aid of technologies and within structures that account for some things and not others.[60] Moreover, industry-produced information and "evidential cultures" combined with what Gwen Ottinger terms "institutional" and "hermeneutic ignorance" do not hold prospects of betterment.[61] These

---

http://australianhumanitiesreview.org/2008/03/01/shadow-places-and-the-politics-of-dwelling/; Laura Pulido, "Rethinking Environmental Racism: White Privilege and Urban Development in Southern California," *Annals of the Association of American Geographers* 90, (2000): 12–40; David N. Pellow, *Resisting Global Toxics: Transnational Movements for Environmental Justice*, Urban and Industrial Environments (Cambridge, Mass: MIT Press, 2007).

[58] Müller, "Toxic Commons," 448.

[59] Sheila Jasanoff, "Virtual, Visible, and Actionable: Data Assemblages and the Sightlines of Justice," *Big Data & Society* 4, 1-15. (December 2017).

[60] Alice Mah, "Environmental Justice in the Age of Big Data: Challenging Toxic Blind Spots of Voice, Speed, and Expertise," *Environmental Sociology* 3, (April 3, 2017): 122–33; Lourdes A. Vera et al., "When Data Justice and Environmental Justice Meet: Formulating a Response to Extractive Logic through Environmental Data Justice," *Information, Communication & Society* 22, (June 7, 2019): 1012–28; Eric Nost and Jenny Elaine Goldstein, "A Political Ecology of Data," *Nature and Space E* 5. 3–17 (2021): 15.

[61] Henri Boullier and David Demortain, "Inventing Prediction for Regulation: The Development of (Quantitative) Structure-Activity Relationships for the Assessment of Chemicals at the US Environmental Protection Agency," *Technology Studies*, 2021.; Gwen Ottinger, "Misunderstanding Citizen Science: Hermeneutic Ignorance in U.S. Environmental Regulation," *Science as Culture* 31, (October 2, 2022): 504–29; Erik Kojola and David N. Pellow, "New Directions in Environmental Justice Studies:

new interests show how injustices are integral to the same systems that are supposed to secure justice by pointing to the many ambiguities and paradoxes, including the researcher's complicity and positionality.[62] This dissertation examines these themes by questioning the role of technology and expertise within environmental claims-making and contributes by introducing concepts such as ambivalence and rumors.

Secondly, central to EJ is the recuperation of collective imaginaries in a local and global situation whose scale and size are impossible to grasp, while marked by slow and fast violence.[63] EJ focuses on a bottom-up approach that includes knowledge and experiences and facilitates a dynamic interaction between researchers and communities.[64] This thesis actively uses Donna Houston's idea of "Environmental Justice Storytelling," a multi-temporal articulation of experiences of a contaminated place that also permits the formulation of other visions.[65] The desire to make *a* world exempt from environmental damage is an ongoing project grounded in the local environmental justice

Examining the State and Violence," *Environmental Politics* 30, (February 23, 2021): 100–118.

[62] Nicholas Shapiro, Nasser Zakariya, and Jody A. Roberts, "Beyond the Data Treadmill: Environmental Enumeration, Justice, and Apprehension," in *Toxic Truths*, ed. Thom Davies and Alice Mah (Manchester: Manchester University Press, 2020).

[63] Amitav Ghosh, *The Great Derangement: Climate Change and the Unthinkable*, (Chicago: The University of Chicago press, 2017); Timothy Morton, *Hyperobjects: Philosophy and Ecology after the End of the World*, (Minneapolis, Minnesota: University of Minnesota press, 2013); Rob Nixon, *Slow Violence and the Environmentalism of the Poor*, (Cambridge, Mass.: Harvard Univ. Press, 2013); Deborah Bird Rose, "Slowly ~ Writing into the Anthropocene," *TEXT* 17, 20 (October 31, 2013); Anand et al., "Enduring Harm."

[64] Gwen Ottinger, "Buckets of Resistance: Standards and the Effectiveness of Citizen Science," *Science, Technology, & Human Values* 35, (March 2010): 244–70,; Shapiro, Zakariya, and Roberts, "Beyond the Data Treadmill"; *Dr. Max Liboiron "BabyLegs" | Nature–Design Triennial*, 2019, https://www.youtube.com/watch?v=9UD6tNSGyzE; Ottinger, "Misunderstanding Citizen Science."

[65] Donna Houston, "Environmental Justice Storytelling: Angels and Isotopes at Yucca Mountain, Nevada," *Antipode* 45, (March 2013): 417–35.

community.[66] In this way, examining the historical roots is an important tool for understanding the current moment while learning from past struggles.[67] Navigating and moving beyond this historical juncture requires a multifaceted approach that includes heterogeneous understandings of knowledge production and collaboration.

These two developments enable a generous cross-fertilization between environmental history and environmental justice, which I have attempted to pursue in the dissertation. In contrast to Christopher G. Boone and Geoffrey L. Buckley, who primarily discuss how historical research can inform environmental justice communities, learning with and from communities, decenters expertise and enables a more relational approach to knowledge.[68] Moreover, historical research can contribute to environmental justice communities, not just by providing "data," but by historicizing data in the nexus of power and knowledge.

Danish History

Although this dissertation is informed by environmental history, given its status and exposure, it inevitably contributes to the Danish historical landscape. Traditionally, Danish environmental history is closely related to a general Danish historiography. In the 1980s, Jesper Hoffmeyer provided a broad history of societal-environmental engagements, while Thorkild Kjærgaard in his Donald Worster-

[66] I explicitly use "a" world to acknowledge that there are many projects dedicated to building many worlds. See for example Joseph Masco, "The Artificial World," in *Reactivating Elements: Chemistry, Ecology, Practice*, ed. Dimitris Papadopoulos, María Puig de la Bellacasa, and Natasha Myers (Durham; London: Duke University Press, 2021), 130–50. and John Law, "What's Wrong with a One-World World?" *Distinktion: Journal of Social Theory* 16, (January 2, 2015): 126–39.

[67] Joseph Masco, *The Future of Fallout, and Other Episodes in Radioactive World-Making* (Duke University Press, 2020), 355; Julie Sze, *Environmental Justice in a Moment of Danger* (Oakland, California: University of California Press, 2020), 4.

[68] Christopher G. Boone and Geoffrey L. Buckley, "Historical Approaches to Environmental Justice," in *The Routledge Handbook of Environmental Justice*, by Ryan Holifield, Jayajit Chakraborty, and Gordon Walker, ed. Ryan Holifield, Jayajit Chakraborty, and Gordon Walker. (Routledge, 2017), 222.

inspired ecohistory covered the Danish agricultural transformation.[69] More recently, Poul Holm and Bo Poulsen have shown the entanglements of coastal communities and marine environments, while Mogens Rüdiger and Flemming Petersen have done enormous work on the history of renewable energy, and Bo Fritzbøger has explored landscape transformations.[70] These perspectives are integral to any understanding of the emergence of the Danish nation-state.

In light of climate change, a green transition, and interdisciplinary fields such as environmental humanities, there has been a re-vitalization of Danish history through environmental analysis. New scholarship engages with societal affairs with larger scope and implications through examinations of climate, politics, regulation, technology, international collaboration, environmental movements, sustainability, urban infrastructure, and water.[71] Given the rapid

[69] Jesper Hoffmeyer, *Samfundets naturhistorie* (Charlottenlund: Rosinante, 1982); Thorkild Kjærgaard, *Den danske Revolution: 1500 - 1800; en økohistorisk tolkning*, (København: Gyldendal, 1996).

[70] Bo Poulsen, Poul Holm, and Brian R. MacKenzie, "A Long-Term (1667–1860) Perspective on Impacts of Fishing and Environmental Variability on Fisheries for Herring, Eel, and Whitefish in the Limfjord, Denmark," *Fisheries Research* 87 (2007): 181–95; Heike K. Lotze et al., "Human Transformations of the Wadden Sea Ecosystem through Time: A Synthesis," *Helgoland Marine Research* 59 (April 1, 2005): 84–95,; Mogens Rüdiger, "From Coal to Wind: How the Danish Energy Policy Changed in 1990," *Scandinavian Journal of History* 44, (August 8, 2019): 510–30; Flemming Petersen, *Da Danmark fik vinger: vindmøllehistorien 1978-2018.*. (Aarhus: Danmarks Vindmølleforening, 2018); Bo Fritzbøger, *Det Åbne Lands Kulturhistorie - Gennem 300 år*, København: Biofolia, 2004).

[71] A brief overview: Holm Jesper, Holm Jesper, Lars Kjerulf Petersen, Jeppe Læssøe, Arne Remmen, and Carsten Jahn Hansen. *Økologisk modernisering på dansk: brud og bevægelser i miljøindsatsen*. København: Frydenlund, 2007; Oluf Danielsen, *Klimaet på dagsordenen: dansk klimadebat 1988 - 2012* (København: Multivers, 2015); Niklas Olsen, "Klimapolitikkens Idéhistorie i Danmark 1980-2022.," *Historisk Tidsskrift* 122, (2023): 182–202; Niklas Olsen and Rasmus Skov Andersen, "Shielding the Market from the Masses: The Origins of Libertarian Anti-Environmentalism in the 1960s and 1970s," *Journal of Modern European History* 20, (August 2022): 304–10; Nina Toudal Jessen, "Jord og landskab. Relationelle landskabsforandringer i det 20. århundrede" (University of Copenhagen, 2022); Nina Toudal Jessen, "Hvor går grænsen? Om naturfredning som oversættelse fra

planetary environmental deterioration and the ongoing consequences of climate change –several themes seek to explain contemporary phenomena by examining historical conditions that underpin present concerns.[72]

By investigating Cheminova, this dissertation contributes to Danish history in two distinct ways. First, because it addresses a general shortage. Bo Poulsen's recent overview of Danish environmental history attests that a few areas still require attention, despite the field's current momentum.[73] Poulsen points explicitly to Cheminova and the toxic heritage sites as one of the areas that need further examination, nationally and globally.[74] Given its prominence in Danish history and media exposure, it might be a surprise that no humanities or social sciences have examined Cheminova. The limited contributions include short entries in Wikipedia, National History Portal, or article

virkelighed til kort," *Tidsskrift for kulturforskning*, (2022); Mikkel Høghøj and Mikkel Thelle, "Material Politics: Approaching Welfare History through Urban Water in 20th Century Denmark," *Scandinavian Journal of History*, December 4, 2023, 1–23; Mikkel Thelle and Mikkel Høghøj, eds. *Environment, Agency, and Technology in Urban Life in the Global North since c.1750: Technonatures in the Global North* (Palgrave Macmillan, 2023); Signe Brieghel and Nina Toudal Jessen, "Fjorden Under Jorden: Grundforbedringsprojekter og historisk dødvande i Vejle og Hjarbæk fjorde," 2023; Melina Antonia Buns, "Making a Model: The 1974 Nordic Environmental Protection Convention and Nordic Attempts to Form International Environmental Law," *Scandinavian Journal of History*, May 5, 2022, 1–23; Asger Hougaard, ed., *Miljøbevægelsens rødder: en antologi*, (Københavns.: NOAH, 2019); Nils Arne Sørensen and Louise Nyholm Kallestrup, "Bæredygtighedshistorie," *Temp - tidsskrift for historie* 12, (June 17, 2022): 5–10;; Asger Hougaard, "Græsrødder: Miljøorganisationen NOAHs Politik Og Strategi 1969-2009" forthcoming.

[72]Previous research had the same motivations, but contemporary research appears somewhat different. For some of the most inspiring contributions recently see: Niklas Olsen and Casper Sylvest, "Atomkraftens fortalere i Danmark. En samtidshistorisk analyse," *Historisk Tidsskrift*, 2023, https://tidsskrift.dk/historisktidsskrift/article/view/135566; Signe Brieghel et al., "Nye Køer På Gammelt Græs: Foder, stofskifte og planetære grænser i dansk malkekvægbrug," *Kulturstudier* 2 (2022): 20.

[73] Bo Poulsen, "Tendenser Og Muligheder i Dansk Og International Miljøhistorie," *Temp - Tidsskrift for Historie* 12, (June 17, 2022): 152–73.

[74] Ibid., 157.

footnotes.[75] However, ethnologist Jørgen Burchardt has begun producing crucial work on Cheminova's early years.[76] The shortage of research likely points to a general tendency as outlined by Poulsen, when considering that similar cases of corporate polluters, like Props Kemiske Fabrik, Grindstedværket, and Superfos, are yet to be examined.

Secondly, this thesis contributes to a critical history of the Danish welfare state. Pollution in a Danish context has predominantly been explored through environmental regulation, waste or waste management, infrastructure, or urban health. However, these important investigations have to a lesser extent engaged with critical societal questions or engaged with corporate polluters. Moreover, chemical pollution remains an under-researched area in Danish historiography, with little incorporation of community – or justice - perspectives.[77] As such, this dissertation advances general knowledge about pollution in Denmark by historicizing and contextualizing pollution that scrutinizes the relationship between expertise, the state, and corporations. Moreover, because of Cheminova's societal position, its connection to Aarhus University, and how the environmental scandals illuminated the shortcomings of regulation and bureaucracy, the dissertation asks questions about health, justice, and knowledge production. As such, the

[75] "Cheminova, Bladan Er Duften Af Barndomsminder - 1001 Fortællinger Om Danmark," accessed December 15, 2023, http://www.kulturarv.dk/1001fortaellinger/da_DK/cheminova/stories/bladan-er-duften-af-barndomsminder; "Cheminova (Auriga) 1938-2014," accessed December 15, 2023, https://danmarkshistorien.dk/vis/materiale/cheminova-auriga-1938-2014; Nina Toudal Jessen, "Hvor går grænsen? Om naturfredning som oversættelse fra virkelighed til kort," *Tidsskrift for kulturforskning*, no. 2 (2022): 1.

[76] Jørgen Burchardt, "Cheminova - En Generationforureners Første År," *Gladsaxe Lokalhistoriske Forenings Årbog 2022*, 2022, 5–35; Af Jørgen Burchardt, "Syntetiske pesticider og Cheminova 1943-1954 - offentlig regulering af giftproduktion og miljøforurening i historisk perspektiv," 2021, 98; Jørgen Burchardt, "Cheminova – en miljøforurener i Måløv," *Byhornet* 51, (2022).

[77] Examples of the sparse but diverse field see the monograph Jens Engberg, *Det heles vel*; The special issue on waste: Camilla Mordhorst and Dorthe Gert Simonsen, "Skrald"; and the interdisciplinary research project "Bylivets sorte omstilling."

thesis extends its sphere of investigation into some of the core institutions of the Danish welfare state.

Through an exploration of Cheminova, this dissertation provides a domestic example of the uneven distribution of environmental harm. By scrutinizing the circumstances of Cheminova's pollution, I show the difference between geographies within the national boundaries, and how some places became peripheral, thus pollutable. By situating international research within a Danish context allows the thesis to open a wide range of perspectives. For example, a specifically salient feature of what Marco Armiero terms the "Wasteocene," describes the "socio-ecological relations creating wasted people and wasted places." [78] A wasted othering not only works in contrast to a clean us but as Traci Lynn Voiles demonstrates, is a convergence of discourse and space - a pre-configuration allowing other places to be polluted.[79] Such perspectives are critical for understanding the historical and ongoing discursive and environmental damage peripheral communities, such as Harboøre Tange, have been subjected to.

By providing a Danish case of pollution, I add to the body of scholars who are critical of "Nordic exceptionalism." I do so, by foregrounding environmental aspects while emphasizing the consequences of ongoing chemical harm produced by a corporation with state participation. In this way, the thesis refrains from perpetuating narratives of a region depicted as environmental pioneers or "do-gooders."[80] I respond to Stefania Barca's and Marco Armiero's observations about the lack of critical perspectives within Western environmental historiography. For example, Barca elaborates on two forms of narrative violence: the

[78] Armiero, *Wasteocene*, 10.
[79] Traci Brynne Voyles, *Wastelanding: Legacies of Uranium Mining in Navajo Country* (Minneapolis: University of Minnesota Press, 2015).
[80] David Larsson Heidenblad, *Den gröna vändningen: En ny kunskapshistoria om miljöfrågornas genombrott under efterkrigstiden* (Nordic Academic Press (Kriterium), 2021); Peder Anker, *The Power of the Periphery: How Norway Became an Environmental Pioneer for the World*, (Cambridge University Press, 2020), 237.

information that either silences, hides, or suppresses stories of environmental injustices, which are co-produced by the state, corporations, or "normal" science. These deliberate tactics ensure the dominant euphemistic narratives of industrialization in Western Europe, without including the groups who bore the primary environmental burden. The second form of narrative violence is "the violence of not even looking for things whose existence our narrative structure does not allow us to accept."[81] Barca urges historians to write a more nuanced history that deconstructs regimes of truth, which continues to shape our understanding of Western history. I see this point as *especially* important in Denmark and the Nordic Region.

The exploration of these narratives in Denmark is inspired by some of the outstanding work done elsewhere in and on the Nordic Region. For example, "Clean Oil" – a popular Norwegian narrative, which Andy Lautrup admirably scrutinizes has a particular social meaning that realigns with a brand of Nordic exceptionalism described as a "regime of goodness."[82] A "clean oil" is only possible through a particular othering that presupposes a dirty oil somewhere else. To claim that products from controversial businesses in the Nordic Region are qualitatively better than elsewhere assumes inferior products elsewhere.[83]

[81] Barca, "Telling the Right Story," 542.

[82] Andy Lautrup, "Generation Carbon: Loss, Goodness and Youth Climate Activism in Norway's Oil Capital" (IT University of Copenhagen, 2022), 62–63. The idea of a Norwegian "Regime of Goodness" was coined by Terje Tvedt and expanded by Nina Witoszek. See: Terje Tvedt, "Det nasjonale godhetsregimet: om utviklingshjelp, fredspolitikk og det norske samfunn," in *Det Norske samfunn* (Oslo: Gyldendal akademisk, 2005), 482–510; Nina Witoszek, *The Origins of the "Regime of Goodness": Remapping the Cultural History of Norway* (Oslo: Universitetsforlaget, 2011). I hold that there are several identical and overlapping features in the Nordic Region.

[83] For outstanding work on Norwegian oil and moral authority see: Ada Nissen, "A Greener Shade of Black? Statoil, the Norwegian Government and Climate Change,1990—2005," *Scandinavian Journal of History* 46, no. 3 (May 27, 2021): 408–29, doi:10.1080/03468755.2021.1876757; Ada Elisabeth Nissen, "An Oil

Raising a critique of "Nordic exceptionalism" does not mean opposing the many good-willed initiatives, that technological advances are inherently bad, or that every green initiative is a fraud. It does show, however, that certain historical narratives are effectively produced and strategically used in some matters. History, in this way, can legitimize present actions by asserting a dominating narrative, potentially creating blind angles. Consequently, an unrecognized and unproblematized green exceptionalism can be an important component in securing business as usual. It remains crucial to unearth the stories of environmental injustices within the Nordic Region to shape more just futures, especially when facing large-scale societal transformations – such as the green transition.

Company as a Force for Good? How Statoil Put Norway's Identity as a' Champion of Ideals' to the Test," *Culture Unbound* 13, no. 1 (July 27, 2021): 16–40, doi:10.3384/cu.3366.

Actors and Materials

The dissertation draws on two types of research strategies and thus two types of material: archival research and fieldwork. In this section, I will reflect on the former category while addressing the latter in the following section.

Generally, I explored the archive to collect correspondences, personal accounts, reports, and studies containing graphs, statistics, and models from natural sciences and health sciences. I visited local archives, regional archives, online archives, national archives, business archives, and university archives.[84] Many days passed while sifting through reports and documents containing pre-examinations, evaluations, drilling samples, financial documentation, communication between engineers and civil servants, and between employees of the ministries.

Cheminova

Naturally, Cheminova is central to my thesis. But who and what Cheminova is, is complicated by more than eighty years of various ownership constellations. The ambiguous relationship between Aarhus University and the research fund AUFF from 1944 to 2014, administrated by a board partially consisting of university employees, has caused numerous speculations over the years. On more than one occasion it became unclear who speaks from what position. And so, it becomes difficult to evaluate if it is Cheminova's position, the university's, or a personal statement. Furthermore, the triple helix model of industry-academia-public institution is exceptional in relation to Danish standards but also diffuses archival material.

[84] The National Archive's search engine and categorization only permits searches of archive-makers and not thematically or with keywords. Thus, Cheminova, for instance, only showed very limited results.

I had a few unsuccessful attempts at entering Cheminova's corporate archive. The potentiality of obtaining permission inevitably entailed reflections on what immediate or potential obligations I would have, what types of material I was permitted access to, and what story would emerge from it. In short, whose story would I write or be allowed to write, and what commitment and expectation would emerge from establishing a relationship with Cheminova.

Institutions

The institutional bodies played an important role. Before the first full environmental regulation in 1973, the jurisdictions consisted of local institutional bodies with the aid of some national experts. When Cheminova came to Harboøre Tange the coastal inspection "Vandbygningsvæsenet" held jurisdiction as they formally owned the land, but any decision was made with the local politicians, the national health department, national environmental laboratories, and other adjacent bureaucratic domains. The environmental law in 1973 was accompanied by the Environmental Ministry and Environmental Agency. Besides assembling a coherent environmental regulation, the institutionalization was intended to clarify who had bureaucratic responsibility for what domain. however, in reality, it turned out to be an enormously complex affair involving legal and bureaucratic arguments. The local municipality held responsibility until the regional regulatory unit took over. The DEPA functioned mainly as an advisory institute but held enormous power in its close association with the Ministry of Environment.

I approached this body of material by identifying what was important and to whom. The dissertation draws heavily on institutional archives, such as the Danish Environmental Protection Agency, and its forty shelf-meters of material. The processes challenged my temper, as patents and archival laws demanded permission for every box, which meant someone had to open every box and go through the material

physically. One central collection of texts was key to my understanding. In 1983, the Danish Environmental Protection Agency published a trilogy of "white books," mapping different institutions' legal, communicative, and regulatory engagements with Cheminova. Covering and commenting on the legal system and jurisdiction, the white books provide an empirical treasure trove through a consistent overview and full institutional access. The books constitute a crucial foundation of my core arguments and have been essential in maintaining some chronological overview and providing information about the different jurisdictions and institutional areas.

In evaluating the material, I looked at referential frequency where some reports or documents appeared more important than others. Eventually, some reports established a truth regime where everyone referred to an "original" report. As such, those reports held a higher credence, as they eventually became "truth" in their usage and reference. The vestiges of those reports appear on public websites that provide an overview of how much chemical waste the depot contains.[85] The estimations, and they are indeed estimations, become naturalized as facts contradicting claims of an ever-seeping and flowing depot or claims of uncertainty.

The media

Despite claims of media participating in normalizing and invisibilizing environmental injustices, they still remained an important source. The many articles from local journalists and investigative reporters exposing failed regulations or environmental violations added a certain thickness and depth to my dissertation. Moreover, statements or op-eds from experts, public debates, and political comments illustrated the complexity of pollution and how to manage it. Obviously, a public

[85] Region Midtjylland, "Kemikaliedepotet ved Høfde 42," accessed February 3, 2021, https://www.rm.dk/regional-udvikling/klima-ressourcer-og-baredygtig-udvikling/jordforurening/forurening-pa-harboore-tange/kemikaliedepotet-ved-hofde-42/.

space is a curated sphere where actors position themselves. Cheminova, for example, used the media a great deal, while the environmentalists also found it an important strategic tool.

Communities and environmental justice

Who and what counts as a community can be hard to pin down. I chose to separate the community into two categories although there is much overlap. The "first" variant is the local community, which I consider because of geographical factors. This community refers to those residing in Thyborøn on the northern peninsula and statistically hold low-income jobs such as industrial fishing. Residents of Thyborøn are historically those who have been most affected by Cheminova's pollution, although not everyone is affected and not in the same way. Gender, employment, and location is a determining factor.

As a secondary and complementary category, I engage with the "environmental justice community," as mentioned in the introductory chapter, which I frequently refer to as "environmentalists." Initially, I found "community" a rather flat concept and not very good at accounting for the parts of the local community who resisted Cheminova's pollution. I was inspired by Kim Fortun, who has similar reflections in the monograph "Advocacy After Bhopal." Fortun uses "enunciatory community" to describe a group that converges as a response to environmental injustice.[86] These communities are not predetermined, nor do they share a similar age, class, or culture but collaborate to understand, respond, and criticize the pollution while mobilizing for environmental justice.[87] The concept resonates with my

[86] Kim Fortun, *Advocacy after Bhopal: Environmentalism, Disaster, New Global Orders* (Chicago: Univ. of Chicago Press, 2001), 6–11.
[87] They use different tools and strategies, which I refuse to disclose. For refusals in research see: Alex Zahara, "Refusal as Research Method in Discard Studies," *Discard Studies*, March 21, 2016, https://discardstudies.com/2016/03/21/refusal-as-research-method-in-discard-studies/.

definition, but I remain loyal to the initial term "environmental justice community."

Figure 2 - Parts of an environmentalists' personal archive. Photo by Sebastian Lundsteen

Through the environmental justice community, I have visited personal archives, been on field trips, stayed in some of their homes, conducted interviews, and gone to meetings. Facebook was one place to stay updated, along with telephone calls and emails.

Absences

In considering the amount of material, there were also absences. I distinguish between *what is lost or forgotten* and *what is not produced.* To the first point, physical and online archives were marked by curious blanks: some material or documents referred to in reports, inventories, or media outputs were lost or unable to be located. Some things are simply lost, while others may go unnoticed. I occasionally used digital methods and online research to find post-internet information, where previously accessible websites were removed, and thus left me facing dead links, despite using archival search engines such as "The Wayback Machine."[88] The fleeting nature of the internet suggests that the promises of unbounded available information do not always live up to the claim.

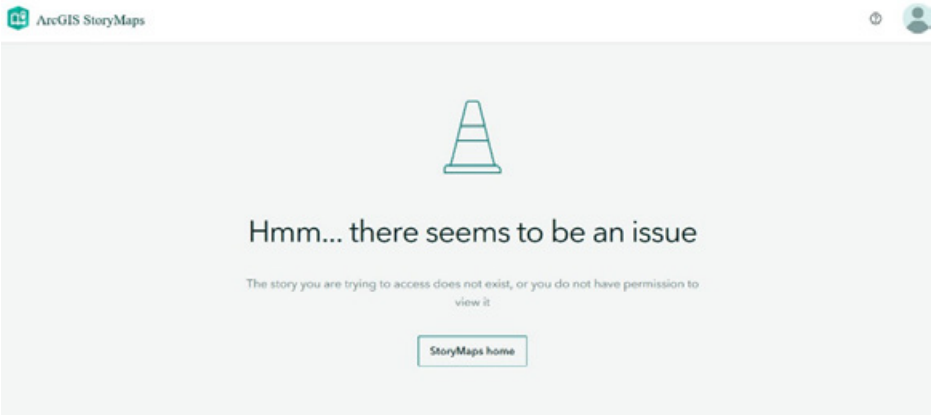

Figure 3 - An example of a no-longer existing websites, where I was looking for monitoring data from a pumping station.

While some materials are lost, others have never been produced. Successes, for example, are often documented and failures excluded.

[88] "Wayback Machine," September 28, 2002, https://web.archive.org/web/20020928184758/http://www.cheminova.dk/html/index.asp?subheader=pages/aktuelt/aktuelt-sub.asp&main=pages/aktuelt/marts01.asp&menu=3.

Bethany Wiggin elaborates on this point through the contamination of the Schuylkill River in Philadelphia:

> "This impoverished data environment, lacking in both quantitative metrics and qualitative narratives, contrasts sharply with the vibrant data streams generated about the river and its watershed above the fall line (…). This portion of the river provides a major source of drinking water for Philadelphians and is well monitored by the city's public water utility. Down where the river is tidal, the refinery has effectively turned a marsh into a data desert."[89]

What Wiggin calls "data deserts" reflects the archival material or information about Cheminova. Whether or not it is a deliberate production of absence, a structural issue, or some unfortunate circumstances, it is nevertheless a gap. The different actors who produce material about Cheminova have specific interests, use specific methods, are interested in specific things, and look for some things and not others, which shape the outcome of the material – meaning the practices are partial and knowledge is situated.[90] The domains of "perceptibility and imperceptibility" as Michelle Murphy terms them, characterize epistemological traditions where some scientists and laypeople "came to render chemical exposure measurable, quantifiable, assessable, and knowable in some ways and *not others*."[91]

Naturally, any research project has its flaws, and I must reflect on my shortcomings. For example, more perspectives from people who worked – or still work - at Cheminova would have provided other angles. Exploring labor union archives could have provided other perspectives and acquiring the local health practitioner's outlook or

[89] Bethany Wiggin, "Restoring a River, Re-Storying History," *International Journal of Urban and Regional Research* 46, no. 4 (July 2022): 665.
[90] Donna Haraway, "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective," *Feminist Studies* 14, no. 3 (1988): 575–99.
[91] My emphasis. See Murphy, *Sick Building Syndrome and the Problem of Uncertainty*, 9.

connecting to former bureaucratic employees could have deepened the dissertation argument. Moreover, as much as I attempted to be aware of the gendered aspects, I failed to extensively incorporate women, by only conducting two interviews – a former activist and an engineer working with the remediation. Relatively late in the process, I began collaborating with two authors who run a project that interviews a large group of people, while also including young people's perspectives. If time had permitted, I could have used this material.

Methodology

A central characterization of environmental history is its variegated methodology and acquirement of interdisciplinary skills.[92] As previously outlined in the overview of environmental history, the present situation has spawned a strong urge to critically rethink traditional epistemologies and methods.[93] However, discussions remain focused on archives and sources that account for positionality, approaches, and power structures, plus the historian's role in amplifying some voices while silencing others.[94] This dissertation offers one way of thinking and doing history in a dialogue between archival research and the field. I will elaborate on the method I term "field history" in this section, but I provide additional and concrete examples and reflections in the introductions accompanying each article.

When I began conceiving this project, it was natural to divide it into two methodological units – a historical element consisting of archival research and a complementary method that included anthropological fieldwork. My background as a history major and anthropology minor made this combination natural. Furthermore, history and anthropology

[92] Jørgensen et al., "Entangled Environments," 18–20; O'Gorman et al., *The Routledge Handbook of Environmental History*, 2.
[93] Velázquez-M et al., "Future Directions in Environmental History."
[94] O'Gorman et al., *The Routledge Handbook of Environmental History*, 5–6. Positionality, for example, is by no means new reflections, especially in gender studies, critical race studies, Marxist and post-colonial/decolonial studies, but it is increasingly gaining currency in environmental history and is now given more prominence. For at least one previous discussion see: Gayatri Chakravorty Spivak, "Can the Subaltern Speak?,", 24; Rosalind C. Morris, *Can the Subaltern Speak?: Reflections on the History of an Idea* (New York: Columbia University Press, 2010); Saidiya Hartman, "The End of White Supremacy, An American Romance," *BOMB Magazine*, June 5, 2020, https://bombmagazine.org/articles/the-end-of-white-supremacy-an-american-romance/; Christina Elizabeth Sharpe, *In the Wake: On Blackness and Being* (Durham: Duke University Press, 2016).

have traditionally shared intimate spaces with plenty of overlap.[95] Indeed, I obeyed the conventions and considerations of both fields' methodological requirements; doing participant observation, conducting interviews, attending meetings, and conversely carrying out extensive archival research, exercising source criticism, and working systematically in databases.

Methodically, I was interested in following the pollution in its material, cultural, political, and submerged states, concretely and metaphorically, through time and space, and the ways different actors relate to it. I chose not to pursue an oral history methodology as I found myself more inclined to the chance encounters provided by the indeterminacies of engaging with the field. I went on tours into the landscape – by myself and with others – and I attended meetings. All in dialogue with archival research. Moreover, my Ph.D. coursework in environmental humanities stirred a curiosity towards exploring methods. Nonetheless, being a historian doing ethnographic fieldwork seemed inadequate for what I was doing, nor did the idea of being an anthropologist doing archival research seem to reflect my approach.

[95] A tentative overview suggests that it is more anthropologists who turn to historical methods/archival research than the other way around. But it could be caused by an inarticulation of methods. See: Scott James C, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven, CT: Yale University Press, 2020); Eric R. Wolf,, *Europe and the People without History* (Berkeley: University of California Press, 2010); Michel-Rolph Trouillot, *Silencing the Past: Power and the Production of History* (Boston, Massachusetts: Beacon Press, 2015); Ann Laura Stoler, *Along the Archival Grain: Epistemic Anxieties and Colonial Common Sense* (Princeton, NJ: Princeton University Press, 2009).

Figure 4 - A zine I created after a field trip to Langøya an island in Norway that is a repository for toxic waste, including Cheminova's. I met with activist groups who are connected to the environmental justice group I collaborate with. The zine is a PDF file blueprint inspired by DIY culture, which you via a YouTube link learn how to fold into a zine. It is one way of disseminating research at a low cost: easy to copy and distribute, including tactile learning. It was also my submittal for a Ph.D. course in Environmental Humanities and storytelling practices.

This methodological puzzle led me to "field history" as a response to calls for new methodologies in environmental history, but is inspired by developments in other disciplines within the environmental humanities, such as field philosophy. Although the "field" is nothing new to environmental historians, and field sciences like biology inform historical practice, I decided to think with the field as a method.[96] As

[96] This is a thread that is developed in field history by Brett Buchanan, Michelle Bastian, and Matthew Chrulew, "Introduction: Field Philosophy and Other Experiments," *Parallax* 24, (October 2, 2018): 383–91. For previous environmental historians "in the field" see William Cronon, "Reading Landscapes - Learning Historical Research," accessed January 13, 2024,

such, I do not claim novelty or a revolutionary "turn," but more as an opportunity to rethink space and place in my dissertation, and a way to approach my research questions adequately.

Mindful of not being "parasitic," field history borrows, adopts, and integrates methods from other disciplines, including discussions, ethical reflections, and concerns, and brings them into dialogue with history as a discipline.[97] This method diverges from traditional ethnography by being specifically attentive to the production of history outside of the archive – what assumptions, claims, or facts are constituted in the field, the work they do, and the outcome of them. Field history produces history but also pays attention to how history is produced. As such, there may be overlap or continuations with ethnohistory or "historicity" in anthropology. However, field history as I conceive it does not emphasize the same cross-cultural analyzes or the relationship between pre-history and history.[98]

All methods are partial, and field history does not provide a universal answer. First of all, there needs to be a defined field, which occasionally rests on the privilege to access a field. A field history in Palestine or Eastern Polesia might not be possible at the current moment. The method is sensible to context and specificity. Although it can be multi-sited, it focuses on place, as the historian, through a physical presence, learns with – and through - their body. In addition, the method demands "an ongoing reflexive practice and an exercise in systematic engagement with the field and the worlds it inhabits," that stresses relational epistemologies, where knowledge is a mutual

https://www.williamcronon.net/researching/landscapes.htm; Emily O'Gorman et al., eds., *The Routledge Handbook of Environmental History*, 3–4.

[97] Buchanan, Bastian, and Chrulew, "Introduction," 386.

[98] Charles Stewart, "Historicity and Anthropology," *Annual Review of Anthropology* 45, (October 21, 2016): 79–94; Raymond Wood, "Ethnohistory and Historical Method," *Archaeological Method and Theory*, 1990, 81–109; M. E. Harkin, "Ethnohistory's Ethnohistory: Creating a Discipline from the Ground Up," *Social Science History* 34, (June 1, 2010): 113–28.

exchange.[99] It consists of a patchwork that reflects on the epistemological and ontological conditions that govern ways of assembling materials and data in the face of fragmentation, gaps, and absences.[100] I found field history as a useful combination in examining cases of environmental issues where historical knowledge played an important role and where there was an engaged environmental justice community. While encountering gaps and absences, I was able to mix different types of knowledge, both archival and from the field.

Being in the field allowed me to engage with local environmentalists, whose way of knowing decentered the role of expert. I learned about the specificities of pollution and what events they deemed as important. I learned about place-specific conditions such as the difference between storms and what kinds of storms pose the danger of unleashing chemical waste. It is not about the severity or intensity of storms that threaten the chemical depot; historically, the danger lay in less intense storms in ill-fated combination with direction, duration, tidal movements, and storm surges created by wind fetch.

I learned about documentation practices, acquiring technical understandings, and how embodied expertise accumulated through decades. I accessed personal archives, including bureaucratic, anecdotal, experienced, and photographed materials. In this way, the field and the archive mutually informed each other by engaging with environmental justice communities and their archives. Field history in my dissertation connects to environmental justice groups but does not think of itself as a provider or a one-way transfer of knowledge to the community. It acknowledges that historians can learn from other groups, thus conceiving interdisciplinarity not only as collaboration

[99] Barbara J. Thayer-Bacon, *Relational "(e)Pistemologies,"* (New York: P. Lang, 2003); Ulrike Felt et al., *The Handbook of Science and Technology Studies*, Fourth edition. (Cambridge, Massachusetts, London, England: The MIT Press, 2017), 19.
[100] Gökçe Günel, Saiba Varma, and Chika Watanabe, "A Manifesto for Patchwork Ethnography," *Society for Cultural Anthropology*, accessed January 13, 2023, https://culanth.org/fieldsights/a-manifesto-for-patchwork-ethnography.

among and between experts and disciplines but with and beside communities.

In the field, I *experienced* the Cheminova stench, which I had only encountered through texts. I learned about the mundane tasks of taking the laundry inside when Cheminova released its fumes so that one's shirt did not stink of chemicals. The experience spawned conversations about the olfactive stigmas – an odorous signifier that discloses one being from a contaminated place. It helped me recognize how pollution is connected to uncertainty and health hazards but also a lived experience: Sometimes understood and acknowledged, sometimes trivialized and ignored. These encounters sat with me as I wrote the articles.

Field history is particularly salient when challenging dominant narratives that exclude or submerge other perspectives. It is an ever-evolving experimental practice, resembling Marco Armiero's suggestion of using cemeteries to document environmental violence.[101] Moreover, field history sympathizes with the "guerilla narrative strategy," which unearths stories of resistance and resisting stories.[102] In this way, field history examines the conditions under which the dominant narrative works and actively engages with the field through *activism*.[103]

Furthermore, the method is engaged with environmental storytelling as community praxis and an active tool in the toolbox of field history.[104]

[101] Armiero, *Wasteocene*, 20–23.
[102] Ibid., 24.
[103] See:"Regina Horta Duarte, Bruna Luiza Costa Pessoa, and Lucas Erichsen, "Activist Environmental History," in *The Routledge Handbook of Environmental History*, ed. Emily O'Gorman et al., 2024.
[104] William Cronon, "A Place for Stories: Nature, History, and Narrative," *The Journal of American History* 78, (March 1992): 1347; Mart Stewart, "Narrative, Place, and Environmental Justice," *Environmental History* 28, (January 1, 2023): 5,doi:10.1086/722678; Donna Houston, "Environmental Justice Storytelling: Angels and Isotopes at Yucca Mountain, Nevada," *Antipode* 45, (March 2013): 417–35,;

An increasing thrust towards activism related to environmental issues has spawned a discussion about what exactly activism is. For example, Gabrielle Hecht uses an academic language that "wears its theory and methods lightly," as a part of a field that aims for an approach that includes making academic language more intelligible.[105] Other scholars like Macarena Gómez-Barris call for decolonial methods, while Rob Nixon introduces the "writer-activist.[106] At the time of writing, I am the co-host of a podcast series that challenges Nordic exceptionalism by developing conversations with academics and activists. Furthermore, I am a part of an artist/researcher collaborative project called "Troubled Waters" which aims to disseminate research to non-academic audiences through a graphic novel.[107] I take these ways of communicating research as a part – but not exclusive to - a field history method, as it does not strictly target an academic audience, but involves conveying research insights in other formats than articles, monographs, and teaching.

Field history holds much potential, but has some concerns that need addressing. Acting as a moral agent aligning with community

---

Deborah Bird Rose et al., "Thinking Through the Environment, Unsettling the Humanities," *Environmental Humanities* 1, no. 1 (2012): 3–4; Emily O'Gorman et al., "Teaching the Environmental Humanities," *Environmental Humanities* 11, (November 1, 2019): 449–50; Astrida Neimanis, Cecilia Åsberg, and Johan Hedrén, "Four Problems, Four Directions for Environmental Humanities: Toward Critical Posthumanities for the Anthropocene," *Ethics and the Environment* 20, no. 1 (2015): 67.

[105] Gabrielle Hecht, *Residual Governance: How South Africa Foretells Planetary Futures* (Durham: Duke University Press, 2023), 15.

[106] Rob Nixon, *Slow Violence and the Environmentalism of the Poor*, 15; Macarena Gómez-Barris, *The Extractive Zone: Social Ecologies and Decolonial Perspectives*, Dissident Acts (Durham ; London: Duke University Press, 2017), xiv.

[107] Sebastian Lundsteen and Anders Riel Müller, "Challenging Nordic Innocence: A Podcast about Social, Spatial and Environmental Justice.," Challenging Nordic Innocence: A Podcast about Social, Spatial and Environmental Justice., accessed February 21, 2024, https://app.cristin.no/results/show.jsf?id=2232784; "Troubled Waters - Eine Comic Reihe," November 14, 2023, http://avbstiftung.de/en/projects/article/news/troubled-water-eine-comic-reihe/.

objectives, does not prevent the field historian from conforming to scientific standards and practices. The autonomy of conducting and interpreting materials is imperative. A field history requires an ongoing conversation about what kinds of history are produced and the historian's role in such a production. Without peddling information uncritically, it demands absolute attention to the nature of sources and how the historian's work is being used – as such, transparency, integrity, and independence have to be taken into account. Moreover, the historian learns about and from communities, but also that there are power structures at play in each relationship: some voices are louder than others, the gendered aspects of dominating a space physically and verbally, how some things are articulated and others remain unspoken.

The stories we tell have consequences.[108] As such, field history recognizes the implications of our research and questions. Normativity is not problematic per se, as the field of discard studies has shown; *all* research is normative by being interested in some areas and not others, prioritizing some modes of inquiry, and asking some questions rather than others.[109] Such insights raise the stakes for history and let it out into the open by rejecting neutrality through embracing transparency. This actively contributes to societal conversations that counter denialism, corporate-produced doubts, and the discourse around fake news, alternative facts, and post-truths.[110]

[108] On effects of stories see: Ursula K. Le Guin, Pul Yi, and Donna Jeanne Haraway, *The Carrier Bag Theory of Fiction* (London: Ignota, 2019).
[109] Liboiron and Lepawsky, *Discard Studies*, 24.
[110] Kari Marie Norgaard, *Living in Denial Climate Change, Emotions, and Everyday Life* (Cambridge, Mass.: MIT Press, 2011); Naomi Oreskes and Erik M. Conway, *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*, Paperback. ed (London: Bloomsbury, 2012); Alice Mah and Thom Davies, *Toxic Truths 12-14*.

Ethics

My research raises some ethical issues, especially when engaging with a place subjected to environmental harm. First, understanding the role of the researcher as an "outsider" researching pollution in a community exposed to harm and the ethical questions that emerge. Second, how research is embedded in larger structures that guide questions and interests, but also requires reflections on the researcher's positionality.

The Cheminova affair is one of the most infamous cases of environmental pollution in Danish history. The community affected has thus experienced a double trauma: pollution and the narrative violence that follows when associated with contamination. As a researcher, there exists a potential peril of prolonging the narrative and thus extending the negative aspects of living in a community associated with environmental harm. Indigenous scholar Eve Tuck calls this "damage-centered research" and addresses the increasing interest as a "persistent trend of doing research in disenfranchised communities."[111] A researcher can easily become fascinated with mesmerizing stories of victims and perpetrators. Such themes are inherent to good and dramatic stories and serve as a captivating communication strategy while advancing the researcher's career and abandoning the community.[112] Tuck defines damage-centered research as one that "(…) operates, even benevolently, from a theory of change that establishes harm or injury in order to achieve reparation" and that it seeps over to the formation of subjecthood and a self-perception of a community as only disenfranchised and damaged, thus extending the narrative and

[111] Eve Tuck, "Suspending Damage: A Letter to Communities," *Harvard Educational Review* 79, (October, 2009): 409.
[112] Ibid., 412.

associate the communities with the negative, with trauma, with dispossession.[113]

A damage-centered narrative is important to have in mind, especially when conducting contemporary history and on cases of environmental harm. I experienced numerous incidents of residents being tired or angered about the association with Cheminova and contamination, as they perceive the area as much more than that. I found it imperative to balance a narrative where the critique is aimed at the structural levels while incorporating local embodied experiences.

I engaged with the local community and the people whom I interviewed based on the set of ethical guidelines provided by The National Committee for Research Ethics in the Social Sciences and the Humanities (NESH).[114] In the part of my materials that includes public appearances, I have attempted to find a balance between public statements and names. For example, I draw on the statements by AUFF representatives made in a public sphere, such as the media or published autobiographies. I make a distinction between them as public figures and personal people, by engaging with their points of view, not seeking to defame or slander them.

For those whom I have followed, parts of the environmental justice community for example, I have a written informed consent, where it is always possible to withdraw their participation, names, and statements. Moreover, the part of the environmental justice community who are public figures – who have released books, op-eds, and run Facebook groups – I am in an ongoing conversation with about the publication of articles.

---

[113] Ibid., 416.

[114] "Guidelines for Research Ethics in the Social Sciences and the Humanities," *Forskningsetikk*, accessed February 28, 2024, https://www.forskningsetikk.no/en/about-us/our-committees-and-commission/nesh/guidelines-nesh/guidelines-for-research-ethics-in-the-social-sciences-humanities-law-and-theology2/.

Ambivalence

I find myself in an ambivalent position. Ethics has come to fill an increasing part of my research and forced a deep reflection on responsibility and complicity. Indeed, my project places me in a precarious position, as a hopefully soon-to-be researcher critiquing a corporation like Cheminova whose previous owner was the second-largest university in Denmark. The research fund AUFF which was the formal owner, is one of the largest funds in Denmark.[115] During my inquiries, it has funded numerous initiatives including high-profile projects in the environmental humanities.[116] Considering potential colleagues, job opportunities in an already precarious market, and future funding schemes demands a balanced approach of careful criticism.

Taking this knowledge into account, I find that working within universities does not exempt a researcher from considering their own position. I have learned about the importance of disclosing power structures, positionality, and involvement, for example, through acknowledging land relations. In light of this practice, I felt inclined to acknowledge my complicity in being supported by a university with a deep commitment to oil and gas extraction. For the past three years, I have been employed by the University of Stavanger, living in and off Stavanger, the oil capital of Norway hosting Equinor, formerly Statoil. This experience has caused multiple reflections about complicity and academia - a position that illustrates the, sometimes, inescapable structures in which research is produced. Instead of trying to disown or averting it, I find myself in an ambivalent position, in staying here but remaining critical of it. I have found a tentative (perhaps superficial) reconciliation in making my connection explicit.

[115] "Fonden Med Fire Milliarder," accessed February 12, 2024, https://jyllands-posten.dk/jpaarhus/article7022187.ece.
[116] I do not find it important to state who and what has been funded.

Theory

"Submergence" is a concept that captures some of the analytical conundrums founded in some basic observations made during my thesis. It is a material, political, and environmental space that considers a range of ideas, approaches, discourses, and forms of knowledge. "Submergence" explains a specific process but is a generative concept that can be helpful in other contexts. It describes the practices around pollution management but aims to develop an adequate vocabulary that lends itself well to describing the knowledge production and power hierarchies around pollution; how some claims and depictions dominate others, and how they ultimately become the truth – meaning that they appear either necessary, good, or normal.

On the surface, "submergence" means to plunge, immerse, or inundate, typically by covering or being covered with water or other types of liquid.[117] However, upon closer inspection, to submerge exceeds the material or physical connotations that involve the act, providing it with a figurative dimension. "Submergence" designates a process or a condition that is distinguished by either a state of being - to be submerged when one is inundated by water - or a transitive verb, that something is submerged, for example, when one submerges an object under water. This contrast makes an important analytical point about "submergence" as an act, and a condition that connotes agency, crucial in rendering visible the unequal relationship between those who submerge and that which is submerged.

If we pursue the first thread, to submerge, it begins with the idea of submergence as a mode of subsuming - to keep something down, as

[117] "Submergence - Advanced Search Results in Historical Thesaurus | Oxford English Dictionary," accessed January 17, 2024, https://www.oed.com/search/advanced/HistoricalThesaurus?textTermText0=submergence&textTermOpt0=WordPhrase.

suppression or exclusion – but we are quickly inclined to advance our thinking by considering what is submerged, how and why, by whom, and with what consequences. Typically, to exclude or suppress means that it is unwanted, whereas chemical waste, for example, is removed because it poses some peril to those dwelling on the surface.[118] Removal is both erasure and active forgetting: things get submerged for a reason.

In this way, "submergence" emerges as a potential solution by creating an "away." However, an away is not always straightforward. As numerous scholars have problematized, removal is a technique, a spectacle, a bureaucratic movement, and not always holding the promise of remaining away.[119] Moreover, the concepts of sacrifice zones show how systems of valuation or enumeration normalize or permit harm at the cost of some other gain, while shadow places focus on the situatedness of away.[120] By re-politicizing the underground, a place previously understood as inert and neutral, "submergence" contributes by turning to the new frontiers of extraction, as sacrifice zones are reconsidered as subsurface.[121]

As such, submergence as a physical act, needs to be accompanied by a series of discourses, epistemes, infrastructures, and technologies that attempt to make sure that the submerged remains as such. The paradox

[118] Karen Pinkus, *Subsurface* (Minneapolis: University of Minnesota Press, 2023), 1.
[119] Balayannis, "Toxic Sights."
[120] Steve Lerner, *Sacrifice Zones: The Front Lines of Toxic Chemical Exposure in the United States* (Cambridge, Mass: MIT Press, 2010); Hugo Reinert, "Notes from a Projected Sacrifice Zone," *ACME* 17 (2018): 597–617.
[121] Geographers have been long attuned to the highly political and ideological realms of the underground, but in terms of waste, it remains marginal. Studies on nuclear repositories is one field that explores this phenomena. Stuart Elden, "Secure the Volume: Vertical Geopolitics and the Depth of Power," *Political Geography* 34 (May 2013): 35–51; Harriet Hawkins, "Underground Imaginations, Environmental Crisis and Subterranean Cultural Geographies," *Cultural Geographies* 27 (January 2020): 3–22; Maria De Lourdes Melo Zurita, Paul George Munro, and Donna Houston, "Un-earthing the Subterranean Anthropocene," *Area* 50, (September 2018): 298–305.

of having a chemical depot that returns, despite it being rendered empty or gone, shows how chemical waste exists physically, bureaucratically, and scientifically, where the latter creates an "away" through remediation loyal to established thresholds, regardless of its experienced consequences. "Submergence" brings into focus the highly mediated nature of scientific engagements with a subsurface peril, where an "away" depends on controlling waste through different techniques. If we accept the relatively established truth that knowledge is highly premised on visuality and epistemologies are entangled with perceptibility, creating an "away" for buried chemical waste requires visualization technologies or strategies such as monitoring and graphs.[122] These data and visualization strategies are neither neutral nor available for understanding without experts interpreting them.[123] Through "submergence" I seek to explain how some types of knowledge dominate others, and some claims stick more than others.

While my initial exploration of the concept was confined to the first part, to submerge, I became inspired by other literature about submergence. The Barbadian poet and scholar Kamau Brathwaite's impressive work "History of the Voice," speaks directly (and indirectly) to "submergence." Brathwaite meditates on a "submerged language" that rethinks identity and resistance. As an outcome of bringing enslaved Africans to the Caribbean, a submerged language, creole, formed a collective tone reflecting a heritage and identity. The

[122] Four contributions that tries to rethink the relationship between seeing and knowing: Donna J. Haraway, *Modest_Witness@Second_Millennium. FemaleMan_Meets_OncoMouse: Feminism and Technoscience*, (New York, NY : Routledge, 2018.), 267–71; Michelle Murphy, *Sick Building Syndrome and the Problem of Uncertainty*, 6; Andrea Ballestero, "Touching with Light, or, How Texture Recasts the Sensing of Underground Water," *Science, Technology, & Human Values* 44, (September 2019): 762–85; Daston Lorraine and Galison Peter, *Objectivity* (New York, New York State ; Zone Books, 2007).

[123] Sheila Jasanoff, "Virtual, Visible, and Actionable: Data Assemblages and the Sightlines of Justice," *Big Data & Society* 4, no. 2 (December 2017): 2; Daston Lorraine and Galison Peter, *Objectivity* (New York, New York State ; Zone Books, 2007), 357–61.

language was made illegal in an attempt to preserve existing power structures; thus, it existed in parallel to the dominant colonial language but beneath public discourse. In a postcolonial context, Brathwaite argues that the submerged language began to surface and integrate into Caribbean cultural production.[124]

In "The Extractive Zone," Macarena Gómez-Barris offers a way to unearth the perspectives silenced or erased by colonial capitalism and its extractive practices. By introducing the "submerged perspective," Gómez-Barris surfaces the multiple and proliferating experiences: embodied knowledge, local accounts, and other ways of knowing that exist beneath homogenous and universalizing capitalist discourses. From the submerged perspective, we can better understand the strategic and concerted efforts of actors implicated in structures that produce unevenness and sustain it through violence. However, the perspective is not only an analytical space of passive criticism, it also opens up for emancipatory politics that envisions different futures by piercing "(…) through the entanglements of power to organize the meanings of social and political life differently."[125]

Both scholars take on the perspective of the submerged. Brathwaite's "submerged language" designates the forms of knowledge derived from experiences and articulated beneath a dominant discourse. He teaches us how languages operate and shape realities, and that two languages can exist simultaneously but not necessarily without hierarchy. Moreover, "submerged languages" do not depict language as inert or static but as transformed in connection with other languages and environments. Gómez-Barris conserves and extends Brathwaite's ideas. The submerged perspectives offer us different ways of understanding circumstances that cultivate and condition modes of violence, ecological and beyond. Common to both conceptualizations of

[124] Brathwaite, "History of the Voice 1979/1981."
[125] Gómez-Barris, *The Extractive Zone*, 31.

"submergence" is the identification of a discursive hierarchy dominating other discourses, embedded in particular power structures, functioning to excuse, suppress, or silence violence.

Figure 5 - A sign that informs beach guests that a submerged chemical depot is nearby. " Photo by Sebastian Lundsteen.

Central to this, is the understanding that "submergence" is also a place of resistance. Brathwaite argues, that the articulation of a submerged language had profound ontological and epistemological consequences as it reflected the experiences of submerged people. It constantly shifted and adapted to the dominant language and the environment, for example, by expressing oneself through particular and situated

rhythms, stress patterns, intonation, and syllables. Gómez-Barris considers a wide range of ideas and visions by artists, movements, activists, cultural producers, and submerged theorists.[126] As such, the process of unearthing the submerged perspective is a "method for decolonized study," making it a crucial part of decentering knowledge and questioning traditional notions of academics as sole experts.[127]

So far, I have accounted for how some discourses and epistemic regimes dominate others. I have attempted to explain how submerged perspectives and submerged materials have the potential to re-emerge. As such, promising a complete and infinite submergence forwarded by specific sciences is always at risk of being challenged by a return of the submerged. Borrowing from decolonial philosopher Enrique Dussel, Leslie Green capitalizes "Science," thus referring to certain epistemic formations that have specific epistemologies and virtues, including universalism, objectivity, and truth as indisputable and indisputably linked with its scientific practice.[128]

However, the things that scientific practices cannot account for, haunt the claims made about pollution. In the foundational text "Specters of Marx," Jacques Derrida suggests a "hauntology" as a form of presence through an absence. Presence, or ontology, is never total but defined through absence. In this way, a haunting is an absence that co-constitutes a presence.[129]

Hauntology is fitting for thinking about the pollution at Harboøre Tange. The specter troubles the many assertive claims about chemical pollution by Science, politicians, and Cheminova. However, the assertions have proven not to be as complete or certain as initially

[126] Ibid., xv.
[127] Ibid., 22.
[128] Lesley Green, *Rock | Water | Life: Ecology & Humanities for a Decolonial South Africa* (Durham London: Duke University Press, 2020), 38.
[129] Jacques Derrida, *Specters of Marx: The State of the Debt, the Work of Mourning and the New International*, (New York: Routledge, 2006), 161; ibid., xx.

depicted. As such, the reoccurrence of pollution has continually haunted the repeated claims that insisted the chemical waste was under control.

Moreover, the specter of chemical pollution also haunts the community—pollution is a tangible intangible that, like a ghost, possesses agency without any immediate material substance. Immediate because the chemical waste has material properties – solid and liquid – but to those exposed to the chemical pollution, it is rarely a phenomenon that can be confronted physically. The pollution appears in distorted forms, not as substances nor physical muck, but as a symptom of exposure, diagnoses, a rumor, or the absence of marine life in the western part of Limfjorden, which might or might not be because of Cheminova's pollution.

Temporalities play an important role in "hauntology," as Derrida argues for temporal discrepancies within the specter, summed up as "time is out of joint."[130] Traces of that which no longer exist but is still present realms can be considered a figuration of hauntology. The past chemical pollution caused by former actions continues to haunt the present. Furthermore, the possibility of the return of pollution forms a specter.

However, a haunting also aspires to something different. A haunting is an interruption into the present through a *no-longer* and *a not-yet,* thus connoting a materialized or realized future from a past that marks its presence in the present.[131] It is a past contaminating the present, but also an unrealized future that structures contemporary actions. In this way, the environmental justice community engages with the

[130] Jacques Derrida, *Specters of Marx: The State of the Debt, the Work of Mourning and the New International*, (New York: Routledge, 2006); Michael Sprinker and Jacques Derrida, eds., *Ghostly Demarcations: A Symposium on Jacques Derrida's Spectres of Marx* (London: Verso, 2008), 213–14.
[131] Mark Fisher, *Ghosts of My Life: Writings on Depression, Hauntology and Lost Futures* (Winchester, UK: Zero books, 2014), 8–10; Mark Fisher, "What Is Hauntology?," *Film Quarterly* 66, (September 1, 2012): 16–24.

contaminated past, to create less polluted futures. “To live with the ghost,” as Derrida suggests, is to live with the chemical waste – not by accepting or tolerating it – but repeatedly summoning its existence, talking about it, staying with it, and relating to it.[132] As such, the environmental justice community's work is countering the normalization or deliberate process of forgetting about the depot.

Figure 6 - One of the past presences of environmental justice groups. Rav-Aage, or Amber Aage, is the informal name of the first person to become publicly recognized as an environmentalist. His son Bjarne carries on his father’s struggle. A street in his native town of Thyborøn is named after him to appreciate his efforts. Photo by Sebastian Lundsteen with a disposable camera.

The haunting resists dominant stories of prosperity and financial success. It is about a community that knows otherwise and troubles Sciences’ claims of an ontological whole: that the pollution was under control despite experiences that countered such assumptions. As the late Mark Fisher wrote:

[132] Jacques Derrida, *Specters of Marx: The State of the Debt, the Work of Mourning and the New International*, (New York: Routledge, 2006): xviii.

"Haunting, then, can be construed as a failed mourning. It is about refusing to give up the ghost or – and this can sometimes amount to the same thing – the refusal of the ghost to give up on us."[133]

Fisher rejects the idea that hauntings are nostalgia as a return to the past, but instead, terms lost futures.[134] The environmental justice community does not wish to return to a time before pollution, instead, it criticizes how contemporary futures are conceived with pollution. The struggle, then, is to fight for a future without the ongoing specter of potentially being exposed to chemical pollution.

[133] Fisher, *Ghosts of My Life*, 22.
[134] Ibid., 24–25.

Article III: Not True, but Also, Not Not True: Rumors about Pollution in Denmark

Figure 9 - Cheminova from outside of its facilities. The barbed-wired fences are one of several examples of military-industrial architecture that create a specific kind of atmosphere. Photo by Sebastian Lundsteen

Article III: Not True, but Also, Not Not True: Rumors about Pollution in Denmark

Facts are not just facts; facts are created. Furthermore, facts are never meaningless; they become facts because they hold or are assigned some kind of importance. In this way, facts do not always reflect the reality they transmit; they are not universal and transcendental but need to be reiterated and maintained. Michel-Rolph Trouillot forwards this point on history and power in "Silencing the Past."[1] Trouillot elaborates on facts and factuality by scrutinizing how some types of information are outside the realms of facts because they are silenced, ignored, or rendered unimportant.

A central motive in the study of environmental issues has been to scrutinize facts. What makes something questionable or unquestionable, natural and unnatural, says something about power relations. More specifically, attending to the regimes of facts and factuality has been important in studying controversies over entities shrouded in uncertainty, such as chemical pollution. This article departs from this strain of research by exploring that which is either not, not-yet, or not-quite facts. As such, the relationship and flow between information and facts opens an interesting analytical path for understanding how each category is attributed or deprived of certain qualities. Instead of going straight to the source by engaging analytically with facts and the related problematic dimensions surrounding them, including evidence, claims-making, and proof, I began looking at the relationship between claims, who made them, why, and how some became truth(ful) while others did not.

I regard this article as the second installment in mixing fieldwork with history. As with ambivalence, I consider this another example of "field history." Where rumors became a starting point for an epistemological journey into the hypothetical and the invalid. Instead of disregarding

[1] This is the large argument Trouillot makes throughout the book, but see specifically: Michel-Rolph Trouillot, *Silencing the Past: Power and the Production of History* (Boston, Massachusetts: Beacon Press, 2015), 28–29.

the outliers and the seemingly irrelevant statements, I became interested in them. I place anthropologists Chloe Ahmann and Michael Taussig in methodological conversation with historians Luise White and Zebulon Dingley to articulate a discussion about empirical material that is not deemed empirically appropriate.[2] In this dialogue, I hope for a cross-fertilization that engages with rumors historically and contemporary.

Relatively early in the research process, I encountered some types of information that seemed as elusive and vague as chemical exposure. Suspicions, suggestions, singular and repeated coincidences, not-quite truthful accounts, contestations and disputes, second-hand stories, small anecdotes, and large conspiracies – all circulated and flowed within the vortex of material as an outcome of seven decades of chemical pollution. I found some information outrageous, others credible, which led me to reflect on how I could, or if I would, evaluate these narratives. One of the larger projects of this dissertation is arguing that there are some things that positivist science does not account for and that these have consequences for the local community. Reflecting on this aim, I was inclined to engage with those things that some sciences regard as invalid – and what better way to do so than those kinds of claims deemed as epistemically invalid, such as rumors?

My initial inclinations proved to be more complicated than I first expected. I had assumed that rumors were, as James C. Scott argues, "a weapon of the weak,"[3] where the local lesser remedied groups used slander to delegitimize or defame a powerful actor. However, I found that rumors were highly adaptive and malleable, concrete and atmospheric, ambiguous and contradictory. Sometimes, they were a

[2] Sebastian Lundsteen, "Not True, but Also, Not Not True: On Rumors about Pollution in Denmark," 8–9.
[3] James C. Scott, *Weapons of the Weak: Everyday Forms of Peasant Resistance* (New Haven: Yale University Press, 1987), 227–40.

weapon of the weak, while in other instances, they were used deliberately to slander weaker opponents.

As such, the article displays the variegated aspects of the elusive phenomena and shows how knowledge about pollution is not a one-way fact-producing system but a highly contested landscape. I use rumors as a heuristic device that allows me to analyze the relationship between Cheminova, the local community, and the regulative/state authorities and the information circulating among them. Moreover, I examine the nature of rumors in different temporal contexts to suggest that rumors and pollution, in the case of Cheminova, are strangely echoed over time.

I explore rumors as articulating a certain kind of atmosphere created by Cheminova. Dimitri Papadopoulos asks, "If our worlds are unimaginable, perhaps even, in a paradoxical way, unsustainable without chemicals that humans make and use - then what does it mean to live and navigate the toxic regime?" [4] I take rumors as expressing and navigating in a specific toxic space dominated by regimes of knowing, not knowing, and knowing later. In this way, fieldwork offered rumors as one way to study the psycho-geography of a place that had undergone radical environmental degradation caused by an existing and powerful actor.

The rumor, as it were, bore close affinities to that of a secret associated with the spectacle of a secret. Exceeding what is directly knowable, the rumor becomes a way to construct meaning in the presence of a powerful entity. Considering the status and nature of a company producing organophosphate-based pesticides, the security protocols,

[4] Dimitris Papadopoulos, "Chemicals, Ecology, and Reparative Justice," in *Reactivating Chemicals: Chemistry, Ecology, and Practice*, ed. Dimitris Papadopoulos, María Puig de la Bellacasa, and Natasha Myers (Durham; London: Duke University Press, 2022), 34.

and the barbed-wired fence displayed in the image above – a particular atmosphere based on hostile architecture provided grounds for rumors to emerge.

I recall visiting the factory on a task that was not directly related to my project. My first impression was the blurry and gradual shift between a coastal landscape and the factory. At one moment, one was in "nature," a characteristic, borderline nostalgic depiction of the Danish west coast typically associated with summer tourism. The next moment, signs, designated paths, barriers, guards, and security measures dominated the surroundings. Before entering the premises, I had to watch a video and put on safety wear – a natural precaution when visiting facilities that produce highly toxic chemicals. I bore a helmet with "Safe Th!nking" written on it and received a map displaying the numerous emergency shelters and designated spots. Upon closer inspection, I found that the number of designated spots far exceeded any previous assumptions I might have had. Considering the map, I asked if the alarm sounded often. Frequently, I was told.

This experience made me think about when the factory starts and ends. From afar, Cheminova is not a place that necessarily draws you in unless you have some special interest. It might be rudimentary, curiosity, or industry-related, or it might be that one might want to find out what is going on in there. It is inaccessible because of what they produce and how they produce it. It is inaccessible because of high-risk production and trade secrets. Contrary to what the article title suggests, I would emphasize that Cheminova, and not just the pollution, is a rumor-producing phenomenon.

Engaging with rumors also made me become a part of prolonging them. For example, being confided with a rumor spawned a research strategy where I began looking for its origin, attempting to contextualize and base the otherwise unfounded claim. And by conjuring the rumors in

different contexts, they proliferated. When I mentioned a rumor, I unavoidably passed it on and was, at times, met by statements identical to or resembling the initial rumor. In this way, my fieldwork informed my historical method by disclosing the rumor, which I then sought to locate in the archives.

Historically, I became interested in what structures were in place that allowed pollution despite accounts of graphic and physical manifestations and numerous warnings. Here, rumors offer one understanding as they illustrate the unevenness of information: how it is or is not legitimized and by whom. Rumors are the outcome of a perceived total ontological whole based on epistemic virtues loyal to positivist measurements and expertise and remain as rumors because the local, vernacular forms of knowledge do not comply with the politics of evidence. More than mere speculation, rumors become accounts of experienced manifestations of pollution but deemed illegitimate because of myopic scientific practices. Put differently, rumors do not necessarily emerge because of technoscientific practices, but they create rumors in their way of monopolizing claims, thus excluding other ways of knowing. As such, by looking at rumors historically, I argue that rumors were a submerged discourse beneath technoscientific claims. In this way, rumors add to the concept of Submergence.

Moreover, Cheminova took advantage of the contested landscapes and the epistemic vagueness. The company participated in rumor-ridden discourses by either dismissing any claims as rumors or gaslighting those who have expressed concerns about Cheminova's pollution. Another effort from Cheminova was how they deliberately sowed seeds of doubt by claiming that the very properties of its pollution were unmistakably recognizable, so any pollution would immediately be found as such and not surrounded by epistemic vagueness.

Article III: Not True, but Also, Not Not True: Rumors about Pollution in Denmark

Cheminova's participation in creating or maintaining rumors appears to contradict the claim about a "Merchant of Certainty" made in Article 1. However, I contend that the company used certainty as a specific claim that promoted some types of information while either omitting or creating doubt about others. In this way, Cheminova used certainty in some situations and types of information while deliberately creating rumors in others. Moreover, providing certainty in one area allowed other areas to be accused of being incorrect, so it became and stayed a rumor. Conviction and ambiguity became important discursive tactics to deploy according to the situation.

Whereas the first two articles provide perspectives from the corporation and the environmentalists, this third article adds to them by engaging with the uncertainties. Thus, it contributes to the general argument, by showing how rumors are useful strategies in claims about pollution.

An abstract has been accepted in *Environmental Humanities* and is awaiting review. The article was submitted on the 3rd of December 2023.

Not True, but Also, Not Not True: On Rumors About Pollution in Denmark

This article suggests rumors as an alternative analytical opening for understanding the flows of knowledge and information surrounding pollution. Instead of asking what counts as truth or facts, the article proposes to engage with an aspect of pollution that lies beside or beyond the politics of evidence. In this way, rumors operate in uncertain territories and through murky epistemes as they are not quite true but also not quite false either.

Through historical and anthropological approaches, the article explores Cheminova, a Danish chemical company with a long and documented history of pollution, through three examples of rumors: First, rumors as expressing life in proximity to a factory shrouded in secrecy and with a hazardous production. Second, rumors as a vernacular and embodied language submerged beneath technoscientific discourses that typically rely on objectivity and facts. Finally, rumors as a strategy used by corporations to create and exploit epistemic ambiguity around pollution through blurring of information or gaslighting the local community. The article ends in a discussion that contemplates the potentialities of rumors as an intervention in current debates about information idealized as pure and transparent in the age of (environmental) data. In this way, the article contributes to environmental humanities by sitting at the intersection between environmental justice, environmental storytelling, science and technology studies, and contemporary work on pollution, by asking

about the power relations in murky territories, how uncertainty works, and what it does.

Introduction

Industrially produced chemicals saturate the planet to the extent that they are found in even the most remote places while marking their presence at each end of material scales from the molecular to the enormous. Furthermore, chemicals traverse temporal scales by touching life before it has been captured, while, as pollutants, their legacy remains forever. At the same time, the aggregation of industrially produced chemicals, frequently known as novel entities, rapidly approaches one of the nine planetary boundaries in which irreversible ecological disasters unleash if transgressed.[1] As we find ourselves in a permanently polluted world,[2] considerable research rightfully focuses on responses to the incremental and the disruptive harm caused by chemical pollution by investigating adverse health effects, documenting the source, or addressing the challenges of evidence as displayed by the field of environmental justice.[3] Furthermore, research on chemical pollution invites us to consider immaterial dimensions like the power (infra)structures unevenly distributing environmental violence or the discursive configurations that allow a place and its inhabitants to be polluted in the first place.[4] What guides and structures much of the research is how we come to understand pollution in all its complexity by attempting to render the invisible visible and the intangible tangible in an effort to accommodate the evasive and uncertain properties surrounding toxic chemicals.

I hope to bring another dimension to contemporary discussions in this article by suggesting rumors as a different path for exploring the uncertainties of chemical pollution. While much important research explores different aspects of industrial, technoscientific, and bureaucratic engagements with chemicals and their harmful effects, I

am interested in what lies beside and beyond dominant depictions of chemical pollution.[5] In this way, the article orbits regimes of truth, politics of evidence, and the authority to establish facts by engaging with that which is precisely not that, or, I might add here, that which is not not that. While uncertainty is a dominant characteristic that shapes how we come to understand pollution – and, as we shall see, such ambiguity is actively pursued by specific actors – I wish to consider how rumors relate to ontological and epistemological dimensions of pollution.

In this sense, the article explores three dimensions of rumors: first, as "living-being" in the "ongoing aftermath of chemical exposure," where secrecy and uncertainty give rise to rumors, thus emerging as a discursive space for articulating ineffable experiences.[6] Second, rumors as a phenomenon that arises in relation to specific modes of knowledge production and legitimization, where rumors emerge as a consequence of particular epistemic virtues. I argue that rumors have a complex relationship with environmental claims-making, including expertise as a power-knowledge relation, as rumors can be a warning device and a way of problematizing claims of scientific objectivity, a hauntology, expressed as a mode of discourse that haunts such depictions.[7] The ghost, according to Derrida, haunts assumptions of perceived totality, that in its claim does not take the unseen into account, and, by this very exclusion becomes a part of it.[8] Last, I illustrate that rumors can serve as strategies of corporate disinformation that render types of information as rumors, thus exterior to scientific realms that rely on truth and facts. By investigating the porous boundaries of knowing and verification, studying what lies outside these domains provides a path for studying the interiority of the same realms. Put differently, rumors, as a rejected type of knowledge and information, can help us understand the mechanisms of inclusion and exclusion in particular discourses and knowledge practices. Rumors, then, facilitate an

exploration of the knowledge-power structures, making some knowledge legitimate while rendering others illegitimate. Such investigations help us recognize and scrutinize the potential limitations of epistemic regimes and information by showing how they can actively be exploited by polluting actors.

Drawing from fieldwork and archival research, I offer three examples of rumors about Cheminova - a Danish pesticide manufacturer who has a documented history of chemical pollution that dates back to the 1950s. The examples display how industrially produced chemicals, and their harmful capacities are understood, negotiated, and constructed by exploring the relationship between a polluting factory, a scientific community, state institutions, and the local population. Rumors in this context, I argue, illuminate the complex ways in which something becomes knowable but not adequate, possible, or allowed to articulate, which is further accentuated through adjacent categories accompanying information, such as secrecy, "inscrutable spaces," power, and truth-claiming.[9]

Further, the empirical material assists in contextualizing and historizing the epistemological and ontological uncertainties surrounding pollution. I showcase how rumors are a part of, or rather, an outcome of, an orchestrated narrative produced by a corporate actor as an "apparatus of ambiguity" coming into existence in the nexus of scientific and bureaucratic expertise. As such, the article seeks to understand the effects that emerge when pollution connects with ambiguous discourses by taking its departure from the unlikely, the unallowed, and the unfounded claims. Rumors serve as an inquiry into contested territories equally defined by certainty and uncertainty, truth and falsity, by being in a state of in-betweenness.

The Multiplicity of Rumors

Broadly, two strands of research approach rumors differently, where one is occupied with the nature of truth and verification while the other is more interested in the social effects and affects of rumors. This section does not necessarily seek to reconcile the two strands but rather deepen and broaden them.

As with pollution, a general characterization of rumors includes ubiquity and evasiveness, and the classic definition provided by the psychologists Allport and Postman typically portrays rumors as occurring in the absence of authorities that can verify the piece of information.[10] However, these definitions neglect to address when and if a rumor transforms into (solid) information and, conversely, when an otherwise credible piece of information – for instance, concrete manifestations of environmental contamination –is depicted as or remains a rumor. As such, by failing to consider what counts as expertise and verification, such definitions escape the task of distinguishing the role of power, such as expertise and authority, in producing truth and rumors. Furthermore, despite an initial contextualization, the definition fails to explore the borderlands in which rumors operate, a territory where information resides on the thresholds of what is known, how it can be known, and the different modes of expressing these types of knowledges. Considering rumors about pollution opens an inquiry into a discursive space inundated by contestation where rumors *and* pollution trouble categories of truth and validity due to each' ambiguous nature.

Ethnographic inquiries have a long and deep fascination with unverified information, such as gossip or slander. Anthropologist Niko Besnier argues that these types of material provide an entry point for analyzing social worlds within small communities and the everyday politics of emotions.[11] Despite affinities with other types of information based on hearsay, rumors amount to more than mere chatter, exemplified by Julien Bonhomme, who terms rumors as a "volatile

phenomenon" exceeding small social circles and not readily discernable as "deterritorialized forms of gossip."[12] In this context, rumors take on a broader and more serious form, aligning with research that has treated rumors regarding hate and prejudices,[13] colonialism,[14] political mobilization as a "weapon of the weak,"[15] collective meaning-making under uncertain and stressful conditions, [16] or as affecting bodies and ordering space within "atmospheres of violence."[17] A common theme is how rumors denote individual and collective forms of circulating knowledge having social, corporeal, and even violent outcomes. The corpus of literature focuses less on veracity but rather on the social being of rumors; instead of what rumors contain and whether they are plausible, the point of analysis is what rumors *do*.

Newer parts of research have taken interest in geographies charged with enviro-political tensions, a "Late Industrialism," as argued by Kim Fortun.[18] According to Fortun, Late Industrialism unfolds through ongoing environmental violence entangled in, and produced by, multiple complex structures consisting of "business and government, of law and politics, of war and farming, of natural and technical systems."[19] Anthropologist Chloe Ahmann situates rumors in this new era and asks if rumors are " subordinate to the authority of expert discourse (…) what might they reveal, and perhaps rearrange, about the workings of authoritative knowledge?"[20] As Ahmanns' article illustrates, considering rumors in tandem with pollution opens other avenues of inquiries, as illegitimate information disturbing highly curated knowledge regimes and where corporate actors occasionally exploit uncertain spaces created by epistemes that monopolize information as pure and objective.

Consequently, epistemic virtues structuring technoscience can smoothly exclude other ways of knowing by glossing them over and rendering them unreliable; thus, rumor carves out a space for expressing denied knowledges. Additionally, rumors can also become a

part of a discursive weapon, occasionally operationalized by powerful actors sowing seeds of doubt and submerging or delegitimizing any accusations of pollution. Nevertheless, as much as the truth claims are embedded in knowledge structures, they are not monolithic and stable but are always historically contingent and can thus occasionally be challenged.[21]

This article builds on previous bodies of thinking but contributes by investigating how a range of actors mobilizes rumors as expressions of experiences in a place subjected to chemical violence spanning decades in which secrecy, risk, and danger have become normalized. Additionally, rumors show how information rendered as a local and vernacular type of knowledge is understood as a rumor, thus becoming a submerged language as it is not allowed to enter technoscientific domains hinging on specific epistemologies. Finally, I demonstrate how the mobilization of rumors results from various bureaucratic, legal, and scientific efforts that, intentionally or unintentionally, become a discursive strategy that turns accusations of pollution around, and the accuser becomes the accused. Through the three analytical moves, I add to the existing literature by being less interested in the e/affects and functions of rumors but attending to their source and circulation, for example, by exploring how Cheminova actively operates in realms of rumors as a strategy of blurring and gaslighting and how rumors proliferate when living among produced uncertainties and rumors.

A Brief History of Cheminova

Cheminova was established in 1938 outside of Copenhagen, Denmark, and made its success after WWII by quenching the agricultural thirst for synthetic fertilizer by supplying the world market.[22] During the wartime, Cheminova was, in a surprising move, donated to Aarhus University, which immediately established a research fund, Aarhus Universitets Forskningsfond (AUFF), becoming the formal owner.[23] In

1952, Cheminova's chemical waste had accumulated to such a degree that it caused antagonism from neighbors and authorities in the Danish capital, leading to multiple accusations of contamination and successive lawsuits. The numerous allegations and indictments led the local authorities to attempt to regulate the company by prohibiting parts of Cheminova's production, initiating extensive monitoring of the local environment, and posing requests to diminish its waste and expand its safety protocols.[24] As such, commissions and court trials tightened the grip on Cheminova's waste management, while the company experienced the increased attention as discriminatory grounded in a lack of what they defined as the correct expertise.[25]

In 1952, amidst court trials and sanctions, Cheminova resettled to Harboøre Tange in west Denmark, far from the capital. The new place was appropriate for a modern chemical corporation, which desired a space free from pedantic authorities.[26] Harboøre Tange, in the 1950s, bore characteristics of a "forgotten place,"[27] as it was considered peripheral with an absence of infrastructures, jobs were mainly unskilled, and a large dependence on a declining fishing industry. In this setting, Cheminova swiftly established its production facilities on Harboøre Tange, a narrow artificial peninsula dividing two bodies of water: Limfjorden, an enclosed water to the east of the factory while the North Sea was west of its premises. For Cheminova, the location was ideal for disposing of toxic waste, as the water efficiently managed and/or removed the waste. By establishing its manufacturing plant rather rapidly, local concerns and environmental restrictions came with continuous latency.[28]

Economic and political opportunity, combined with scarce and delayed regulation of a chemical company that insisted on the harmlessness of its production, allowed continuous chemical contamination of the area. As such, Cheminova came with a promise of prosperity and a price: The company's controversial waste management was accepted, or even

tolerated, to a greater degree than in Copenhagen, as alleviating financial inequalities was deemed more important.[29] In this way, Harboøre Tange became a sacrifice zone – where a disproportionate amount of pollution was legitimized by pitting economic priorities against environmental degradation and health risks. The relationship between an inadequately regulated chemical company and regulating authorities who prioritized financial prosperity in favor of environmental harm shaped how the pollution became bureaucratically permitted, although the local community saw it otherwise.

Today, Harboøre Tange is experiencing multiple and delayed effects of three vastly contaminated sites: most notoriously, a submerged chemical waste depot on the shoreline, where Cheminova dumped liquid and solid waste between 1957 to 1962 between two dunes next to the North Sea. Cheminova's old factory premises, where the combination of contaminated debris and buried waste, complicate remediation and is considered the second largest contaminated site. Lastly, the most contaminated site, which contains an unknown amount and equally unknown types of chemical substances; a site that hosts Cheminova's current facilities.[30] AUFF sold Cheminova in 2014 for 8.5 billion Danish kroner, approximately 1.1 billion euros, to the US Agri-tech conglomerate FMC.[31] A recent mapping by the government lists Cheminova's three polluted sites as the most costly and severe in Denmark.[32] I became interested in the multiplicities of pollution, what it is, and how it is understood, including the "minor horrors"[33] saturating life in a heavily contaminated place within the context of a self-acclaimed welfare state, such as Denmark. Here, I found a dense web, or an atmosphere of hearsay, suspicions, and almost, but not quite, pieces of verified information.

The Birthday Party

Article III: Not True, but Also, Not Not True: Rumors about Pollution in Denmark

I first encountered rumors during an initial stint of fieldwork, where I attended a celebration of an environmentalist turning 70 years old. The occasion gathered a crowd of family, friends, and allies who had dedicated much of their lives to documenting and fighting Cheminova's pollution. The party was held on the brink of summer and fall, when the weather was mild but still retained the promise of a shift. We were allowed to gather during a short stay that, like the weather, was caught in a moment of hesitation - a brief gap between cautiousness and recklessness of a world in an ongoing unsettling motion.[34]

At the birthday party, a woman approached me to ask if we could talk somewhere private. So, we withdrew from the crowd and relocated to a separate room. By being withdrawn from the party, the setting established a relationship of trusting me with information that excluded the rest of the party. The social interaction blurred the roles as in a performance where I, the outsider, was relocated from off-stage to on-stage (or was it the other way around), staging a scene for the disclosure.[35] Reminiscent of an initiation rite by a collective sworn to battle a powerful corporation, I became inaugurated through the passing of a secret.

If a secret is, as defined by Michael Taussig, "knowing what not to know" and denotes "that which is known but cannot be generally spoken of," it expresses a ubiquitous type of knowledge that is unable or unallowed to be articulated in some domains.[36] What are secrets to rumors, then? Secrets and rumors have an unusual kinship; common to them both is that they operate along the lines of concealment and revelation, encapsulating a form of submerged knowledge drifting beneath public discourses while everything surrounding them - the gestures, the setting – attests or indicates, the importance of the information itself. However, adding secrecy to the rumor intensifies the latter and thus changes the stakes. The rumor, conveyed in a secretive way, was both a testament and a conjuration of Cheminova's power,

creating an atmosphere of privileged or even dangerous knowledge; the information was delivered by speaking of what was not to be spoken of.

The woman leaned slowly toward me, signaling I had to be prepared, as this may not be what I wanted to hear. A slight squint or contraction followed as a testimony of what was about to come. Commencing confidentiality, she accompanied the information with a series of small gestures, utterings, lowering her voice, and raising her eyebrows, making distinct eye contact as a sign that this was serious but unlikely information. As such, her bodily signals accompanied the verbal flow of information: "In the 1990s, several NATO and UN officials visited Cheminova. I saw it myself. The purpose was to verify if Cheminova had supplied Saddam Hussein with chemicals used for warfare." By emphasizing validity through a conflation of visuality and legitimacy, as to *I saw it myself*, it remains purposeless to question whether *if* my newfound confidante had witnessed the visit. More interesting, however, is an exploration of *what* was witnessed, as suggested by the dichotomy in the statement: between what was seen and subsequently venturing on the intent and purpose of the officials. Not as far-reaching or "epistemologically crippled" as conspiracy theories,[37] the statement exceeded the limited and personal account and became distinguished through its ties to other contexts.

"What are historians to do with such evidence?" Luise White asks when encountering rumors. White suggests taking them at "face value" as "everyday descriptions of extraordinary occurrences."[38] Thus, not questioning the likelihood of the statement, the broader context is vital for understanding what the rumor expressed. Cheminova produces organophosphate-based pesticides, a synthetic chemical initially developed by German chemists that sought to replace former and more lethal pesticides. During WWII, Gerhardt Schrader, a lead chemist for IG Farben, refined and transformed organophosphates into nerve gasses like Sarin and Tabun, intended for chemical warfare for the Nazi

empire.[39] The connection between pesticides and warfare is well documented, with established links between the military-industrial complex and agricultural extermination of unwanted pests, including its ties to the necropolitics of racial capitalism amplified by fantasies of purity.[40] Given the potential calamities of its production, Cheminova resembled and proliferated military security standards by being highly guarded and surrounded by fences with barbed wire while subjected to numerous security standards and protocols, typical of Denmark's 118 high-risk production facilities.[41] The secrecy surrounding the factory was met with the secrecy of rumors.

The rumors connecting Cheminova with military organizations are not just related to a production potentially supplying chemical weapons intended for warfare. In 1969, conservative American President Richard Nixon saw political opportunities in the emerging environmental movement. Nixon was motivated by harnessing the shift in values and becoming an "environmental president" by suggesting adding a social dimension to NATO. Nixon put pressure on other members to form an international environmental governance unit.[42] Born out of (or into) the Cold War machine, NATO became an additional instrument in asserting power and forwarding global environmental governance by establishing the Committee on the Challenges of Modern Society (CCMS). The committee managed studies and fellowships that focused on issues like pollution, advanced health care, and the disposal of hazardous wastes.

Similarly, the UN Conference on the Human Environment in Stockholm in 1972 saw an additional institutionalization of environmental issues handled by organizations having long-standing affiliations with war institutions. The same year, the United Nations inaugurated its Environmental Programme (UNEP) with a core focus on industrial pollution.[43] The presence of both UN and NATO representatives was common in a place that produces chemical products

due to security measurements assessing the risk of a chemical disaster or disruptive force of chemical waste caused by accidents in addition to monitoring. NATO and the UN's environmental monitorization do not, however, foreclose the possibility of Cheminova producing chemical weapons or supplying components or technologies that aid the development or production of such weapons.

Additionally, the rumor was situated in a specific temporal context, giving credibility to the unlikely. In the late 1980s and early 1990s, events in the Middle East reignited debates about chemical warfare. Organophosphorus esters, Cheminova's main product, became an international focus as Iraqi assaults on Kurds, Iranians, and Kuwait was a central tool in the prelude to the first Gulf War.[44] Furthermore, Cheminova, a global exporting corporation connected to many countries worldwide, had the infrastructure and the capacity to distribute hazardous products.

The immediate connection between military organizations and environmental concerns was not as implausible as it first appeared when the same rumor returned in a different setting. Some months later, while paying a visit to the environmentalist whose birthday I had attended, I was handed an article accompanied by a verbal disclosure about the document's covert status. The article, from a union magazine dated 1957, was titled "Cheminova – The most controversial company in Denmark." The article described the numerous environmental scandals surrounding the factory but with excused its pollutive affairs with an emphasis on job security and regional development. I was guided by the environmentalist towards a section of particular interest. Appearing as a brief, casual remark requiring otherwise no particular attention, it described rumors linking Cheminova to the military-industrial complex. The passage forwarded several accusations of Cheminova's CEO for manufacturing American nuclear weapons, producing mustard gas "and all other kinds of scary things."[45] The

article displayed vestiges of rumors persisting through time about the risks of a factory producing highly toxic and dangerous chemicals, seeking to provide knowledge on scattered information that nevertheless made an immediate connection.

Variations of the same rumor emerged in other contexts. For instance, during a conversation with a relative of a former Cheminova employee, I was reminded of how casual and ordinary rumors about the company were, even when unveiling something potentially scandalous: exemplified by one rumor that suggested how Cheminova had begun making and experimenting with hydrogen bombs. The person thought it probably originated from hearing numerous blasts from within the factory premises, as accidents such as explosions were common at Cheminova. Considering the persistence of rumors through time and place, Zebulon Dingley, in dialogue with Walter Benjamin's term "constellation" notes that rumors are not just "new imaginings for new relationships" but constellations of "old and new elements" shaped and signified by "shifting circumstances of the present."[46] The old rumors returned in contemporary contexts, denoting both historical and present concerns, that described life as it unfolded in the presence of a factory that produces something threatening, but what it was, when, and where it might occur remained hard to fathom.

Returning to the birthday party, the rumor suggested how the discursive ambiance and epistemological vagueness surrounding Cheminova was an exercise for the environmentalists in interpreting patterns by assembling dotted and conjectural pieces of information and constructing intuitive meaning. The rumor's persistence, transgressing time and space, responded to the ongoing uncertainty when living proximate to a hazardous production. As such, the rumor was, in its circulation and, through historical trajectories, not a fact, unraveling the clandestine practices of a manufacturing plant producing highly toxic chemicals. Instead, forwarded in a setting thick with secrecy, the rumor

had another function as a modality of expressing experiences when neighboring a chemical factory that, in its very production, posed a substantial peril to the community. The rumors articulated an embodied experience through different channels than those rejecting unconventional modes of relating to a factory that radiates violence – environmental and military. The rumor, as it were, was a way to communicate the undercurrents and structures of living-being within proximity of a polluting – and a perilous – entity.

Following feminist environmental storytelling practices encapsulated by Donna Haraway's paraphrase that "it matters what stories we use to tell other stories with,"[47] rumors are a way of "embracing the complexities and contradictions of lived experience." [48] The embodied experience is articulated through other channels than those rejecting unconventional modes of relating to a factory that radiates violence – environmental and military. At Harboøre Tange, environmental storytelling included an environmental justice dimension, as, according to Donna Houston,

"Environmental justice storytelling is a practice that can give insight into what it means to live with and transform environmental crisis. Storytelling and imaginative praxis as a method and as a process illuminates what people do in various places to combat environmental injustice."[49]

The rumor, as it were, was both a way to communicate the undercurrents and structures of living-being with a polluting – and a perilous - entity as well as expressing the empirically unacceptable, thus making space for types of knowledge and experiences that are not allowed. Rumors expressed a praxis where storytelling became a mode of resistance, as a shared and submerged discourse aimed at challenging dominant stories about the Nordic Region as pollution-free and environmental frontrunners. Furthermore, the rumors became an

insight into how fenceline communities operated with information that has been deemed empirically invalid, but nevertheless expresses the very real experiences of pollution.

Of Nocturnal Discharges and Contaminated Life

As previously indicated, rumors about Cheminova's pollution are as old as Cheminova itself. A few years after the company settled on Harboøre Tange, rumors began circulating about toxic sewage being discharged illegally into the fjord and harming the fishing population.[50] The national water monitoring authorities, Danmarks Fiskeri- og Havundersøgelser, reacted to the rumors by initiating an investigation on the ostensible hearsay categorized as "local rumors," suggesting it a less credible claim but serious enough for a national institute to examine the matter. [51] The following inquiry examined the suspected source of contamination on Cheminova's premises: chlorophenol, a chemical used for producing pesticides, which, according to Cheminova, had not been introduced into production yet. The investigation proceeded by interviewing several fishers who had initiated the unverified information. The fishers failed to provide solid proof: no documentation of harm posed by Cheminovas chemical stench, no apparent contaminated fishing gear, and evidence of synthetic distaste in the fish.[52] The absence of solid proof, meaning material evidence, meant that the fisher's statements were disqualified and remained a rumor.

A few months later, the local fisheries officer reported new incidences of contaminated fish in Limfjorden. A subsequent inspection showed excessive discharges of cooling water containing high levels of hydrogen sulfide used in the processes of synthesizing chemical compounds. The estimated levels were illegal according to a previously settled permission with the regulating authorities. Despite hydrogen sulfides' toxic properties and the scale of discharge, the authorities did

not find any "unwanted consequence" for general fishing in the fjord, nor did they find it reasonable to impose additional restrictions.[53] Subsequent inspections led the authorities to conclude that they did not find the rumors untrue or false but exaggerated, implying that it was a matter of the degree to which the allegations were substantial enough.

Incidences of pollution claimed by the local fishers became accounts untranslatable for scientific epistemologies, negotiated through thresholds. Producing highly toxic pesticides meant that Cheminova relied on infrastructures to remove the hazardous excess, be it water or subsurface storage. What counted as pollution depended on assessing where the chemical waste could be without causing immediate harm, and harm was measured against the ecosystem properties –enclosed water or the open sea, land, or coastline - or immediate decline in the totality of a fishing population.[54]

Contamination was understood in relation to the fishing population, and the data was either too premature or incidental to estimate the broader consequences. Despite apparent incidences of excessive chemical waste, it did not become pollution - *as a problem* - before it had a more significant (and proven) effect. Put differently, the hazardous waste from the production was allowed as long as it did not pollute, and pollution only emerged through the transgression of thresholds.[55]

In the 1950s, monitoring and regulating chemical pollution was still a relatively new endeavor, making the distinction between industrial excess and pollution challenging to determine, especially in assessing what counts as environmental harm and when it occurs.[56] The rumors emerged as a response to the highly visible and material manifestations of environmental harm by traveling other channels than technoscientific domains that perceived pollution through measurements, groupings, and systems. Rumors italicized the paradoxical difference between two ontological and epistemological regimes: The pollution was manifest

and tangible to the fishers; they could see, smell, and taste it, but bureaucratic forms of expertise could not measure the harm or find an amount significant enough, thus failing to prove any causality.

Claims of severe contamination accumulated, and the initial articulations of pollution became an ominous account of chemical violence. A few years later, in 1956, local fishers discovered contaminated lobsters and eels near Cheminova's premises and reported it to Danmarks Fiskeri- og Havundersøgelser.[57] Cheminova reacted to the accusations by claiming that it was nothing more than rumors. In a correspondence sent to several actors, Cheminova refused to be the source and thus suggested other options: a nearby factory could be an equally likely cause, or Cheminova pointed to the indeterminacy of pollutive sources supported by an absence of direct documentation. Further, Cheminova rejected any implication, contending that "the factory had never discharged any wastewater into the fjord while the factory was in operation and will not do so in the future," followed by the untenable logic of regulating that which does not exist.[58] Finally, Cheminova implied that no one can hinder "irresponsible persons starting rumors" but that it is both harmful and costly. Upon noticing instances of contamination, the company suggested taking immediate action by sending samples to Cheminova or the local authorities; following this method of urgency, Cheminova insisted that any complaints would quickly disappear.[59] As such, Cheminova used rumors as a part of a strategy to blur or gaslight anyone who reported pollution by continually questioning the claims; first, by reducing the local community's experiences of chemical contamination to rumors, then the company pointed to indeterminacy, followed by outright denial. Finally, by pointing to the potential harm of rumors, financially and in terms of publicity, Cheminova warned the local community and the authorities by pointing to the seriousness of making such claims.

The increasing contamination of Limfjorden was not just experienced by individuals: local enterprises also expressed grave concerns. A local oyster-farming business, Limfjordsøsters-Kompagniet, had expressed early unease about Cheminova's pollutive wastewater and decided to act on emerging local stories. Namely, one rumor that circulated among local fishers ended up at the desk of the oyster company CEO. The rumor gravitated around illegal disposal of toxic sewage stemming from Cheminovas production, carried out in the dead of night. Because the rumor reported of clandestine and covert actions, the oyster company suspected that the workers were acting without the direction's knowledge, thus risking Cheminova's existence.

Uneasy about this problematic piece of information, the oyster company CEO informally approached his counterpart at Cheminova. However, upon receiving the rumor, the Cheminova executive retorted that he was surprised that the rumors had arrived so late as in the past years, at every bar in the area, one could get served with such unlikely stories in return for one or two beers.[60] If the CEO of the oyster company could supply Cheminova with the names of the "rumormongers" who had started them, the CEO would happily teach them a lesson.[61] Adding to the dismissal of any accusation, the CEO maintained that excess from the production was so toxic that any unpermitted discharge would be too inconvenient to dump in any other place than the designated areas. Furthermore, if any unauthorized dumping did happen, it would immediately be discovered due to the high amount of sludge in the wastewater and its spectacular coloring.[62] Considering the multiple explanations provided and the high stakes in wanting to "teach the rumormongers a lesson," it was a strategy that temporarily distracted suspicions of illegal activities. Additionally, the outline of a discursive strategy composited of a binary appears; Cheminova's toxic waste was *extremely* certain through its terrible

smell and sensational colors, while anything else was kept in a state of ontological fuzziness by way of rumors.

In the following decades, Cheminova constructed the harmful effects of its waste in vague and uncertain ways by giving incoherent information. When authorities inquired about how much hazardous waste the company accumulated, the company explained the difficulties and complexities of measurement over time.[63] When confronted with claims connecting the factory and illegal dumping, Cheminova discursively separated chemical waste from pollution. Pollution was, contrary to waste, indeterminant and accidental.[64] In this way, Cheminova built an "apparatus of ambiguity" in its depiction of hazardous waste as a part of a strategy in which confusion and "infrastructures of not knowing" became a central part of its depiction.[65] The rumors were incorporated into the apparatus as pollution deviated from an otherwise coherent system of waste removal – the rumors were, like pollution, separated from context. Relatedly, Cheminova led a self-proclaimed "politics of openness" where the company provided all available information in the name of transparency.[66] However, isolated incidences and accidents were utilized as models of explanations, supported by a (notable) absence of information whenever pollution was linked to the company.

The rumors came as a response by the local community, who witnessed and reacted to experiences of radical environmental transformation unfolding in different ways. As a submerged language,[67] not allowed to penetrate the density of official languages, such as bureaucratic government vocabularies, nor counted as evidence or proof, it became an articulation of a traumatic experience. However, Cheminova used the rumors to its advantage by creating intentional ambiguity in which other ways of knowing, vernacular and embodied, were delegitimized by depicting them as rumors and, therefore, invalid. In this way, rumors were not solely a "weapon of the weak"[68] or an outcome of deficient

environmental information but a strategy actively used by Cheminova to render pollution harmless despite its apparent manifestations.

The Sabotage Theory

In light of its pollution cases, Cheminova had an ambivalent relationship with its surroundings, including the authorities and the local community. However, the company eluded attention and stricter control and serious repercussions until the 1970s when the establishment of the Ministry of Environment – initially The Ministry of Pollution in 1971, was followed by the Danish Environmental Protection Agency (DEPA) a year later, and the promulgation of the first Environmental Law in 1973 finished the trinity of environmental governance. Environmental awareness had thus made the national agenda, while environmental politics specifically focused on addressing pollution and polluting industries, with Cheminova highlighted as a particular concern.[69]

Reflecting societal trends, young, activist-inclined people were increasingly interested in environmental protection and formed a critical mass less suspicious of approaching industrial actors. For example, on June 24, 1978, two young biologists conducted fieldwork on Harboøre Tange next to Cheminova. The peninsula had become a biological hotspot hosting a rich and rare bird habitat, which was the primary motivation for the biologist's visit. They did not find a flourishing flock of birds; instead, they discovered a considerable amount of contaminated terns and seagulls.[70]

Responding to the shocking findings, the biologists collected several affected birds and approached the DEPA the following day. In a report describing the situation, the biologists underlined the severity of the contamination both in terms of scope and toxicity while identifying Cheminova as the source, as the contaminated life was found within a

few miles of the (only) factory. The biologists urged the DEPA to take immediate action by analyzing the birds, specifically focusing on the causality between pesticides and contamination, posing stricter temporary regulations, informing other relevant authorities, and monitoring wildlife on the peninsula.[71]

On subsequent visits carried out by several actors in the following weeks, more than 300 additional birds were reported either lifeless or visibly sick from chemical contamination.[72] The peninsula had turned into a torturous scene saturated by death, including a choreography of terror composed of birds suffering from chemically induced convulsions strewn across the coastline among scattered regurgitated sand eels. The findings catalyzed a media frenzy termed "the bird killings on the peninsula."[73] Numerous samples was collected and sent for analysis, while bureaucratic confusion about jurisdiction and responsibility manifested in a paper trail between several institutions.[74]

One outcome was a series of inspections and meetings with Cheminova, who had not detected "anything out of the ordinary at the time of finding the dead birds" other than some dead fish on the coastline, which they brought back for analysis, prior to the biologists' findings.[75] A Cheminova representative told a local newspaper, "We frequently search the area looking for signs of potential pollution, and the fish were immediately analyzed. We did not find any of the substances we know from our factory. We were particularly looking for phosphor, which we did not find."[76] A few days after, the representative elaborated, explaining that besides "some dead fish lumped together," they found sick seagulls, one of which they trapped and brought back for analysis. After a while in captivity, the seagull was feeling visibly better but was force-fed contaminated sand eels, thus returning to its state of contamination, and died soon after. Rats were subsequently "tested" but appeared normal, and monitoring threshold levels did not reveal anything unusual.[77] Furthermore, the company had not reported

any accidents, while multiple water samples failed to prove a too-high amount of toxic components.[78]

Simultaneously, Cheminova stated in the media that the analysis showed no sign of pesticide-related chemicals by alluding to the unlikely and courted to the reasonable: "To me, it sounds unbelievable that the birds would die from eating fish living near the outlet from the sewage pipes. The hazardous chemicals are discharged in extremely small amounts, and the wastewater is diluted immediately in "Vesterhavet."[79]

Subsequent analysis from official laboratories diverged from Cheminova's investigation by linking the contaminated birds and fish with ethyl-Parathion, one of the company's most successful pesticides.[80] A Cheminova CEO admitted to the documented findings of the toxic substances but maintained that if the factory was implicated (although depicting it as impossible), it could only be due to an extremely high discharge in an equally extremely short time. In other words, if there was any correlation between the contaminated beings and the chemical company, it was an isolated accident.[81]

Amid the uncertain moments between discovering contaminated wildlife and not proving a direct causality, a memo written by a civil defense inspector emerged. The memo described a meeting between Cheminova and the county water inspector, discussing the possibility of deliberately placing contaminated sand eels by a Cheminova antagonist.[82] A newspaper editorial picked up on the unlikely scenario, claiming that Cheminova entertained the hypothesis in order to displace responsibility.[83] Following the newspaper's accusation, the civil defense inspector who had reported to the local chief of police about the rumor stated that in another conversation, "a leading Cheminova employee" had ceased furthering any sabotage theory to maintain a "good relationship with the local community, not needing accusations

with a theory that cannot sufficiently be substantiated."[84] In the media, Cheminova dismissed theories about sabotage but insisted on remaining open to any likely as well as unlikely scenarios while denying participating in circulating the theory by asserting that the rumor came from the county.[85]

After a year of investigations, the DEPA initially acquitted Cheminova due to a lack of solid proof. The decision fostered severe criticism and subsequent complaints. Based on the county's several inspections and Cheminova's investigations, the DEPA decided that the chemical company could not be held responsible. Despite the otherwise obvious connection between Cheminova's substance and the contamination, including the fact that Cheminova was the only factory producing Parathion in Scandinavia, the case concluded that it was impossible to establish any link to the incident.[86]

However, serious flaws in the bureaucratic process helped shape the outcome. First, after finding a peninsula ruined by a synthetic plague on June 24, the biologists attempted to contact the DEPA on the 26th and 28th of June without success. Next, the biologists had sent their written report to DEPA's former address, and, as additional (un)luck would have it, the report ended up with a wrong file number and in the wrong office. Additionally, the head of the department in the DEPA only contacted the responsible authorities, the regional division, on June 30 – four days after the findings.[87] Finally, due to different circumstances, such as vacation and bad weather conditions, the county collected samples and measured the company's wastewater three weeks after the biologists reported the contamination, thus finding normal thresholds.[88]

The seeming finalization as lacking a culprit guilty of "the bird death on the peninsula" served as an opportunity to reanimate the rumors. Under the headline, "Theory about sabotage against Cheminova," a newspaper reported how the case seemed "mysterious" because

Cheminova's exoneration did not automatically identify a perpetrator. If Cheminova was innocent, a chief engineer in the DEPA noted, the only possibility was that somebody had purposely planted contaminated fish to put Cheminova under scrutiny. Supporting the argument was that Cheminova's tests showed nothing illegal, and only certain birds and fish were contaminated.[89]

A few days later, a professor of Law at Aarhus University developed the sabotage theory in an op-ed. [90] At first glance, he argued, everything appeared normal, but the seeming bureaucratic inertia causing the delay suggested otherwise; in fact, it indicated something suspicious. Perhaps it was a strategy from the biologists, the professor ruminated, as he pointed to Cheminova's self-monitoring finding nothing unusual and that only some birds and fish were affected by Parathion. The professor continued his musing by considering the nature of the evidence while indicating that the innocent party, Cheminova, was not entirely acquitted before someone was found guilty. Slowly approaching the crux of the claim, the professor suggested that the pesticide producer's innocence logically meant that someone had intentionally drenched the sand eels in Parathion. Transforming Cheminova from perpetrator to victim in a deductive move and speculating on motives, the only plausible explanation was that environmental fanatics performed the contamination incident.

Moreover, who else was at the center of this "whodunnit" mystery than the two biologists. The professor explicitly stated that the biologists, being environmental fanatics, would do anything to help their cause, as the aim justified the means in such extremist circles. The biologists', or eco-terrorists, clumsiness was a deliberate tactic by, on purpose, delaying the report and blurring any proof of Cheminova's innocence, thus making any trial impossible and holding the company responsible. This clever idea, but poorly executed, was intended to put Cheminova under the spotlight and increase pressure on the factory.

The biologists replied a few days after explaining that only a vivid imagination combined with superficial knowledge could generate such a grotesque suggestion. Refuting and countering the allegations by providing nuanced details, the biologists were adamant that " it looks like an attempt to intimidate other environmentally concerned persons from reporting companies that violated environmental law. As is evident, one risks an accusation of orchestrating the entire thing and, in addition, being reported to the police."[91]

The rumor proliferated in gaps and cracks between institutions, arising in one context but soon slipping or leaching into others. Despite the many outspoken rejections, the sabotage theory did not vanish but found new spaces of legitimacy. The otherwise deceased rumor was resurrected at a meeting between the DEPA and an environmental NGO in late November 1979. In a (not officially approved) meeting minutes,[92] a chief engineer of DEPA "categorically denied that the poison (parathion) came from Cheminova" and that "one cannot rule out the possibility, that the sand eels was dipped in "Bladan" and thrown in the water."[93] When the NGO objected to the statement, a fellow DEPA employee admitted that the theory was too ludicrous and unsubstantial to be vented. However, the DEPA held its position of not having sufficient proof to litigate Cheminova, as a trial would only accept strictly technical evidence, while other circumstantial indications, biological and otherwise, were worthless. The DEPA would not litigate Cheminova unless they were confident of winning the case, and "the accused had to be given the benefit of the doubt."[94]

What started as mere speculation circled other spheres and gained currency outside the media, ultimately adopted by experts, thus amounting to a truism. Two fields, law and technoscience, became strange bedfellows in sharing epistemic values such as objectivity and establishing a certain, direct and provable link between cause and effect. In addition, the inadequacy of bureaucratic regulation, failing to

penalize or react to the otherwise obvious connection, paved the way for rumors to emerge. The rumor, then, became a legible argument through transubstantiation, where suggestions and speculations became adopted as expert knowledge through an argument premised on "if not this, then that." In terms of pollution situated in territories of uncertainty, because particular epistemes fail to incorporate other types of knowledge, the production of not knowing exploits the conjoining of two systems that cannot verify that which eludes verification, such as pollution, thus rumors became an opportunity to antagonize and delegitimize those raising the critique.

Conclusion

Rumors about Cheminova's pollution show how flows of information operate and are operationalized in three ways. First, rumors were animated by living in proximity to a facility perpetually exposing the local community to danger. Rumors, as forwarded to me during fieldwork, were not about verification or truth but a submerged discourse of living with risk that re-emerged over time and space. Next, I illuminated how rumors worked as an exterior to bureaucratic regimes of monitoring and regulation, becoming a part of a contested space of environmental claims-making. In this way, the rumors circulated and recirculated while public institutions found it hard to grapple with. Environmental expertise and the manifestation of pollution hinged on the politics of evidence as measurements, quantification, and stable documentation, which, in turn, excluded other types of information as viable sources of knowledge. What was first horrifying articulations of a place in radical environmental degradation exerted by chemical violence, as the water turned yellow, an invisible synthetic stench inundated the area, and wildlife was visibly harmed, later became a strategy for Cheminova to discard accusations as slander or unfounded accusations. Especially when the polluted substances did not take on

the same sensual characteristics. The rumors emerged – and remained *as rumors* because the institutional domains did not allow for knowing otherwise. Last, contrary to rendering rumors as a "weapon of the weak," it became a discursive strategy from a corporate entity sowing seeds of doubt and sabotaging other types of expertise, trying to enter domains monopolized by particular epistemic virtues, such as facts. If specific scientific expertise divides reality into what is and what is not, then everything that fails to be validated as that which automatically becomes that which is not. In the intersection between environmental governance and juridical spheres, this strange dichotomy became another register of exploitation for Cheminova, using it to its advantage.

I hope to add another layer to prevalent studies on rumors and environmental conflict by taking both seriously and looking at how they work and what work they do. I have shown that rumors are not only deployed by those with lesser resources but are among many tactics in information warfare where powerful actors use rumors to delegitimize or counter any accusations. Further, by analyzing the rumor, I have hoped to show that rumors about pollution provide an essential insight into the contested (and sometimes very singular) sphere of bureaucratic environmental governance, information, and environmental justice.

Studying the nature of rumors can especially be helpful as we find ourselves in a time and age where misinformation runs rampant concurrently with multiple and interlinked environmental crises. As such, in a world saturated with pollution and information, where the latter is supposed to alleviate or control the former, both have come to be defined by instability and uncertainty. For example, the age of information augmented by algorithmic architecture has given cause to numerous epistemological questions about truth, objectivity, and mediation, which has gained new heights in environmental

disciplines.[95] Getting enough or just the right information does not automatically equal access or transparency, nor does it necessarily aid the pursuit of justice or guarantee expressing living-being in a place subjected to environmental harm.

Rumors help critically scrutinize these questions, where data is juxtaposed with truth, for example, by accumulation with an embedded promise of knowledge claims through data. The ubiquity and permeation of data, then, has challenged and problematized (and in some instances democratized) truth claims and power structures asserting epistemic regimes through expertise and, particularly prevalent for the purpose of this article, making claims about the environment and the repercussions it might entail; in the words of Gwen Ottinger, it expresses regimes of values that can both enable alienation as well as attunement.[96] In this way, getting enough or the correct information does not automatically equal access or transparency, nor does it necessarily aid the pursuit of justice or guarantee expressing living-being in a place subjected to environmental harm.

Notes

[1] Kelly Thornber et al., "First, Do No Harm: Time for a Systems Approach to Address the Problem of Health-Care-Derived Pharmaceutical Pollution," *The Lancet Planetary Health* 6, no. 12 (December 2022): e935–37; "IPCP | The International Panel on Chemical Pollution," accessed April 27, 2023, https://www.ipcp.ch/; Linn Persson et al., "Outside the Safe Operating Space of the Planetary Boundary for Novel Entities," *Environmental Science & Technology* 56, no. 3 (February 1, 2022): 1510–21.

[2] Coined by Liboiron et al., in a special issue probes different modes of activism and living on a planet saturated by chemical contaminants, which binds as much as separates us. See: Max Liboiron, Manuel

Tironi, and Nerea Calvillo, "Toxic Politics: Acting in a Permanently Polluted World," *Social Studies of Science* 48, no. 3 (June 2018): 331–49.

[3] Alice Mah and Thom Davies, *Toxic Truths: Environmental Justice and Citizen Science in a Post-Truth Age.* (Manchester: Manchester University Press, 2020); Rob Nixon, *Slow Violence and the Environmentalism of the Poor* (Cambridge, Mass.: Harvard Univ. Press, 2013); Thom Davies, "Slow Violence and Toxic Geographies: 'Out of Sight' to Whom?," *Environment and Planning C: Politics and Space*, April 10, 2019; Simone M. Müller, "Corporate Behaviour and Ecological Disaster: Dow Chemical and the Great Lakes Mercury Crisis, 1970–1972," *Business History* 60, no. 3 (April 3, 2018): 399–422; S Eben Kirksey, Nicholas Shapiro, and Maria Brodine, "Hope in Blasted Landscapes," *Social Science Information* 52, no. 2 (June 2013): 228–56; Gwen Ottinger, "Misunderstanding Citizen Science: Hermeneutic Ignorance in U.S. Environmental Regulation," *Science as Culture* 31, no. 4 (October 2, 2022): 504–29.

[4] Traci Brynne Voyles, *Wastelanding: Legacies of Uranium Mining in Navajo Country* (Minneapolis: University of Minnesota Press, 2015); Marco Armiero, *Wasteocene: Stories from the Global Dump*, 1st ed. (Cambridge University Press, 2021); Max Liboiron and Josh Lepawsky, *Discard Studies: Wasting, Systems, and Power* (Cambridge, Massachusetts: The MIT Press, 2022).

[5] For remarkable research on how we come to know chemicals see: Natasha Myers, *Rendering Life Molecular: Models, Modelers, and Excitable Matter* (Durham: Duke University Press, 2015); Evan Hepler-Smith, "Molecular Bureaucracy: Toxicological Information and Environmental Protection," *Environmental History* 24, no. 3 (July 1, 2019): 534–60; Michelle Murphy, *Sick Building Syndrome and the Problem of Uncertainty: Environmental Politics, Technoscience, and Women Workers* (Durham: Duke University Press, 2006); Sheila Jasanoff, "Virtual, Visible, and Actionable: Data Assemblages and the Sightlines of Justice," *Big Data & Society* 4, no. 2 (December 2017).

[6] This article is inspired by one of the STS scholar Michelle Murphy's core research commitments that examine life in the wake of chemical-saturated industrialism and the infrastructures that unequally distribute

synthetic harm. Michelle Murphy, "Alterlife and Decolonial Chemical Relations," *Cultural Anthropology* 32, no. 4 (November 18, 2017): 494–503.

[7] Anthropologist Lesley Green conjoins Derrida's concept of hauntology with the totality of scientific representation to unearth some of the forgotten or overlooked elements in environmental discourse. The ignored ways of understanding the environment, Green argues, proliferate the unjust aspects of the Anthropocene as it eclipses colonial, capitalist, and racist structures still existing. See: Lesley Green, *Rock | Water | Life: Ecology & Humanities for a Decolonial South Africa* (Durham London: Duke University Press, 2020), 15–16; Jacques Derrida, *Specters of Marx: The State of the Debt, the Work of Mourning and the New International*, 1. publ, Routledge Classics (New York: Routledge, 2006).

[8] Derrida, *Specters of Marx*.

[9] Inscrutable Places are places that are made difficult to know because of bio/environmental, epistemic, and political economic factors. Adrianne C. Kroepsch and Katherine R. Clifford, "On Environments of Not Knowing: How Some Environmental Spaces and Circulations Are Made Inscrutable," *Geoforum* 132 (June 2022): 171–81.

[10] Gordon W. Allport and Leo Postman, *The Psychology of Rumor*, The Psychology of Rumor (Oxford, England: Henry Holt, 1947); Gary A Fine, "Rumors and Gossiping," in *Handbook of Discourse Analysis*, ed. Teun Van Dijk, 1985, 223–37; Axel Gelfert, *The Routledge Handbook of Applied Epistemology*, ed. David Coady and James Chase, 1st ed. (Routledge, 2018), 259–71.

[11] Niko Besnier, *Gossip and the Everyday Production of Politics* (Honolulu: University of Hawai'i Press, 2009), 1–3; Chelsea Horton, "Gossip—A Thing Humans Do," *Anthropology News*, February 20, 2020, https://www.anthropology-news.org/articles/gossip-a-thing-humans-do/; Max Gluckman, "Gossip and Scandal," *Current Anthropology* 4, no. 3 (1963): 307–16.

[12] Julien Bonhomme borrows this specific term from Isaac Joseph: Julien Bonhomme, Dominic Horsfall, and Philippe Descola, *The Sex Thieves: The Anthropology of a Rumor* (Chicago: Hawoo Publishing Company, 2016), 4.

[13] Veena Das, "Specificities: Official Narratives, Rumour, and the Social Production of Hate," *Social Identities* 4, no. 1 (February 1998): 109–30.
[14] Luise White, *Speaking with Vampires: Rumor and History in Colonial Africa* (Berkeley, California: University of California Press, 2000).
[15] Scott, *Weapons of the Weak*.
[16] Shibutani Tamotsu, *Improvised News: A Sociological Study of Rumor: (3. Pr Inting)*. (Indianapolis, New York: Bobbs-Merrill, 1966).
[17] Sarah Luna, "Affective Atmospheres of Terror on the Mexico–U.S. Border: Rumors of Violence in Reynosa's Prostitution Zone," *Cultural Anthropology* 33, no. 1 (February 22, 2018): 58–84.
[18] Kim Fortun, "Ethnography in Late Industrialism," *Cultural Anthropology* 27, no. 3 (August 2012): 446–64; Kim Fortun, "From Latour to Late Industrialism," *HAU: Journal of Ethnographic Theory* 4, no. 1 (June 2014): 309–29.
[19] Fortun, "Ethnography in Late Industrialism," 447.
[20] Chloe Ahmann, "Uncertainty In Motion: Rumors of a Proxy War in Late Industrial Baltimore," *Cultural Anthropology*, n.d., 306.
[21] On epistemic infrastructures, see Michelle Murphy, *The Economization of Life* (Durham; London: Duke University Press, 2017), 6–7.
[22] "Cheminova venter at kunne give Aarhus Universitet 100.000 i 1951," *Aarhus Stiftstidende*, December 4, 1950; "Danske Ukrudtsmidler sendes til flere end 30 Lande," *Aalborg Stiftstidende*, May 20, 1956.
[23] Henning Lehmann et al., "Fundats for Aarhus Universitets Forskningsfond" March 20, 1986, Carl Holst-Knudsen (1886-1956) - Materiale vedr. Århus Universitet, Aarhus Stadsarkiv.
[24] Jørgen Burchardt, "Cheminova – en miljøforurener i Måløv," *Byhornet* 51, no. 3 (2022): 15–17; "Procedure i Cheminova-Sagen: Indlæg Af Anklager Og Forsvarer -Nyt Retsmøde Paa Fredag," *Frederiksborg Amtsavis*, November 19, 1952; "40.000 Kroner for Ødelagte Afgrøder," *Jydske Tidende*, November 22, 1952. (Author)
[25] Gunnar Andreasen, *Første halvleg* (Forlaget Vest, 1983); "Fabrikken der flyttes fra Maalev til Rønland," *Morsø Folkeblad*, March 7, 1952;

"Ingeniøren, der flytter sin Fabrik til Rønland," *Berlingske Aftenavis*, January 7, 1952; "Giftfabrikken har endelig fået ro," *Aalborg Stiftstidende*, June 24, 1956.

[26] "Ingeniøren, der flytter sin Fabrik til Rønland"; "Cheminova Flytter Fra Maalev Til Landets Mest Øde Omraade," *Roskilde Dagblad*, January 7, 1952; "Den nye Cheminova-fabrik møder nye vanskeligheder: Myndighederne stiller nye krav - Flytter man til udlandet?," *Demokraten*, August 16, 1953; Jørgen Burchardt, "Cheminova - En Generationforureners Første År," *Gladsaxe Lokalhistoriske Forenings Årbog 2022*, 2022, 5–35; Burchardt, "Cheminova – en miljøforurener i Måløv"; Wittus Nielsen, *Cheminova - en giftig affære* (Copenhagen: Gyldendal, 1985); Andreasen, *Første halvleg*, 90–95.

[27] Ruth Wilson Gilmore, "Forgotten Places and the Seeds of Grassroots Planning," in *Engaging Contradictions: Theory, Politics, and Methods of Activist Scholarship*, ed. Charles R. Hale and Craig Calhoun (Berkely: University of California Press, 2008), 31–61.

[28] "Court Transcript of Negotiation Protocol" (Landvæsensnævnet for Skodborg-Vandfuld og Hjerm-Ginding herreders 1. nævnskreds, October 15, 1953); Miljøministeriet, "Miljøministeriets orientering om Cheminova: myndighedernes sagsbehandling," Hvidbog (København: Miljøministeriet, 1981), 37–38; "Correspondance Concerning Samples and Measurements of Cheminova's Wastewater," April 24, 1953, 21-2, Harboøre-Thyborøn Local Archive; Gunnar Andreasen and Cheminova, "Wastewater Diversion Rønlandsværket," July 1, 1953, 21-2, Harboøre-Thyborøn Local Archive.

[29] Sacrifice Zones have been subject to multiple considerations, from the emergence to anthropological explorations and theological analysis, both being particularly interested in the conceptual layers of "sacrifice" and its implications. See: Steve Lerner and Phil Brown, *Sacrifice Zones: The Front Lines of Toxic Chemical Exposure in the United States* (Cambridge, Mass.: The MIT Press, 2012); Hugo Reinert, "Notes from a Projected Sacrifice Zone," 2018, 21; Ryan Juskus, "Sacrifice Zones," *Environmental Humanities* 15, no. 1 (March 1, 2023): 3–24.

[30] Christian Andersen, "Status for generationsforureninger 2022" (Danske Regioner, November 24, 2022).
[31] Ove Kusnitzoff, "Cheminova er blevet solgt for 8,5 milliarder kroner," *Politiken*, September 8, 2014, https://politiken.dk/oekonomi/virksomheder/art5536046/Cheminova-er-blevet-solgt-for-85-milliarder-kroner.
[32] Andersen, "Status for generationsforureninger 2022."
[33] Anthropologist Hugh Raffles describes "minor horrors" as catastrophes, no matter how small they might appear, nevertheless transform everything that follows. Furthermore, they also make up the world's great horrors. I use the term to argue that even if Cheminova's pollution is minor compared to others, like Monsanto or Bayer, and even if people in Harboøre Tange are exposed to less chemical violence than other places, they are still subjected to violence, and Cheminova is still a part of the same structures that produce the great horrors. Hugh Raffles, *The Book of Unconformities: Speculations on Lost Time* (Portland, Oregon: Verse Chorus Press, 2022), 6.
[34] The fieldwork was carried out in the early days of the COVID-19 pandemic, a pandemic which is still unfolding and whose fullest consequence we have yet to see.
[35] Erving Goffman, *The Presentation of Self in Everyday Life*, (New York: Anchor Books, 1990).
[36] Michael T. Taussig, *Defacement: Public Secrecy and the Labor of the Negative* (Stanford, Calif: Stanford University Press, 1999), 2–3.
[37] Cass R. Sunstein and Adrian Vermeule, "Conspiracy Theories: Causes and Cures," *Journal of Political Philosophy* 17, no. 2 (June 2009): 202–27.
[38] White, *Speaking with Vampires*, 4–5.
[39] Developed, but never used by the Nazi Empire, see: Frederick Rowe Davis, "Organophosphates," in *Agents of Risk and Change, 1800-2000*, ed. Ernst Homburg and Elisabeth Vaupel, Environment in History: International Perspectives, volume 17 (New York: Berghahn Books, 2019). Additionally, in his biography, Cheminova CEO, describes a visit from Gerhard Schrader, according to the CEO, stated: "Erfunden wurde das Paration bei uns in Leverkusen.Technisch wurde es aber geboren bei Ihnen in Rønland."Andreasen, *Første halvleg*, 105–6.

[40] Edmund Russell, *War and Nature: Fighting Humans and Insects with Chemicals from World War I to Silent Spring*, Studies in Environment and History (Cambridge ; New York: Cambridge University Press, 2001); Brian Williams and Jayson Maurice Porter, "Cotton, Whiteness, and Other Poisons," *Environmental Humanities* 14, no. 3 (November 1, 2022): 499–521; Glenn Cross, *Dirty War: Rhodesia and Chemical Biological Warfare 1975-1980* (Solihull, West Midlands, England: Helion & Company, 2017); Adam M. Romero, "Commercializing Chemical Warfare: Citrus, Cyanide, and an Endless War," *Agriculture and Human Values* 33, no. 1 (March 2016): 3–26.

[41] Secrecy and security are by no means exclusive to other types of high-risk areas. For a relatable example, Joseph Masco thoughtfully explores the connection between secrecy, security, and nuclear facilities Joseph Masco, "Lie Detectors: On Secrets and Hypersecurity in Los Alamos," *Public Culture*, 2002.; Joseph Masco, *The Future of Fallout, and Other Episodes in Radioactive World-Making* (Duke University Press, 2020), 76; "Se kortet: Der er 118 risikovirksomheder i Danmark - de ligger især ved de store havne," September 2, 2020, https://erhvervplus.dk/erhvervplus/se-kortet-der-er-118-risikovirksomheder-i-danmark-de-ligger-isaer-ved-de-store-havne.

[42] For a detailed analysis of Nixons motivations and the implications see: Jacob Darwin Hamblin, "Environmentalism for the Atlantic Alliance: NATO's Experiment with the 'Challenges of Modern Society,'" *Environmental History* 15, no. 1 (January 1, 2010): 54–75.

[43] Jan-Henrik Meyer, "Who Should Pay for Pollution? The OECD, the European Communities and the Emergence of Environmental Policy in the Early 1970s," *European Review of History: Revue Européenne d'histoire* 24, no. 3 (May 4, 2017): 377–98; Maria Ivanova, "Designing the United Nations Environment Programme: A Story of Compromise and Confrontation," *International Environmental Agreements: Politics, Law and Economics* 7, no. 4 (November 23, 2007): 337–61.

[44] N Munro, Kathleen R. Ambrose, and Annetta P. Watson, "Toxicity of the Organophosphate Chemical Warfare Agents GA, GB, and VX: Implications for Public Protection.," *Environmental Health Perspectives* 102, no. 1 (January 1994): 18–37.

[45] Tom Olufson, "Cheminova - Danmarks mest omstridte virksomhed," *Arbejdsmændenes Fagblad - Organ for Danmarks Organiserede Arbejdsmænd*, December 15, 1957, 533.
[46] Zebulon Dingley, "Rumor and History Revisited: 'Mumani' in Coastal Kenya, 1945," *The Journal of African History* 59, no. 3 (November 2018): 398,
[47] Donna J. Haraway, *Staying With the Trouble: Making Kin in the Chthulucene*, Experimental Futures: Technological Lives, Scientific Arts, Anthropological Voices (Durham: Duke University Press, 2016), 12.
[48] Pavithra Vasudevan et al., "Storytelling Earth and Body," *Annals of the American Association of Geographers*, November 29, 2022, 1–17.
[49] Donna Houston, "Environmental Justice Storytelling: Angels and Isotopes at Yucca Mountain, Nevada," *Antipode* 45, no. 2 (March 2013): 413.
[50] Miljøministeriet, "Miljøministeriets orientering om Cheminova: myndighedernes sagsbehandling bilag 2," Hvidbog (København: Miljøministeriet, 1981), 19.
[51] Miljøministeriet, "Miljøministeriets orientering om Cheminova," 44–45.
[52] Miljøministeriet, "Miljøministeriets orientering om Cheminova bilag 2," 19.
[53] Ibid., 19–20.
[54] Max Liboiron shows how techno-science understands pollution, assessment, and regulation which hinge on particular relations to, and understandings of, Land and Nature, sharing similar aims as colonialism. Pollution emerges when L/land cannot hold its capacity for harm. Max Liboiron, *Pollution Is Colonialism* (Durham: Duke University Press, 2021).
[55] Ejnar Friis and Landvæsensnævnet for Skodborg-Vandfuld herrede, "Approval of discharge of sewage," September 21, 1953, 20-4, Lokalarkivet for Thyborøn-Harboøre-Engbjerg.
[56] Jens Engberg, *Det heles vel: forureningsbekæmpelsen i Danmark fra loven om sundhedvsvedtægter i 1850'erne til miljøloven 1974*, 1st ed. (Copenhagen: Miljøkontrollen, Københavns Kommune, 1999), 258–60.

[57] "Report on inspection of Cheminova," June 26, 1956, 20-4, Lokalarkivet for Thyborøn-Harboøre-Engbjerg.
[58] Gunnar Andreasen and Cheminova, "Skade paa fiskeriet," January 15, 1957, 21-2, Harboøre-Thyborøn Local Archive.
[59] Ibid.
[60] Miljøministeriet, "Miljøministeriets orientering om Cheminova bilag 2," 22–23.
[61] A report from the Danish Environmental Agency states that the CEO uses the expression "sladder-hanke" a derogative term for one who spreads gossip or rumor. Furthermore, the CEO uses "en afklapsning," implying both suggest physical and verbal violence. Ibid., 23.
[62] Recalling that Cheminova had been given permission to dump liquid chemicals in a seeping area between two dunes next to the factory. The color of Cheminova's most toxic wastewater is described in sources as resembling an "egg-yolk." Ibid.
[63] Cheminova, "Concerning Landfill," July 13, 1956, 20-4, Lokalarkivet for Thyborøn-Harboøre-Engbjerg.
[64] Ibid.; "Report on inspection of Cheminova."
[65] According to historian Michelle Murphy our encounters with chemicals – and chemical pollution - are shaped by epistemic habits, including constructing them as discrete objects "floating in white space" and as uncertain and imperceptible entities. The invisibility and uncertainty surrounding industrial chemical pollution is an achievement, not a natural fact. Michelle Murphy, "Reimagining Chemicals, With and Against Technoscience," in *Reactivating Elements*, ed. Dimitris Papadopoulos, María Puig de la Bellacasa, and Natasha Myers (Duke University Press, 2022), 263–65.
[66] See Author forthcoming
[67] Kamau Brathwaite, "History of the Voice 1979/1981," in *Roots*, Ann Arbor Paperbacks (Ann Arbor: University of Michigan Press, 1993), 259–304.
[68] Scott, *Weapons of the Weak*.
[69] Jens Kampmann et al., "Miljøministeriet gennem årene," 2012, 9.
[70] Bodil Deen Petersen and Hans Skotte Møller, "Report on Findings of Contaminated Birds," June 25, 1978, Private archive.
[71] Ibid.

[72] Kari Elvestad, "Rapport over dødsfald blandt fugle og fisk i området nær Cheminovas spildevandsudløb i Vesterhavet juni 1978" (Statens Veterinære Serumlaboratorium, September 18, 1978).
[73] Aage Hansen, "Ingen Tør Sige Sandheden Om Fugledrabene På Tangen," *Ringkjøbing Amts Dagblad*, July 24, 1978; "Cheminova Skyldig i Massedrab På Fugle," *Ekstra Bladet*, July 12, 1978.
[74] Gudrun Wium-Andersen and Søren Wium-Andersen, eds., *Cheminova-Sagen 1978: En Miljøsag Belyst Ved Akter Og Avisdebat* (Ørsted: Nucleus, 1979); Miljøministeriet, "Miljøministeriets orientering om Cheminova bilag 2," 202–35.
[75] "Other than some dead birds" is Cheminova's description, not the authors.
[76] Henrik Kaufholz, "Sjældne Fugle Fundet Døde Ved Kemifabrik," *Politiken*, July 1, 1978.
[77] Henrik Herping, "Cheminova Fandt Selv de Døde Og Forgiftede Måger Ved Havet," *Ringkjøbing Amts Dagblad*, July 4, 1978.
[78] Leif Stilling and Ringkjøbing Amtskommune, Amtsvandsinspektøren, "Fugledød På Harboøre Tange, Thyborøn-Harboøre Kommune," Memo, (5 october1978).
[79] "Vesterhavet," translated into the "western ocean," is a Danish term for the area between the west coast of Jutland and the North Sea. Kaufholz, "Sjældne Fugle Fundet Døde Ved Kemifabrik."
[80] Wium-Andersen and Wium-Andersen, *Cheminova-Sagen 1978*, 25.
[81] "Fugle Døde Af Urent Spildevand," *Politiken*, July 12, 1978. Recalling Murphy that shows how polluting companies actively produce images of chemicals as "floating in white space." See footnote 55.
[82] Miljøministeriet, "Miljøministeriets orientering om Cheminova bilag 2," 207.
[83] "Forgiftningen - Manglende respekt for naturen," *Politiken*, July 17, 1978.
[84] Miljøministeriet, "Miljøministeriets orientering om Cheminova bilag 2," 207.
[85] Arne V. Jensen, "Fugledød og Cheminova," *Politiken*, July 20, 1978.
[86] Wium-Andersen and Wium-Andersen, *Cheminova-Sagen 1978*.
[87] "Gift-Alarm Blev Syltet i Tre Uger," *Ekstra Bladet*, August 11, 1978.

[88] Stilling and Ringkjøbing Amtskommune, Amtsvandsinspektøren, "Fugledød På Harboøre Tange, Thyborøn-Harboøre Kommune," 5 october 1978.
[89] Egon Havbo, "Teori om sabotage mod Cheminova," *Morgenavisen Jyllandsposten*, July 3, 1979.
[90] Stig Jørgensen, "Cheminova-sagen mærkelig," *Morgenavisen Jyllandsposten*, July 6, 1979.
[91] Bodil Deen Petersen and Hans Skotte Møller, "Professorens indlæg i Cheminova-sagen," July 11, 1979.
[92] The minutes from the meeting was not approved but was commented on extensively in subsequent disputes about responsibilities and the role of the DEPA.Miljøministeriet, "Miljøministeriets orientering om Cheminova bilag 2," 226–29. The NGO is the Danish Union for Ornithologists.
[93] «Bladan» is the brand name for Cheminova's parathion-based pesticide. Ibid., 227.
[94] Ibid.
[95] Andreas Hepp, Juliane Jarke, and Leif Kramp, eds., *New Perspectives in Critical Data Studies: The Ambivalences of Data Power*, Transforming Communications – Studies in Cross-Media Research (Cham: Springer International Publishing, 2022); Eric Nost and Jenny Elaine Goldstein, "A Political Ecology of Data," *Nature and Space E* 5 (1), no. 3–17 (2021): 15; Antonia Walford, "Raw Data: Making Relations Matter," *Social Analysis* 61, no. 2 (January 1, 2017); Bruno Latour, "Why Has Critique Run out of Steam? From Matters of Fact to Matters of Concern," 2004, 24.
[96] Kim Fortun et al., "Pushback: Critical Data Designers and Pollution Politics," *Big Data & Society* 3, no. 2 (December 2016); Alice Mah, "Environmental Justice in the Age of Big Data: Challenging Toxic Blind Spots of Voice, Speed, and Expertise," *Environmental Sociology* 3, no. 2 (April 3, 2017): 122–33; Lourdes A. Vera et al., "When Data Justice and Environmental Justice Meet: Formulating a Response to Extractive Logic through Environmental Data Justice," *Information, Communication & Society* 22, no. 7 (June 7, 2019): 1012–28; Gwen Ottinger, Kelly Bronson, and Dawn Nafus, "Clicks and Particulates:

Value, Alienation, and Attunement as Unifying Themes in Big Data Studies," *Big Data & Society* 10, no. 1 (January 2023).

Article IV: A Pump, a Depot, and Some Amber: Submerged Histories and the Specter of Chemical Pollution

Figure 10- Puccinellia maritima specimen tested for mercury in 1981. The specimen was located in DEPA's archive. Scan by Sebastian Lundsteen

Article IV: A Pump, a Depot, and Some Amber: Submerged Histories and the Specter of Chemical Pollution

This image documents an unexpected encounter while going through boxes in the Danish Environmental Protection Agency archive. Ripped from its previous environmental context, there is seemingly little information about the plant. Taped to a piece of paper, the top corner marks the index and reference number, while on the bottom left, a small note provides information about the area it was sampled (Knopper Enge), the date (15th of September 1981), and the species name (strandannelgræs). Seaside alkali grass is the common name in English and grows in most coastal environments in western Denmark, especially in estuaries such as Harboøre Tange. Fixed in time and space and shyly evading the accelerated impermanence outside of the archive, the tentative knowledge displayed on the page inclines a further exploration elsewhere.

The plant itself is largely unspectacular, but its history is what makes it remarkable. I found the plant among folders and documents in a box titled "The Cheminova-hole." Here, the specimen's additional archival context informs us that it was collected because of suspected mercury contamination on a coastal meadow behind the chemical depot near the 42nd groin. Considering the temporal context – in the fall of 1981 – the sample was taken three months after the spectacle of emptying the submerged chemical depot. Subject to enormous media coverage, the chemical depot had been declared empty by politicians, bureaucrats, and scientists. However, as this plant testifies, removing (parts of) the hazardous waste was insufficient. Those responsible had not considered previous circulation, sedimentation, or continual leaching from the depot. The waste did not respect compartmentalization, where the toxic chemicals were supposed to be inside the depot. The waste contradicted and resisted those estimations made possible by measurements and visualized through models by clearly transgressing the boundaries

horizontally and vertically. The waste had, in an impossible way, re-emerged. It had escaped the confinement of the underground.

The plant-turned-sample illustrates a central argument in this fourth and final article. Thematically, I am interested in tracing the physical space of the underground and the associated political, cultural, and scientific projections. The underground is a place that holds numerous speculative capacities ranging from inert, dark, uncanny, and barren to extractive, infinite, and exclusion. Moreover, resistance, secrecy, and resistance add to the expanding descriptions used to imagine the below. The article explores the modalities of the underground in three ways: the making of the depot, the return of the depot, and resistance to the depot.

By attending to the scientific, regulatory, and bureaucratic considerations of chemical waste, this article describes how the depot came into existence. Contrary to general assumptions, the depot was not initially conceived as a subsurface structure but made into one. In the 1950s, Cheminova's waste – first liquid, then solid – grew in substance and as a problem. The hazardous by-products of producing toxic chemicals was deemed unsafe or unfit for surface dwellers through risk discourses, and no technology was sufficient or fully developed for managing the waste.

I argue that continual scientific claims of certainty hinged on the belief that controlling the chemical waste was to know and predict the waste – even as it consistently defied previous claims and attempts at knowing it. In this way, I demonstrate how the underground did not provide the certainty and security, experts had guaranteed. Furthermore, remediation, or "emptying the depot," did not provide the "away" as

initially promised.[1] As such, the re-emergence of the chemical waste was another perturbation in a series of unsettling discoveries, where what was previously rendered as gone had returned.

The article illuminates the historical conditions of a bizarre inversion of extractivism. As with extraction, the depth became considered a worthless space, thus posing an opportunity to sustain industries whose production is contingent on disposing of a toxic by-product. Corresponding to extractive practices, portrayals of subterranean time and space as infinite and inert work in tandem. Scientific estimations were fitted into long-term diagrams that supported these ideas about the underground. I, therefore, argue that two distinct kinds of chemical waste exist: one inside a sphere mediated and predicted by technologies aimed to make it manageable within scientific domains. Here, pollution is connected to temporalities associated with the underground – as a discursive pre-configuration – that allows substances to be safely hidden or removed. The construction of an "out-of-sight" renders the subsurface as a new modality of frontierism. The "other" pollution is the material substances, or the physical reality, that do not obey the scientific projections. As the chemical waste and the pollution repeatedly return, thus haunting the claims of an away.

In the article, I suggest focusing on verticality as a distinct historical method, that explicitly focuses on verticality in relation to the underground. I ask what kinds of imaginaries are associated with the underground, what kinds of epistemes and technologies dominate those imaginaries, how have they changed, and how can we think otherwise. As illustrated by the plant in the archive, the elusive encounter with a

[1] There is a difference between emptying the depot (tømme depotet) and remediation (oprensing). The first term was used in previous attempts at "emptying the depot" while the latter is a discourse only used recently.

material (the plant) and its immaterial properties (the pollution) sparked a critical engagement with the many ways that chemical pollution was being framed, that exceeded its material substance. My finding of a contaminated plant that might, or might not cause harm, perhaps now, perhaps later, became a strange way of experiencing pollution – although I was far removed from its source. And thus, the affective encounter spawned a series of questions, that I took to the field, which laid the foundation for this article.

This methodology consisting of tangential proximations sums up my methods for studying and understanding the nature of chemical pollution. I approached pollution through its different ways representations, how it can be known in other ways, and finally, how the material realities of the waste transform defy the accounts or renderings of the pollution as stable or contained.

I use a pump as a way of visualizing the relationship between "down there" and "up here" mediated by a surface. The pump came to my attention during an excursion with an environmentalist. We had spent the day conversing about Cheminova, responsibility, and historical trajectories. One way of learning from the environmental justice community, I had previously found that tours in the area typically inspired them to share information differently than in an interview setting. As such, I wanted to have a tour of the area to "see" what he saw. As we headed for the chemical depot, the environmentalist became increasingly agitated as we approached the area. I assumed that the depot infuriated the environmentalist but found to my surprise that it was a wooden construction consisting of a pump and filter station. The pump works as a prompt for the article and my conversations about remediation with the environmentalist.

Article IV: A Pump, a Depot, and Some Amber: Submerged Histories and the Specter of Chemical Pollution

Engagements with verticality have conceptual ties to "submergence" as a framework for understanding chemical pollution and environmental issues. The article adds to previous adaptations of the concept by explicitly and literally focusing on the underground. Moreover, the article shows how some scientific epistemes dominate others, but instead of discursive or human contestation of these knowledge regimes, it is the material reality that keeps troubling the claims. As such, the article underlines "submergence" in the context of a re-emergence, through the fluid boundaries of the term. The permeability and the porous boundaries all suggest that the re-emergence of chemical pollution is possible (or likely) under the current regime.

By proposing a turn towards verticality as a distinct approach, I contribute to environmental history. As I show, the underground constitutes a broad large field of inquiry, for example in cultural studies, history of technology, and political geography. With the advent of environmental disasters on a planetary scale and the subsurface as a new frontier of resource capitalism, the time is ripe for historical inquiries that scrutinize the roots of underground engagements – especially, through an environmental lens. Such studies can help advance a more comprehensive understanding of contemporary developments that increasingly look to unrecognized, and subterranean spaces for new resources and dumpsites. Here we can consider Carbon Capture and Storage or toxic heritage sites. Moreover, being analytically committed to the underground can open alternatives to the current regimes, such as regenerative farming that focuses on cultivating the soil instead of plants.

Finally, the article seeks to promote a more environmentally just agenda, by arguing for the potential and possible otherwise. As with the other articles, I wanted to bring together different perspectives and

attitudes toward pollution – in this case, the buried chemical depot. For quite some time I had circulated the fisher's commitment to resisting environmental pollution and his relationship to amber but did not find the right place for this story. Furthermore, I was committed to ending the article in a way that did not return or perpetuate the status quo. I wanted to introduce a different and more intimate ending.

Thus, the article ends in two different ways. One mimics the repetition of the pump, as a sort of eternal re-occurrence. The other ending involves the fisher but opens for a different future. In this way, I hope to convey an argument to the reader both in terms of writing and form. Within this framework, justice is accounted for, through different ways of understanding and relating to the environment, including the subterranean. Given the conceptual and geographical expansion of environmental justice, the re-politicization and articulation of the "other-than-surface" geographies. As such, spatial justice becomes a volumetric justice that seeks to scrutinize the power relations between surface and depth, including the distributed violence, temporally and spatially, that extends far beyond its locality.

At the current stage, the article is considered a part of a special issue in the journal Lagoonscapes - *The Venice Journal of Environmental Humanities*. However, nothing is decided yet and I might opt for another, more historically focused, journal.

A Pump, a Depot, and Some Amber: On Submerged Histories and the Specter of Chemical Pollution

Introduction

On a small strip of land on the Danish West Coast, a pump transports and filters contaminated water. The pump is just one among several pumps scattered across the area. It is part of multiple remedial technologies intended to prevent the circulation of a vast amount of buried chemical waste. The strip is called Harboøre Tange and separates the North Sea from the enclosed water of Limfjorden. Also, it remains one of the most polluted sites in Denmark, counting over 300 different types of noxious chemicals. The amount is unknown but is estimated to exceed 120.000 tons of toxic waste in three large, different, but related sites. The chemical waste is connected through Cheminova, which bears the primary responsibility, as the three contaminated locations include its former factory site, its present facilities, and a submerged chemical depot located on the beach next to the North Sea. Cheminova's production of organophosphate-based chemicals, predominantly pesticides, has transformed Harboøre Tange into a toxic space by unleashing industrial residues into the environment, including long-term deposits of hazardous chemical waste. The three sites are considered the most severe examples of

chemically contaminated environments and occupy the top three spots on a list of "generational pollutions" or "mega sites." The list indexes the most financially expensive and harmfully extensive pollution sites in Denmark.

Of the many different pumps, this specific pump balances the water intake from the buried chemical waste depot and, in doing so, prevents excessive circulation of hazardous chemicals transported by water flows. Additionally, it perpetually prevents a submerged catastrophe from coming into existence by filtering and cleaning contaminated water from this very moment into eternity. It is a slow-motion mitigation process and a critical technology that works as a safeguard, transforming an urgent and intolerable chemical cataclysm into a long-term, gradual release. In this way, the pump stretches time and harm. The material function of the pump is thus to keep the unwanted chemical waste in stasis by keeping it in the right place. In a more abstract sense, the pump is a technology embedded in temporal scales that exceed human life, spanning generations and even centuries. It is inscribed with epistemic regimes that participate in creating specific perceptions of pollution, the environment, and the subterranean. Despite efforts to chameleonize the pump through material constructions imitating its "natural" environment, it is also one of the very visible signs indicating a submerged environmental catastrophe. Thus, it amounts to more than its materiality and function, as it epitomizes the relationship between an 'up here' and a 'down there' mediated by a surface.

By examining the political and scientific arguments surrounding the submerged chemical depot on the coastline, this article centers around the basic question of why subsurface storage became the preferred way of handling waste. Subsequently, I am interested in adjacent

perspectives on why the deposited chemical waste has yet to be removed despite repeated incidences of not being as empty or controlled as portrayed. The article finds its methodological awareness in scrutinizing how the underground is depicted by introducing verticality as a historical method consisting of a specific approach. As such, I look for epistemic values, discourses, and temporalities alongside the epistemological habits and technologies that produce the notion of the subterranean as an ideal place to store waste. Moreover, I am interested in the surface – or surfaces – as archeologist Tim Flohr Sørensen reminds us, as "surfaces are always in the plural, and they are interlaced."[1] Sørensen develops a concept of "surface ecologies," expressing a reluctance to notions of depth as a particular profound revelation through removing a surface. A surface ecology recasts the surface as anything but irrelevant by trusting the "immediate encounter," thus making the surface an object of inquiry rather than a blockade of knowledge while not foreclosing the possibility of exploring the depth.[2] As illustrated by the pump, the immediate encounter on the surface allows an exploration that does not only aim at understanding the depth but, in the process, "revealing" the surface.

In this way, the article pursues the methodological ambition of verticality by staying in the ambivalent space of surface and depth. I hope to show that such an approach allows a further inquiry into stratigraphic intimacy that points to different ways of relating to the underground. I hope to show the importance of such an approach by contextualizing and historicizing the subterranean in the post-WWII industrial "chemical age" and its ongoing aftermath, signified by pervasive, continual, and aggregating toxic legacies.[3]

To examine underground imaginaries, the article introduces "submergence" as a conceptual framework for exploring chemical

pollution and the vocabularies accompanying the subterranean. A tentative outline of "Submergence" encompasses how some places are constructed in ways that allow specific actions. The actions and depictions are tied to highly political realms where mitigation and management strategies continue or even allow the increase of pollutive production. For example, by discourses of managing and control, the harmful waste is transformed into harmless waste but evades questions about how long and harmless to whom.

The subsurface becomes a realm of pure ontology, where technological advances and technoscientific representations conveying permanency are haunted by the instability of the environments over time. The fluid connotations of Submergence suggest that these renderings are seldomly stable, thus introducing the possibility of a re-emergence. In this sense, submergence troubles claims of a complete "away" through confinement and assists in rethinking relationships to the underground, including temporalities and the conception of toxic heritage sites.

"How can we account for these embodied, more personal modes of sensing which do not make it onto models and maps? How can the mobilising of geological knowledge to claim territory at the expense of other knowledges be resisted?"[4] Charlotte Wrigley poignantly asks in the fascinating article on the Kola Super Deep Hole in Siberia. The ability to find crevices of knowing and relating otherwise must accompany critical projects seeking to de-universalize and denaturalize particular knowledge forms. In this way, Wrigley's question stages the last part of the article. Here, I will seek to develop Submergence that resonates with the proposed analytical commitments, seeking to incorporate ways of knowing otherwise by including submerged voices.

By foregrounding the fluid aspects of Submergence, there is always a potential for a re-emergence. These are the unheard, the silenced, the

unaccounted, and the suppressed dimensions of a depot that is believed to be controlled. The concept is inspired by Caribbean poet Kamau Brathwaite and decolonial feminist Macarena Gomez Barris, who work with Submergence as a submerged language or a submerged perspective, which is found and articulated beneath dominant discourses.[5] As such, Submergence has a conceptual history that seeks to formulate a response that counters hegemonic narratives.

An excavation of the deep

Traditionally, historical research has mainly explored subterranean realms through imaginaries tied to different religious rituals or cultural traditions. Within these fields, the world below has been a vehicle for understanding past societies' relationships with things no longer existing while providing insights into cultural traditions.[6] According to historian Rosalind Williams, the industrial age altered the relationship to the subterranean through accelerating technological advances that gave rise to a purported mastery of a new environment. Extractive practices such as mining and oil drilling opened previously unseen worlds of resources and became new modes of expansion and domination. This historical moment significantly affected our understanding of the environment as perceptions of the underground became rendered as inherently artificial, thus creating an extreme and effective banishment of nature.[7]

Through cultural representations of the subterranean, Williams explores the social, psychological, and political outcomes of living in a profoundly technological environment while remaining critical to technological fetishism. The technological advances, Williams argues, did not eliminate religiously inclined cultural imaginaries of the underground but rather replaced the spiritual with another form of

belief – a technological-based imaginary of mastery. An anthropocentric fantasy of conquest by altering a profoundly hostile place for humans, the underworld was an imaginary space that replaced "the natural environment with a technological one."[8] Considering the accelerating numbers of toxic legacy sites, mining activities, and subsurface deposits, the impression of a technological mastery of the underground remains pervasive.

The mix of technological velocity and capitalist promises of eternal growth has introduced an unprecedented ecological crisis. It has such scope and effect as it touches all life on the planet, however disproportionately, and now amounts to a geological epoch. In light of the planetary predicament, scholars have become increasingly attentive to the spatial, stratified, zonal, or layered dimensions.[9] The Lifetimes Research Collective identifies a "geological turn" in historiography, which might seem evident considering the implications of climate emergency, which some choose to term *The Anthropocene.* In their "geomaterialist approach to historical futures," which uses fossils and fossilization as "the basis for a new theory of historical futures," the collective explores what it means to think with objects of deep time.[10] Taking an analytical position from unfathomable timescales to thinking about sediments, this article seeks a related approach by exploring the temporalities assigned to the underground, made possible by technoscientific habits of forecasting or prognosis assisted by technological artifacts, including data, models, and graphs. Together, they create a specific kind of epistemic certainty, where the present is extrapolated into an abstract time scale.

Other disciplines have increasingly focused on verticality, best exemplified and perhaps most natural in geography. In the past decade, the field has reconceptualized verticality by questioning spaces

appearing as unseen, unnoticed, or inhabitable (for humans). The critical approaches of the subterranean and aerial spaces have led to an expansion in new vocabularies and investigations that target and re-politicize the depictions of these spaces.[11] For example, Stuart Elden's article "Secure the Volume: Vertical Geopolitics and the Depth of Power" asks us to reconsider what kinds of power and politics are associated with the subterranean. A turn to the vertical and, especially, a volumetric approach attunes research to otherwise neutral concepts, allowing investigations related to infrastructures and/or submerged structures, including ecological "issues where what goes on below the surface impacts across boundaries would be pollution or the draining of aquifers (…)."[12] A "subterranean Anthropocene," as Melo Zurita et al. suggest, involves past (underground) futures as contemporary life unfolds in the wake of industrialism and global capitalism as the main drivers of a planetary ecological apocalypse. The Anthropocene proliferates through technology and the subsurface as new modes of exploitation, which has "helped redefine the underground as 'legible nature' opening epistemological spaces for economic, social, and political calculation."[13] In light of the multiple and interlinked planetary ecological crises, a turn to the underground is well underway, exemplified by research interrogating the political dimensions of depth, where oil extractive practices work as tools for criticizing the capitalist desire for growth, including green growth.

This article pursues a related yet diverging analytical ambition from existing research. Like extractivist fantasies rendering the underground inert, monolithic, and absent of life, the subterranean is valued for its stability, making it an ideal space to place unwanted materials. Diverging from an extractive vocabulary, this article analyzes the underground as a space of insertion. Depositing, what Hugo Reinert terms "the other depth," functions as a double movement of extractive

practices, becoming the "unspoken shadow places" that are "also depicted as a junk space, a nonspace, a subsidiary depth to act as a receptacle for the toxic surplus produced in the extraction of 'surplus' value."[14] Carbon Capture and Storage (CCS), Nuclear Waste Facilities, and buried hazardous waste sites all testify that the subterranean has become a resource holding specific characteristics that make it ideal for certain actions. In this way, the underground has been recast as places containing sacrificial logics of capitalist externalities, creating an out-of-sight as illustrated by the concept of ultimate sinks for pollution because of its stability, which Jennifer Gabrys, among others, has problematized.[15] As such, extractive practices are allowed through processes of invisibility and imaginaries of an unbounded taking without consequences, which gains its logic from projections of the underground as monolithic, eternally stable, and synchronized through the application of incomprehensible timescales. The same set of characteristics are evoked when depositing or storing materials, such as toxic chemical waste, beneath the surface.

Subterranean imaginaries share similar characteristics with industrially produced toxic chemicals and are subjected to the same specific representational techniques that secure their proliferation. As Evan Hepler-Smith argues, "Chemical substances are the agents of environmental toxicity, and environmental toxicity is to be controlled through coordinated information systems."[16] Hepler-Smith shows how chemicals became organized, cataloged, and registered, which has consequences for how they are governed. In a molecular bureaucratic way, chemicals had to be assigned distinct properties to catalog, manage, and regulate them - molecular identities inside bureaucratic ways of governance, built for bureaucratic purposes, had to be universalized, homogenized, and abstract for them to make claims about them.

Article IV: A Pump, a Depot, and Some Amber: Submerged Histories and the Specter of Chemical Pollution

The intersection of chemicals and environmental harm conceptualized as pollution, becomes a matter of assessing how much damage an environment can hold before it becomes visible or experienced.[17] The visibility depends on several technical arrangements that connect to depictions of the underground. According to Michelle Murphy, the way we perceive chemicals is typically an outcome of a technoscientific and industrial legacy, where representations and categorizations of chemical molecules are severed from context. The understanding of chemicals, including their pollutive capacities, inhabits our language and imaginaries to the extent that it is hard to talk about them and act upon them without using such nomenclatures.[18] The same goes for the underground, and using chemical pollution and its relations might be a valuable way to make a point about, paraphrasing Murphy, what happens to the underground happens to its relation. This includes you too, just with a latency.[19]

The making of a depot

The depot's history began in 1952 when the Danish pesticide-producing company Cheminova came to Harboøre Tange. The advent of a company producing relatively complex products, as was the chemical industry considered at the time, inundated concerned voices who pointed to Cheminova's numerous disputes about environmental contaminations with Danish regulatory institutions. The company's previous location, outside of the Danish capital of Copenhagen, had turned into a toxic relationship with its surroundings, human and environmental, that began when Cheminova started experimenting with hormone products and organophosphates. Specifically, its waste disposal conducts - or rather lack thereof – caused numerous complaints, regulatory efforts, and trials.[20]

Article IV: A Pump, a Depot, and Some Amber: Submerged Histories and the Specter of Chemical Pollution

Cheminova successfully established and sold an image stereotypical of chemical capitalism to the local politicians, where synthetic substances matched synthetic growth. The promises of thousands of jobs and perpetual prosperity were held against a purported necessity of externalizing hazardous residues. Harboøre Tange was geographically and politically peripheral in the 1950s; thus, it had yet to enjoy the same privileges of a developing welfare state as in other, more centralized places. The area consisted of Thyborøn on the northernmost part of the peninsula, which was famous for its traditional and smaller-scale fishing, which, by the 1950s, was increasingly replaced by commercial fishing, while to the south was Harboøre – a town that prized itself as committed to a strict and segregated variant of Christianity. The interiority of financial security provided to those who chose, or had to, take work at Cheminova came at the cost of externalizing its waste into the imminent surroundings. It was a trade-off attuned to sacrificial logics: contamination in return for wealth.[21]

Negotiations about waste disposal between the Cheminova and the local authorities, with the aid of national experts, ended in a compromise where minimally treated sewage was stored in tanks and transported by trucks to a designated area a few kilometers west of the factory. The agreement described the site in unclear details as either on the coastline to the North Sea or between the dunes neighboring the coast, opting for a seeping strategy to render the liquid excess gone.[22] Despite the relatively unclear instructions, an area between two dunes near the coastline next to the coast was chosen.

In 1956, Cheminova pleaded a case of urgency to the responsible authorities as the capitalist law of accumulation operated asynchronously with the rhythm of the granular and gradual permeation of liquid descending through the sand. Beyond the liquid waste, the

growing production demanded additional places to deposit solid waste, from thick toxic sludge to contaminated infrastructure, such as debris from production facilities and barrels. The local coastal authorities, Vandbygningsvæsenet (VBV), who had the jurisdiction, rejected Cheminova's initial requests as they were wary about the consequences of turning a seepage area into a chemical landfill.[23]

According to a report based on the National Danish Fisheries investigation, Cheminova's attempt to expand the agreement was conceived when the company began experimenting with mercury as seed dressing. A severe storm in 1957 circulated the highly toxic substance from the production facilities to the immediate surroundings, leading Cheminova to advocate for a politics of burial. Despite Cheminova rendering the event as "an isolated accident," the volatile nature of elementals roaming on the surface, such as wind and its frequency is characteristic of the area, especially during winter, were resolved through a perceived safety, control, and stability of subsurface containment.[24]

The rejection of Cheminova's suggestion led to a larger discussion about the nature of toxic residues and disposability, as chemical waste posed an unprecedented situation. The Danish Fisheries argued that some waste is "so toxic that one must prevent that it, in legal or illegal ways, becomes available for humans or animals," and the new hazardous chemical paradigm was expected only to intensify. While submerging waste in "very deep water," preferably west of the UK, was considered an ultimate sink, albeit too costly a solution, burial was promoted as a cheaper alternative.[25] However, both methods could potentially jeopardize humans and animals. Additionally, incineration, ion technology, and other methods had yet to gain traction as economic aspects, work hazards, or the contingencies of what "other types of

nuisances subsurface depositing might bring" were also brought under scrutiny.[26]

Discontent with the rejected permission, Cheminova CEO Gunnar Andreasen phoned the head of VBV, explaining the importance of finding an agreement. Andreasen proceeded by arguing that the present place between the two dunes was perfect for disposal of material waste: no other place on the peninsula was more adequate, as the coastline was desolate (enough) to avoid human and animal exposure, the waste had corrosive properties thus dissolving the solid substances entirely within three years, and tidal movements and storms would transport the rest into the ocean. Further, the Cheminova CEO argued that transporting hazardous waste to other places was a more significant risk than close-by depositing.[27]

The VBV soon found that any attempt at declining the company's efforts to gain permission meant that Cheminova did it with or without permission. On May 27th, 1957, Cheminova achieved a temporary three-year agreement for depositing its solid waste in the same place in the seeping area because it was presented as "the least risk-filled solution."[28] As the southern part of the area became increasingly filled with minimally treated sewage, the new arrangement divided the landfill into a southern and northern area, divided by a dune. The southern area, resembling a toxic pool, became an additional site for depositing industrial debris, contaminated infrastructure, and containers with chemical waste that gradually moved to the north as it filled up. In contrast, the northern area was turned into a seeping area.[29]

The advent of Cheminova entailed a series of permissions and regulatory exceptions for the local, regional, and national authorities. The production, including the residues, required significant expertise in estimating the consequences according to the recipient. What began as

a temporary solution of a seepage area for toxic sewage eventually became an opportunity for Cheminova to create a chemical landfill. In this way, the primary regulatory regime focused on managing the waste and not questioning the extensiveness or the type of production causing the waste. The hazardous residues that eventually became a chemical dumpsite on the coast was not deposited below the surface but conveniently stored between two large dunes.

Between the 11th and the 18th of February 1962, a weeklong storm ripped the front dune closest to the North Sea, taking what had become a chemical pool into the sea but leaving the toxic landfill relatively intact. Upon inspecting the area, the VBV found that contrary to any agreement on depositing solid waste as a temporary three-year permission, thus ending in 1960, Cheminova had continued its operations and dumped a vast amount of chemical waste between the dunes. The chemical dumpsite was now exposed, with no dune left to shelter the landfill from waves and storm-induced flooding. The VBV ordered an immediate discontinuation of depositing the waste, the establishment of a pipeline transporting sewage directly into the North Sea "in a safe way," and that Cheminova had to cover the landfill with sand in a way that "the entire terrain appears evenly and clean."[30] Storms are a natural and predictable part of Harboøre Tange; in fact, a violent storm in 1825 significantly impacted the area – one whose consequence still unfolds to this day.[31] However, the combination of accumulating hazardous waste with opportunistic or ill-conceived solutions and volatile elements took the authorities by surprise, and the chemical depot, as submerged, did not start as such but was made into one.

The Day the Depot Came Back

Article IV: A Pump, a Depot, and Some Amber: Submerged Histories and the Specter of Chemical Pollution

After the decision in 1962 to cover and submerge the depot, its concealment did not mean closure. Incidences of contaminated water and soil reappeared as traces of pesticide residues, mercury, and other chemical contaminants emerged during the 1960s, ending in re-negotiations of the original agreements.[32]

In 1971, during coastal maintenance work, the depot was incidentally uncovered. Subsequent meetings tried to estimate the underground landfill's size, scale, and material to prevent repeating the unfortunate and surprising re-emergence of toxic waste previously rendered gone. To the local authorities and Cheminova's grave disbelief, the estimations and deterministic scenarios based on calculative measures that served as decisive reasonings regarding the depot's Submergence had not accounted for the contingency of human actions. Subsequently, the authorities ordered Cheminova to exhume an estimated 1260 m3 tons of sand drenched with chemical waste and re-store it in large piles at Cheminova's facilities. The sand, however, had become contaminated to such a degree that the company had to cover it with a thick layer of sand. Various examinations aimed to estimate the size and location of the depot as multiple storms had scattered toxic debris, while seeping, flooding, and rhythms of water had contributed to a further dispersal. The waste in the depot was, not as first assumed, a dry and solid substance but more of a sticky and oily character, which meant that the calculated seeping of water through the depot and carrying contaminants into the sea was a process that now happened "presumably extraordinary slow."[33]

To the coastal authorities, the depot was in danger of being attacked by the sea, which would lead to contamination of the area through circulating the chemical waste with water and wind as a symbiotic vehicle. However, the question about accountability remained

undecided, as the Danish state owned the area, and Cheminova had legally obtained permission to dump, but the waste ultimately belonged to Cheminova. To complicate the matter further, in 1961, the Danish state collected DDT deemed no longer useful, and Cheminova CEO convinced the authorities to place them in the landfill.[34] The coastal authorities meant that the most favorable solution would be for Cheminova to re-deposit the remaining deposited chemical waste on its factory premises. Cheminova objected by stating that the unknown dimensions, namely substance, toxicity, and volume, meant any re-storing would be too perilous and costly. A compromise was found by re-enforcing the boundaries of the depot that covered the depot with a thick layer of asphalt covered with sand and plants.[35]

The main reason for the depot's covering was to shelter it from the sheer forces of storms and flooding that potentially would carry and spread the toxic content. Covering the depot was intended as a protective measure, shielding its content from exposure to the surface. Its underground placement became translated into models and diagrams, where different modes of enumeration and prognoses, conceived as probabilities, were a bureaucratic language of management.[36] However, the depot faced other incontrollable threats, thus gaining a terrible urgency. The west coast of Jutland, of which the peninsula is a part, is characterized by its coastal erosions. The depot eventually became known as "The Depot by the 42nd Groin" – as the beach had reclined towards it, placing it next to the groin. A coastal construction consisting of a long arm extending into the ocean, a technology originating from the end of the 19th century, had been a preventive measure from the relentless waves taking the terra and bringing it to sea.[37]

One thing was the constant threat of waves attacking the depot and subsequent coastal erosion. Another consideration was the depot's permeability – whether toxic waste seeped or leaked into its surroundings. Another factor involved whether leaking or washing was as controlled as first thought. On February 4th, 1976, a police report was followed up by an inquiry from the Danish Environmental Protection Agency about the exposure of the depot considering the threats mentioned above. A storm had caused severe concerns and a meeting involving a broad range of expert institutions, the municipality, and Cheminova. At the meeting, a consensus agreed that the depot, which was estimated to contain 2500 m3 tons of sand and waste, was best left alone, which was promulgated by the local municipality with the jurisdiction.[38] A series of demands accompanied the decision, which included several preventive measurements, such as continual monitoring (mostly during winter and after storms) and a recommendation to consider establishing a submerged sheet pile wall. After a lengthy discussion between the Coastal Protection Services and the local municipality, the latter decided to forfeit its demands because of the "numerous incalculable consequences" and the fact that they could not see any progress in the negotiations.[39]

It remains unclear what the incalculable consequences might be, but a series of statements from the coastal protectorate assessed that a combination of amount, seeping, location, and flows of water running through the depot would ultimately make the depot secure in its place. The alternative, exhuming the chemical waste, was increasingly impossible due to the different types of waste blending to form a sludge-like substance. Sorting the waste was necessary for any remediation, as technologies only permitted a compartmentalized treatment. Moreover, analyzing the substances in the depot was futile due to its muddled state. If the depot could not remain where it was, the

assessment concluded that another adequate repository had to be found, or it had to be treated at the national treatment facilities for hazardous waste, Kommunekemi. Kommunekemi rejected the last scenario as incineration was their modus operandi, which did not sufficiently treat mercury and arsenic, two identified components in the buried toxic sludge.[40]

So, the chemical waste remained subsurface but slowly began forcing its way into political attention again. For example, other related contamination incidents from Cheminova's sewage led to increasing attention from biologists, environmentalists, and the authorities in 1978-1979.[41] The multiplying reports of environmental degradation caused by Cheminova's waste led to other investigations that might provide partial or complete explanations of the findings of pesticide-contaminated wildlife, such as birds and marine animals. A press release on December 4th, 1980, confirmed local fisher's suspicion about a severe leaking from the chemical depot. Subsequent measurements and monitoring had shown that chemicals were seeping into the North Sea to a degree higher than initially expected. The unexpected outflow posed a set of issues different than the other types of pollution, like sewage. The fact that the coast had eroded, making the water proximate to the depot, created a new situation where attacking waves increased the threat.

Moreover, the pollution was highly contingent on "natural" conditions, such as rainfall and water level.[42] Consequently, the depot was not the buried controlled entity as first depicted. The environmental processes had troubled previous reasonings and projections of a slow and steady seep, making the regional authorities favor removal.[43]

In a summarizing report from January 1981, the toxicological tests had to give a complete overview of the environmental damage that the

depot posed. Only a few (known) chemical substances were tested using a non-specific test because a test considering all the substances was too costly a method.[44] In May 1981, Civilforsvarets Analytisk-Kemisk Laboratorie, a state-owned laboratory, made its investigations consisting of several drillings in and around the depot. A large proportion consisted of transformed chemical substances, which were highly toxic, and the substances moved vertically and horizontally. No DDT, dioxins, or other hard-to-dissolve products were found, and traces of mercury were similarly inconclusive. The report concluded that "there had happened a significant chemical transformation of the original waste-products in the depot, and that there has been transported a significant amount of highly toxic products, a large portion easily dissolving." [45]

Media dispatches from a toxic coast that associated fish with contamination threatened the national fishing exports. The economic consequences weighed in on the politicians who tried to steer between protecting the chemical and the fishing industry. Finally, in the spring of 1981, the DEPA ordered the removal of the chemical depot, and during the summer, 25300 barrels of contaminated sand were transported for a final deposit in a former salt mine in Hessen, Germany.[46] "Away" meant storing the chemical waste elsewhere. And that elsewhere was Germany.

On July 1st, 1981, a group of experts gathered to discuss the submerged chemical depot, the existence of which had become an urgent concern. The Danish Environmental Agency (DEPA) invited representatives from several institutions, including engineers and consultants, the National Geotechnical Institute, and the Institute for Water Quality.[47] The DEPA wanted to know the future impact and damage of the remediated depot: How much mercury had flushed from the depot and

how much was left in the layers of sand surrounding it. Subsequently, large amounts of mercury had reached the groundwater and transported it with its currents beneath the depot. Ultimately, the DEPA sought to establish how much mercury had leaked to the North Sea so far and how much would leak or seep into the ocean in the future.

The report showed how a wide range of chemical compounds had altered, suggesting a chemical transformation process had happened in the depot. Although in its transformative stage, it was esteemed that 120 tons of chemical residues and approximately a ton of mercury remained submerged.[48] The remediation meant removing the "worst risk" of pollution, and thus 121 tons of toxic waste was considered sufficient, with an estimation of seeping of 23 kg per year, with an uncertainty of 13 kg. Ultimately, the consultant engineering company, COWI, suggested three possible scenarios for the depot: either a complete or partial removal, stopping or minimizing any future perils of contamination, or a series of preventive technologies such as a sheet pile wall and a membrane covering the depot aiming to slow down any seeping, or finally, pumping and filtering contaminated groundwater thus reducing the seeping by a half. The DEPA decided on a fourth and different option that included a monitoring program covering the marine and terrestrial environment surrounding the depot and signs that warned about longer stays at the contaminated beach. According to the DEPA, the initiatives suggested by COWI had an economic impact that did not match the environment, ultimately putting a price on the environment. Monitoring and visual markers, such as signs, were decided to be adequate prevention techniques for the chemical depot.[49]

A Hole and a Pump

Article IV: A Pump, a Depot, and Some Amber: Submerged Histories and the Specter of Chemical Pollution

In the late summer of 1982, the national conservation agency, Danmarks Naturfredningsforening, found an alarming amount of mercury in shorebirds roaming and nesting close to the depot. The birds had found their habitats behind the dunes beside the chemical depot. Further analyses showed a severe contamination that counted organic phosphorus compounds and phenols, besides the mercury.[50] The Cheminova-hole, as it was termed, was not quite a hole but an area consisting of meadows, wetlands, and small ponds. Although the hole was colloquially termed a hole, bureaucratically, it was decided to be a depot. However, it was a depot where no chemicals had been placed. In this sense, it was a hole, a depot, albeit accidentally formed.

How the chemical waste had ended up there – thus the source of contamination - was uncertain, but most likely because of the other chemical depot on the shoreline. The chemical waste had been distributed by wind and water, seeping, bursting pipelines for sewage, and human activity both in making and remediating the depot.[51] Despite the monitoring, the entombments, the covering, and the precautions, the chemical waste did not respect the boundaries made by the DEPA and the local regulating authorities.

Whether the hole and the depot were the same, as they were shaped by each other, developed into a conundrum. It had eluded bureaucratic categorization by being not quite a hole nor qualified as a depot as its establishment had happened without the intention of depositing but rather as a consequence of a spill-over. This distinction had jurisdictional and management implications. In this way, questions regarding whether the independence or interdependence between the hole and the depot became central as it entailed the financial costs of establishing and managing the pollution. Moreover, if the hole could qualify as a depot, it was under the DEPA's administration.

Cheminova's position was that either way, it was a relatively small environmental matter that could not be justified with complex and costly remediation plans – thus favoring a thin layer of sand covering the area.[52]

The chemical waste existed in two realities. One was the material consequences of a contaminated area, which had spread to a large area and thus showed how pollution spread in the entire area. The other was a bureaucratic categorization that sought to manage it within economic and classification systems, where a depot structured its management.[53] The hole has several similarities with the depot, as the ways of managing the threat of chemical contamination were by covering it with soil and submerging it. Moreover, several actors, the DEPA and Cheminova, found that the central concern was financial – whether it would be reasonable to handle the costs it might pose. Finally, the decision to use remediation technologies that postponed or controlled the pollution through a slow, steady control was favored. However, it disregarded the many factors, elemental, for instance, that would have consequences for the area. As such, we return to the pump we met at the beginning of the article, the unimportant little technology that holds a potential environmental catastrophe to re-emerge.

An investigation concluded that the chemical compounds were a consequence of the chemical depot of the beach and that the area was too sizeable and complicated to remove or remediate with biological or chemical substances. A third option, the familiar strategy of Submergence, emerged as a favorable option by covering the entire area with sand. Additionally, to prevent any further damage, a pump with carbon filters was deployed to control and remediate the water levels. The pump was to be under Cheminova's management.[54] By the

time the project was on the cusp of being realized in 1988, high water levels had made any attempts to submerge the chemicals impossible.

Moreover, Cheminova had undergone a large lawsuit that attempted to place the responsibility of the chemical depot on the corporation. The verdict freed Cheminova from responsibility, as permissions were obtained from the authorities, the state had participated, and too much time had passed. This reasoning, combined with a new environmental profile, made Cheminova decline responsibility for remediation initiatives, including the maintenance of a pumping station initially suggested in 1983.[55]

Y2K

The remediation process in 1982 removed the chemical waste above the groundwater level and thus left an estimated 120 tons of chemical waste and 1 tons of mercury in the depot. At the turn of the millennium, two storms in December 1999 attacked the depot, thus exposing it to the environment and weakening it for additional storms. The depot broke open on January 31st, 2000, and the chemical waste returned. In a note from the regional authority, Ringkøbing Amt, a reportedly "Cheminova-smell," a strange synthetic odor came from the depot but was noticeable several kilometers away.[56] Several initiatives sought to cover the depot again to avoid the unfathomable consequences of a complete breach.[57]

The authorities were determined to identify how serious a threat the depot was to its surroundings, which was described as an "environmentally unacceptable" seeping from the depot and into the sea. Moreover, the investigation wanted to settle whether new monitoring programs or further examinations were required. The projects comprised various technologies and sampling techniques,

visualization strategies, and drilling samples. As such, advanced instruments provided promises of certainty, data loggers and sensory equipment were to determine what the underground contained and how much by using advanced monitoring programs that sought to validate environmental movements: the currents, groundwater flows, levels of water, conditions of wind, and amount of rain.[58]

Considering the time scales and the spatial expansion entering the analysis, the context began to widen. A geological portrait encompassing glacial and interglacial structures shaped by deep time reaching back to the Holocene argues for the impact of fjord-based clay on hydrogeological conditions. Furthermore, the underground is depicted through a series of models and data that show the dynamic flows of the environment through different perspectives: some models cut across the depot (and the beach) and the dikes, while others forward a gaze from above using mapping technologies, while still others show environmental enumerations from data-shaped, or rather dotted, images of water levels.[59] At the same time, Excel-style data sheets support the claims forwarded by the dotted images. Knowing the depot and managing the chemical waste shifted from knowing what was inside it to knowing its surrounding environment. The epistemological transformation was assisted by enhanced technologies that enhanced preciseness, leading to an ever-expanding series of examinations.[60]

Water samples from the many drillings show that the area contains "surprisingly high levels of phosphorous organic compounds" and is "heavily affected by environmentally foreign substances."[61] The seeping, which in the 1950s and 1960s was assumed to have let the substances into the sea, had also caused the emergence of the Cheminova-hole. The report concluded that the 120 tons of chemicals left below the groundwater level, which was impossible to exhume and

remediate, did not account for the chemical residues sedimented in the seabed near the coast or the Cheminova hole. There was much more than what was thought. Furthermore, the remediation strategies used for the Cheminova-hole were relatively futile, as they only accounted for "normal" conditions and not, as the three successive storms showed, extreme weather, where water caused flooding.

Further investigations followed the report, attempting to provide new knowledge about managing the depot, including considering possible technologies. The optimal solution for encapsulating the depot was identified to be a sheet pile wall because it sheltered the waste from the outside. The wall was inserted into a thick layer of silt and then clay, making the depot hermetically shut.[62] The regional authorities argued that the approach would stop seeping and leaking horizontally by blocking cross-cutting water currents and flows, and vertically, the silt-and-clay would prevent the waste from contaminating the water beneath. Established in 2006, this technology had a lifetime of approximately 15 years, which was considered enough time for developing technologies to remediate the complex type of pollution.[63]

What counted as a depot –the inside and outside – and how much chemical waste became an ongoing controversy. Some early investigations relating to the 1981 remediation found pockets of chemical waste that had sedimented beneath the silt layer, which was supposedly a solid border.[64] Moreover, the official estimations of 120 tons of chemicals have been steady since 1981, while the depot was estimated to leak around 5 tons a year. The mismatch between a stable amount inside the depot contradicted the annual estimations of the flows – which was commented on by a representative from the authorities, who commented that it was all tentative estimations – the former and the recent measurements. However, the recent

measurements were more precise and believable. Despite the prediction of 120 tons of chemical waste in the depot and the imprecise seeping estimations, it still appears on public websites and is figuring in public discourse today.[65]

The depot remains submerged in 2024, with negotiations for a large-scale remediation process. The process has decade-long prospects, as it encompasses all of the three sites. The latest episode of the return of a submerged depot in 2001 initiated a two-decade-long investigation, with multiple pilot projects that ultimately ended in a closer attempt to remediate the depot.[66] In the meantime, the pump transports and filters water repeatedly, thus balancing the water intake from the buried chemical waste depot and, in doing so, preventing excessive circulation of hazardous chemicals transported by water flows. Additionally, it perpetually prevents a submerged catastrophe from coming into existence by filtering and cleaning contaminated water from this very moment into eternity. It is a slow-motion mitigation process and a critical technology that works as a safeguard, transforming an urgent and intolerable chemical cataclysm into a slow, gradual release. In this way, the pump stretches time and harm. The material function of the pump is thus to keep the unwanted chemical waste in stasis by keeping it in the right place. In a more abstract sense, the pump is a technology embedded in temporal scales that exceed human life, spanning generations and even centuries.[67]

Submergence – Environmental Justice and the Specter of Other Futures

The subterranean remains an ambiguous space saturated by different imaginaries, projections, and depictions related to each ideological project. In a book on subsurface explorations, Robert Macfarlane states

that in the moment of the Anthropocene, "time is profoundly out of joint – and so is space. Things that should have stayed buried are rising up unbidden."[68] The return of things disturbs the presupposition of an "ought to" or a "should have," as these are indebted to a conjuration of the underground in particular ways, as inert and artificial space bereft of nature, by particular actors, from proponents of unbounded growth to different scientific traditions indebted to specific epistemic values and epistemological traditions; through models and diagrams, remediation technologies, and preventive measures. I have attempted to scrutinize this "should have" projected onto the subsurface realms and the imaginaries surrounding them by identifying key features and reasonings. I hope to have shown the underground as a space interwoven with ideological, material, and discursive projections.

For example, I aimed to showcase how the act of submerging unwanted or intolerable substances, such as hazardous waste, is accompanied by discursive configurations evoked to legitimize subsurface depositing. Claims of underground stability are conjured despite the depot being placed in – and beneath - a landscape known for its unpredictability and despite continual examples of the depot not being as safe or controlled as asserted. Such claims, connected to other types of reasoning, financial, for instance, became one of controlling the narrative over time and insisting on the stability supported by remedial technologies as well as forecasting and measurements, diagrams, and models. These framings became a dominant discourse that operated by assuming and asserting regimes of truth that aspired to monopolization. The question of externalization and the creation of away necessitates questions such as away from whom, where, what, and for how long, as these are typically unstated or understated.[69]

Article IV: A Pump, a Depot, and Some Amber: Submerged Histories and the Specter of Chemical Pollution

Technoscientific representations of the depot and the accompanying depictions of safe storage and harmlessness are usually portrayed as an ontological whole through idioms of objective science. As such, the claims hinge on specific scientific domains that produce (and assert) certainty. However, as Derrida notes in his work on hauntology, there is never presence without absence and vice versa.[70] Hauntology - a riff on ontology - is a way to problematize being and presence in its perceived totality, which also has consequences that include temporalities. The ghost, as neither material nor immaterial, neither of the present nor the past, neither visible nor invisible, problematizes the constructed divide between existence and non-existence. The specter of chemical pollution haunts the very image of the depot as a secure way containing hazardous waste and the idea of "gone."

In the small wind-beaten town of Thyborøn, just a few kilometers north of the depot, sits a retired fisher polishing amber in his workshop. The fisher, who has spent his entire life in the town, is shaping the amber until it has reached an aesthetically appealing form. The workshop is an extension of the house where he grew up and now lives. Besides the workshop is an amber museum and a little shop where the fisher gives guided tours and sells the polished and reworked amber. The fisher learned to find, gather, and shape the amber from his father, known as "Rav-Aage" or "Amber-Aage."

The museum and shop do not resemble the typical tourist attraction a visitor might stumble upon. In front of the house is a large monument of shame dedicated to the politicians who have yet to take responsibility for cleaning up the numerous toxic sites in Denmark. It was not erected there but illegally placed at the site of the chemical depot in 2016.[71] Now, it is placed in the front yard of the fisher's house.

The fisher inherited the environmental struggle from his father, who was known to be the first (officially) environmentalist in Denmark.[72] Since the 1950s, when Cheminova came to Harboøre Tange, Rav-Aage became highly concerned about the severe pollution that increasingly began contaminating Harboøre Tange. Rav-Aage was part of a group that actively and publicly problematized Cheminova's pollution and advocated for remediation in 1981.[73] Like his father, the fisher has received a knighthood for being a lifelong environmentalist. As such, the fisher embodies an intergenerational struggle for the right to an environment not saturated by chemical pollution. The fisher is concerned about the new remediation process because of previous events and his father's long but ultimately inconclusive struggle.[74] Will the remediation succeed in removing the chemical waste, or is it in the process of becoming a future toxic heritage site that is remembered or forgotten. The fisher remembers and embodies a different story than the dominant, where institutional, scientific, and bureaucratical abandonment has defined the seven-decade-long existence of the depot. A depot that includes other types of pollution had devastating health consequences for the local population.[75]

Different temporalities run through the shop where the fisher is working. The amber traveled from deep time, as former tree resin that voyaged ultimately became submerged and transported by water, where it rested for some millions of years. In its fossilized state, the resin returned to the shoreline, normally after hard storms, where the fisher became trained in spotting the amber. He then brings it back to the shop where he sits and polishes deep-time artifacts, known as the "Northern Gold." [76] He has learned from his father to know the surrounding environment, to interpret it, and to discover these small gems.

Like his father, his enthusiasm for shaping these deep-time artifacts into contemporary aesthetic objects is a way of relating to deep time. What was once submerged returned in its own time and is now remodeled into human temporalities. And the fisher has learned to handle these little artifacts with care. The engagement with amber shows how thinking about deep time is not only challenging and strange that "warps our sense of indebtedness to earth forces and creatures past, present and future."[77] However, it also fosters radical different ways of thinking about the past, present, and future as otherwise. The amber signifies those not living as a relic of deep time, the present in the encounter and discovery of them, and those not living yet as it points to the contingency of the encounter.

The amber and the chemical depot are a "paradoxical kind of kin."[78] They are marked by slow and fast temporalities involving past doings, present relationships, and future generations living with chemical pollution. However, the fisher carries on by "remembering, commemorating, and publicly surfacing these hidden toxic histories" as a mode of political resistance.[79] How the fisher knows and understands the environment is a substantial part of his environmentalist ethos.

As a prefigurative environmental politics, the fisher is actively working for a future where the area he lives in is not saturated by chemical pollution. He has attended meetings, protested, and written numerous op-eds and letters to politicians. The retired fisher is motivated by a future that does not belong to him but one in which his kin find themselves– both human and more-than-human.

Notes

[1] Tim Flohr Sørensen, "A Gentle Shock of Mild Surprise," in *Heritage Ecologies*, by Torgeir Rinke Bangstad and Þóra Pétursdóttir, 1st ed. (London: Routledge, 2021), 147.
[2] Ibid., 149.
[3] Rebecca Altman, "Time-Bombing the Future: How 20th-Century Synthetics Altered the Very Fabric of Us All," *Aeon*, accessed November 14, 2023, https://aeon.co/essays/how-20th-century-synthetics-altered-the-very-fabric-of-us-all; Liboiron, Tironi, and Calvillo, "Toxic Politics."
[4] Charlotte Wrigley, "Going Deep: Excavation, Collaboration and Imagination at the Kola Superdeep Borehole," *Environment and Planning D: Society and Space*, July 11, 2023, 5.
[5] Brathwaite, "History of the Voice 1979/1981"; Macarena Gómez-Barris, *The Extractive Zone: Social Ecologies and Decolonial Perspectives*, Dissident Acts (Durham ; London: Duke University Press, 2017).
[6] Karen Pinkus, *Subsurface.*, 1st ed., Posthumanities (Minneapolis: University of Minnesota Press, 2023), 1–3.
[7] Rosalind H. Williams, *Notes on the Underground: An Essay on Technology, Society, and the Imagination*, New ed (Cambridge, Mass: The MIT Press, 2008), 4.
[8] Ibid., 19.
[9] Alexandra Arènes, Bruno Latour, and Jérôme Gaillardet, "Giving Depth to the Surface: An Exercise in the Gaia-Graphy of Critical Zones," *The Anthropocene Review* 5, no. 2 (August 2018): 120–35; Kathryn Yusoff, "Geosocial Strata," *Theory, Culture & Society* 34, no. 2–3 (May 2017): 105–27, doi:10.1177/0263276416688543; Kathryn Yusoff, *A billion black Anthropocenes or none*, 2018; Bruno Latour and Peter Weibel, *Critical Zones. The Science and Politics of Landing on Earth*, n.d.
[10] The Lifetimes Research Collectives, "Fossilization, or the Matter of Historical Futures," *History and Theory* 61, no. 1 (March 2022): 5.

[11] Anna Jackman and Rachael Squire, "Swirling, Splashing, Slowing: Towards Gentle Volumes," *Political Geography* 106 (October 2023); Chi-Mao Wang, "Towards a Solid-Fluid Territory: Sand Dredging, Volumetric Practices, and Earthly Elements," *Political Geography* 106 (October 2023); Franck Billé, "Introduction: Speaking Volumes," *Society for Cultural Anthropology*, October 24, 2017, https://culanth.org/fieldsights/introduction-speaking-volumes.
[12] Stuart Elden, "Secure the Volume: Vertical Geopolitics and the Depth of Power," *Political Geography* 34 (May 2013): 41.
[13] Maria De Lourdes Melo Zurita, Paul George Munro, and Donna Houston, "Un-earthing the Subterranean Anthropocene," *Area* 50, no. 3 (September 2018): 301.
[14] Hugo Reinert, "On the Shore: Thinking Water at a Prospective Mining Site in Northern Norway," *Society & Natural Resources* 29, no. 6 (June 2, 2016): 720.
[15] Gabrys have shown how sinks are places of transformation. See: Jennifer Gabrys, "Sink: The Dirt of Systems," *Environment and Planning D: Society and Space* 27, no. 4 (August 2009): 666–81, doi:10.1068/d5708; Joel A. Tarr, *The Search for the Ultimate Sink: Urban Pollution in Historical Perspective*, 1st ed, Technology and the Environment (Akron, Ohio: University of Akron Press, 1996).
[16] Hepler-Smith, "Molecular Bureaucracy," 536.
[17] Liboiron, *Pollution Is Colonialism*.
[18] Murphy, "Alterlife and Decolonial Chemical Relations," 497.
[19] Michelle Murphy, "Chemical Infrastructures of the St. Clair River," in *Toxicants, Health and Regulation since 1945*, 2016, 107.
[20] Author - Article SP; Burchardt, "Cheminova - En Generationforureners Første År."
[21] "Ingeniøren, der flytter sin Fabrik til Rønland"; "Landvæsenskendelse"; Jeppe Høst and Sille Radoor Larsen, "Ansvar for Egen Egn? Kulturhistoriske Perspektiver På Regionalt Udviklingsarbejde," *Kulturstudier* 7, no. 1 (July 14, 2016).
[22] Friis and Landvæsensnævnet for Skodborg-Vandfuld herrede, "Approval of discharge of sewage."

[23] Cheminova, "Anmodning Om Deponering Af Fast Affald i Klitgryden Ved Høfde 42.," July 13, 1956, 21-2, Harboøre-Thyborøn Local Archive; Miljøministeriet, "Miljøministeriets orientering om Cheminova bilag 2," 106–11.
[24] Sv. Svendsen, "Institutional Correspondance about the Prospect of a Landfill" (Vandbygningsvæsenet, August 17, 1956), 20-4, Lokalarkivet for Thyborøn-Harboøre-Engbjerg; Miljøministeriet, "Miljøministeriets orientering om Cheminova bilag 2," 107–8.
[25] Simone M. Müller and David Stradling, "Water as the Ultimate Sink: Linking Fresh and Saltwater History," *International Review of Environmental History* 5, no. 1 (May 9, 2019): 23–41.
[26] The Danish term is "tilgængeligt" which directly translated is to be available. Miljøministeriet, "Miljøministeriets orientering om Cheminova bilag 2," 107–8.
[27] Ibid., 108–9.
[28] Arne Lehnfelt, "Communication on the possibility of an extended agreement for depositing waste" (Ministeriet for offentlige arbejder, December 5, 1956), 20-4, Lokalarkivet for Thyborøn-Harboøre-Engbjerg.
[29] Leif Stilling, "Fjernelse af depot ved høfde 42," October 1, 1981, Box 218, 1895, Høfde 42 (Cheminova) 1981-2003, Miljøstyrelsen, Aarhus.
[30] Miljøministeriet, "Miljøministeriets orientering om Cheminova bilag 2," 27; Miljøministeriet, "Miljøministeriets orientering om Cheminova: myndighedernes sagsbehandling bilag 1," Hvidbog (København: Miljøministeriet, 1981), 211–12.
[31] Bo Poulsen, *Stormflod*, 100 Danmarkshistorier (Aarhus: Aarhus Universitetsforlag, 2019).
[32] Miljøministeriet, "Miljøministeriets orientering om Cheminova bilag 2," 133–39; Jan Boëtius, "Toxicity of Waste from a Parathion Industry at the Danish North Sea Coast," *Helgoländer Wissenschaftliche Meeresuntersuchungen* 17, no. 1–4 (April 1968): 182–87.
[33] Miljøministeriet, "Miljøministeriets orientering om Cheminova bilag 2," 126.

[34] Andreasen, *Første halvleg*.
[35] Miljøministeriet, "Miljøministeriets orientering om Cheminova bilag 2," 124–27.
[36] Aage Ebbensgaard and Ringkjøbing Amtsvandsinspektorat, "Kemikalieaffaldsgrube Ved Høfde 42, Thyborøn-Harboøre Kommune," December 16, 1980, Private archive.
[37] Kystdirektoratet, "Høfde," accessed March 22, 2021, https://kyst.dk/kyster-og-klima/kystbeskyttelse/kystbeskyttelsesmetoder/hoefde/.
[38] Miljøministeriet, "Miljøministeriets orientering om Cheminova bilag 1," 118.
[39] Ibid., 51–52.
[40] Ibid., 120–21.
[41] Deen Petersen and Møller, "Report on Findings of Contaminated Birds"; Wium-Andersen and Wium-Andersen, *Cheminova-Sagen 1978*.
[42] Aage Ebbensgaard, "Pressemeddelelse: Kemikalieaffald Ved Høfde 42, Harboøre Tange" (Ringkjøbing Amtskommune, Amtsvandsinspektøren, December 4, 1980).
[43] Ebbensgaard and Ringkjøbing Amtsvandsinspektorat, "Kemikalieaffaldsgrube Ved Høfde 42, Thyborøn-Harboøre Kommune."
[44] P. Schjødtz Hansen, "1981 Vandkvalitetsinstituttet Undersøgelse Af Kemikaliedepotet Ved Høfde 42" (Vandkvalitetsinstituttet, ATV., January 28, 1981), 9.
[45] Arne Kjær Sørensen, "Civilforsvarets Analytisk-Kemiske Laboratorium Rapport Om Udsivning Af Stoffer Fra Høfde 42 Depotet," May 6, 1981, 23.
[46] Cowiconsult, "Fjernelse Af Kemikalieaffaldsdepot Ved Høfde 42 På Harboøre Tange - Rapport Vedr. Projektets Gennemførelse," 1981.
[47] Ibid., 1–2.
[48] Cowiconsult, "Fjernelse Af Kemikalieaffaldsdepot Ved Høfde 42 På Harboøre Tange - Rapport Vedr. Projektets Gennemførelse."
[49] Ibid., 21–22.

[50] Ringkjøbing Amtskommune, Amtsvandsinspektøren, "Afhjælpning Af Forureningen i Engarealerne Øst for Høfde 42 - 'Cheminovahullet.' Projektoplæg Juli 1984 i Henhold Til Lov Om Kemikalieaffaldsdepoter," July 1984.
[51] Ibid., 7–10.
[52] Ringkjøbing Amtskommune, Amtsvandsinspektøren, "Afhjælpning Af Forureningen i Engarealerne Øst for Høfde 42 - 'Cheminovahullet.' Projektoplæg Juli 1984 i Henhold Til Lov Om Kemikalieaffaldsdepoter."
[53] Elise Bastrup, "Minutes - Kemikalieaffaldsdepot Cheminovahullet," September 21, 1984.
[54] Ringkjøbing Amtskommune, Amtsvandsinspektøren, "Afhjælpning Af Forureningen i Engarealerne Øst for Høfde 42 - 'Cheminovahullet.' Projektoplæg Juli 1984 i Henhold Til Lov Om Kemikalieaffaldsdepoter," 19–20.
[55] Ringkjøbing Amt, "Udledning Af Oppumpet Drænvand Fra 'Cheminovahullet,'" September 27, 1988.
[56] Ringkjøbing Amt, "Høfde 42 - Undersøgelse Af Forureningssituationen Ved Høfde 42 Og 'Cheminovahullet' På Harboøre Tange," 01 2001.
[57] Jens Østergaard and Flemming Højgaard Madsen, *Fisk kan ikke tale: en fiskers kamp mod Cheminovas forurening* (Skørping: Forlaget Rebild, 2017), 255.
[58] Ringkjøbing Amt, "Høfde 42 - Undersøgelse Af Forureningssituationen Ved Høfde 42 Og 'Cheminovahullet' På Harboøre Tange," 6–7.
[59] Ringkjøbing Amt, "Høfde 42 - Undersøgelse Af Forureningssituationen Ved Høfde 42 Og 'Cheminovahullet' På Harboøre Tange."
[60] Ringkøbing Amt, "Høfde 42: Status over Forureningssituations Ved Høfde 42 På Harboøre Tange," June 2003.
[61] Ringkjøbing Amt, "Høfde 42 - Undersøgelse Af Forureningssituationen Ved Høfde 42 Og 'Cheminovahullet' På Harboøre Tange," 36.

[62] Knud Jacobsen, "Udsivning af gift fra høfde 42 standses ikke," *Thisted Dagblad*, October 25, 2003, 6.
[63] Ibid.
[64] Sørensen, "Civilforsvarets Analytisk-Kemiske Laboratorium Rapport Om Udsivning Af Stoffer Fra Høfde 42 Depotet."
[65] Andersen, "Status for generationsforureninger 2022."
[66] Ringkjøbing Amt, "Etablering af spunsvæg ved høfdedepotet på Harboøre Tange: Vurdering af korrosionsrisiko på spunsvæggen. Pilotprojektbeskrivelse," May 2004, 9; Søren Dyreborg, "Demonstration af basis hydrolyse & biologisk nedbrydning: In-situ tests," n.d., 23.
[67] Here I have written/copied the exact same paragraph as in the beginning. I have done so as a kind of literary trick, that seeks to demonstrate – through writing – the perpetuality and circularity of the depot and the pump.
[68] Robert Macfarlane, *Underland: A Deep Time Journey* (London: Penguin Books, 2020), 13–14.
[69] A body of research has addressed previous claims of environmental harm as "invisible" by pointing to the inequality perspectives, thus asking, invisible to whom? See: Davies, "Slow Violence and Toxic Geographies"; Adrian Gonzalez, "What Justice and for Whom? A Political Ecology of Voice Study into 'Senses of Justice' in Peru's Loreto Region," *Environment and Planning E: Nature and Space* 5, no. 1 (March 2022): 473–504, doi:10.1177/2514848621989612.
[70] Derrida, *Specters of Marx*.
[71] TV Midtvest, "Ulovlig skamstøtte rejst ved Cheminova," *TV MIDTVEST*, accessed February 24, 2024, https://www.tvmidtvest.dk/lemvig/ulovlig-skamstotte-rejst-ved-cheminova.
[72] Mandag d 25 februar 2008 and kl 22 00 Del denne artikel Del denne artikel, "Danmarks første miljøaktivist død," *Berlingske.dk*, February 25, 2008, https://www.berlingske.dk/content/item/1117530.

[73] Østergaard and Højgaard Madsen, *Fisk kan ikke tale*; Jørn Gade, "Cheminova 'Kværulant' Og Miljøforkæmper: Jeg Sagde Jo Bare Sandheden," *Land Og Folk*, 11 1987.
[74] AUTHOR
[75] Elsebeth Lynge et al., "Cancer Incidence in Thyborøn-Harboøre, Denmark: A Cohort Study from an Industrially Contaminated Site," *Scientific Reports* 11, no. 1 (December 2021): 13006, doi:10.1038/s41598-021-92446-y.
[76] "Rav - Nordens guld," *Nationalmuseet*, accessed February 24, 2024, https://natmus.dk/historisk-viden/danmark/oldtid-indtil-aar-1050/bronzealderen-1700-fkr-500-fkr/forbindelser-sydpaa/rav-nordens-guld/.
[77] Franklin Ginn et al., "Introduction: Unexpected Encounters with Deep Time," *Environmental Humanities* 10, no. 1 (May 1, 2018): 214, doi:10.1215/22011919-4385534.
[78] Zoe Todd, "Fish, Kin and Hope: Tending to Water Violations in *Amiskwaciwâskahikan* and Treaty Six Territory," *Afterall: A Journal of Art, Context and Enquiry* 43 (March 2017): 104, doi:10.1086/692559.
[79] Elizabeth Kryder-Reid and Sarah May, *Toxic Heritage: Legacies, Futures, and Environmental Injustice*, 1st ed. (London: Routledge, 2023), 344.

Conclusion

We are experiencing a new historical situation where the consequences of living in the ongoing aftermath of chemical pollution require us to provide new interpretations, meanings, and understandings. By exploring chemical pollution as a material, scientific, industrial, bureaucratic, and intimately experienced object, I have hoped to show how a case-specific study provides an essential piece for understanding the contemporary global environmental situation. Exposure to pollution is not shared equally, but I hold that it is urgent to study pollution in various contexts, including the global North.

A central premise of this dissertation has been to historicize and contextualize the chemical pollution at Harboøre Tange to understand why the area has been contaminated for more than seven decades. As such, the dissertation has pursued this task by combining a series of questions directed and addressed at each article, which converges to comprise a larger argument.

Article I asked about the *ways Cheminova construct particular narratives around its chemicals, waste, and harmful effects.* By examining the underlying structures and reasonings of Cheminova's narratives, I argued that the company deliberately constructed distinct portrayals of its pollution. Cheminova created an image of a local and a global company that moved across scale and geographies to claim the necessity of its production and, thus, its pollution. Through "submergence, I show how Cheminova managed to frame its pollution as decontextualized, normalized, and externalized. The series of discursive techniques aimed at submerging critical narratives was largely successful in disassociating the pollution from its source. This article contributes to environmental history by exploring the discursive strategies of a Danish corporate polluter and how it established a series of claims around its pollution. Moreover, I found it urgent to include

other voices who challenged Cheminova's claims by asking *how environmentalists, bureaucrats, and scientists challenged these narratives and how they changed over time and across space.* As such, I investigated how Cheminova adjusted and adapted to various forms of criticism.

In article II, I shift perspective and temporal context. By engaging in an ongoing remediation process, I ask how *emotions such as ambivalence can illuminate our understanding of environmental injustices and the role of historically lived and unfolding experiences of pollution in shaping community engagements in environmental issues.* In this way, I explicate the historical circumstances of remediation and how bureaucratic and scientific estimations have described the depot as empty or removed. The local community, however, repeatedly found that it was not quite the case. Following an environmentalist, I demonstrate how historically informed experiences shape engagements with present remediation processes. Furthermore, use submergence to underline that knowledge-power is not just a feature of powerful corporations but can emerge out of an asymmetrical relationship where an engaged community – an environmental justice community – is excluded because they critique the premises of remediation. I place ambivalence in this setting as a heuristic device that allows me to explore citizen-state relationships critically, thus adding to contemporary research on environmental issues by exploring the emotional engagements of environmentalists. Ambivalence, I contend, is critical for understanding contemporary environmental issues that include complicity and complexity.

Where the first and second articles are integral for understanding how some narratives about pollution are being produced and framed as certain or evident while others are not, Article III explores the ambiguous and vague space between truth and non-truth. The article sets out to investigate how *rumors can illuminate knowledge and power structures in cases of pollution and how rumors advance our*

understanding of evidence, truth, and facts in environmental justice. The article provides a crucial element to the general thesis as it does not follow one actor's perspective but examines an evasive and slippery phenomenon as a starting point for inquiry. In this way, the article pursues a similar approach to "follow the thing," by tracing the phenomena that open different complex interactions and sentiments. I explore rumors in three ways: expressing living-being in a contaminated place where the accountable remains a powerful entity, as a type of knowledge deemed empirically invalid, and as a way of delegitimizing claims of pollution. As such, I contribute to environmental history by engaging with rumors' historical and contemporary nature as a distinct approach to studying a discursive terrain of uncertainty and ambiguity. Additionally, I engage in current discussions in the field of environmental justice by scrutinizing the nature of information – how some types become facts while others stay outside the realm of evidence. Ultimately, I contend that rumors have great potential in scrutinizing power/knowledge relationships.

The fourth and last article provides a slightly different focus by turning to the spatial dimensions of pollution. In this article, I am interested in exploring what kinds of arguments and projections made the subsurface ideal for storing chemical waste. To explore the relationship between surface and depth, I ask about the role of *Cheminova and bureaucratic actors in making underground waste storage the ideal way of handling chemical pollution.* I contend that the underground is essential for understanding how Harboøre Tange has remained chemically polluted for more than seven decades. The article provides an essential contribution to newer research that has increasingly begun looking to the underground to provide a better understanding of the current ecological crises. I introduce these perspectives to an environmental history that looks at the historical roots for contemporary actions. Through different imaginations and representations, I explore historically how the chemical waste became submerged and remained

as such. The submergence came with a series of guarantees and estimations, which did not hold. As such, the article shows the instability of the underground and the instability of the narratives that attempted to depict the underground as stable. Moreover, the article includes the perspectives of an environmental justice community by asking how *the concept of "submergence" can help nuance the submergence and re-emergence of waste and discourses?* As such, I actively incorporate other types of narratives than the technoscientific dominant discourses of the subsurface by advocating for relational perspectives. "Submergence," then, is never stable but holds potential for a re-emergence of other narratives.

Taken together, the four articles seek to answer the overarching research question: *How does the history of Cheminova and the material, cultural, scientific, and bureaucratic production of chemical waste nuance our understanding of pollution and environmental justice in the Nordic Region?*

By attending to the conditions, it remains a central argument that specific narratives dominated others and that these narratives did not just emerge and gain validity. I call this orchestration and prioritization of knowledge "submergence." As such, dominant narratives were supported by different types of expertise and reasonings, vested with interests that ultimately shaped Harboøre Tange's current situation. I hope that I have illuminated how narratives are not immaterial, intangible, and innocent stories confined to spaces of detached articulations, but fundamental to our understandings and engagements with them. Bringing in perspectives from several actors – including those accountable or implicated - helps to understand the different motivations and reasonings underlying environmental issues and their outcomes. I have attempted to bring these aspects into perspective by paying attention to the ways in which pollution, remediation, and resistance interplay. As such, I have attempted to provide a complex yet

clear, account of a case of chemical pollution spanning more than seventy years.

I have learned that Cheminova did not depict chemicals and their pollutive capacities in ways it was not convinced of. Instead, the company found that the harm was relative to other factors, whether population growth, financial prosperity, or dilutive capacities of the North Sea or the surroundings. Cheminova considered chemical waste either less harmful or an inevitable part of the production and had to be disposed of – with or without the authorities' knowledge. These aspects created a situation where corporate interests collided with the environment.

Moreover, political and bureaucratic decisions hinged on knowledge about pollution. Cheminova either produced information with an industry-shaped interest, or the knowledge largely depended on specific forms of expertise and scientific communities. These types of knowledges, or epistemic regimes, accumulated and expanded with the help of new understandings and measurements and aided by new technologies. Regulations tightened, and knowledge increased, but the pollution kept returning. I have hoped to show how modes of governing chemical waste and pollution rely on other factors than reducing pollution but are dependent on societal and economic factors. I gradually became aware that the scientific community is not the only one responsible for these decisions but finds itself assessing and evaluating according to environmental regulations, which is the outcome of political negotiations. These processes include compromises with industrial interests.

Consequently, hierarchies of knowledge about environmental contamination excluded other types of knowledge that were not subject to the same interests or disobeyed the law of the threshold. This dissertation has introduced a range of actors – fishermen, environmentalists, neighbors, journalists, an oyster company CEO,

biologists, and other experts – to nuance the narratives of resisting environmental injustices and chemical pollution. The heterogeneity of those problematizing chemical pollution shows – across time and space – how several interests also intervene in prevalent discourses while sometimes coming together and others on their own. It also shows that opposition takes on different forms. I call this way of opposing pollution as "re-emergence."

A primary objective of this thesis consists of a research commitment to the community. I have differentiated between the "local community" and the "environmental justice community." Drawing on insights from communities that have experienced – and still experience – the consequences of environmental injustices is crucial for any environmental framework. I have prioritized the "environmental justice" over the "local," thus emphasizing specific dimensions. Arguably, different perspectives result in different interpretations, leaving out experiences of living in a contaminated area that might appear more normal or mundane.

I have pursued the research questions through a method termed "field history." By using this method, I encountered and experienced instances of complete triviality removed far from the spectacle of chemical pollution as depicted in the media. Although I remain reluctant to simple binaries, I have come to learn that Harboøre Tange is marked by slow and fast violence. Sometimes, during storms or accidents at Cheminova, the violence is disruptive, while the days in between resemble a "normal" day in a small town in Denmark. "Normal" in quotation marks because there is nothing normal about the chemical smell that fills the area, although it used to be worse. "Normal" in quotation marks because when other types of chemical pollution emerge, such as the high findings of the pollutant PFAS in

2022, that might or might not have anything to do with the factory, the residents express indifference. As if this might be the new "normal."[158]

I pursued a perspective that troubles this "normality" by engaging with the environmentalists. The approach might be partial or limited, but it forwards a narrative that is dedicated to other kinds of futures. By describing futures, I am not proposing a singular future but rather the range of possibilities that arise from contemporary conditions. In his work on potential futures, Franco Berardi introduces "futurability" by distinguishing between different scenarios in the present moment and examining the layers of potentialities ranging from the impossible to the possible.[159] Berardi pursues a non-deterministic non-linear approach to the future conceptualized as a "horizon of possibilities as "an infinite sprawl of connecting, flashing points."[160] Through engagement and prioritization with the "environment justice community" I have hoped to show how the toxic space, which has defined Harboøre Tange for so long, does not hold one possible future. I have aimed to provide an alternative to the defeatist resignation where pollution has become normal, by suggesting that a horizon of different futures is available too. As such, the "chrono-politics" of the environmental justice

[158] "Nye PFAS-fund på Harboøre Tange," *Lemvig Kommune*, accessed April 1, 2022, https://www.lemvig.dk/Default.aspx?ID=3567; "Cheminova Udleder Meget Høje Niveauer Af PFAS-Kemikalier Med Fabrikkens Spildevand *Gylle.Dk | Landbrug, Miljø, Natur, Biodiversitet*, November 3, 2022, https://gylle.dk/cheminova-udleder-meget-hoeje-niveauer-af-pfas-kemikalier-med-fabrikkens-spildevand/; "Hænger fundet af PFAS-stoffer på Harboøre Tange sammen med Cheminova?," April 4, 2022, https://folkebladetlemvig.dk/artikel/h%C3%A6nger-fundet-af-pfas-stoffer-p%C3%A5-harbo%C3%B8re-tange-sammen-med-cheminova; "Nye PFAS-fund på Harboøre Tange: Kommune fraråder at spise hjemmedyrkede afgrøder," *TV MIDTVEST*, accessed December 12, 2023, https://www.tvmidtvest.dk/pfas/nye-pfas-fund-paa-harbooere-tange-kommune-fraraader-at-spise-hjemmedyrkede-afgroeder.

[159] Franco Berardi, *Futurability: The Age of Impotence and the Horizon of Possibility* (London New York: Verso, 2019), 16–18.

[160] Ibid., 28.

community is dedicated to the present to create a better and more livable area in the future but starting from a contaminated present.[161]

By studying a contemporary case, historically, I have elucidated the small mechanisms and drivers of environmental injustices in a Nordic welfare state. The dissertation has natural limitations in terms of scope and perspective, but it speaks to larger aims and commitments.

Consider one of the most used terms in environmental research: green transition. As a transitive verb, it signals a movement but does not imply a direction or destination. A green transition – the enormous and inevitable task involving the urgently demanded large-scale societal transformation – needs to situate its questions and concerns, for a future of living on a less damaged planet.[162] Failing to do so, is to avoid the uneasy task of finishing the sentence: a green transition – for whom and into what? In this matrix, questions of justice become complicated as they are situated, and what justice is, is not always obvious. One person or group of people's justice might be another group of people's injustice. So, justice perspectives do not always match each other. However, sitting with communities subjected to environmental injustices - listening to them and learning from them - might open other positions and help introduce different perspectives. Moreover, central catalysts in producing injustices are rarely between groups but rather embedded in structures and nested in power.

In order to refrain from repeating the vignettes that introduced this dissertation and refusing to follow the same injustices that this thesis has shed light on, environmental history plays a fundamental role. The repetition of injustices is not inevitable, but they are more likely to re-occur with similar outcomes when they are integral to the structures

[161] T. J. Demos, *Radical Futurisms: Ecologies of Collapse, Chronopolitics, and Justice-to-Come* (London: Sternberg Press, 2023), 19–26.
[162] Anna Lowenhaupt Tsing et al., *Arts of Living on a Damaged Planet, Ghosts of the Anthropocene, Monsters of the Anthropocene* (Minneapolis: University of Minnesota Press, 2017).

that produce them. In this way, environmental history faces an important task of examining the conditions of the crisis rather than the crisis itself. As such, it is not just any type of history that is required, but rather one that actively amplifies marginalized perspectives and takes them into account. In this way, environmental history has the potential to interject itself into contemporary environmental discussions by making an explicit commitment to building better and more just futures.

Bibliography

Adam, Barbara. *Timescapes of Modernity: The Environment and Invisible Hazards*. London: New York: Routledge, 1998.

Agyeman, Julian, and Bob Evans. "'Just Sustainability': The Emerging Discourse of Environmental Justice in Britain?" *The Geographical Journal* 170, no. 2 (2004): 155–64.

Anand, Nikhil, Bethany Wiggin, Lalitha Kamath, and Pranjal Deekshit. "Enduring Harm: Unlikely Comparisons, Slow Violence and the Administration of Urban Injustice." *International Journal of Urban and Regional Research* 46, no. 4 (July 2022): 651–59.

Anker, Peder. "A Pioneer Country? A History of Norwegian Climate Politics." *Climatic Change* 151, no. 1 (November 2016): 29–41.

Anker, Peder. *The Power of the Periphery: How Norway Became an Environmental Pioneer for the World*. Cambridge: Cambridge University Press, 2020.

Armiero, Marco. *Wasteocene: Stories from the Global Dump*. Cambridge: Cambridge University Press, 2021.

Armiero, Marco, Thanos Andritsos, Stefania Barca, Rita Brás, Sergio Ruiz Cauyela, Çağdaş Dedeoğlu, Marica Di Pierri, et al. "Toxic Bios: Toxic Autobiographies—A Public Environmental Humanities Project." *Environmental Justice* 12, no. 1 (February 2019): 7–11.

Bagelman, Jen, and Sarah Marie Wiebe. "Intimacies of Global Toxins: Exposure & Resistance in 'Chemical Valley.'" *Political Geography* 60 (September 2017): 76–85.

Balayannis, Angeliki. "Toxic Sights: The Spectacle of Hazardous Waste Removal." *Environment and Planning D: Society and Space* 38, no. 4 (August 2020): 772–90.

Ballestero, Andrea. “Touching with Light, or, How Texture Recasts the Sensing of Underground Water.” *Science, Technology, & Human Values* 44, no. 5 (September 2019): 762–85.

Ballestero, Andrea, and Brit Ross Winthereik, eds. *Experimenting with Ethnography: A Companion to Analysis*. Durham: Duke University Press, 2021.

Barad, Karen Michelle. *Meeting the Universe Halfway, Quantum Physics and the Entanglement of Matter and Meaning*. Durham: Duke University Press, 2007.

Barca, Stefania. *Forces of Reproduction: Notes for a Counter-Hegemonic Anthropocene*. Cambridge: Cambridge University Press, 2020.

Barca, Stefania “Telling the Right Story: Environmental Violence and Liberation Narratives.” *Environment and History* 20, no. 4 (November 1, 2014): 535–46.

Bell, Karen. *Achieving Environmental Justice: A Cross-National Analysis*. Bristol: Bristol University Press, 2014.

Bendixsen, Synnøve, Mary Bente Bringslid, and Halvard Vike, eds. *Egalitarianism in Scandinavia*. Cham: Springer International Publishing, 2018.

Benjaminsen, Tor A., and Paul Robbins. “Nordic Political Ecologies.” *Norsk Geografisk Tidsskrift - Norwegian Journal of Geography* 69, no. 4 (August 8, 2015): 191–96.

Bensaude-Vincent, Bernadette, and Isabelle Stengers. *A History of Chemistry*. Cambridge, Massachusetts: Harvard University Press, 1996.

Berardi, Franco. *Futurability: The Age of Impotence and the Horizon of Possibility*. London New York: Verso, 2019.

Boffey, Daniel. "Greta Thunberg Condemns UK Firm's Plans for Iron Mine on Sami Land." *The Guardian*, February 11, 2022. https://www.theguardian.com/environment/2022/feb/11/sami-people-said-no-british-firms-plans-open-pit-mine-divide-sweden-greta-thunberg.

Bonneuil, Christophe, and Jean-Baptiste Fressoz. *The Shock of the Anthropocene: The Earth, History and Us*. Translated by David Fernbach. Paperback edition. London New York, NY: Verso, 2017.

Borowy, Iris. "Making Sense of the History of Toxicity: How Poisonous Pasts May Have Touched Me and Everybody Else." *Environmental History* 26, no. 3 (July 17, 2021): 411–24.

Boudia, Soraya, Angela N.H. Creager, Scott Frickel, Emmanuel Henry, Nathalie Jas, Carsten Reinhardt, and Jody A. Roberts. "Residues: Rethinking Chemical Environments." *Engaging Science, Technology, and Society* 4 (June 28, 2018): 165–78.

Boudia, Soraya, and Nathalie Jas. "Introduction: Risk and 'Risk Society' in Historical Perspective." *History and Technology* 23, no. 4 (December 2007): 317–31.

Boullier, Henri, and David Demortain. "Inventing Prediction for Regulation: The Development of (Quantitative) Structure-Activity Relationships for the Assessment of Chemicals at the US Environmental Protection Agency." *Science and Technology Studies* 32 (2019): 137-157.

Brathwaite, Kamau. "History of the Voice 1979/1981." In *Roots*. Ann Arbor Paperbacks. Ann Arbor: University of Michigan Press, 1993.

Brichet, NS, Hastrup, F & Riede, F, *Mild Apocalypse – Feral Landscapes in Denmark: Reflections on an Exhibition*, 2017. https://aesengagement.wordpress.com/2017/02/21/mild-apocalypse-feral-landscapes-in-denmark-reflections-on-an-exhibition/

Brieghel, Signe, Nathalia Brichet, Kari Eriksson, Camilla Nielsen, Liza Rosenbaum Nielsen, Katy Overstreet, and Frida Hastrup. "Nye Køer På Gammelt Græs: Foder, stofskifte og planetære grænser i dansk malkekvægbrug." *Kulturstudier* 2 (2022): 185-204.

Brieghel, Signe, and Nina Toudal Jessen. "Fjorden Under Jorden: Grundforbedringsprojekter og historisk dødvande i Vejle og Hjarbæk fjorde," *Kulturstudier* 2 (2023): 51-74.

Brown, Kate. "The Last Sink: The Human Body as the Ultimate Radioactive Storage Site." In *Out of Sight, Out of Mind: The Politics and Culture of Waste*, edited by Christof Mauch, RCC Perspectives: Transformations in Environment and Society, no. 1, (2016): 41–47.

Buchanan, Brett, Michelle Bastian, and Matthew Chrulew. "Introduction: Field Philosophy and Other Experiments." *Parallax* 24, no. 4 (October 2, 2018): 383–91.

Bullard, Robert D. *Dumping in Dixie: Race, Class, and Environmental Quality*. Routledge, New York, NY 2018.

Bullard, Robert D. "Environmental Justice: It's More Than Waste Facility Siting." *Social Science Quarterly*, no. 3 (1996).

Buns, Melina Antonia. "Making a Model: The 1974 Nordic Environmental Protection Convention and Nordic Attempts to Form International Environmental Law." *Scandinavian Journal of History*, (2022): 1–23.

Buns, Melina Antonia, and Dominic Hinde. "Green States in a Dirty World: 1975 and the Performance of Nordic Green Modern." In *Nordic Media Histories of Propaganda and Persuasion*, edited by Fredrik Norén, Emil Stjernholm, and C. Claire Thomson (Cham: Springer International Publishing, 2023), 243–60.

Burchardt, Jørgen. "Syntetiske pesticider og Cheminova 1943-1954 – offentlig regulering af giftproduktion og miljøforurening i historisk perspektiv. *Erhvervshistorisk Årbog*, *70*, no. 1-2 (2021) 22–119.

Burchardt, Jørgen. "Cheminova - En Generationforureners Første År." *Gladsaxe Lokalhistoriske Forenings Årbog* (2022) 5–35.

Burchardt, Jørgen. "Cheminova – en miljøforurener i Måløv." *Byhornet* 51, no. 3 (2022), 3-35.

Museum Odense. "Bylivets sorte omstilling," June 4, 2020. https://museumodense.dk/forskning/forskningsprojekter/byens-sorte-omstilling/.

Camilla Mordhorst and Dorthe Gert Simonsen. "Skrald." *Kulturstudier* 3, no. 2 (2012): 6–13.

"Cheminova (Auriga) 1938-2014." Accessed December 15, 2023. https://danmarkshistorien.dk/vis/materiale/cheminova-auriga-1938-2014.

"Cheminova, Bladan Er Duften Af Barndomsminder - 1001 Fortællinger Om Danmark." Accessed December 15, 2023. http://www.kulturarv.dk/1001fortaellinger/da_DK/cheminova/stories/bladan-er-duften-af-barndomsminder.

Cronon, William. "A Place for Stories: Nature, History, and Narrative." *The Journal of American History* 78, no. 4 (March 1992): 1347-1376.

Cronon, William "Reading Landscapes - Learning Historical Research." Accessed January 13, 2024. https://www.williamcronon.net/researching/landscapes.htm.

Danielsen, Oluf. *Klimaet på dagsordenen: dansk klimadebat 1988 - 2012*. København: Multivers, 2015.

Daston Lorraine and Peter Galison. *Objectivity*. New York, NY; Zone Books, 2007.

Davis, Frederick Rowe. *Banned: A History of Pesticides and the Science of Toxicology*. New Haven: Yale University Press, 2014.

Demos, T. J. *Radical Futurisms: Ecologies of Collapse, Chronopolitics, and Justice-to-Come*. London: Sternberg Press, 2023.

Derrida, Jacques. *Specters of Marx: The State of the Debt, the Work of Mourning and the New International*. New York: Routledge, 2006.

Jacques Derrida and Michael Sprinker, *Ghostly Demarcations: A Symposium on Jacques Derrida's Specters of Marx*, (London: Verso, 2008).

Egan, Michael. "Chemical Unknowns: Preliminary Outline for an Environmental History of Fear." In *New Natures: Joining Environmental History with Science and Technology Studies*, eds., Dolly Jørgensen, Finn Arne Jørgensen, and Sara B. Pritchard, 124–38. Pittsburgh, Pennsylvania: Pittsburgh University Press, 2013.

"EJAtlas." Accessed August 25, 2022. http://www.envjustice.org/ejatlas/.

Elden, Stuart. "Secure the Volume: Vertical Geopolitics and the Depth of Power." *Political Geography* 34 (May 2013): 35–51.

Elmore, Bartow J. *Seed Money: Monsanto's Past and Our Food Future*. New York, NY: W.W. Norton & Company, 2021.

Engberg, Jens. *Det heles vel: forureningsbekæmpelsen i Danmark fra loven om sundhedsvedtægter i 1850'erne til miljøloven 1974*. Copenhagen: Miljøkontrollen, Københavns Kommune, 1999.

Felt, Ulrike, Clark A. Miller, Laurel Smith-Doerr, and Rayvon Fouché, eds., *The Handbook of Science and Technology Studies*. Fourth edition. Cambridge, Massachusetts, London, England: The MIT Press, 2017.

Fisher, Mark. *Ghosts of My Life: Writings on Depression, Hauntology and Lost Futures*. Winchester, UK: Zero books, 2014.

Fisher, Mark "What Is Hauntology?" *Film Quarterly* 66, no. 1 (September 1, 2012): 16–24.

Fortun, Kim. *Advocacy after Bhopal: Environmentalism, Disaster, New Global Orders*. Chicago: Univ. of Chicago Press, 2001.

Fortun, Kim "From Latour to Late Industrialism." *HAU: Journal of Ethnographic Theory* 4, no. 1 (June 2014): 309–29.

Foucault, Michel. *Archaeology of Knowledge*. Routledge Classics. London; New York: Routledge, 2002.

Fritzbøger, Bo. *Det Åbne Lands Kulturhistorie - Gennem 300 år*. 2. udg. København: Biofolia, 2004.

Fritzbøger, Bo. "Miljøhistorie - Er Der Noget Nyt under Solen?" In *Miljöhistoria Över Gränser*, eds., Fredrik Björk, Per Eliasson, and Bo Fritzbøger. Malmö: Malmö högskola, 2006.

Gabrys, Jennifer. "Sink: The Dirt of Systems." *Environment and Planning D: Society and Space* 27, no. 4 (August 2009): 666–81.

Ghosh, Amitav. *The Great Derangement: Climate Change and the Unthinkable*. Chicago: The University of Chicago press, 2017.

Gómez-Barris, Macarena. *The Extractive Zone: Social Ecologies and Decolonial Perspectives*. Durham: Duke University Press, 2017.

Green, Lesley. *Rock | Water | Life: Ecology & Humanities for a Decolonial South Africa*. Durham: Duke University Press, 2020.

NESH "Guidelines for Research Ethics in the Social Sciences and the Humanities." *Forskningsetikk*. Accessed February 28, 2024. https://www.forskningsetikk.no/en/about-us/our-committees-and-commission/nesh/guidelines-nesh/guidelines-for-research-ethics-in-the-social-sciences-humanities-law-and-theology2/.

Günel, Gökçe, Saiba Varma, and Chika Watanabe. "A Manifesto for Patchwork Ethnography." Member Voices, *Fieldsights*, June 9, 2020. https://culanth.org/fieldsights/a-manifesto-for-patchwork-ethnography.

Hannestad, Adam "»Grotesk« og »forkasteligt«: Cheminova sælger forbudt nervegift til Pakistan og Libanon," *Politiken* March 29, 2023. https://politiken.dk/indland/art9276112/%C2%BBGrotesk%C2%AB-og-%C2%BBforkasteligt%C2%AB-Cheminova-s%C3%A6lger-forbudt-nervegift-til-Pakistan-og-Libanon.

Hansen, Keld "Cheminova udleder meget høje niveauer af PFAS-Kemikalier med fabrikkens spildevand *Gylle.Dk*, November 3, 2022. https://gylle.dk/cheminova-udleder-meget-hoeje-niveauer-af-pfas-kemikalier-med-fabrikkens-spildevand/.

Hansen, Bjarne, "Hænger fundet af PFAS-stoffer på Harboøre Tange sammen med Cheminova?," April 4, 2022. https://folkebladetlemvig.dk/artikel/h%C3%A6nger-fundet-af-pfas-stoffer-p%C3%A5-harbo%C3%B8re-tange-sammen-med-cheminova.

Haraway, Donna J. "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective." *Feminist Studies* 14, no. 3 (1988): 575–99.

Haraway, Donna J. "Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin." *Environmental Humanities* 6 (2015).

Haraway, Donna J. *Modest_Witness@Second_Millennium. FemaleMan_Meets_OncoMouse: Feminism and Technoscience*. New York, NY: Routledge, 2018.

Haraway, Donna J. *Staying With the Trouble: Making Kin in the Chthulucene*. Durham: Duke University Press, 2016.

Harkin, M. E. "Ethnohistory's Ethnohistory: Creating a Discipline from the Ground Up." *Social Science History* 34, no. 2 (June 1, 2010) 113-128.

Hartman, Saidiya. "The End of White Supremacy, An American Romance." *BOMB Magazine*, June 5, 2020. https://bombmagazine.org/articles/the-end-of-white-supremacy-an-american-romance/.

Hawkins, Harriet. "Underground Imaginations, Environmental Crisis and Subterranean Cultural Geographies." *Cultural Geographies* 27, no. 1 (January 2020): 3–22.

Hecht, Gabrielle. *Residual Governance: How South Africa Foretells Planetary Futures*. Durham: Duke University Press, 2023.

Heineman, Tom. *Når Tilbud Dræber*. Documentary, 2006. https://vimeo.com/459235183.

Henriksen, Line. "Ecohauntology." *Critical Posthumanism Network*, May 20, 2021. https://criticalposthumanism.net/ecohauntology/.

Hepler-Smith, Evan. "Molecular Bureaucracy: Toxicological Information and Environmental Protection." *Environmental History* 24, no. 3 (July 1, 2019): 534–60.

Historians for Future. "History Happens Now – A Response to 'Is History History?,'" August 22, 2022. https://historiansforfuture.org/history-happens-now-a-response-to-is-history-history/.

Hoffmeyer Jesper. *Samfundets naturhistorie*. Charlottenlund: Rosinante, 1982.

Høghøj, Mikkel, and Mikkel Thelle. "Material Politics: Approaching Welfare History through Urban Water in 20th Century Denmark." *Scandinavian Journal of History*, December 4, 2023, 1–23.

Holm Jesper, Holm Jesper, Lars Kjerulf Petersen, Jeppe Læssøe, Arne Remmen, and Carsten Jahn Hansen, eds., *Økologisk modernisering på dansk: brud og bevægelser i miljøindsatsen*. København: Frydenlund, 2007.

Holifield, Ryan Jayajit Chakraborty, and Gordon Walker, eds., *The Routledge Handbook of Environmental Justice* London; New York: Routledge, Taylor & Francis Group, 2018.

Hougaard, Asger. "Græsrødder: Miljøorganisationen NOAHs Politik Og Strategi 1969-2009," PhD Diss., University of Bergen, Forthcoming.

Hougaard, Asger. ed. *Miljøbevægelsens rødder: en antologi*. København: NOAH, 2019.

Houston, Donna. "Environmental Justice Storytelling: Angels and Isotopes at Yucca Mountain, Nevada." *Antipode* 45, no. 2 (March 2013): 417–35.

Hyllested, Simon. "Nye PFAS-fund på Harboøre Tange: Kommune fraråder at spise hjemmedyrkede afgrøder." *TV MIDTVEST*, March 30, 2022. https://www.tvmidtvest.dk/pfas/nye-pfas-fund-paa-harbooere-tange-kommune-fraraader-at-spise-hjemmedyrkede-afgroeder.

Ingrisch, Anna. "På Giftig Grund" *Genstart* DR LYD." Accessed January 19, 2024. https://www.dr.dk/lyd/special-radio/genstart/genstart-2024/genstart-paa-giftig-grund-11802450022.

Jasanoff, Sheila. "Virtual, Visible, and Actionable: Data Assemblages and the Sightlines of Justice." *Big Data & Society* 4, no. 2 (December 2017): 1-15.

Jessen, Nina Toudal. "Hvor går grænsen? Om naturfredning som oversættelse fra virkelighed til kort." *Tidsskrift for kulturforskning*, no. 2 (2022): 53-67.

Jessen, Nina Toudal. "Jord og landskab. Relationelle landskabsforandringer i det 20. århundrede." PhD Diss., University of Copenhagen, 2021.

Jungersen, Rasmus. "Nordic Waste har indgivet konkursbegæring," *DR* January 19, 2024. https://www.dr.dk/nyheder/seneste/nordic-waste-har-indgivet-konkursbegaering.

Jørgensen, Dolly, and Franklin Ginn. "Environmental Humanities." *Environmental Humanities* 12, no. 2 (November 1, 2020): 496–500.

Jørgensen, Finn Arne, Unnur Birna Karlsdóttir, Erland Mårald, Bo Poulsen, and Tuomas Räsänen. "Entangled Environments: Historians and Nature in the Nordic Countries." *Historisk Tidsskrift* 92, no. 1 (March 26, 2013): 9–34.

Kjærgaard, Thorkild. *Den danske Revolution: 1500 - 1800; en økohistorisk tolkning*. København: Gyldendal, 1996.

Kojola, Erik, and David N. Pellow. "New Directions in Environmental Justice Studies: Examining the State and Violence." *Environmental Politics* 30, no. 1–2 (February 23, 2021): 100–118.

Kristensen, Katrine Emilie. "Nordic Waste blev varslet påbud: Nu giver de lyd fra sig." *TV2 Østjylland.* January 17, 2024. https://www.tv2ostjylland.dk/randers/nordic-waste-blev-varslet-paabud-nu-giver-de-lyd-fra-sig.

Kusnitzoff, Ove. "Cheminova er blevet solgt for 8,5 milliarder kroner." *Politiken*, September 8, 2014. https://politiken.dk/oekonomi/virksomheder/art5536046/Cheminova-er-blevet-solgt-for-85-milliarder-kroner.

Langston, Nancy. *Toxic Bodies: Hormone Disruptors and the Legacy of DES*. New Haven: Yale University Press, 2010.

Larsson Heidenblad, David. *Den gröna vändningen: En ny kunskapshistoria om miljöfrågornas genombrott under efterkrigstiden*. Nordic Academic Press (Kriterium), 2021.

Lautrup, Andy. "Generation Carbon: Loss, Goodness and Youth Climate Activism in Norway's Oil Capital." PhD Diss., IT University of Copenhagen, 2022.

Law, John. "What's Wrong with a One-World World?" *Distinktion: Journal of Social Theory* 16, no. 1 (January 2, 2015): 126–39.

Le Guin, Ursula K., Pul Yi, and Donna Haraway. *The Carrier Bag Theory of Fiction*. London: Ignota, 2019.

Leeuw, Georgia de. "The Virtue of Extraction and Decolonial Recollection in Gállok, Sápmi." In *Coloniality and Decolonization in the Nordic Region*, by Adrián Groglopo and Julia Suárez-Krabbe, 68–88, London: Routledge, 2023.

Lemvig Kommune. "Nye PFAS-fund på Harboøre Tange." Accessed April 1, 2022. https://www.lemvig.dk/Default.aspx?ID=3567.

Lerner, Steve. *Sacrifice Zones: The Front Lines of Toxic Chemical Exposure in the United States*. Cambridge, Mass: MIT Press, 2010.

Liboiron, Max. *Pollution Is Colonialism*. Durham: Duke University Press, 2021.

Liboiron, Max, and Josh Lepawsky. *Discard Studies: Wasting, Systems, and Power*. Cambridge, Massachusetts: The MIT Press, 2022.

Lotze, Heike K., Karsten Reise, Boris Worm, Justus van Beusekom, Mette Busch, Anneli Ehlers, Dirk Heinrich, et al. "Human Transformations of the Wadden Sea Ecosystem through Time: A

Synthesis." *Helgoland Marine Research* 59, no. 1 (April 1, 2005): 84–95.

Lundsteen, Sebastian "Shadow Places, Environmental Justice, and the Submergence of Pollution." *Forthcoming.*

Lundsteen, Sebastian. "In Praise of Ambivalence: Reflections on Experiences of Pollution and Remediation." In *Ambivalences of Ecological Transformation: Perspectives from the Environmental Humanities*. *Forthcoming.*

Lundsteen, Sebastian "Not True, but Also, Not Not True: On Rumors about Pollution in Denmark." *Forthcoming.*

Lundsteen, Sebastian, and Anders Riel Müller. "Challenging Nordic Innocence: A Podcast about Social, Spatial and Environmental Justice." Accessed February 21, 2024. https://app.cristin.no/results/show.jsf?id=2232784.

Mah, Alice. "Environmental Justice in the Age of Big Data: Challenging Toxic Blind Spots of Voice, Speed, and Expertise." *Environmental Sociology* 3, no. 2 (April 3, 2017): 122–33.

Mah, Alice, and Thom Davies. *Toxic Truths: Environmental Justice and Citizen Science in a Post-Truth Age.* Manchester: Manchester University Press, 2020.

Malm, Andreas, and Alf Hornborg. "The Geology of Mankind? A Critique of the Anthropocene Narrative." *The Anthropocene Review* 1, no. 1 (April 2014): 62–69.

Mart, Michelle. *Pesticides, a Love Story: America's Enduring Embrace of Dangerous Chemicals.* Kansas: University Press of Kansas, 2018.

Martinez-Alier, Joan, and Stanislav Shmelev. "Between Activism and Science: Grassroots Concepts for Sustainability Coined by

Environmental Justice Organizations." *Journal of Political Ecology* 21, no. 1 (December 1, 2014).

Martinez-Alier, Joan, Leah Temper, Daniela Del Bene, and Arnim Scheidel. "Is There a Global Environmental Justice Movement?" *The Journal of Peasant Studies* 43, no. 3 (May 3, 2016): 731–55.

Masco, Joseph. *The Future of Fallout, and Other Episodes in Radioactive World-Making*. Duke University Press, 2020.

McNeill, J. R. "Observations on the Nature and Culture of Environmental History." *History and Theory* 42, no. 4, (2003): 5–43.

McNeill, John Robert, and Peter Engelke. *The Great Acceleration - An Environmental History of the Anthropocene Since 1945*. Cambridge, Massachusetts: Harvard University Press, 2014.

McNeill, J.R. "The State of the Field of Environmental History." *Annual Review of Environment and Resources* 35, no. 1 (November 21, 2010): 345–74.

Melo Zurita, Maria De Lourdes, Paul George Munro, and Donna Houston. "Un-earthing the Subterranean Anthropocene." *Area* 50, no. 3 (September 2018): 298–305.

Melosi, Martin V. "Environmental Justice, Political Agenda Setting, and the Myths of History." *Journal of Policy History* 12, no. 1 (January 2000): 43–71.

Melosi, Martin V. "Equity, Eco-Racism and Environmental History." *Environmental History Review* 19, no. 3 (1995) 1-16.

Mitman, Gregg. *Empire of Rubber: Firestone's Scramble for Land and Power in Liberia*. New York: The New Press, 2021.

Mitman, Gregg, Michelle Murphy, and Christopher Sellers, eds. *Landscapes of Exposure: Knowledge and Illness in Modern Environments*. Chicago, Illinois: University of Chicago Press, 2004.

Mohai, Paul, David Pellow, and J. Timmons Roberts. "Environmental Justice." *Annual Review of Environment and Resources* 34, no. 1 (November 1, 2009): 405–30.

Moore, Jason W. *Anthropocene or Capitalocene? Nature, History, and the Crisis of Capitalism*. Oakland, California: PM Press, 2016.

Morris, Rosalind C. *Can the Subaltern Speak?: Reflections on the History of an Idea*. New York: Columbia University Press, 2010.

Morton, Timothy. *Hyperobjects: Philosophy and Ecology after the End of the World*. Minneapolis: University of Minnesota press, 2013.

Müller, Simone M. "Corporate Behaviour and Ecological Disaster: Dow Chemical and the Great Lakes Mercury Crisis, 1970–1972." *Business History* 60, no. 3 (April 3, 2018): 399–422.

Müller, Simone M. "Hidden Externalities: The Globalization of Hazardous Waste." *Business History Review* 93, no. 1 (2019): 51–74.

Müller, Simone M. *The Toxic Ship: The Voyage of the Khian Sea and the Global Waste Trade*. Seattle: University of Washington Press, 2023.

Müller, Simone M. "Toxic Commons: Toxic Global Inequality in the Age of the Anthropocene." *Environmental History* 26, no. 3 (July 17, 2021): 444–50.

Müller, Simone M., and May-Brith Ohman Nielsen, eds. *Toxic Timescapes: Examining Toxicity across Time and Space*. Athens: Ohio University Press, 2022.

Murphy, Michelle. *Sick Building Syndrome and the Problem of Uncertainty: Environmental Politics, Technoscience, and Women Workers*. Durham: Duke University Press, 2006.

Murphy, Michelle. "Chemical Regimes of Living." *Environmental History* 13, no. 4 (2008): 695–703.

Murphy, Michelle. "Chemical Infrastructures of the St. Clair River." In *Toxicants, Health and Regulation since 1945*, edited by Soraya Boudia and Nathalie Jas, 103–17. New York, NY: Routledge, Taylor & Francis Group, 2013.

Murphy, Michelle. "Alterlife and Decolonial Chemical Relations." *Cultural Anthropology* 32, no. 4 (November 18, 2017): 494–503.

Nash, Linda Lorraine. *Inescapable Ecologies: A History of Environment, Disease, and Knowledge*. Berkeley: University of California Press, 2006.

Neimanis, Astrida, Cecilia Åsberg, and Johan Hedrén. "Four Problems, Four Directions for Environmental Humanities: Toward Critical Posthumanities for the Anthropocene." *Ethics and the Environment* 20, no. 1 (2015): 67-97.

Nielsen, Henrik Vinther. "Mystik om jord på Nordic Waste: Hvad er der i de 26 procent 'andet'? *Ingeniøren*, January 25, 2024. https://ing.dk/artikel/mystik-om-jord-paa-nordic-waste-hvad-er-der-i-de-26-procent-andet.

Nissen, Ada. "A Greener Shade of Black? Statoil, the Norwegian Government and Climate Change,1990—2005." *Scandinavian Journal of History* 46, no. 3 (May 27, 2021): 408–29.

Nissen, Ada Elisabeth. "An Oil Company as a Force for Good? How Statoil Put Norway's Identity as a' Champion of Ideals' to the Test." *Culture Unbound* 13, no. 1 (July 27, 2021): 16–40.

Nixon, Rob. *Slow Violence and the Environmentalism of the Poor*. Cambridge, Massachusetts: Harvard Univ. Press, 2013.

Norgaard, Kari Marie. *Living in Denial Climate Change, Emotions, and Everyday Life*. Cambridge, Massachusetts: MIT Press, 2011.

Nost, Eric, and Jenny Elaine Goldstein. "A Political Ecology of Data." *Nature and Space E* 5, no.1 (2021): 3-17

Nyhus, Håvard. "I dag startar rettssaka om gruveslam i fjorden – dette er striden." *NRK*, September 18, 2023. https://www.nrk.no/vestland/i-dag-startar-rettssaka-om-gruveslam-i-fjorden-_-dette-er-striden-1.16559043.

Nyhus, Håvard. "Overraskande vending: Dommen i fjordsøksmålet vert utsett." *NRK*, November 20, 2023. https://www.nrk.no/vestland/overraskande-vending_-dommen-i-fjordsoksmalet-vert-utsett-1.16644864.

Nyhus, Håvard. "Rettssak om gruveavfall i Førdefjorden: Dommen fell i dag." *NRK*, January 10, 2024. https://www.nrk.no/vestland/rettssak-om-gruveavfall-i-fordefjorden_-dommen-fell-i-dag-1.16708548.

O'Gorman, Emily, Thom van Dooren, Ursula Münster, Joni Adamson, Christof Mauch, Sverker Sörlin, Marco Armiero, et al. "Teaching the Environmental Humanities." *Environmental Humanities* 11, no. 2 (November 1, 2019): 427–60.

O'Gorman, Emily, William San Martín, Mark Carey, and Sandra Swart, eds. *The Routledge Handbook of Environmental History*. Routledge International Handbooks. Abingdon, Oxon; New York, NY: Routledge, 2024.

Obbekjær, Mie, Louise Voller, and Jonathan Thyberg "Giftigt stof fra Kvanefjeld i Grønland kan forurene drikkevand og elve" *Danwatch*,

March 26, 2021. https://danwatch.dk/perspektiv/giftigt-stof-fra-kvanefjeld-i-groenland-kan-forurene-drikkevand-og-elve/.

Öhman, May-Britt. "TechnoVisions of a Sámi Cyborg: Reclaiming Sámi Body-, Land-, and Waterscapes After a Century of Colonial Exploitations in Sábme." In *Illdisciplined Gender*, eds., Jacob Bull and Margaretha Fahlgren, 63–98. Cham: Springer International Publishing, 2016.

Öhman, May-Britt "The Ski or the Wheel?" In *Routledge Handbook of Critical Indigenous Studies*, eds., Brendan Hokowhitu, Aileen Moreton-Robinson, Linda Tuhiwai-Smith, Chris Andersen, and Steve Larkin, 431–46. New York, NY: Routledge, 2021.

Olsen, Niklas. "Klimapolitikkens Idéhistorie i Danmark 1980-2022." *Historisk Tidsskrift* 122, no. 1 (2023): 182–202.

Olsen, Niklas, and Rasmus Skov Andersen. "Shielding the Market from the Masses: The Origins of Libertarian Anti-Environmentalism in the 1960s and 1970s." *Journal of Modern European History* 20, no. 3 (August 2022): 304–10.

Olsen, Niklas, and Casper Sylvest. "Atomkraftens fortalere i Danmark. En samtidshistorisk analyse." *Historisk Tidsskrift* 122, no. 2 (2023): 423-455.

Oreskes, Naomi, and Erik M. Conway. *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*. London: Bloomsbury, 2012.

Otte, Mads. "Jordlavine kan oversvømme hel by – men kommune afviste risikoen." *TV2 Østjylland*. January 17, 2024. https://www.tv2ostjylland.dk/randers/jordlavine-kan-oversvoemme-hel-by-men-kommune-afviste-risikoen.

Ottinger, Gwen. "Buckets of Resistance: Standards and the Effectiveness of Citizen Science." *Science, Technology, & Human Values* 35, no. 2 (March 2010): 244–70.

Ottinger, Gwen "Misunderstanding Citizen Science: Hermeneutic Ignorance in U.S. Environmental Regulation." *Science as Culture* 31, no. 4 (October 2, 2022): 504–29.

Oxford English Dictionary "Submergence - Advanced Search Results in Historical Thesaurus." Accessed January 17, 2024. https://www.oed.com/search/advanced/HistoricalThesaurus?textTermText0=submergence&textTermOpt0=WordPhrase.

Papadopoulos, Dimitris María Puig de la Bellacasa, and Natasha Myers eds. *Reactivating Chemicals: Chemistry, Ecology, and Practice* Durham: Duke University Press, 2022.

Pellow, David N. *Resisting Global Toxics: Transnational Movements for Environmental Justice*. Urban and Industrial Environments. Cambridge, Massachusetts: MIT Press, 2007.

Pellow, David N *What Is Critical Environmental Justice?* Cambridge, UK; Medford, MA, USA: Polity Press, 2018.

Petersen, Flemming. *Da Danmark fik vinger: vindmøllehistorien 1978-2018.* Aarhus: Danmarks Vindmølleforening, 2018.

Pinkus, Karen. *Subsurface.* Minneapolis: University of Minnesota Press, 2023.

Plumwood, Val "Shadow Places and the Politics of Dwelling." *Australian Humanities Review* 44, no. 2 (2008): 139–50.

Thomsen, Carsten. "Politiet advarer om jordskred efter massiv regn i Randers." *DR,* December 16, 2023.

https://www.dr.dk/nyheder/seneste/politiet-advarer-om-jordskred-efter-massiv-regn-i-randers.

Potter, Emily, Fiona Miller, Eva Lövbrand, Donna Houston, Jessica McLean, Emily O'Gorman, Clifton Evers, and Gina Ziervogel. "A Manifesto for Shadow Places: Re-Imagining and Co-Producing Connections for Justice in an Era of Climate Change." *Environment and Planning E: Nature and Space* 5, no. 1 (March 1, 2022): 272–92.

Poulsen, Bo. "Tendenser Og Muligheder i Dansk Og International Miljøhistorie." *Temp - Tidsskrift for Historie* 12, no. 24 (June 17, 2022): 152–73.

Poulsen, Bo, Poul Holm, and Brian R. MacKenzie. "A Long-Term (1667–1860) Perspective on Impacts of Fishing and Environmental Variability on Fisheries for Herring, Eel, and Whitefish in the Limfjord, Denmark." *Fisheries Research* 87, no. 2–3 (2007): 181–95.

Povinelli, Elizabeth A. *Geontologies: A Requiem to Late Liberalism*. Durham: Duke University Press, 2016.

Povinelli, Elizabeth A. On Biopolitics and The Anthropocene: Elizabeth Povinelli, interviewed by Kathryn Yusoff and Mat Coleman. Interview by Kathryn Yusoff and Mat Coleman. Accessed February 27, 2024. https://www.societyandspace.org/articles/on-biopolitics-and-the-anthropocene.

Povinelli, Elizabeth A. "The Will to Be Otherwise/The Effort of Endurance." *South Atlantic Quarterly* 111, no. 3 (July 1, 2012): 453–75.

Pulido, Laura. "A Critical Review of the Methodology of Environmental Racism Research." *Antipode* 28, no. 2 (April 1996): 142–59.

Pulido, Laura. “Rethinking Environmental Racism: White Privilege and Urban Development in Southern California.” *Annals of the Association of American Geographers* 90, no. 1 (2000): 12–40.

Region Midtjylland. “Kemikaliedepotet ved Høfde 42.” Accessed February 3, 2021. https://www.rm.dk/regional-udvikling/klima-ressourcer-og-baredygtig-udvikling/jordforurening/forurening-pa-harboore-tange/kemikaliedepotet-ved-hofde-42/.

Reinert, Hugo. “Notes from a Projected Sacrifice Zone.” *ACME* 17, no. 2 (2018): 597–617.

Reinert, Hugo. “The Midwife and the Poet.” *Environmental Humanities* 11, no. 1 (May 1, 2019): 137–51.

Reinert, Hugo. “The Skulls and the Dancing Pig: Notes on Apocalyptic Violence.” *Terrain*, no. 71 (April 11, 2019).

London Mining Network. “Indigenous Sami Rights under Attack from Swedish State and UK Mining Company.” *London Mining Network*, June 21, 2022. https://londonminingnetwork.org/2022/06/indigenous-sami-rights-under-attack-from-swedish-state-and-uk-mining-company/.

Rose, Deborah Bird. “Slowly ~ Writing into the Anthropocene.” *TEXT* 17, no. Special 20 (October 31, 2013), 1-14.

Rose, Deborah Bird, Thom van Dooren, Matthew Chrulew, Stuart Cooke, Matthew Kearnes, and Emily O’Gorman. “Thinking Through the Environment, Unsettling the Humanities.” *Environmental Humanities* 1, no. 1 (2012): 1–5.

Ross, Benjamin, and Steven Amter. *The Polluters: The Making of Our Chemically Altered Environment*. Oxford: Oxford Univ. Press, 2010.

Rubow, Cecilie. “The Indoor People’s Enchanted Ecologies.” *Environmental Humanities* 14, no. 2 (July 1, 2022): 475–93.

Rüdiger, Mogens. “From Coal to Wind: How the Danish Energy Policy Changed in 1990.” *Scandinavian Journal of History* 44, no. 4 (August 8, 2019): 510–30.

Rye, Jørgen “Fonden Med Fire Milliarder.” *Jyllands-Posten*, September 14, 2014. https://jyllands-posten.dk/jpaarhus/article7022187.ece.

Said, Edward W. *Orientalism*. Penguin Modern Classics. London: Penguin Books, 2003.

Sametinget. “Sami Parliament viewpoint on Gállok/Kallak.” Accessed January 20, 2024. https://www.sametinget.se/164992.

Schlosberg, David. *Defining Environmental Justice*. Oxford University Press, 2007.

Schlosberg, David “Theorising Environmental Justice: The Expanding Sphere of a Discourse.” *Environmental Politics* 22, no. 1 (February 2013): 37–55.

Scott James C. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven: Yale University Press, 2020.

Scott, James C. *Weapons of the Weak: Everyday Forms of Peasant Resistance*. New Haven: Yale University Press, 1987.

Shapiro, Nicholas, Nasser Zakariya, and Jody A. Roberts. “Beyond the Data Treadmill: Environmental Enumeration, Justice, and Apprehension.” In *Toxic Truths*, eds., Thom Davies and Alice Mah, 301-325. Manchester: Manchester University Press, 2020.

Sharpe, Christina Elizabeth. *In the Wake: On Blackness and Being*. Durham: Duke University Press, 2016.

Sørensen, Nils Arne, and Louise Nyholm Kallestrup. "Bæredygtighedshistorie." *Temp - tidsskrift for historie* 12, no. 24 (June 17, 2022): 5–10.

Spivak, Gayatri Chakravorty. "Can the Subaltern Speak?" Macmillan, Basingstoke, 1988.

Stengers, Isabelle. *Another Science Is Possible: A Manifesto for Slow Science*. English edition. Cambridge; Medford, MA: Polity, 2018.

Stewart, Charles. "Historicity and Anthropology." *Annual Review of Anthropology* 45, no. 1 (October 21, 2016): 79–94.

Stewart, Mart. "Narrative, Place, and Environmental Justice." *Environmental History* 28, no. 1 (January 1, 2023): 4–13.

Stoler, Ann Laura. *Along the Archival Grain: Epistemic Anxieties and Colonial Common Sense*. Princeton, New Jersey: Princeton University Press, 2009.

Strathern, Marilyn. *Property, Substance, and Effect: Anthropological Essays on Persons and Things*. First. Chicago: HAU Books, 2022.

Svennevig, Kristian, Marie Keiding, Jacob Kidmose, Julian Koch, and Samuel Paul Jackson. "Jordskredsaktivitet ved Nordic Waste, Randers Kommune." Danmarks og Grønlands Geologiske Undersøgelse Rapport 2024/6, January 22, 2024.

Swanson, Heather Anne. "The Banality of the Anthropocene." *Society for Cultural Anthropology*, February 22, 2017. https://culanth.org/fieldsights/the-banality-of-the-anthropocene.

Reuters. "Sweden Gives Qualified Go-Ahead for Northern Kallak Iron Ore Mine," March 22, 2022, sec. World. https://www.reuters.com/world/sweden-gives-qualified-go-ahead-northern-kallak-iron-ore-mine-2022-03-22/.

Schertow, John Ahni. "Sweden: Ongoing Road Blockade Against Mining in Saami Territory" *Intercontinental Cry*. https://intercontinentalcry.org/sweden-ongoing-road-blockade-against-mining-in-saami-territory-19953/.

Sze, Julie. *Environmental Justice in a Moment of Danger*. Oakland, California: University of California Press, 2020.

Táíwò, Olúfẹmi O. *Reconsidering Reparations: Worldmaking in the Case of Climate Crisis*. New York: Oxford University Press, 2022.

Tarr, Joel A. *The Search for the Ultimate Sink: Urban Pollution in Historical Perspective*. Akron, Ohio: University of Akron Press, 1996.

Taylor, Dorceta E. *Toxic Communities: Environmental Racism, Industrial Pollution, and Residential Mobility*. New York: New York University Press, 2014.

Thayer-Bacon, Barbara J. *Relational "(e)Pistemologies."* New York: P. Lang, 2003.

"The Official Site of Jåhkågasskas Resistance against a Mine in Gallok/Kallak!" Accessed January 19, 2024. https://www.gallok.se/en-gb/.

Thelle, Mikkel & Mikkel Høghøj eds. *Environment, Agency, and Technology in Urban Life in the Global North since c.1750*: *Technonatures in the Global North*. Palgrave Macmillan, 2023.

"Troubled Waters - Eine Comic Reihe," November 14, 2023. http://avbstiftung.de/en/projects/article/news/troubled-water-eine-comic-reihe/.

Trouillot, Michel-Rolph. *Silencing the Past: Power and the Production of History*. Boston, Massachusetts: Beacon Press, 2015.

Tsing, Anna Lowenhaupt, Heather Anne Swanson, Elaine Gan, and Nils Bubandt eds., *Arts of Living on a Damaged Planet, Ghosts of the Anthropocene, Monsters of the Anthropocene*. Minneapolis: University of Minnesota Press, 2017.

Tuck, Eve. "Suspending Damage: A Letter to Communities." *Harvard Educational Review* 79, no. 3 (October 6, 2009): 409–28.

Tvedt, Terje. "Det nasjonale godhetsregimet: om utviklingshjelp, fredspolitikk og det norske samfunn." In *Det Norske samfunn*, 482–510. Oslo: Gyldendal akademisk, 2005.

Tyberg, Jonathan. "Mineselskab taber radioaktiv kamp om Grønlandsk fjeld. Men slaget er ikke over." *Danwatch* November 18, 2021. https://danwatch.dk/mineselskab-taber-radioaktiv-kamp-om-groenlandsk-fjeld-men-slaget-er-ikke-ovre/.

United Church of Christ, and Commission for Racial Justice. "Toxic Wastes and Race in the United States," 1987.

University of Stavanger "Presenting the Greenhouse Green Transitions Programme" November 10, 2022. https://www.uis.no/en/research/presenting-the-greenhouse-green-transitions-programme.

Vera, Lourdes A., Dawn Walker, Michelle Murphy, Becky Mansfield, Ladan Mohamed Siad, Jessica Ogden, and EDGI. "When Data Justice and Environmental Justice Meet: Formulating a Response to Extractive Logic through Environmental Data Justice." *Information, Communication & Society* 22, no. 7 (June 7, 2019): 1012–28.

Vergès, Françoise. "Capitalocene, Waste, Race, and Gender." *E-Flux*, June 10, 2019. https://www.e-flux.com/journal/100/269165/capitalocene-waste-race-and-gender/.

Voller, Louise, Mie Obbekær, Jeppe Tyberg.“Jagten på Grønlands sjældne jordarter” *Danwatch* March 20, 2021. https://danwatch.dk/undersoegelse/jagten-paa-de-sjaeldne-jordarter-i-groenland/.

Voyles, Traci Brynne. *Wastelanding: Legacies of Uranium Mining in Navajo Country*. Minneapolis: University of Minnesota Press, 2015.

“Wayback Machine,” September 28, 2002. https://web.archive.org/web/20020928184758/http://www.cheminova.dk/html/index.asp?subheader=pages/aktuelt/aktuelt-sub.asp&main=pages/aktuelt/marts01.asp&menu=3.

Wiggin, Bethany. “Restoring a River, Re-Storying History.” *International Journal of Urban and Regional Research* 46, no. 4 (July 2022): 660–73.

Witoszek, Nina. *The Origins of the “Regime of Goodness”: Remapping the Cultural History of Norway*. Oslo: Universitetsforlaget, 2011.

Wolf, Eric R., Thomas Hylland Eriksen, and Noël L. Diaz. *Europe and the People without History*. Berkeley, Calif London: University of California Press, 2010.

Wood, Raymond. “Ethnohistory and Historical Method.” *Archaeological Method and Theory*, 1990, 81–109.

Zahara, Alex. “Refusal as Research Method in Discard Studies.” *Discard Studies*, March 21, 2016. https://discardstudies.com/2016/03/21/refusal-as-research-method-in-discard-studies/.

Appendix 1

Sikt

Vurdering av behandling av personopplysninger

Referansenummer	Vurderingstype	Dato
500488	Standard	15.01.2024

Tittel
Submergence: Environmental Justice and the Specter of Chemical Exposure

Behandlingsansvarlig institusjon
Universitetet i Stavanger / Fakultet for utdanningsvitenskap og humaniora / Institutt for kultur- og språkvitenskap

Prosjektansvarlig
Sebastian Lundsteen Nielsen

Prosjektperiode
31.03.2021 - 05.01.2024

Kategorier personopplysninger
Alminnelige
Særlige

Lovlig grunnlag
Samtykke (Personvernforordningen art. 6 nr. 1 bokstav a)
Allmennhetens interesse (Personvernforordningen art. 6 nr. 1 bokstav e)
Uttrykkelig samtykke (Personvernforordningen art. 9 nr. 2 bokstav a)
Personopplysninger som det er åpenbart at den registrerte har offentliggjort (Personvernforordningen art. 9 nr. 2 bokstav e)

Behandlingen av personopplysningene er lovlig så fremt den gjennomføres som oppgitt i meldeskjemaet. Det lovlige grunnlaget gjelder til 13.04.2024.

Meldeskjema

Kommentar
Personvemtjenester har vurdert endringen i prosjektsluttdato.

Vi har nå registrert 13.04.2024 som ny sluttdato for behandling av personopplysninger.

Vi vil følge opp ved ny planlagt avslutning for å avklare om behandlingen av personopplysningene er avsluttet.

Lykke til videre med prosjektet!