Exchanges

The Interdisciplinary Research Journal

Volume 10, Issue 2 (March 2023) - Special Issue

Issue Highlights:

- 'Animal's People': Agency & the Aesthetics of Disability
- Artificial Pollinators & Multispecies Justice
- Empathy, Anthropocene & Asian American Sci-Fi
- Soil Care & Reciprocity in Market Gardening
- Whales, Society & the Portuguese Empire

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Exchanges: The Interdisciplinary Research Journal

Volume 10, Issue 2 (March 2023) - Special Issue

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Dr Gareth J Johnson (**exchangesjournal@warwick.ac.uk)**

Exchanges is a scholar-led, peer-reviewed, diamond open access, interdisciplinary, online-only journal dedicated to the publication of high-quality work by researchers in all disciplines for a broad scholarly audience. No author fees or subscription charges are levied, and contributors retain their author rights. Since 2013, the title has attracted innovative research articles, critical essays and interviews from emerging domain experts and early career researchers globally. The title also publishes scholarly work by practitioner authors and independent scholars.

A Managing Editor-in-Chief based at the University of Warwick oversees development, policy and production, while an international Editorial Board comprised of early career researchers provide advice and practically contribute to editorial work. Associate editors are recruited to participate in producing specific special themed issues. Exchanges usually publishes two issues annually, although additional special themed issues are periodically commissioned in collaboration with other scholars.

Exchanges' twin missions are to encourage intellectual exchange and debate across disparate research communities, along with developing academic authorial and editorial expertise. These are achieved through providing a quality assured platform for disseminating research publications for and by explicitly cross-disciplinary audience, alongside ensuring a supportive editorial environment helping authors and editors develop superior academic writing and publishing skills. Achieving enhanced contributor esteem, visibility and recognition within these broader scholarly communities is a further goal.

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I've Seen the Future, and it Will Be: Editorial, Volume 10, Part 2

Gareth J Johnson

Institute of Advanced Study, University of Warwick, UK
Correspondence: gareth.johnson@warwick.ac.uk
Twitter: @llordllama
ORCID: 0000-0003-3953-6155

I've seen the future and it will be,
I've seen the future and it works.
And if there's life after, we will see,
So I can't go like a jerk (**Prince, 1990**)

Introduction

Welcome to the twenty fourth edition of *Exchanges: The Interdisciplinary Research Journal*. If you are a new reader, then you are especially welcome although naturally a hearty greeting to our longstanding readers too. This editorial, as is normally the case, offers an introduction to the journal's contents alongside some insights into recent developments at the journal. Naturally, it also contains information for potential authors looking to make a contribution to future journal issues. Alongside this there's also a guide to our various social media presences – and most notably – news about our new direct announcements mailing list too.

In the Year 2525…

This issue represents the fifth in our series of special themed issues, which began with 2020's *Cannibalism* volume (v7.2). Each of these special issues have been the result of collaborative projects wherein the journal works alongside one or more external scholars in drawing together a collection of work on a topic of mutual interest. This time our principal collaborator has been Dr Catherine Price of the University of Nottingham, to whom we are naturally grateful. In partnership with colleagues the Delft University of Technology, Netherlands and with the funding support of the British Academy Catherine has been leading on The Anthropocene and More-Than-Human World project for some time. As Catherine has provided a narrative concerning this collaboration's genesis and evolution within a couple of pieces later on, I won't belabour the points here (**Price, 2023a; 2023b**).

However, I would like to note as with all our preceding special issues this has felt like a productive, engaging and I would argue authentically and mutually beneficial collaboration experience. As Editor-in-Chief (EIC) I've

especially enjoyed working with Catherine through the workshops which preceded this issue's call for papers and then on into the editorial production itself. I should also like to note that delivering on part of the workshop programme, and in drawing together the issue, I have also enjoyed some very interesting interactions with the delegates, many of whom are also contributing authors this issue.

If reading this editorial, or more importantly this issue itself, has piqued your interest in collaborating with the journal on a future special issue project: well, then I would love to hear from you. You can contact me via the address above, or alternatively visit our site to learn more about our past and future special issue plans, and the various pre-requisites involved. That said, an informal, exploratory conversation to explore the possibilities more, commits does not commit you to anything! [i]

Living in Electric Dreams

Since we are looking forward this issue towards an uncertain future, I would like to take the opportunity to flag up a new contributor policy introduced in recent weeks. You cannot have failed to read or hear about AI (artificial intelligence) tools like *ChatGPT* in recent months, and undoubtably their use in academia continues to be a 'hot topic'. Consequently, Exchanges and its Board have in line with best practice ethical guidance, and current publishing practices at major journal titles introduced a policy concerning the use of such tools within manuscripts submitted to the journal.

Briefly speaking, within this policy AI tools cannot be cited as authors within any *Exchanges* submissions. Moreover, authors are regarded as solely responsible for any and all contents of their manuscripts. Additionally, where AI tools are used to prepare any portion of the manuscript, the usage of these tools needs to cited, explained and transparent. Through this policy stance, authors are not denied the usage of AI tools within their work, but are required to demonstrably show how such tools have contributed to their research, writing and related endeavours.

While, undoubtedly, this will be a policy we revisit as external practices and guidance evolves, you can read the current policy guidance on *Exchanges* policy page (**Exchanges 2023a**). Naturally, where any prospective authors have any concerns, they are warmly invited to get in touch with us directly ahead of any submission.

Papers

Having dispensed with introductions and policy matters, let's turn to the issues articles. I am delighted to present an interesting range of scholarship on our central theme, and I am sure every reader will find something to pique their interests.

Introduction

In *Saying Goodbye and Fighting for the Future* **Catherine Price** offers readers a brief overview of the associated *More-Than-Human-World* writing workshop programme, which engendered this issue, while offering insight into project's wider goals. The piece also highlights the funders, collaborators, contributors and supporters who have been so vital in supporting the project and this issue too (1).

Articles

We then move on to the articles themselves, opening with **Alena Cicholewski** and their article *Empathy as an Answer to Challenges of the Anthropocene in Asian American Young Adult Science Fiction*. In this, the author particularly explores the novels of Malinda Lo and Cindy Po. In a close reading approach, Cicholewski considers when combined with ecopedagogy research, how far novels like these encourage a sense of empathy between the human and more-than-human beings (5).

Next, in *Repositioning Craft and Design in the Anthropocene,* **Berilsu Tarcan**, **Ida Nilstad Pettersen** and **Ferne Edwards** offer a consideration of how more-than-human approaches can be applied to craftwork. The authors stress how the study of craftwork maintains a relevance in this domain due to its pre-industrial practice origins. Introducing a fresh more-than-human framing into this arena, they further consider, especially relating to textiles, how such crafted artefacts represent traditional and indigenous knowledge. This, they suggest, offers a new approach for addressing the 'nonhuman' within human-crafted works (26).

Following on, **Catherine Price** offers a timely exploration into *Do we need Artificial Pollination if we have Multispecies Justice in the Anthropocene?* Here, the author considers how the loss of native pollinators in the current era raises questions of multispecies justice. In illustrating their argument, Price explores three artificial pollination technologies, highlighting how these technological solutions fail to address wider pollinator-loss issues, such as habitant loss and climate change. Considering this wider picture, the author stresses enables potential futures wherein democracy, diversity and sustainability can be applied in a more-than-human world (50).

We turn to considerations of *Corals, Geo-Sociality, and Anthropocene Dwelling* with **Justin Westgate**. Exploring the ecological emergency around the Great Barrier Reef, the author offers insights into what humans could learn from its environmental dynamic. Suggesting that these demonstrated 'evolved fluid-dynamic and planetary relationships' could offer insights into more-than human ontologies, the paper offers a picture of an inextricably interconnected environment. Intriguingly, in contrast to common framings as locations requiring protection, Westgate suggests there is actually much to be admired in coral's tenacious structural resilience too (74).

In our next paper, **Nina Vieira** considers whaling and its relationship to the dynamics of the Portuguese Empire. *In Whales Lost and Found*, the author examines how this has shaped the ways in which society and people perceived and utilised both the ocean and the marine animals within it during this historical period. As the impacts upon the whale populations was considerable, Vieira offers an insightful view into the biodiversity loss during this time, contrasted with the impacts on creatures within the current Anthropocene (106).

We shift themes in the next paper, from **Sonakshi Srivastava**, to consider human-centric aspects within Indra Sinha's works. In *Res(crip)ting the Gaze: Agency and the aesthetics of disability in 'Animal's People'*, the author considers the boundaries of 'dis/ability' within the framing of the Sinha's book, the Anthropocene and the aesthetics of disability politics. In this way Srivastava offers insights into the human impact upon human bodies, as an effect of environmental disasters (131).

And finally for this section, **Alejandra Melian-Morse** offers to make us consider *Teaching to Care for Land as Home*. With some resonance with the prior piece, the author considers how a feminist, justice-oriented approach to environmental care can achieve functionality through the lens of the Anthropocene. Within this scope, Melian-Morse adopts an ethnographic approach to consider this within an all-girls outdoor education programme. It exposes the benefits derived from an ecofeminist approach and the subsequent repositioning of the relationship between the environment and the programme participants (144).

Critical Reflections & Conversations

To round out our special issue, we present a pair of shorter articles. The first while badged under our critical reflections format you'll see is actually a fascinating fusion with the conversational style. In *Caring with the Non-Human: Reciprocity in market gardening*, **Michiel van de Pavert** and **Adriana Ressiore** present and debate theory as well as practice around soil

care. Considering rationalities and reciprocity between humans and non-humans, dialogically they explore a range of soil care facets in an engaging, pragmatic and enlightening mode. (**163**).

Fittingly, in an issue of global discourse around the Anthropocene, we close with an overt trans-national conversation between **Catherine Price** and **Sophie Chao**. In *Multispecies, More-Than-Human, Non-Human, Other-Than-Human: Reimagining idioms of animacy in an age of planetary unmaking* the pair offer an invaluable definition of terminology from multispecies to non-human, and more-than-human. In seeking to simplify the conversation, excitingly the duo rapidly uncover how a greater complexity exists when one truly considers debates concerning idea around the beyond-human worlds are within 'an epoch of planetary unmaking'. Their discussions resonate strongly with many of the papers in the issue, and as such provides an ideal codicil to the various debates (177).

Calls for Papers

Looking forward to future issues, here is some information about our two main current calls for contributions. Naturally, authors are advised to keep an eye out between issues on our social feeds, announcements and newsletter for additional news for potential contributors.

Authentic Interdisciplinarity: Anniversary Issue Call for Papers

Tying into the 10th anniversary issue of *Exchanges: The Interdisciplinary Research Journal* (Late Autumn 2023) we are seeking contributions which seek to celebrate, challenge or define ideas around authentic interdisciplinarity. While the deadline for peer-reviewed articles has now passed, there is still time for authors to contribute a shorter piece such as a conversation or critical reflection for consideration.

Potential authors looking for further inspiration to frame their articles are encouraged to download the full text of the call, which is available on the journal's site (**Exchanges, 2022a**). As is *Exchanges*' tradition, we will potentially consider any work which its authors choose to present which seeks to address the themes evident within this call. As always, authors are welcome to discuss their submission proposal with the Editor where desired.

Deadline:

- **Critical Reflections, Conversations (interviews) or Essays: 30th June 2023**

Open Calls for Paper

Thematic call aside, *Exchanges* continues to invite and welcome submissions throughout the year on any subject. Articles passing our review processes and accepted for publication will subsequently appear in the next available issue (normally published in either April and October). *Exchanges* readers have a broad range of interests, hence articles from any discipline or tradition written for a broad, scholarly audience will be considered. However, articles which explicitly embrace elements of interdisciplinary thought, praxis or application are especially welcome.

Manuscript submissions may be made under our peer-reviewed articles or review articles format, or alternatively our editorially reviewed shorter critical reflections and conversation formats. [ii] There latter formats are often able to transit to publication faster and make an ideal first article for authors who may not have published a scholarly article before or for those looking to embrace a vein of reflexivity into their professional output.

As *Exchanges* has a core mission to support the development and dissemination of research by early career and post-graduate researchers, we are especially pleased to receive manuscripts from emerging scholars or first-time authors. However, contributions from established and senior scholars are also welcomed too. Further details of our open call requirements can be found online (**Exchanges, 2022b**).

There are no submission deadlines as manuscripts are accepted for consideration throughout the year.

Informal Approaches

The Editor-in-Chief welcomes approaches from authors to discuss prospective articles for themed and regular issues of the journal. [iii] However, abstract submission or editorial discussions ahead of a submission are not a requirement, and authors may submit complete manuscripts without any prior communication. Authors are always encouraged to include a note to editor indicating the article format under which their manuscript is to be considered (e.g., peer-reviewed article, critical reflection etc.).

All submitted manuscripts will undergo scoping and editorial review, with those seeking publication as research articles additionally undergoing formal peer-review by external assessors. Editorial decisions on manuscript acceptance are final, although unsuccessful authors are normally encouraged to consider revising their work for later reconsideration.

Advice for prospective authors appears frequently in our podcasts, editorials and throughout the *Exchanges* author portal pages (**Exchanges, 2022c**). Authors may wish to also familiarise themselves with Exchanges journal policies (Exchanges 2023a).

Exchanges is a diamond open access, scholar-led journal, meaning there are no author fees or reader subscription charges (**Fuchs & Sandoval, 2013; Bosman et al, 2021**). Authors retain copyright over their work but grant the journal first publication rights as a submission requirement. Authors are also invited to review

Forthcoming Issues

Our next issue will be the Spring 2023 issue, for which preparations are naturally underway. In that issue's editorial I'll be talking more about our author survey report and updating readers on our publication policies too. Later this year we are looking forward to bringing you our *Pluralities of Translation* special issue as well ahead of our autumn 2023 issue, comprising our tenth birthday issue. We do hope you will be able to join us for each of these.

Acknowledgements

My thanks most especially to Catherine Price for her work in inspiring this special issue, and for her support for the journal over the past couple of years. I am also grateful to all the workshop participants – especially those who directly contributed to this issue's contents. Naturally, my thanks to goes to all those editors who worked on this issue, especially Amy Gibbons and Catherine for their work as associate editors on it.

Thanks as well goes out to all our reviewers for their vital and often timely intellectual contributions towards this issue, without whom, producing a quality-assured, peer-reviewed, scholar-led publication would not be possible.

My continued thanks to the members of our Editorial Board for their suggestions for suitable reviewers during the production of this issue. I would like to note an especial thanks to Natasha Abrahams, University of Melbourne who departed the editorial Board at the end of 2022. Natasha joined the journal a few months before I did and was one of our longest serving Board members. Myself and the rest of the Board, naturally wish her every future success!

Finally, my gratitude too to Dr Fiona Fisher and the Institute of Advanced Study for their part in continuing to strategically and operationally supporting *Exchanges*' mission.

Continuing the Conversation

Exchanges has a range of routes for keeping abreast of our latest news, developments and calls for papers. In-between issues to continue the interdisciplinary exchange of experience underlying our operations you may wish to listen to our growing range of podcasts or read our blog posts. Please do contribute as we value hearing the thoughts of our author and readership communities.

Editorial Blog:	blogs.warwick.ac.uk/exchangesias/
Linked.In:	www.linkedin.com/groups/12162247/
Twitter:	@ExchangesIAS

Exchanges Newsletter

We also launched a new newsletter via email, which encapsulates all the latest news from the journal in one monthly message. At time of writing the April issue is due to go out, but you can register to receive it and access all the back issues at the same time. Register your interest via the link below.

www.jiscmail.ac.uk/cgi-bin/wa-jisc.exe?A0=EXCHANGES-ANNOUNCE

The Exchanges Discourse Podcast

Since our last issue at the end October there has been a considerable number of new podcast episodes. Six of our past authors have graced us with interviews about their lives, careers and research publication. More than that we've two episodes focussing in with practical advice and guidance for authors on publishing either critical reflections or conversation articles (**Exchanges 2023b&c**). We have also just released our first panel discussion episode, with a number of past authors returning to debate and explore issues of interdisciplinarity (**Exchanges, 2023d**). Easily our longest episode to date, it is a fascinating listen and highly energised discussion between our four panellists, and well worth a listen.

You can find a list of these and all forty-three past episodes of *The Exchanges Discourse* via the *Exchanges* site.

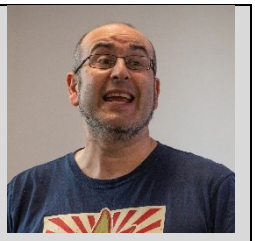
Episodes: exchanges.warwick.ac.uk/index.php/exchanges/podcast

I heartily encourage all readers of the journal, and especially first-time authors, to like, share and subscribe to our episodes, which are available on most major podcast platforms, and specifically hosted on the *Spotify for Podcasters* site.[iv]

Podcast: podcasters.spotify.com/pod/show/exchangesias

All episodes are free to stream or download and listen to at your leisure. Naturally, we also welcome approaches suggestions for topics we could address as part of future episodes too. Although, the easiest way to be invited to appear in an episode is to author an article for *Exchanges*!

As Editor-in-Chief I am also always pleased to discuss potential publications, collaborative opportunities or invites to talk further about *Exchanges* and our activities. Contact me if you would like to arrange a consultation, via the contact details at the start of this editorial or via the links on the site.



Gareth has been *Exchanges'* Editor-in-Chief since 2018. With a doctorate in cultural academic publishing practices (NTU), he also possesses various other degrees in biomedical technology (SHU), information management (Sheffield) and research practice (NTU). His varied career includes extensive experience in running regional and national professional bodies, academic libraries, project management and applied research roles. He retains professional interests on power-relationships within and evolution of scholarly academic publication practice, within social theory and political economic frameworks. He has aptitudes in areas including academic writing, partner relationship management and effective communication praxis. An outspoken proponent for greater academic agency through scholar-led publishing, Gareth is also a Fellow of the *Higher Education Academy*, and regularly contributes to a number of podcasts.

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Editorial Board Members

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Endnotes

[i] **Initiating Special Issues:** We certainly welcome outline discussions for the ways in which *Exchanges* could become your publication partner for a proposed special issue – however, we cannot guarantee we can accommodate every request. You are warmly invited to contact myself as Editor-in-Chief to discuss any prospective ideas, without commitment. There is more information about requirements and steps in initiating a special issue available on both the *Exchanges* and *IAS* pages, as well as in previous episodes of the podcast (**Exchanges, 2023e; IAS 2023**).

[ii] **Word counts**: For the purposes of considering a submissions' word count, we do not typically include abstracts, references, endnotes or appendences. While submissions just over or under their word count will still be initially considered for review, any significantly in excess will normally be declined and returned to their authors with advice for revision.

[iii] **Contact Details**: The EIC's address is given at the head of this article, and on *Exchanges'* Contact pages. https://exchanges.warwick.ac.uk/index.php/exchanges/about/contact

[iv] **Podcast**: The podcast is also streamed and available on the Apple and Google Podcasts podcasting platforms. Search for it by name.

Saying Goodbye and Fighting for the Future

Catherine Price

School of Geography, University of Nottingham, Nottingham, UK
Correspondence: catherine.price@nottingham.ac.uk
Twitter: @catherinejprice
ORCID: 0000-0003-1846-5407

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Editorial review: This article has been subject to an editorial review process.

Abstract

This article is an introduction to the special issue relating to the Anthropocene and More-Than-Human World Writing Workshop Series funded by the British Academy. In it, project lead Catherine Price offers an overview of the project workshops and their contents, and provides a lead in the main content of the issue which is dedicated to outputs from these sessions' participants. The article concludes with a range of acknowledgements for those who have contributed to the project and the issue in various ways.

Keywords: Anthropocene; More-Than-Human-World; British Academy; introduction; workshops

This special issue is the culmination of *The Anthropocene and More-Than-Human World Writing Workshop Series* funded by the *British Academy*. Over a period of four months in 2021, 18 emerging scholars took part in a series of workshops designed to develop academic writing skills. The workshops were all held online, and whilst this was partly a necessity because of the COVID-19 pandemic, it did enable inclusivity and diversity. Participants were from several countries including the UK, India, Portugal, Norway, the USA, Canada, and Australia. Disciplines represented included geography, sociology, science and technology studies, design, and English literature.

Workshops were designed to provide an overview of conventional academic writing and publishing, through to more novel forms of communicating academic research. We started with a workshop led by Professor Pat Thomson on blogging and conversation pieces. Several blog posts produced during this workshop appear on *The Anthropocene and More-Than-Human World Writing Workshop Series Blog* (**2023**).

Dr Helen Kara led a workshop on creative academic writing. We were given an overview of creative academic writing, storytelling, poetic inquiry, play/screenplay writing, and comics, and also had an opportunity to practice these different forms of writing. Some of the work produced in this session by various participants can be found in the Creative Academic Writing Workshop blog post (**Price, 2021**), on The Anthropocene and More-Than-Human World Writing Workshop Series Blog.

A workshop on 'Writing Green Stories' was led by Professor Denise Baden. This session focused on green themes in fiction writing, and participants took part in writing exercises to develop their writing styles.

Dr Gareth Johnson led two workshops on academic publishing. The first focused on writing for academic journals, whilst the second concentrated on peer review and revisions to manuscripts. The results of these two workshops can be found within the pages of this special issue.

The series finished with an inspiring seminar by Dr Sophie Chao, on *The Promise of Multispecies Justice* (**2022**). This was a fitting end to the series, as participants reflected on the promises associated with multispecies justice in an increasingly catastrophic world.

The breadth and depth of thinking around the Anthropocene and more-than-human world which emerged from the workshops is evident not only in this special issue, but also in the blog posts which feature on The Anthropocene and More-Than-Human World Writing Workshop Series Blog (**2023**). This scholarship is urgently needed if we are to address the problems of the Anthropocene including the climate crisis, biodiversity loss, the depletion of water and other physical resources, and pollution

and toxic chemicals. Whilst it is time to say goodbye to The Anthropocene and More-Than-Human World Writing Workshop Series project, it is just the beginning of fighting for a flourishing more-than-human world, for now and in the future. The articles in this special issue contribute to that fight.

Acknowledgements

This project was generously funded by the British Academy. Grant number KFSSFKNAW\100008.

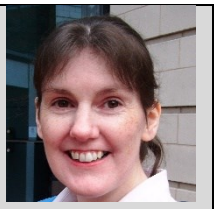
Firstly, thank you to all the emerging scholars who contributed to the workshops, blog and special issue. It has been a joy and pleasure to work with you all. Your enthusiasm has been infectious, and without you, this project would not have been a success.

Thank you to Professor Pat Thomson, Dr Helen Kara, and Professor Denise Baden for facilitating the workshops and providing the opportunity for emerging scholars to experiment with different forms of communicating academic research.

A special thanks to Dr Sophie Chao for generously taking the time to present her research to the group and for such an in-depth discussion.

Thank you to all those who acted as reviewers on this special issue, and for giving up your time to do so. A special thanks also to Dr Roy Rozario, Dr Sun Yee Yip, Amy Gibbons, and Quynh Vu. Your contributions have brought this special issue to a high academic standard and into print.

Finally, a massive thank you to Dr Gareth Johnson, Exchanges' Editor-in-Chief. Your support has been invaluable throughout the whole lifetime of the project. I have learnt so much from you about academic publishing. Thank you for facilitating the two academic writing workshops and for passing your knowledge on to the emerging scholars.



Catherine Price is a Research Fellow in the School of Geography, University of Nottingham. Her research interests include climate change and just transitions to low carbon societies, the social and ethical impacts of agricultural technologies, and relationships between humans and more-than-human worlds. She leads the British Academy funded project, *The Anthropocene and More-Than-Human World Writing Workshop Series*.

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Empathy as an Answer to Challenges of the Anthropocene in Asian American Young Adult Science Fiction

Alena Cicholewski

Institute for English and American Studies, University of Oldenburg, Germany
Correspondence: alena.cicholewski@uol.de
Twitter: @ACicholewskiMA
ORCID: 0000-0002-2456-827X

Peer review: This article has been subject to a double-blind peer review process.

Abstract

This article suggests that Malinda Lo's Adaptation duology (2012-2013) and Cindy Pon's Want duology (2017-2019) represent empathy as a desirable answer to challenges of the Anthropocene. Set in near-future Taipei, Want follows a group of teenagers who eventually become militant environmental activists. The teenage protagonists' capacity for empathy distinguishes them from the villainous antagonist and makes them likeable for the readers despite their violent tactics. Lo's duology features two teenagers who are turned into human/alien hybrids by extra-terrestrial scientists after a nearly fatal car accident. The procedure equips the protagonists not only with an accelerated healing ability, but also gives them access to other people's emotions through touch. Although the teenagers at first experience their newfound superpowers as a burden, they slowly realise their significant potential for changing humanity for the better. My article will combine close readings from the novels with research from ecopedagogy to explore in how far novels like Lo's Adaptation and Pon's Want can encourage readers to treat their fellow human beings as well as more-than-human life forms with more empathy.

Keywords: ecopedagogy; empathy; Anthropocene; Asian American literature; young adult fiction; science fiction

Introduction: The Importance of empathy

Throughout the last decade, the book market for young adult literature has become more diverse with the publication of an increasing number of novels by authors of colour (**Cart, 2016: preface page x**). Simultaneously, the ongoing climate crisis is ever-present in young adult fiction: although environmental concerns such as animal rights have been addressed in literature aimed at adolescents since the late 19th century (cf. Hogan, 2009: 3), contemporary novels tend to engage more explicitly with the problems that the Anthropocene[i] poses 'by raising awareness on climate change and related human rights issues, communicating fears and hopes about the future, and ultimately inspiring creative thinking and action' (**Adami, 2019: 135**). While the Anthropocene causes numerous problems for most life forms on Earth, what I am particularly interested in here is what Martusewicz et al. call 'the cultural roots of the ecological crisis' (**2021: p. 9**). I suggest that the empathy for both other humans and more-than-human beings potentially evoked by the chosen novels can work to question anthropocentric worldviews thereby potentially leading readers away from regarding the more-than-human world merely as an exploitable resource and instead moving towards acknowledging their own entanglement with multispecies environments. Such a shift in attitude then is the prerequisite for more sustainable relationships towards other living beings. This article incorporates both the increasing diversity in young adult fiction and the genre's engagement with environmental issues by suggesting that Malinda Lo's *Adaptation* duology (**2012-2013**) and Cindy Pon's *Want* duology (**2017-2019**) represent empathy as a desirable answer to challenges of the Anthropocene. Literary scholar Suzanne Keen has worked extensively on how to make the concept of empathy productive for the analysis of literature. Keen builds on C. Daniel Batson's eight concepts of empathy and adds her own, 'narrative empathy' to conceptualise how readers empathise with characters accessed through narratives (**Keen, 2019: 194-195**). Both Batson and Keen remain on an anthropocentric level, although scientists have proven certain animals' capacity for empathy since the 1990s (**Dolby, 2019: 406**). Additionally, my article will take Dobb's work into account that differentiates between types of empathy that work to affirm the status quo (what she calls 'doxic empathy') and those that challenge existing hierarchies (what she calls 'critical empathy') (**cf. Dobbs, 2017: 603**). Based on all four scholars, my own approach for the purpose of this article then considers empathy as the ability to share the feelings of other life forms and to imagine oneself in their situation while taking existing power structures into account.

While Pon and Lo's novels are far from the only works of Asian American young adult fiction that address problems of the Anthropocene – I am thinking of the post-apocalyptic setting of Joan He's science fiction novel *The Ones We're Meant to Find*, the class-warfare in Marie Lu's dystopian *Legend* trilogy or Maggie Tokuda-Hall's anticolonial fantasy novel *The Mermaid, the Witch and the Sea* – I have chosen *Adaptation* and *Want* as case studies for this article because of how explicitly they connect social and environmental issues. Set in near-future Taipei, *Want* follows a group of teenagers who eventually become militant environmental activists. The teenage protagonists' capacity for empathy distinguishes them from the villainous antagonist and makes them likeable for the readers despite their violent tactics. The protagonists' likeability encourages the readers' emotional investment in the story and makes reader identification with the characters and readers' support of their fight for more environmental and social justice more likely. Lo's duology features two teenagers who are turned into human/alien hybrids by extraterrestrial scientists after a nearly fatal car accident. The procedure equips the protagonists not only with an accelerated healing ability, but also gives them access to other people's emotions through touch. Although the teenagers at first experience their newfound superhuman powers as a burden, they slowly realise their significant potential for changing humanity for the better. My article will combine close readings from the novels with research from ecopedagogy to explore how far novels like Lo's *Adaptation* and Pon's *Want* can encourage readers to treat their fellow human beings as well as nonhuman life forms with more empathy while recognizing how certain ways of organizing society need to radically shift to ensure that Earth remains a liveable place for both human and more-than-human beings.

Asian American Young Adult Science Fiction and Ecopedagogy

My work is situated at the nexus of Asian American science fiction, Asian American young adult fiction and young adult fiction as a vehicle for ecopedagogy. The historical entanglement of the genre of science fiction with imperialist ideologies (**as outlined in Rieder, 2008**) has – as Jessica Langer explains – inspired several forms of reappropriation and reversal of the colonial trope of the alien invasion in postcolonial science fiction (**cf. Langer, 2011: 4**). It is against this background that I read how the novels in question engage with science fictional genre conventions. Although Asian American science fiction has received more critical attention in the last decade (with publications like Betsy Huang's *Contesting Genres in Contemporary Asian American Fiction*), scholarly engagement still 'tend[s] to be partial and fragmented' and particularly the 'incredible proliferation of [Asian American] young adult and children's speculative fiction necessitates more critical conversations', as Sohn argues (**2020**). Indeed, there is a scarcity of general research on Asian American young adult

literature (**cf. Park Dahlen, 2020**) and the few works that exist – such as Ymitri Mathison's *Growing up Asian American in Young Adult Fiction* – mostly focus on realist fiction. Thus, my article seeks to open up further discussions, not just about the novels that I analyse here, but also about Asian American young adult science fiction and its social significance more broadly.

To interrogate the novels' social significance and point to ways in which they engage with questions of environmental activism, I employ the ecopedagogical conceptual framework of EcoJustice Education. According to Richard Kahn:

> *[e]copedagogy seeks to interpolate quintessentially Freirian aims of the humanization of experience and the achievement of a just and free world with a future oriented ecological politics that militantly opposes the globalization of neoliberalism and imperialism, on the one hand, and attempts to foment collective ecoliteracy and realize culturally relevant forms of knowledge grounded in normative concepts such as sustainability, planetarity, and biophilia, on the other.* (**Kahn, 2010: 18**)

In time, ecopedagogies have become 'complex and plural in framing and foci' (**Misiaszek, 2020: 617**). All ecopedagogies share their application of the 'basic principles of critical pedagogy to the study of intersecting social and ecological issues' (**Martusewicz et al., 2021: 15**) with the overall 'goal of ending all socioenvironmental injustices and violence' (**Misiaszek, 2020: 617**). To make sense of the anti-capitalist and anticolonial aspects of both book series, I chose to approach them from the perspective of EcoJustice Education, 'an intersectional activist-educator framework', first defined by Martusewicz, Edmundson, and Lupinacci in 2011 (**Lupinacci & Happel-Parkins, 2016: 16**). EcoJustice Education 'critically and ethically examines the intersection of ecological degradation and unjust social suffering in conjunction with the possibility for such a framework to shift Western industrial models of education toward sustainable and socially just teaching and learning' (**Ibid**). What makes this specific approach particularly relevant for my analyses of Pon and Lo's books is its emphasis on a 'pedagogy of responsibility' that urges educators to teach students to:

> *Learn to analyze the deep cultural roots of the social and ecological crises plaguing our world [… and to] identify the diverse cultural practices that encourage relationships of mutual care of both human communities and the natural world […and to] develop the imagination needed to recognize what are mostly unconscious ways of being that are harming the world, and to create solutions, not just for the future but now, in our present contexts.* (**Martusewicz et al., 2021: 18**)

As authors of children's literature and young adult fiction have consciously included 'environmentalism and concern for endangered species' in their works since at least the 1970s (**Hogan, 2009: 179**), an EcoJustice Educational reading of their works can help to figure out in how far those media can contribute to shifting their readers' attitudes towards the more-than-human world.

Despite the early presence of representations of other-than-human species in texts for young readers, it took until the mid-1990s for ecocritical readings of children's literature to gain traction (**cf. Gaard, 2008: 14**). Scholarly discussions on young adult fiction more specifically started later with an increasing number of publications appearing after 2010. An influential example of this trend is Alice Curry's 2013 monograph *Environmental Crisis in Young Adult Fiction: A Poetics of Earth*, in which she analyses how 'young adult novels attempt to develop a sustainable ethic of care that can encompass […] 'feminised' [in the sense of existing 'outside the parameters of the adult white male subject'] peoples and spatialities, including nonhumans and the environment' (**Curry, 2013: 1**). However, unlike the novels that Curry analyses, *Want* and *Adaptation* do not focus predominantly on the 'individual empowerment' of their respective protagonists (**Ibid: 5**), but rather represent the empowerment of Zhou and Reese as inextricably tied to changing their socio-political circumstances. Zhou can only make peace with his mother's (and his substitute mother figure's) death after he has managed to destroy the factory of the man responsible for Taipei's pollution. Reese can only start to explore her own (sexual) identity after uncovering the government conspiracy at the core of the novels' plot. Thus, these books are more in line with Valentina Adami's observation that 'in YA literature, the individual emotional crises faced by the protagonist are often directly or metaphorically linked to political and social issues, so that the most pressing issues of society are connected to the adolescent's quest for identity' (**Adami, 2019: 130**). She continues to argue that '[t]his is particularly true for YA speculative fiction' in general and young adult dystopias in particular, which 'tend to counter the despair of the genre with a hopefulness about the possibility for change, usually expressed by the confidence of the young protagonists who rebel against a flawed society and keep acting and fighting for a better future' (**Ibid: 132**). Although I argue that only *Want* qualifies as a (critical) dystopia, both *Want* and *Adaptation* share 'a hopefulness about the possibility for change' and feature teenage protagonists 'fighting for a better future' through political activism that is committed to both environmental and social justice, as my following analyses will show.

Empathy as Basis for Environmental Activism in Cindy Pon's *Want*

Cindy Pon's 2017 young adult science fiction novel *Want* takes its readers to near-future Taipei that is ravaged by pollution caused by factories of global corporations taking advantage of a lack of local environmental protection laws. Taiwanese society is socially stratified into wealthy *you* who can protect themselves with expensive bodysuits and impoverished *mei* dying early because of the health hazard that the poor air quality presents. At the centre of *Want* is Jason Zhou, an orphaned *mei* teenager who – together with a group of friends – is working peacefully towards improving the living conditions in Taipei. His friend Arun's mother, ecology professor Dr Nataraj, supports them. After discovering that Jin Feiming, the CEO of a large corporation, has prevented the introduction of stricter environmental protection laws by bribing and threatening politicians, Dr Nataraj is murdered by Jin's contract killers. The assassination of Dr Nataraj causes Zhou and his friends to switch to violent tactics, including kidnapping, burglary, hacking and bombings.[ii] Throughout the whole novel, the teenage activists are portrayed as likeable (thereby encouraging reader identification), and their militant acts are justified through stark representations of the suffering of the *mei* population and through an absolute vilification of antagonist Jin Feiming. An essential component of the characterization in the novel concerns its focus on empathy: whereas Zhou and his friends display empathy towards both other-than-human and human beings, villainous Jin is consistently presented as entirely devoid of empathy. My article reads *Want* as a critical dystopia (in the sense of Baccolini and Moylan). My argumentation builds on Huang's insight that Asian American authors approach the genre of critical dystopias 'by maintaining the delicate balance between hope and pessimism in the face of an unassailable Leviathan' and by creating ambiguous endings that avoid overly simplistic 'solutions underpinned by a nostalgic, illusory belief in our ability to return to an unsullied past' (**Huang, 2010: 140**). Three close readings explore how the novel presents empathy as crucial for ethical relationships, both between humans and between human and other-than-human beings. By considering corporate greed as the primary reason for both environmental and social problems, *Want* connects 'ecological degradation and unjust social suffering' in manner akin to EcoJustice Education (**Lupinacci & Happel-Parkins, 2016: 16**) and might be read as taking an anti-capitalist stand as it contrasts the villain's egotism with the teenage characters' commitment for social justice. While Zhou is at the centre of *Want* – a position that is also emphasised by his status as the only narrator in the whole book – the novel does not cast him in the role of *the chosen one* or an individualistic hero, but rather hints at a sense of collective agency through highlighting the importance of Zhou's friends.

This observation ties in with Victoria Flanagan's insight of a 'rethinking of agency' that is happening in young adult novels by 'suggest[ing] that agency needs to be reformulated – through redistribution, for example, so that it is conceptualised as collective and networked, instead of being based purely on individualism' (**Flanagan, 2014: 5**). This destabilisation of the classic individualistic hero has implications for my reading. I suggest that by offering several characters with whom the adolescent readers are invited to identify, *Want*, on the one hand, allows its readers to play through the consequences of the group's actions for each character and on the other hand, emphasises the need for collective action in the face of overpowering corporate greed. This also relates to the focus on sustainable communities as opposed to merely individual action that EcoJustice Education advocates.

The murder of Dr. Nataraj brings the friendship between Zhou and his clique to a new level by inspiring them to plot their revenge against Jin Feiming. Their plan involves Zhou infiltrating *you* society to gain more information to destroy Jin's factory. To this end, Zhou befriends Jin's teenage daughter and heir Daiyu (and eventually ends up falling in love with her). Towards the end of the novel, it is revealed that Daiyu was aware of Zhou's scheme from the start and provided information willingly, disgusted by her father's unethical business practices. In contrast to her circle of superficial socialite friends, Daiyu is worried by the extreme social inequality of Taipei: She uses her wealth to support social projects and wants to change her father's company for the better. Other members of Zhou's group of friends include 19-year-old Lingyi, a skilled hacker, her girlfriend Iris who stands out with her ninja-like stealth and hand-to-hand combat skills and Victor, a street vendor who is comfortable with stretching the bounds of legality. Arun (the son of the murdered professor) is a highly intelligent medical student who attempts to help the *mei* population by researching lung diseases. He is at the centre of my first close reading.

As part of his research, Arun is developing an antidote to the avian flu. In the passage at hand, Zhou is visiting Arun in his lab after his first test of the antidote has resulted in the death of his six lab monkeys. When Zhou greets Arun, '[h]e gave a dejected shake of his head' and shocks Zhou by only saying: 'They died' (**Pon, 2017: 73**). Arun explains the situation by showing Zhou footage of his failed experiment, his voice 'sounding hoarse' (**Ibid**). Arun is not only disappointed by the setback in his research, but also mourning his lab monkeys. His grief continues when he and Zhou meet with the rest of their group: when asked what is wrong with him, he just 'shrugged, his shoulders sagging. "Hard day, I don't really want to talk about it."' (**Pon, 2017: 74**). Zhou describes Arun as 'so upset, he hadn't bothered to put on a face mask' (**Ibid: 75**) – as a medical student Arun is

acutely aware of the health hazard that the bad air quality poses, so him forgetting his face mask is indicative of his intense emotional upheaval. Although Arun's use of the monkeys as test animals may leave readers uneasy and seems to perpetuate notions of anthropocentrism, a plot twist later in the novel changes this perception. After Jin has ordered his scientist employees to create a new virus for a lung disease and subsequently released it in Taipei to boost the sales of his protective suits, Arun is working hard on the antidote. However, before new lab monkeys have arrived, Arun's friends Lingyi and Iris contract the disease and almost die as a result. To save their lives, Zhou and Victor persuade Arun to inject them with his (untested) new antidote putting them effectively on the same level as his lab monkeys. When his test is successful, Arun is giving away the vaccine for free, in line with the anti-capitalist agenda of the novel: Arun and Zhou organise guerrilla vaccinations, breaking into the warehouses in which infected patients have been quarantined and administering the medicine to them. Overall, though, the novel's representation of animal testing remains anthropocentric: Although Arun is emotionally affected by the monkeys' suffering and eventually involuntarily turns his friends into test subjects, the general necessity of animal testing for medical research is never called into question. Thus, Arun does not understand that 'we [i.e., the human species] are always-and-already entangled with the nonhuman animals that surround us on the planet: they exist not only as species that must be managed, preserved, or rescued within a stewardship paradigm, but as individuals whose lives matter within an approach focused on common worlds' (**Dolby, 2019: 410**). Despite his ostensible affection for the monkeys, Arun still regards them primarily as resources for his research that benefits humanity much more than other species. In the end, the representation of Arun as able to empathize with his test monkeys simply becomes a way to endow Arun with a sympathetic character attribute that works to distract readers from pondering larger questions concerning the ethics of animal testing.

A capacity for empathy is also a central character trait of protagonist Zhou. The passage in which he is helping a stranger (who later turns out to be patient zero of the epidemic caused by Jin's virus) illustrates that nicely. When a *mei* man in his twenties collapses after a JinCorp press conference, Zhou does not run away in a panic like most other bystanders do, but instead tries to help. Despite the warnings of other onlookers, Zhou instinctively touches the man with his bare hands and uses the technology of his *you* suit to check his temperature. The man's condition triggers Zhou's painful childhood memory of his mother dying of a similar disease: 'He was burning up. Just like my mom had' (**Pon, 2017: 122**). Thus, helping the stranger becomes a way for Zhou to reconnect to the helplessness he

felt as a thirteen-year-old boy, but with the difference that his new *you* persona has the means to provide medical care: 'But here, now, there was something I could do. "Command," I said. "Get an ambulance to Liberty Square *now*"' (**Pon , 2017:123**). When a nearby *mei* girl tells Zhou not to bother with an ambulance because of the costs, he retorts: '*I'll* pay for all of it. We can't leave him here. He's still alive' (**Ibid**). In contrast to the indifferent *you* and the resigned *mei* around him, Zhou acknowledges his responsibility by stepping up to help the stranger. Thus, this passage works to characterise both Zhou and the diegetic mainstream society: while the wealthy *you* do not care about the suffering that is happening directly in front of their eyes, the *mei* have given up on expecting any help. Zhou then steps into that void as a prototypical idealist teenage activist for social justice and in doing so might encourage readers not to feel put off by societal ignorance and resignation and to instead stand up for what they believe in.

In contrast to Arun and Zhou who live among the *mei* and have experienced the loss of their mothers due to Jin's involvement and pollution respectively, Zhou's love interest Daiyu has led a very privileged life as the daughter of CEO Jin Feiming. However, unlike her superficial friends who only care about following the latest fashion trends, attending parties, and hooking up with other *you* teenagers, Daiyu spends her free time organising charity events. At one such event, a conversation with Zhou leads her to question her means to improve the lives of other inhabitants of Taipei. Zhou comments on Daiyu's plan to financially support an orphanage by suggesting that 'maybe the best way to help is to prevent their [i.e., Taipei's orphans'] parents from dying so young […] Dying from hunger and illness exacerbated by our polluted air and water' (**Pon, 2017: 105**). Inspired by Zhou's suggestion, Daiyu persuades her father to produce a more affordable version of his protective suits. The readers later learn that her well-meaning plan backfires, as Jin equips the cheaper suits with surveillance software and intends to sell the data that the suits gather. Until the last third of the novel, Daiyu appears to be an obedient daughter who – though much more socially conscious and empathetic than her father – is still invested in keeping up the status quo. Thus, Daiyu starts out as a proponent of a moderate form of social activism that remains 'within a global neoliberal framework, championing "sustainable development" without challenging the unsustainability of an economy advocating endless growth' (**Gaard, 2008: 14**). However, this changes towards the end of *Want*, when Daiyu reveals that she had willingly helped Zhou to bring down Jin after learning that he had ordered the murder of his opponents: 'I knew my father was capable of questionable choices in his business practices, but […] there are no blurred lines when it comes to murder' (**Pon, 2017: 205**). In the end, Daiyu is

radicalised both by her father's unethical behaviour and by Zhou's insistence on widespread social and economic change as the only means to permanently improve the living conditions of the *mei* population. Daiyu's character development might be read as a call for more solidarity between teenagers from different socio-economic backgrounds. Despite the importance of the love story between Daiyu and Zhou for the plot, Daiyu's personal growth is not only a result of her relationship to Zhou, but also of her own empathetic personality combined with an increased sense of self-efficacy. Daiyu continues her activism after the bombing of her father's factory by creating an interactive experience of pre-pollution Taipei in an old theatre that invites guests to view images of the blue sky, smell unpolluted air and feel (artificial) wind and sunshine. This display is Daiyu's attempt to show the people of Taipei what they stand to gain if they work towards decreasing the level of pollution.

At first glance, this ending looks like one of the 'solutions underpinned by a nostalgic, illusory belief in our ability to return to an unsullied past' that the Asian American version of the critical dystopia seeks to avoid (**Huang, 2010: 140**). However, *Want* embraces a certain ambivalence in its final moments: During the successful destruction of Jin's factory, Zhou's friend Victor is killed accidentally. Zhou's hacker friend Lingyi gives evidence for Jin's crimes to the police that causes Jin to flee Taiwan to avoid a trial. Furthermore, the extreme social stratification of Taiwanese society and the problem of pollution remain largely unchanged illustrating the limitations of a single act such as the destruction of one factory. Thus, *Want* avoids the pitfalls of proposing overly simplistic solutions to complex problems and instead challenges readers to think through the ethical implications of militant environmental activism themselves. However, it should be noted that this potential ambivalence is abandoned in Ruse, the sequel to *Want*, when – at the end of the novel – Zhou and his friends manage to get Jin arrested in Shanghai. In *Want*, Zhou still struggles with the potential consequences of his actions:

> *I knew that in order to bring about a revolution, not only would yous be hurt in the process, but many meis as well […] Means to an end. Wasn't that phrase usually used by villains in stories – or, at best, by misguided heroes? But nothing big was ever gained without sacrifice. You grasped that fast enough as a reader from Luo Guanzhong to Tolstoy to Woolf. […] [I]n the end, the truth was a harsh and ugly one: in order to change the status quo, we had to be destructive. Seize control of the narrative. Redirect the plot.* (**Pon, 2017: 131**)

In his line of reasoning, Zhou uses references to canonical authors to justify his violent plan as the only viable solution. The combination of authors mentioned (a 14th century Chinese author, a 19th century Russian author

and a modern British author) might be read as hinting towards some form of universal truth that exceeds geographical and temporal boundaries. His use of bookish metaphors (narrative and plot as signifying the course of development of Taipei) at the end of the quote establish a connection between fictional booklover Zhou and the real-world readers of *Want* and can be read as a request. This connection between narrator and reader is re-established with the final sentence of the novel 'This was only the beginning' (**Pon, 2017: 229**). This sentence cannot only be read as a commentary on the diegetic situation at the end of the novel but might also work as a call to action for the readers. *Want* constitutes a young adult dystopia that follows (rather than renovates[iii]) the typical generic traits as identified by Heinze: A cohesive main narrative is told from the point of view of a teenager with an emphasis on 'plot, conflict, action, and the protagonists[' thoughts and feelings]' (**Heinze, 2018: 30**). What an ecopedagogical reading of this novel can make visible, however, is the (often ambivalent) entanglement of its human protagonists with the more-than-human world. Examples for this are the villain's abuse of biotechnology for his own gain, Arun's caring but simultaneously exploitative relationship to his lab animals or the protagonists' efforts to reduce pollution in Taipei to make the city liveable again for all humans and more-than-human life forms. All those issues offer starting points for a re-thinking of interspecies relationships and a recognition of how capitalist systems turn those commonly considered as less-than-human into commodified, exploitable resources that can be made productive within an EcoJustice Education framework.

Empathy as Transformative Force for Humanity in Malinda Lo's *Adaptation* and *Inheritance*

The plot of Malinda Lo's *Adaptation* duology focuses on two American teenagers, Reese Holloway and David Li, who after a nearly fatal car accident find themselves in a secret military facility. After their discharge from the mysterious hospital, they soon discover that the 'very advanced medicine' (**Lo, 2012: 49**) that was used to save their lives has had some unexpected side effects: Their bodies are able to heal much faster than before and they are able to share other people's emotions by touching them. Much of the plot of *Adaptation* concerns Reese and David's attempts to learn more about their new abilities and leads up to their discovery that the technology used on them is extraterrestrial in origin. In this article, I focus mainly on its sequel *Inheritance*, in which the existence of extraterrestrial beings on Earth (who are passing for human) is made public and the plot switches between Reese's coming to terms with her new identity as an alien/human hybrid and the societal repercussions of the reveal of extraterrestrial life. In Huang's chapter on the representation

of aliens in Asian American science fiction, she uses Ted Chiang's *Story of Your Life* as an example to show how Asian American authors tend to focus 'on the effort to establish communication' and not – in contrast to many Anglo-American science fiction novels – on the 'requisite struggle for dominance between humans and aliens' (**Huang, 2010: 107**). Although *Adaptation* and *Inheritance* are not as aesthetically and structurally innovative as *Story of Your Life*, I argue that some of Huang's insights can also be transferred to Lo's duology, most importantly the focus away from violent conflict and towards establishing mutual communication to share information to the benefit of both parties. Additionally, Sohn explains that though '[i]t would be simplistic to call all Asian American science fiction texts oppositional, […] these works often operate from within an activist framework and illuminate obscured voices and histories' (**Sohn, 2008: 11**). In both *Adaptation* and *Inheritance*, Anglo-American Reese functions as the only narrator and focalizer inviting readers to share her perspective and to identify with her on a personal level. In *Adaptation*, Reese realises that she is bisexual which makes her one of very few bisexual protagonists in early 2010s young adult fiction (**cf. Cart, 2016: 193**), thus increasing the visibility of a previously underrepresented social group. Furthermore, the novel uses Reese's love interest Chinese American David Li to educate readers about Chinese American history and to address anti-Asian racism. During the duology, Reese and David develop from helpless victims to confident teenagers taking an active role in the negotiation of human/alien relations. After Reese and David are repeatedly abducted (first by the extraterrestrial Imria after the car accident, then twice by the US military) in *Adaptation*, they decide to take matters into their own hands in *Inheritance* and give impromptu press conferences, do TV interviews, and get involved Imria/human diplomatic matters. Their corporeal hybridity positions them in-between the (mostly economic) interests of human politicians and the presumably altruistic plans of the extraterrestrial visitors. I will first analyse the representation of the extraterrestrial Imria in both novels with a special focus on the role that empathy plays in their society. A second close reading will look at Reese's superhuman powers and how her view on them changes: at first, Reese is overwhelmed by the intensity of feeling other people's emotions. However, after training her new abilities, she can deploy them purposefully and – at the climax of *Inheritance* – Reese saves her life by using them. A final paragraph will think through the social implications of Reese's enhanced capacity for empathy.

Although the Imria already appear in *Adaptation*, the first instalment of the series, it is only in *Inheritance*, the final book of the duology, that the readers learn more about their society and their reasons for coming to Earth. Millions of years before *Adaptation* is set, the Imria began to look

for another planet to build a new civilization in their likeness. After the extraterrestrial scientists 'pushed certain species in a different direction' thereby creating the homo sapiens (**Lo, 2013: 229**), humanity was left to develop on its own. However, when the Imria witness the creation of the atomic bomb, they decide to return to Earth and get involved, as Imria leader Akiya Deyir explains: 'We cannot allow you to destroy your planet and destroy yourselves' (**Ibid: 251**). According to Deyir, the Imria regard the human lack of empathy as the main reason for humanity's problems:

> *The foundation stone of Imrian society is our ability to share consciousness with one another: susum'urda. It makes us who we are. From the day we are born, we are connected intimately with our loved ones, and this is the reason that we have survived for so many millions of years. But we failed to give you this ability, and because of that, you grew into a very different kind of people […] your lack of susum'urda made you a violent people, prone to attack rather than to love*. (**Lo, 2013: 267**)

This patronising view on humanity is criticised by Reese who demands that the Imria treat humanity as 'equals' (**Lo, 2013: 254**) rather than regarding them as a failed experiment that needs to be fixed. Thus, the Imria's supposedly elevated capacity is revealed as what Lobb calls 'doxic empathy', i.e., a form of empathy directed from a privileged towards a marginalised party that is not interested in changing the status quo but tends to 'contribute to the ossification, rather than alleviation, of oppressive power relations' (**Lobb, 2017: 598**). Reese - as a character whose hybridity positions her in between the Imria and humanity - contradicts the Imria's framing of humanity as biologically incapable of empathy and instead maintains humans have found ways to work around their lack of *susum'urda* and can still treat each other in an empathic manner if they choose to do so.

Decades prior to the plot of the novel, the Imria's view of humanity as deficient has led them to make a research agreement with the US government and together they started working towards a procedure that can give humans the power of *susum'urda*. Thus, the first encounter between Imria and humans is not a violent one, but rather focuses on cooperation, a tendency that Huang also observes in other Asian American science fiction texts that 'challenge the oppositional thinking that frames encounters with otherness only in terms of conflict and power' (**Huang, 2010: 112**). However, the extraterrestrial DNA that the Imria provide to help to ostensibly improve humanity, is abused by human scientists working in the military-industrial complex with the aim to weaponise animals (which reveals their view on animals as exploitable resources) and create supersoldiers, thereby proving the Imria's assessment of the violent

nature of humanity right. Whereas the military's attempt to turn birds into surveillance tools leads to an international catastrophe when the modified birds cause plane crashes (for more information about the representation of birds in Lo's duology, see Cicholewski), their supersoldier experiments manage to genetically optimise human beings for combat purposes, with superior physical prowess, fast reaction time, but also poor impulse control.

Towards the end of *Inheritance*, protagonist Reese and her two love interests, male human/alien hybrid David Li and female Imria Amber Gray are abducted by those supersoldiers on behalf of the US government who intend to conceal their unethical experimentation with Imria DNA. Due to Reese's training of her superhuman capacity for empathy with the Imria, she can use it to her advantage and save her own and her friends' lives. When Daniela Torres, one of the supersoldiers, insists that she 'can run faster, sleep less, and shoot better than any *normal* human being […] They [i.e., the military scientists] made me into a killer and I'm doing that fine' (**Lo, 2013: 284)**, Reese uses her power of *susum'urda* to reveal Torres' repressed love for her seven-year-old son who was taken away from her. Reese also learns that the genetic modification is slowly killing the soldier: 'Inside Torres's body, Reese felt the decay eating away at her, like a corpse rotting into the ground' (**Ibid: 286**). By promising Torres to take care of her son, Reese can convince her to assist in her escape. Thus, the novels represent the military's attempts to weaponise extraterrestrial DNA as harmful, both to humanity in general (through the modified birds that bring down planes) and particularly to marginalised people (as the soldiers selected for the supersoldier program were offered to participate in the experiment as alternative to serving time in prison). This abuse of the alien's genetic material by the military-industrial complex is contrasted with the Imria's intended use as exemplified by Reese and David who are empowered to experience 'true empathy' (**Lo, 2013: 72**) in the sense of the ability to directly share their thoughts and feelings with other humans and Imria.

As the Imria have designed Reese and David's modification to be inheritable and are offering the procedure to human volunteers, they hope that it can radically transform humanity. Reese's love life provides an example of how this kind of empathy can change human society: due to the power of *susum'urda*, Reese can engage in a consensual non-monogamous romantic relationship with both David and Amber at the end of the book series. Since all three involved parties have access to each other's emotions by touch, they have less problems with jealousy, though the public stigmatisation of non-monogamous relationships in mainstream human society creates difficulties for them, which they eventually escape from by visiting the Imria home planet Kurra 'where plural relationships

were normal' (**Ibid: 324**). Lara Hedberg points out potential problematic implications of this representation:

> *The question must be asked whether the books also suggest that it is only through the use of posthuman bodies that queer relationships become successful. The articulation of Reese's girlfriend as alien, her boyfriend as posthuman, and their connection through posthuman communication positions the implied reader to view open and accepted queer relationships as a manifestation of alien DNA.* (**Hedberg, 2014**)

While Hedberg certainly makes a valid point, it should also be noted that *Inheritance* acknowledges the existence of a 'tiny [human] polyamorous community' (**Lo, 2013: 324**). Furthermore, Lo's employment of Reese as the only narrator encourages readers to identify with her and follow her development from absolutely rejecting non-monogamy towards a more accepting attitude. Indeed, given the scarcity of young adult novels that depict polyamorous romantic relationships at all, the presence of a positive representation of Reese's romantic attachment with both David and Amber in *Inheritance* might already contribute to a normalising of non-monogamy. The move away from heteronormative, monogamous relationships ties in with a de-commodification of romantic relationships (despite capitalist heteropatriarchy) implying that partners are not regarded as one's property, but rather as equals. Kim TallBear explains how consensual non-monogamy can have a 'decolonial potential' that can effectively unsettle the compulsory heterosexual monogamy of white settler societies (**TallBear, 2020: 470**). By explaining that '[s]ettler-colonial governments in the United States and Canada imposed compulsory monogamy that helped privatise and constitute land ownership for settler men, their families, corporations, and states', TallBear also associates the arrangement of interpersonal relationships with environmental issues by pointing out the logic of property that casts both (white settlers') wives and nature in the role of exploitable resources (**Ibid: 473**). Although Lo's duology does not connect polyamory explicitly with its anticolonial agenda, its inclusion of queer consensual non-monogamous romantic relationships works to question the heteronormative conventions usually at play in young adult fiction in general (**cf. Cart, 2016: 194**) and young adult dystopias in particular (**cf. Heinze, 2018: 37**).

While this insight into Reese's love life provides a glimpse into the potential of enhanced empathy to change humanity for the better, the novels ultimately leave open as to what exactly such a transformed human society can look like. Spencer argues that the ending of *Inheritance* represents 'oppressive social systems as immutable and enduring' as it is not 'using the advanced alien race to queer or disrupt, resist, or reimagine culturally constructed categories' (9). I disagree. Instead, I suggest that the

duology remains hopeful about the possibility for positive change and might invite readers to re-think their preconceived notions of how societies are organised. While Spencer reads the novels' emphasis on the importance of empathy as individualising systemic oppression (cf. page 9: 'racism and queerphobia are reduced to issues of individual personal feelings'), I indeed consider the opposite to be the case. I argue that empathy in Lo's duology is not just represented as a way for individuals to relate to each other in an ethical way but also as inspiring collective action.

Reading the duology from an EcoJustice Education perspective directs the attention towards the cultural practices of mutual care that the Imria stand for and contrast them with the greed and quest for domination of the military industrial complex that led to death and suffering of both (marginalised) humans and other-than-human beings. In addition, Lobb's insistence that empathy needs to be considered alongside the power structures that surround it can help provide us with the vocabulary to describe the type of empathy the protagonists of the book series embody. As Reese and David's 'position of (temporary or transitional) authority here is not used to cement, naturalize or reproduce relations of inequality, but is committed to their transformation towards a greater parity of participation', their way of relating to other humans exemplifies what Lobb classifies as 'critical empathy' (**Lobb, 2017: 603**). However, Reese's commitment to advocate for 'a greater parity of participation' is limited to her fellow humans and (despite her initial horror at discovering the military's abuse of genetically modified birds) does not extend to other-than-human life forms.

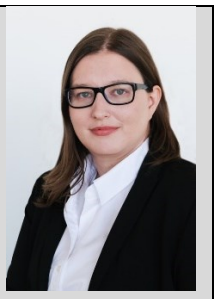
Conclusion: The Limits of empathy

My analysis has shown that empathy plays a central role in both Pon and Lo's book series. In *Want,* representing the protagonist and his teenage friends as empathetic works to make them likeable for the readers, while the characterization of the antagonist with an absolute lack of empathy justifies the heroes' violent acts against his property. In Lo's duology, the protagonist's capacity for empathy is turned into a veritable superpower through the introduction of extraterrestrial DNA into her genetic makeup. The empathetic basic attitude of the protagonists in both duologies is inextricably tied to their political activism: In *Want,* Zhou's commitment for supporting the marginalised *mei* population of Taipei is present throughout the whole novel, though he only becomes radicalised into militant environmental activism after his mother figure Dr. Nataraj is murdered. In *Inheritance*, Reese seeks to use her powers to mediate between the occasionally paternalistic Imria and sceptical human socio-political institutions. Thus, both book series not only encourage readers to treat their social environment in an empathetic manner, but also

represent youth political activism as a logical corollary of an empathetic worldview.

However, in both duologies, empathy seems to be limited to other human beings and does not include other-than-human life forms. Although Arun in *Want* is mourning the test monkeys that he unintentionally killed during his medical experiment, his grief does not lead him to question the necessity of animal testing in general. In *Adaptation*, the animals modified with extraterrestrial DNA are represented as dangerous for humans and thus evoke feelings of fear and horror rather than empathy. Despite their continuation of anthropocentrism, both novels can be made productive for discussions concerning human relationships to each other as well as to more-than-human beings: *Want*'s focus on social inequality can serve as a starting point for exploring how the effects of environmental degradation play out differently depending on one's social class, whereas *Inheritance* invites readers to imagine what a society built on empathy might look like. An EcoJustice Educational approach to teaching both book series can build on how the novels connect social and environmental issues and celebrate youth political activism while simultaneously drawing attention to the duologies' shortcomings regarding their unwillingness to question hierarchical relationships between humans and the more-than-human world.

Alena Cicholewski is an academic writing instructor at the University of Bremen, Germany. She also teaches at the Institute of English and American Studies at the University of Oldenburg, where she completed her PhD in English literature in 2020. Her current research project focuses on representations of interspecies kinship in 21st century North American young adult fiction. Alena is particularly interested in exploring how recent adolescent literature presents collaborative relationships between human and more-than-human entities as an alternative to hierarchical concepts of human/non-human encounters. Alena's research interests include young adult literature, comics, and postcolonial approaches to popular culture more generally.



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Endnotes

[i] The term Anthropocene - as popularised by Paul Crutzen in 2002 - designates an epoch in which human activity has significantly influenced geological processes on Earth **(cf. Crutzen, 2002)**. The term itself has been criticised as downplaying that not all humans are equally responsible for and affected by its consequences and as being anthropocentric and thus erasing its influence on more-than-human life forms **(cf. inter alia Haraway, 2016: 49; Todd, 2015: 244; Yusuff, 2018: 11-12)**. Despite these pitfalls, I am still using the term here as a pragmatic shorthand to encompass the environmental and socio-economic consequences of human induced climate change.

[ii] Ruediger Heinze explains that explicit representations of violence are a common generic feature of young adult dystopias **(cf. Heinze, 2018: 33)**. Due to the resources and skills necessary to perpetrate the acts of violence shown in *Want*, I argue that their representation works to characterise the protagonists as highly intelligent, capable of strategic planning and physically fit (rather than actually inspiring readers to imitate their crimes in real life).

[iii] The fact that the novels feature no white characters, and that queer character Lingyi plays a prominent role (particularly in the second book of the series) sets the *Want* duology apart from the majority of US American young adult dystopias.

Repositioning Craft and Design in the Anthropocene: Applying a More-Than-Human approach to textiles

Berilsu Tarcan[1], Ida Nilstad Pettersen[2], Ferne Edwards[3]

Department of Design, NTNU – Norwegian University of Science and Technology, Norway
Correspondence: [1]berilsu.tarcan@ntnu.no*, [2]ida.nilstad.pettersen@ntnu.no, [3]f.edwards@surrey.ac.uk
ORCID: [1]https://orcid.org/0000-0001-8675-9648, [2]https://orcid.org/0000-0003-3979-9772, [3]https://orcid.org/0000-0003-0389-193X
*Corresponding author

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Abstract

As a part of industrial mass production, the field of design has been deeply involved in the exploitation of natural resources. In design, better ways to approach the nonhuman-human relation are needed. In this article, we contribute by exploring how more-than-human perspectives can be used to engage with this relationship, and more specifically, by focusing on how the fields of design and craft relate to more-than-human worlds. Crafts are relevant as they are practices of making that preceded and exist beyond mass production. In design studies, more-than-human notions and posthumanist frameworks are still new. Although recent studies mention design in the context of more-than-human, they do not thoroughly integrate it within relationships between craft and design.

Through positioning a more-than-human approach within the craft-design relationship, the design field can learn from and shift to a more equal understanding between humans and nonhumans. The article addresses this by describing emerging craft and design practices, and by providing textile examples. Non-western textiles and their motifs are given as example artefacts that consider traditional and Indigenous knowledge in more-than-human worlds. By looking at these motifs from more-than-human perspectives, we suggest that design and craft can deliver a new approach for addressing nonhumans in human-made things.

Keywords: More-than-human worlds; craft and design; motifs; textile design; felting; decolonising design

Introduction

The geological age known as the Anthropocene was declared because of humans' irreversible exploitation of the planet, which in turn has created significant problems that have impacted nature and triggered climate change. It is argued that the start of the Anthropocene traces back to the consequences of the Industrial Revolution, such as the change into mass production, industrialisation, and the irreversible exploitation of natural resources (**Crutzen, 2002**). According to Crutzen (**Ibid: 23**), the age of the Anthropocene, or the `human age', `could have started in the latter part of the eighteenth century, when analyses of air trapped in polar ice showed the beginning of growing global concentrations of carbon dioxide and methane'. Crutzen also notes that this date coincides with `James Watt's design of the steam engine in 1784' (**Ibid**).

With the age of the Anthropocene, it is clear that humans should reconsider their relationship with the environment. This reality implies that design studies should find ways to question and help redirect the development by rethinking what design practices and processes can include (**Tarcan et al., 2022**). Furthermore, design studies have a moral imperative to rethink relationships with the world. Turning to design's relation to crafts is then relevant, as crafts are making practices that existed before and are performed beyond industrialisation and mass production **(Tonkinwise, 2022)**. In this article, design and craft fields are discussed through their relationship in history, and how this relationship relates to more-than-human approaches. The notion more-than-human, first introduced by Abram **(1996)**, refers to the elements of the earthly nature and environment. We refer to more-than-human as a term that aims to overcome the current modern dichotomies between nature and culture (**Souza Júnior, 2021**), and understanding the world from broader perspectives, such as living with nonhumans. Here, we argue that design and craft, largely understood as Anthropocentric or human-centred practices and activities, should be rethought from a more-than-human perspective.

Decentralising humans in design studies would help address problems caused by the Anthropocene as it would encourage positive and reciprocal human and more-than-human ecological relations of co-existence. Consequently, in this article we discuss how design can turn into a more-than-human practice through several approaches, including craft. We suggest that looking through more-than-human ways of knowing could contribute to the decolonisation of design (**Abdulla et al., 2019**), an emerging movement that suggests designing for anti-oppressive futures, listening to Indigenous experiences and challenging Eurocentrism (**Tunstall, 2013**).

The article first clarifies the significance of design in the Anthropocene, and why a more-than-human approach is needed in design and craft studies. Next, textiles and their motifs are introduced as more-than-human entities and are discussed as an example to reconsider more-than-humans in everyday life through artefacts, continuing the design and craft relationship. Textiles provide a starting point for a wider reconceptualisation of the human-nonhuman relation and more-than-human design, contributing to a future research agenda related to more-than-human worlds and design. Afterward, the article explores how design and craft concepts are related to each other. By investigating possibilities for employing more-than-human perspectives and decolonial practices in design through the example of textiles, we seek to find out how we can better approach the nonhuman-human relationship in the field of design, and how we, as humans and nonhumans can better coexist in the Anthropocene epoch.

Design in Relation to the Anthropocene and More-Than-Human Worlds

Design as a field is placed prominently under the influences of Eurocentrism and anthropocentrism (**Escobar, 2018; Forlano, 2017, Fry, 2009**). As humans, we live in an artificial world, surrounded by objects. Nevertheless, we should reconsider the creation of artificial things or artefacts that add to the artificial, non-natural world we co-inhabit. The Anthropocene and more-than-human influences become important for defining future conditions.

Non-anthropocentric understandings of practices and more-than-human worlds can be approached from different perspectives. In this article, the terms 'more-than-human', 'nonhuman', and 'other-than-humans' refer to all things that are not human, such as nonhuman natures, environment, animals and materials. More-than-human research consists of contributions from different fields, such as multispecies research, animal geographies, ecofeminism, environmental humanities, human-animal studies, new materialism, queer ecologies, science and technology studies, and more (**Bastian et al., 2017**). As Tsing (**2013: 27**) writes, we 'are made in entangling relations with significant others'. While many studies consider these approaches, there remains a need to address the Anthropocene and more-than-human research further from craft-design relationships, and through non-Eurocentric perspectives.

Design as an act of making and remaking is a 'world-shaping force' (**Fry, 2009**). As Fry (**Ibid: 3**) states, 'we have become too dependent on the artificial worlds that we have designed, fabricated and occupied'. As designers are involved in creating artificial artefacts with various processes

and techniques, a way to rethink how designers deal with designing and making objects could be through non-anthropocentric and non-Eurocentric approaches, such as the usage of natural materials, or rethinking design processes from different worldviews such as ancient cultures or non-Western frameworks. There are many movements and opportunities that can challenge human-centred design approaches.

As one of these challengers, the more-than-human concept helps humans reposition themselves within a network of others and acknowledge the interdependencies. This can potentially help address the problems caused by the Anthropocene and shift the field of design towards more responsible, ethical, inclusive and environmentally friendly approaches. Approaches that decentralise humans in design, can also decolonise practices. For instance, through the decolonising design movement (**Tunstall, 2013**) designers' roles could be reframed, such as being facilitators for alternative modes of being and becoming (**Schultz et al., 2018**), which could lead to more equal practices in design.

Human-centred design (sometimes referred to as user-centred design) has been the core theory in design since the 1980s, although one might argue that humans have been prioritising their own needs long before that. Bringing more-than-human perspectives into design methods and processes could help reconsider design's human-centrism. The different sides that challenge human-centeredness in design involve technology or environment-related approaches. For instance, design studies related to posthumanism (**Forlano, 2017**) primarily focus on technological issues and how they relate to more-than-human perspectives, or non-anthropocentrism (**DiSalvo & Lukens, 2011**).

Although design is mainly human-centred, recent studies discuss how design can be more-than-human as a practice, as a field or an activity, and claim that a shift towards more ecological and sustainable approaches are necessary (**Roudavski, 2021**). Many studies focus on technology-based factors and how they are leading to a more-than-human design field (such as Internet of Things, Human-Computer-Interaction). Some studies also draw on philosophies related to placing objects at the centre, such as animism, Object Oriented Ontology (OOO), or focus on the environment, nature and sustainability. Involving more-than-human actors in design can lead to a more equal agency when positioning humans and nonhumans in the field. Giaccardi and Redström (**2020: 9**) state that the future of design practices may be different to how they emerged 'as a response to industrialization', if we take designing as making 'some-thing for some-one'. They emphasise the need to go into a 'more-than-human design practice', by suggesting that 'in a more than-human world of design and designing, outcomes and experiences are the result of dynamic interplay

between people and networked computational things, as well as between things and other things' (**Ibid: 10**). These points relate to making-with and learning from the natural world, material or other entities, as they all signify a relational aspect and equal positioning of the actors.

Challenging human-centred design could be possible by placing the object or artefacts in the centre of the practice. As it leads to alternative ways of thinking, thinking of objects as equals to others could trigger more-than-human thinking in design studies. OOO is a philosophical theory that takes every entity as equal (**Harman, 2015**). Therefore, humans are elements of philosophical interest, but are not the sole elements (**Bogost, 2012**). Bogost (**Ibid: 6**) in 'Alien Phenomenology' states that 'OOO puts things at the centre of being. We humans are elements, but not the sole elements, of philosophical interest. OOO contends that nothing has special status, but that everything exists equally—plumbers, cotton, bonobos, DVD players, and sandstone, for example'. In other words, according to Bogost (**2012: 11**), 'everything equally exists' but 'things do not exist equally'. For example, we as humans and nonhuman animals equally exist, but as humans, we place ourselves superior to them, and because of this hierarchy, we don't exist equally. For design and craft studies, this signifies the importance of acknowledging non-binary approaches when rethinking how design processes can change.

Some other notions, such as animism also have objects as a central interest. Animism is the notion that nonhumans have a personhood, which is an emergent property of them having an inner soul or spirit (**Marenko, 2014**). These notions are employed in design studies. For instance, Marenko gives the example of smartphones to describe how animism relates to human's relationship with objects, claiming that animistic tendencies are apparent**:**

> *In a sense, the smartphone has morphed into a trusted friend, with its own presence, voice, and distinct personality…Our smartphone becomes an extension of our own cognition and emotions. Because of this animated and responsive presence, we often end up treating our smartphone as if it is alive.* (**Marenko, 2014: 221)**

However, there is a difference between animism/Amerindian perspectivism and OOO/speculative realism. In their article 'Design Research and Object-Oriented Ontology', Lindley, Akmal et al. (**2020**) show how flat ontologies, rather than distributing spiritual qualities to things as in animism, can be used by design studies scholars. They explain how design research can employ OOO, through some case studies that involve design projects of tarot cards, an app, a board game, a living room and a kettle. Through all these projects, they aimed to develop a new understanding of the smart technologies through their relations, often

called the Internet of Things, and to encourage further discussions on how OOO relates to design. While their approach is from socio-technical design research, they emphasise that OOO encourages experimentation. They demonstrate how OOO can be combined with different ways of seeing and thinking.

Textiles as a Way to Communicate – Symbols as More-Than-Human Entities

In this section, we take textiles as an example of craft-design relationships and discuss how they can be reconsidered through more-than-human worldviews. Textiles have a rich and long history in design and craft studies and provide relevant frameworks to discuss emerging topics of decolonising design and post or non-Anthropocentrism.

We take design not as a consumer-centric practice to sell products to users, but as meaning-making or 'making sense of things' (**Krippendorff, 1989: 9**), and a practice that affects our daily life and experiences. The emphasis is not on whether the following textile examples are made for other humans or other living beings, it is about how design can be a facilitator to change worldviews. Designers 'co-create the world with others (humans and non-humans) with whom we live in co-existence' (**Escobar, 2012: 18**). Therefore, it is possible to approach more-than-human perspectives through design and craft, from multiple perspectives. Furthermore, we emphasise that design and craft are changing, holistic and reflective practices (**Schön, 1992**).

Of all the crafts, Dormer (**1997**) claims that textiles are the least marginal, referring especially to the woven cloth**.** He offers two reasons for this outcome: one is the basic technology of textile crafts, the other lies in the continuation between craftsperson, production designer, amateur and professional (**Ibid**). He defines a `fluidity' in the art, design, and practice of woven textiles (**Ibid: 168**). Fluidity in craft-making through more-than-human worlds is also apparent through the practice itself.

The more-than-human relationship is apparent within the textiles themselves. An example of how ancient cultures manifested their relationship with other-than-humans (such as the natural world, trees or birds, and a plurality of ecologies) was through symbols used in textiles. These symbols are a way of communication and language, which emphasises a more-than-human relationship with nature. We believe that ancient artefacts with symbols from old tribes and traditional culture can be investigated further through more-than-human approaches to see how this relationship can be revived or taken back to life. As symbols in textiles were used as a communication method, we suggest that they can be applied to communicate a more-than-human relationship in

contemporary culture. Looking from these ways of knowing can inform studies in decolonising design, which we interpret as moving away from Eurocentrism. These textiles, motifs and symbols have been studied in craft and design fields, but studies that interpret them through non-Anthropocentric and non-Eurocentric perspectives are not common. In this study, we are thus interpreting textiles, motifs and symbols through non-anthropocentric and non-Eurocentric perspectives. The examples included here were selected through a literature review on textiles and supplemented with a field study. The review was made to find examples of felt made and woven carpets, which have an importance in Turkish textile history. Turkish textile history was relevant as it provides examples on human-nature-culture relationships, and Berilsu Tarcan's field study was conducted in Turkey. Furthermore, we think that this can provide further thought to discuss more-than-human worldviews through decolonisation of design.

The initial aim was to find artefacts that could exemplify human-nonhuman relationships. In the examples, we focus on the interpretation of motifs, which communicate visually through nature-related symbols such as birds, the tree of life and the sun. These examples can be studied further, or designers and makers can be encouraged to re-explore the motifs from more-than-human and multispecies perspectives.

*Figure 1: Felt Beam from Karadirlik Village, Turkey, made by Mehmet Göçer (Source: **Soysaldi, 1998: 73**).*

When the fibres and patterns are interwoven with each other, for instance in felting, the practice and process can be considered as a more-than-human activity, with the wool material and different stages of patterns coming together on the felted or woven surface. Consequently, we show some examples of textiles with felting, a craft technique that is mostly made by compressing wool fibres with pressure. As a craft-design relationship example, this practice can be a way to re-engage with environmental influences among us, referring to the symbols from old

cultures and nature. For example, Figure 1 shows a felt beam example from Karadirlik, a Yoruk (Turkic nomads, a term that is derived from `yörümek' in Turkish, which means `to walk') village in Turkey. The felt beam is a master feltmaker's work and contains several motifs. In the middle, a circular medallion with the sun, its rays, and the expression of rotation in an orbit can be seen. There are rectangular medallions in the direction of the two short sides of the middle coin. The rhombus in the middle of these medallions is surrounded by four-petalled, flower-like shapes with filled corners (**Soysaldi, 1998: 76**).

*Figure 2: Patterns from Arif Cön's felting workshop in Turkey, that signify a more-than-human relationship through symbols such as birds that refer to nomadic culture, from a field study (Source: **Tarcan, 2021**).*

Similarly, images in Figure 2, taken in feltmakers craft workshops in Tire, Izmir, demonstrate motifs that give reference to nomadic culture and more-than-humans. The bird motif, according to the feltmaker who owns the workshop, is a Yoruk symbol that had been used for ages. It is known that the bird motif has been a common symbol in the geography of Anatolia. For instance, in the pre-Islam period of Turkish art, the bird was the symbol of the soul (**Eycil and Us, 2019**). It is also known that shamans knew birds as helpers and as protector souls (**Ibid**). The age of this symbol goes back to many ancient societies such as Hittite, Urartu, Lydia, Pergamon and is used as decoration in carpets and pottery (**Yozgat, 2019**). The bird motif references the human-nature relationship.

*Figure 3: An example analysis of patterns from an 18th century carpet from Konya, Turkey. The carpet is held in Vakiflar Hali Muzesi, Istanbul, as inventory nr. 102. (Source: **Kültür ve Turizm Bakanlığı, No: 81, 2006**).*

Likewise, many handwoven carpets demonstrate more-than-human motifs. In Figure 3, an example carpet from the Konya region in Turkey is shown, with motifs (ordered from top to bottom in Figure 3, left image) of burdock, dragon, carnation, tulip, bird, rose, the tree of life and running water. These motifs all have different meanings and relations, which have been analysed and discussed from fields such as craft and art history. The tree of life is an example of an element that is known in many cultures, and can mean fertility, immortality, luck, abundance, health, and getting rid of illness (**Agac and Sakarya, 2015**). It is apparent in many rugs from Turkey, such as the example in Figure 3 (left and right). Other motifs such as bird, dragon, burdock, tulip, rose, carnation, and running water are also elements of nature and can be taken as more-than-human entities in relation with humans. We suggest that these motifs can be considered as more-than-human entities and emphasised as elements that bring back nature in artefacts we use.

Design and Craft Relationship

In this article, we argue that a way to challenge the dominant human-centeredness and anthropocentrism in design could be through re-exploring craft and design relationships. Having introduced examples of textiles made through feltmaking and weaving, we next turn our attention to how more-than-human and decolonial perspectives can help position design and craft studies in de-anthropocentric discourses more broadly. This discussion is thus not limited to textiles, but centred on the craft-design relationship, and how certain assumptions about design and crafts

could be questioned through different ontological conceptions of things and agencies. The terms design and craft are ambiguous and understood in different ways in different cultures and time periods. In this section, we clarify how this relationship has shifted through time and changing discourses.

According to Dormer (**1997: 219**), `to write about', or even to talk about craft with `clarity and coherence' is difficult. Oakley (**2014: 114**) states that using the word craft always carries a risk for misinterpretation, as craft can be used for 'a small group of defined activities and their outcomes', instead of a specific approach to making. Similarly, design as a term is often a challenge to describe. However, there are many attempts to describe both of these terms. Although the primary aim of the article is not to compare definitions of craft and design in history, some relevant descriptions are briefly outlined in this section to clarify their relationships, and how these relations relate to the Anthropocene and to more-than-human worlds.

Adamson refers to craft as a 'way of doing things' (**2009: 4**), and a `process of making' (**Ibid: 2**). Dormer (**1997**) defines craft from two different angles. First, it could mean studio crafts, which he refers to as anyone working with a craft medium. Second, he refers to the process of craft, which is the process 'over which a person has detailed control' (**Ibid, 1997: 7**). Sennett (**2008: 9**) describes craftsmanship as a basic human impulse, the 'desire to do a job well for its own sake'. Campbell (**2005: 27**) points to the fact that it is a shortened version of handicraft, which draws attention to the contrast between producing objects by hand and with the aid of a machine. Broader definitions suggest craft as 'a dynamic process of learning and understanding through material experience' (Gray and Burnett, 2009: 12), 'a form of embodied knowing that involves materials, tools and social communication' (**Groth et al., 2013: 4**), or an essentially `human and humanising process' (**Bunnell, 2004: 5**).

Design, traditionally referred to as a plan or problem-solving (**Simon, 1969**) is also a diverse field, including unique and creative disciplines. Heskett (**2005**) states that a wide spectrum of the terminology and practice of design creates confusion. He claims that activities such as nail design, floral design or funeral design serve as an appropriation of the word, to create an `aura of competence' (**Ibid: 4**). Heskett (**Ibid: 5**) defines design as 'the human capacity to shape and make our environment in ways without precedent in nature, to serve our needs and give meaning to our lives'. Glanville (**2006**) and Jonas (**2007**) claim design can be considered as the primary human activity, while Krippendorff (**1989: 9**) describes it as 'making sense of things'**.**

When describing design as a term, Margolin refers to The Oxford English Dictionary, which states that design first appeared as a term in the mid-16th century as 'a plan or scheme intended for subsequent execution' (**Margolin, 2015: 17**). He states that consequently, what humans were doing before the 16th century, which led up to the activity called design, was known by other names (**Ibid**). Adamson (**2015**) criticises that Margolin does not mention other words in many other languages that approximate to the concept of design. However, as Suchman (**2021: 25**) suggests, this can be understood as careful attention to define the genealogy of the term design, 'specifically located within 16th century Europe, as part of a process of decolonising the histories and geographies of making practices'.

The Separation and Entanglement of Craft and Design

Design and craft-making are related creative concepts. More-than-human perspectives can challenge how craft and design are related, for instance through challenging what 'industry' means today, and this can lead to lifestyles more inclusive of the environment. Collaborations between the design and craft fields today demonstrate that these terms suggest new possibilities for the future of sustainability. To better understand how craft and design terms entangle with each other, it is important to briefly discuss the separation of craft from design. This separation is defined as `one of the phenomena of the late-twentieth-century Western culture', and its outcomes are defined as `startling' (**Dormer, 1997: 18**).

Craft's separation from design is directly linked to the emergence of the Industrial Revolution, starting in Britain around 1770. Before the Industrial Revolution, objects were produced with traditional production methods such as handcrafting, using local resources. For example, textiles were commonly made from wool and were hand spun to yarns. With the spinning wheel and loom invented, cotton became more popular as it was quicker to produce. Afterward, machine production and the development of industrialisation took over for the artisanal production and some handicrafts, which also led to the emergence of the industrial design profession (**Heskett, 1980**). The Industrial Revolution is mainly defined as the transition from an agrarian society to an industrial one, as an 'economic phenomenon' that led to dramatic changes in the world (**Hartwell, 1971; More, 2000; Olson and Kenny, 2015**).

Craft and Making from Contemporary Perspectives

Today, movements in craft-related practices are emerging under the influences of sustainability, participatory approaches, social practices and community. These contemporary approaches related to craft making, such as Do-it-Yourself (DIY), craftivism, repair culture, and the maker movement all strengthen interdisciplinary relations.

DIY craft originates `from a culture that does not seek professional validation within traditional art methodology but rather is motivated by joining with others socially in shared, creative activity' (**Stevens, 2009: 52**). Other extensions such as DIT (Do-It-Together) and DIWO (Do-It-With-Others) (**Fernandez & Iazzetta, 2015**) are recent and related terms used to define relevant activities. Many other movements related to craft `making', such as maker and craftivism has emerged since. Craftivism as a word is made from the combination of craft and activism. This movement creates happy, cheerful products in the urban setting. The movement is influenced by DIY, and focuses on projects such as teaching knitting lessons, crocheting hats for the less fortunate, and sewing blankets for abandoned animals (**Greer, 2007**). In craftivist practices, the process is more important than the product itself, and the community participants work towards a common goal (**Buzsek & Robertson, 2011**).

Design and craft-making both refer to a creation process. The practice of making, explained by Hawkins and Price (**2018: 14**), fabricates our relationships to ourselves and others, 'weaving the textures of our individual and collective identities'. Furthermore, making is described as fundamental to our being by Carr and Gibson (**2016: 297**), as 'we make bodies, homes, identities and memories every day'.

The maker movement emerged with the development of new technologies with an influence of DIY, and with a network of people who were interested in electronics, coding, 3D printing or other post-industrial production methods. With Make magazine starting in 2005, and following the introduction of technology-related fairs, the movement created an impact in the world. Dougherty, the founder of Make magazine, notes that he tries to stay away from the word inventor, and defines maker projects as 'creative applications for new and old technologies, combining mechanical, electronic, and digital systems' (**Dougherty & Conrad, 2016: 48**). Although the movement is primarily associated with its relations to technological tools and inventions, he also remarks that as humans we have always been makers `as cooks preparing food for our families, as gardeners, as knitters' (**Dougherty, 2012: 11**), or as toolmakers, storytellers, tinkerers (**Dougherty & Conrad, 2016**).

There are scholars who explore making and craft as a `critical and political mode of engagement' (**Lindstrom & Stahl, 2014: 152**), with slightly different agendas and visions. Critical Making (**Ratto, 2011; Hertz, 2015**) is one of the approaches that tackle these issues, which aims to `turn the relationship between technology and society from a "matter of fact" into a "matter of concern"' (**Ratto, 2011: 259**). Ratto, who initiated critical making labs in Europe and Canada, aims to 'use material forms of engagement with technologies to supplement and extend critical

reflection and, in doing so, to reconnect our lived experiences with technologies to social and conceptual critique' (**Ibid: 253**). He suggests that people's lived experiences with technologies often do not 'match descriptions of technological effects, which tend to be either overly optimistic or pessimistic' (**Lindstrom & Stahl, 2014: 152**). Matt Ratto and Garnet Hertz state that critical making is capable of preventing the world from repeating itself as it is now (**Hertz, 2015**), and they stress the difference between critical making and making that comes across as depoliticised: 'Cleansing making of its politics takes away this amazing opportunity to better understand and exist in the world. It turns the making movement into just another way to create an industrial workforce' (**Ibid: 51**).

Some studies in craft and making started to consider posthuman, new materialist and more-than-human related approaches (**Vennatrø & Høgseth 2021**). Foote and Verhoeven (**2019**) describe how the maker movement claims to promote meaningful change and challenge asymmetric power structures, but that it still puts the maker as the controller of the material and technological tools. To respond to issues related to this, they use 'new materialist and posthuman theories to reposition the maker amongst their materials, tools, and environment' (**Ibid: 73**), so that the maker can be an equal partner in the process. They refer to the interrelation between human and nonhuman, as a reaction to humanist frameworks. They criticise such limiting frameworks for failing to critically address the influences of late capitalism and its ecological consequences. They also point out that the 'Maker Movement' is a Western movement and often anthropocentric. Consequently, there is still potential for addressing making and maker culture from non-anthropocentric and non-western approaches. The same goes for design, craft, and other related practices. While craft and the maker movement provide a strong basis in which to develop a more-than-human perspective (**Tacchetti et al., 2021**), the engagement of design with the more-than-human still needs further exploration. Studying design and craft relationships can facilitate exploring more-than-human perspectives in the design field from environmental and ecologically oriented approaches.

Nature-Culture Divide and Applying Theory to Practice in Design and Craft Making

In this section, we discuss the nature-culture divide with respect to textiles and how design and craft could embrace a posthumanist framework. Many rational approaches separate humans and nature, and reflect and reproduce the nature-culture divide, referred to as 'bifurcation of nature' (**Latour, 2005; Stengers, 2006; Whitehead, 1920**). Humans have however always lived in an environment, and many 'nonhumans' are part of

humans' lives. This leads us to agree with others (**Braidotti, 2019; Haraway, 2016; Tsing, 2013**) that we cannot separate humans from the natural world (the global ecology), which also consists of nonhuman entities such as trees, nonhuman animals, and geological formations. As nonhuman entities form the natural world, we should be treating humans as a part of the natural world, instead of separating them. Here, we claim that we need a more-than-human approach to design so we can come to terms with the Anthropocene and better co-exist with nonhumans and that a more-than-human design/craft could overcome the bifurcation of nature. When we look at ancient cultures and traditional knowledges, we see that there is already a relationship between humans and nature that is not binary: by listening to non-binary definitions of nature, we can learn to shift our relationship with materials, craft-making and design. For instance, the 'making-with the environment' approach employed in the Phenomenal Dress project (**Smitheram & Joseph, 2020**) exemplifies how posthuman theory from Māori perspectives can relate to materials thinking in design studies. In their study, Māori knowledge is listened to, together with making-with approaches, by taking the wind not as an inspiration but as an entity in the design process.

Design and craft fields are particularly significant and appropriate for challenging dichotomies between culture and nature. For instance, posthumanist research is primarily theoretical. There is a particular challenge in decentring the human when it emerges out of theoretical studies, and this should not be underestimated, especially when posthumanist research is used or applied in the field (**Pacini-Ketchabaw et al., 2016**). As the nature/culture divide in Western humanism provides the structuring logic for human-centric and anthropocentric practices, it is a challenging task to find innovative ways for putting concepts into practice (**Ibid**). Even though there is significant research in the theory of craft and design, parts of these fields are based on application and practice. Craft and theory, according to Dormer (**1997**), are like oil and water. Similarly, putting the concept of posthumanism into craft, means a practice-based approach might be challenging but also necessary in order to put the concepts into application. We believe that design and craft-making as practices are an opportunity to bridge the theory and practice in posthumanist approaches.

When we take design's meaning as 'making sense of (things)' (**Krippendorff, 1989: 9**), our relationship with things we create come into a different understanding, signifying the importance of any object or thing that we are surrounded with. Therefore, looking at more-than-human elements and relations can bring out many possibilities for design studies to make sense of the environment and human-nonhuman interdependencies. We have brought up the example of textiles and their

motifs to demonstrate how they can be rethought through posthumanist approaches such as the more-than-human. These textile motifs demonstrate a way to make us consider how we can further a human-nature relationship that existed for a long time, through non-Western perspectives.

A Future Research Agenda for Craft and Design in More-Than-Human Worlds

In this study on more-than-human perspectives in design, we have focused on textiles, and more specifically weaving and feltmaking. However, we propose that this perspective can be employed to study and work with other crafts, as well as other domains. For instance, more-than-human frameworks from decolonised perspectives could be employed to engage with other materials, or even to develop materials. Such frameworks based on flat ontologies could be employed in design studies that relate to relations between humans, materials, societies, and natural worlds. For future research, textiles and traditional motifs can be researched further to see how they relate to more-than-human worlds, and how this relation can be employed and engaged within design and craft. Exploring their relationships can help rethink the processes and assumptions within design and craft theory and practice, to reconsider what they could mean in a more-than-human world. In this article, we have shown examples from historical textiles; however, a practice-based study on these motifs could provide a bridge between posthuman theories and practical studies. We hope to encourage designers and makers to develop further examples by considering the more-than-human meanings of motifs.

Although recent studies explore textile design through similar frameworks, textile making is not often researched through non-anthropocentric or post-anthropocentric approaches. In this article, we have presented a more-than-human approach focusing on textile making and motifs, and symbols used in woven or felted products. For this, we have provided examples of the sun, the tree of life, and bird motifs in textiles. Nonetheless, there are countless traditional motifs that consist of nonhuman entities and human-nonhuman relations that could be rethought from more-than-human frameworks. Many traditional motifs relate to animals and plants, and many others relate to culture, religion, and so on. Further studies on different motifs could be made by reflecting on how their meanings can be rethought from more-than-human perspectives.

Furthermore, other aspects also have importance in shaping the meaning and interpretation of textiles and their motifs. For instance, the craftsmanship, the colours, the positioning of the motifs, and the usage of materials provide different contexts and symbolic meanings to textiles. These meanings have not been explored in the article but could be discussed by drawing on more-than-human perspectives in future research.

While there are many opportunities to explore craft-design relations through a more-than-human lens, we proposed to employ this for textiles, with traditional motif examples. However, we acknowledge that there is more to explore in this relationship than looking at the motifs. For example, the entanglement of patterns and wool fibres could also be explored through more-than-human approaches. The process of making the felted artefact also involves a non-hierarchical agency between fibres and patterns, and the result of the process is blurry, meaning it is not certain what will come out of the process, especially in handcrafting processes. This could be a starting point for makers and designers to involve posthumanist frameworks into the practice of making.

Additionally, many other case studies could be introduced for future research – within and beyond the category of textiles, employing posthumanist frameworks in craft-design relationships. Exploring human-nonhuman collaborations through different elements such as patterns, materials, or landscapes, could provide further suggestions to design for the post-Anthropocene.

Concluding Remarks

In the age of the Anthropocene, this article has highlighted how designers should question and rethink what design practices and processes can include, and how these can be shifted. A way to deal with this could be by considering more-than-human worldviews. In the article, we have explored craft-design relationships through non-Anthropocentric and non-Western frameworks. From Turkish textiles, we exemplified this through a handwoven rug, a felted beam and felted cushions that demonstrate human-nonhuman relationships. As these textiles and motifs have references from nature, we discussed how they can be reconsidered through more-than-human worldviews. From the practice and process of making, we gave examples from nomadic culture, of motifs with symbolic meanings, and how the interweaving of fibres and patterns can be considered a more-than-human activity. Furthermore, we have encouraged designers and makers to re-explore such motifs from more-than-human and multispecies perspectives. Against the background of these textile examples, we addressed the issue of human-nonhuman relationships in design, concentrating on two points. Firstly, we introduced

more-than-human perspectives and approaches as a possible way forward to answer how humans and nonhumans can better coexist in the Anthropocene epoch. Secondly, we suggested more-than-human approaches and decolonial design as ways of better approaching the nonhuman-human relation in craft-design relationships.

The study relates to textiles and sustainability issues and proposes a future research agenda for furthering such work. It could however also be applied to other fields. For example, flat ontological perspectives from non-Western approaches could be applied in other domains, such as in further developing technology-related studies. Things around us that are designed by people influence daily life just like natural entities do. How we perceive the world and conceive of natural entities could not only affect our treatment of the natural world, but it could also change our relations with other humans and nonhumans, including the earth, the materials and other beings.

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Berilsu Tarcan is a designer and researcher from Turkey, based in Norway. Currently she is researching more-than-human and design connections as a practice-based PhD candidate at NTNU, Department of Design. Previously, she worked in academia in Turkey and holds bachelors and MSc. degrees in industrial design. She is a part of design and posthumanism network. Her research interests include posthuman frameworks, craft-design relationships, handicrafts, material culture, traditional knowledge, decolonizing design.

Ida Nilstad Pettersen is associate professor at the Department of Design, Faculty of Architecture and Design, NTNU – Norwegian University of Science and Technology. She holds a PhD in design for sustainability, and her research addresses everyday practices and the role of design in climate- and environment-related societal transformations. Her research interests include consumption, human-nature relations, and participatory design.

Ferne Edwards is a cultural anthropologist who has conducted research on sustainable cities, food systems and social change across Australia, Venezuela, Ireland, Spain, Norway and the UK. Her books include the edited volumes, 'Food for Degrowth: Perspectives and Practices' and 'Food, Senses and the City' (both Routledge, 2021) and the monograph, 'Food Resistance Movements: A Journey into Alternative Food Networks' (Palgrave, 2023). Ferne is based at the University of Surrey, UK, where she contributes to the EU IA project, FoodCLIC.

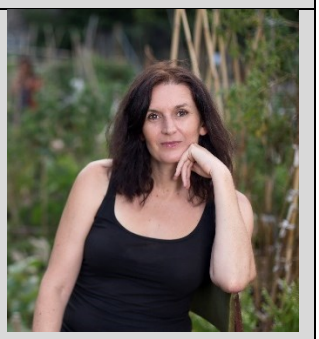

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Figure 3: An example analysis of patterns from an 18th century carpet from Konya, Turkey. The carpet is held in Vakiflar Hali Muzesi, Istanbul, as inventory nr. 102. (Source: Photo reproduced by kind permission of Kültür ve Turizm Bakanlığı).

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Do we need Artificial Pollination if we have Multispecies Justice in the Anthropocene?

Catherine Price

School of Geography, University of Nottingham, Nottingham, UK
Correspondence: catherine.price@nottingham.ac.uk
Twitter: @catherinejprice
ORCID: 0000-0003-1846-5407

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Abstract

The era we now live in is termed the Anthropocene. Climate change, land use change, pesticide and insecticide use, and pollution are all contributing to pollinator loss. To ensure food crops continue to be pollinated, artificial pollinator technologies are being developed. This article asks the question: do we need artificial pollination if we have multispecies justice in the Anthropocene? Three examples of artificial pollination technologies, Edete, Olombria, and RoboBee, are provided to help address this question. However, the companies designing and developing artificial pollination technologies do not aim to address the underlying problems of pollinator decline such as habitat loss and climate change. Addressing problems such as pollinator loss with the use of digital technology puts humanity onto the course of uncertain futures. For more just futures, there are calls for a turn towards multispecies justice. Considering pollinator loss through the lens of multispecies justice puts us on an altogether different course from that of using artificial pollination. With multispecies justice there is the potential for futures which are democratic, just, diverse, and sustainable for humans and the more-than-human world.

Keywords: Multispecies justice; insect pollinators; pollinator crisis; artificial pollination; industrialised agriculture; digital technology

Introduction

The era we now live in has been termed the Anthropocene. According to Steffen et al. (**2007: 614, emphasis in original**), the term '*Anthropocene* suggests that the Earth has now left its natural geological epoch, the present interglacial state called the Holocene. Human activities have become so pervasive and profound that they rival the great forces of Nature and are pushing the Earth into planetary *terra incognita*'. The world is changing and the alteration of the global carbon cycle, the escalating loss of biodiversity, toxic chemicals, and the depletion of water and other physical resources all illustrate how the Anthropocene is the result of humans being disconnected from the world we live in (**Bonneuil & Fressoz, 2017; Kolbert, 2014; Standing, 2019; Wright, 2017**). Environmental impacts do not affect humans and the more-than-human world equally (**Fox & Alldred, 2020**), and inequalities between humans are also widened by environmental issues.

Scientific and technological developments are also increasing in the Anthropocene. Rosi Braidotti (**2019**) argues we are positioned between the Fourth Industrial Revolution and the Sixth Extinction. The development of artificial intelligence, the Internet of Things (IoT), robotics, biotechnology, and nanotechnology are part of the Fourth Industrial Revolution and are put forward as solutions to the problems humanity faces. However, these technologies can create more problems than they solve as they can create social inequalities and deplete the Earth's resources (**Braidotti, 2019**). The Fourth Industrial Revolution is characterised by the 'bio-genetic capitalisation of all living systems, and a pervasive use of self-correcting technologies, driven by artificial intelligence' (**Ibid: 32**). The Sixth Extinction, the dying out of species as a result of human activity, is forecast to be more devastating than the previous other five (**Kolbert, 2014**). This 'slow violence' (**Nixon, 2011: 2**) of species loss is occurring gradually, going relatively unnoticed and is distributed across space and time (**Jørgensen et al., 2022**). This positioning between the Fourth Industrial Revolution and the Sixth Extinction means the human and more-than-human world is being subjected to the accelerations of both capitalism and climate change simultaneously (**Braidotti, 2019**). Continued economic growth and attempts to reduce emissions which contribute to climate change are conflicting forces which may prove impossible to strike a balance between. Disasters resulting from the conflicting forces of climate change and capitalism along with other forces are already occurring (**Tsing, 2015**). For example, with industrialised agriculture, the appetite for profits and increasing yields due to consumer demand has led to the use of excessive fertiliser and pesticide applications. This in turn threatens biodiversity, destroys soils, and can lead to super-weeds.

Before moving on, it is important to note that I use the terms wild insect pollinators and honeybees throughout the article. Wild insect pollinators are taken to be bees (e.g. bumblebees, carder bees, and leafcutter bees), moths, butterflies, hoverflies, flies, and beetles. Whilst it is noted that honeybees can be wild insect pollinators, in this article, honeybees are taken to be those which are kept in managed beehives. They are also noted separately to other insect pollinators because they are used commercially in agricultural systems and are worth hundreds of billions of dollars to the agricultural sector (**Nimmo, 2015**). This separation is not intended to privilege honeybees but to illustrate their importance in the agricultural sector for food production.

Wild insect pollinators are at risk of extinction at local and global levels because of climate change, habitat loss, land use changes, pesticide and insecticide use, pollution, and the introduction of non-native species (**Ellis et al., 2020; Memmott et al., 2007**). Climate change is altering the timing of the flowering of some plants, and this is affecting the interactions between pollinators and plants (**Memmott et al., 2007**). If there is a mismatch between plants flowering and the emergence of pollinators, the opportunity for interactions between the two are altered (**Gérard et al., 2020; Memmott et al., 2007**). This could potentially lead to the extinction of certain species of pollinators and certain species of plants (**Memmott et al., 2007**). Additionally, colony collapse disorder (CCD) has led to a rapid decline in honeybees (**Lorenz, 2016; Nimmo, 2015**). CCD occurs when adult honeybees abandon a hive even if the colony appears productive and healthy (**Lorenz, 2016**). This is not the only problem associated with honeybees. Due to inadequate breeding practices by commercial breeders, honeybees have suffered a loss of genetic diversity (**Nimmo, 2015**). This may impact the long term viability of honeybees, especially if they were to suffer from disease.

The most valuable pollinators for agriculture are honeybees (**Kevan, 1999**). In the UK, honeybee numbers have been declining over the last 20 years, and this could have serious implications for food crops which rely on insect pollination (**Breeze et al., 2011**). The importance of insect pollinators should not be underestimated. Nimmo (**2021: 14**) argues that 'insect pollinators reproduce and propagate themselves of their own volition and undertake pollination activities at no or remarkably low cost to beekeepers and farmers'. Insect pollinators carry out free work for farmers and gardeners. A third of food consumed by humans worldwide are pollinated by insects, and a further third of food products have relied upon insects for pollination at some point in the production process (**Nimmo, 2015**).

In the UK, honeybees are required for pollinating industrialised crop systems because there are insufficient wild insect pollinator numbers (**Breeze et al., 2011**). However, the decrease in wild insect pollinator numbers has arisen because of industrialised agriculture and the associated heavy use of insecticides and pesticides (**Ellis et al., 2020; Goulson, 2020; Lorenz, 2016**), habitat loss, climate change, non-native invasive species, the spread of diseases, and light pollution (**Goulson, 2020**).

Whilst declining wild insect pollinator numbers could be seen as a problem of collapsing biodiversity, Nimmo (**2021: 7**) points out that the 'pollinator crisis is inscribed as a delimited economic problem of markets, prices, labour and production'. Without honeybees or wild insect pollinators, humans would have to take over and hand pollinate crops. This practice already takes place. Since the 1980s, apple trees have been hand pollinated in Sichuan Province, China, due to the decline in pollinator numbers caused by habitat loss and the overuse of pesticides (**Partap & Tang, 2012; Price, 2022a**). In the UK alone, hand pollination would cost £1.8 billion a year (**The Wildlife Trusts, 2022**). However, instead of dealing with the problem of collapsing biodiversity, the answer is to look for technological solutions to ensure food crop pollination continues. Declining numbers of honeybees and wild insect pollinators has led to the development of artificial pollination techniques in an attempt to prevent the need for human intervention.

This article examines what the future may hold for insect and artificial pollinators. To investigate possible futures, I ask the question: do we need artificial pollination if we have multispecies justice in the Anthropocene? In the next section, I introduce three emerging artificial pollination technologies. I then discuss industrialised agriculture and the pollinator crisis, before moving on to entanglements and pollination. The discussion then moves to humility, multispecies justice and pollinator loss, before I turn my attention to how we can rethink food crop pollination with multispecies justice. The article concludes arguing that the use of digital technology such as artificial pollination does not address declining insect pollinator numbers. This puts us onto the course of uncertain futures. With a turn to multispecies justice, there is the potential for futures which are democratic, just, diverse, and sustainable for humans and the more-than-human world.

Artificial Pollination Technologies

Humans depend on insect pollinators for the pollination of many food crops. With the pollinator crisis and the decline of insect pollinator numbers, artificial pollination is proposed as a potential solution. Chechetka et al., describe artificial pollination:

> *There is currently substantial interest in understanding and designing bio-inspired robotics, to command naturally occurring properties such as morphologies, movements, and control mechanisms in artificial settings in order to improve performances. Recent advances in bio-inspired robotics promise to bridge the performance gap with respect to animals. Among the various bio-inspired robots being developed, aerial robots represent a class of emerging robotics with the expectation of solving the issues arising from the global decline in the population of honeybees, which are normally involved in the pollination of plants.* (**Chechetka et al., 2017: 224**)

This quote by Chechetka et al. illustrates how artificial pollination is put forward as a solution for addressing the pollinator crisis. I now provide three examples of artificial pollination technologies. These are all different, but all require digital technologies.

The first example is the Edete pollen harvester. This is an artificial pollination service which mirrors the work of honeybees by collecting and distributing pollen. Step 1 is pollen harvesting and is carried out in the following way:

> *(1) Edete mechanically harvests flowers, (2) separates the pollen from the flower, (3) then stores the viable and germinable pollen for more than one year using our proprietary method, overcoming the problem of desynchronization of different cultivars' blooms. (4) Ensures fertilization and fruit setup by matching the best pollinizer with each commercial variety regardless of the timing of their bloom, guaranteeing, and even increasing, crop yield.* (**Edete, 2021**)

Step 2 is pollen distribution:

> *During blooming, the stored pollen is loaded into Edete's proprietary high-efficiency artificial pollinator which disperses dry pollen on the trees. The 2Btm pollinator uses LIDAR sensing to algorithmically reach as near as required to each tree contour, and use electrostatic deposition onto the targeted flowers. Edete's 2Btm mechanical pollinator units can operate day and night, rapidly and thoroughly covering any open flower in its range and are not limited by daylight or low temperatures conditions.* (**Edete, 2021**)

This technology has been used successfully by almond growers in the USA and Australia, with artificial pollination fertilisation increasing yields (**Edete, 2021**). The company puts the technology forward as a solution for crop pollination following the decline in wild insect pollinators and honeybees, and any mismatches between plants flowering and the emergence of insect pollinators due to climate change.

The second example is a different type of artificial pollination which is being developed by Olombria in the UK:

> *Olombria encourages flies to be more efficient pollinators, in scenarios where bees are no longer as viable. Flies are already adept pollinators, being the main pollinators in urban environments, and in total, accounting for over 30% of all pollination.*
>
> *Olombria provides horticultural growers with information on pollinators and environmental conditions and uses chemical volatiles to manage pollinating fly species, thereby increasing crop productivity, and ensuring sustainable food harvests for the future.* (**Olombria, 2021**)

Agri-TechE describes the flies as being easily bred and because they die at the end of each season, they require little care. Olombria is also working with organisations in the UK to further enhance the artificial pollination technology:

> *Olombria is working with leading agricultural research organisations including Imperial College, Rothamsted Research, and NIAB-EMR to develop an Internet-of-things (IoT) system consisting of a network of small nodes spread throughout an orchard. The nodes collect data and curate the behaviour of flies in the field. Olombria aims to work with natural systems to manage and support rather than exploit local ecosystems.* (**Agri-TechE, 2021**)

Olombria is a technology which manipulates the behaviour of flies in order to manage crop pollination. The company has developed this technology as a solution for crop pollination due to declining wild insect pollinator numbers caused by pesticide use, climate change, and pathogens.

The third example are RoboBees which are being developed by the Wyss Institute at Harvard University. These miniature robots could be used for crop pollination along with weather, climate and environmental monitoring. The RoboBee consists of three components which are the body, brain and colony. The construction is described by the Wyss Institute as follows:

> *Body development consists of constructing robotic insects able to fly on their own with the help of a compact and seamlessly integrated power source; brain development is concerned with "smart" sensors and control electronics that mimic the eyes and antennae of a bee, and can sense and respond dynamically to the environment; the Colony's focus is about coordinating the behaviour of many independent robots so they act as an effective unit.* (**Wyss Institute, 2021**)

These RoboBees are being designed to fly in a swarm, with hundreds or thousands completing a task (**Harvard Magazine, 2017**). This requires complex programming to ensure the RoboBees are all completing the same task. There is potential for RoboBee to be used for crop pollination.

These three examples of artificial pollination technologies are all designed to carry out the work of insect pollinators. Whilst natural ecosystems are failing, the agricultural industry could be looking at approaches to reduce agrochemical inputs. In the UK, agrochemical use has been central to changes in how agricultural land is farmed and has contributed to declining biodiversity (**Lang, 2021**). The Pesticide Action Network UK (PAN-UK) is the NGO that monitors pesticide use and impact in the UK. They point out that since 1990, the amount of land treated with pesticides has increased by 63%, while the number of times farmland is treated with pesticides has almost doubled. For example, a UK potato crop is sprayed 32 times (**Pesticide Action Network UK, 2022**). This has had a detrimental impact on insect numbers. In the UK, there are now 50% fewer insects than in 2005 (**Goulson, 2020**). Instead of addressing these issues, there is a turn to artificial pollination technologies designed to replace insect pollinators. Artificial pollination is engineered to overcome the collapse of natural systems, but fails to address the fundamental and underlying issues of pollinator loss including climate change, habitat loss, land use changes, pesticide and insecticide use, pollution and the introduction of non-native species.

Industrialised Agriculture and the Pollinator Crisis

The systems which established and maintain industrialised agriculture are at the heart of the pollinator crisis. It is these systems which exploit nature. This is illustrated by honeybees who are already commodified (**Cilia, 2019; Ellis et al., 2020; Nimmo, 2015, 2021**). Honeybees and wild insect pollinators are seen as a technology in agricultural production as opposed to insects in ecosystems threatened by an ecological crisis (**Nimmo, 2021**). As Nimmo (**2015: 5**) argues, 'the role of technology in industrialised animal agriculture is grasped as a means to enable ever more precise and totalising control over the animal's body and its bodily activity in the interests of increased productivity, efficiency, and profitability'. Honeybees and wild insect pollinators are part of this industrialised system

of productivity, efficiency, and profitability. As Braidotti (**2002: 126**) points out, animals are used and treated as an 'industrial production plant' and are often used as 'prototypes for engineering'. This is certainly the case as the examples of Edete and RoboBee described in this article mirror insect pollinators. Discussing ants, Braidotti (**2002**) explains how these insects are portrayed in books and films as industrious workers or as prototypes of industrial robots. This is why insect pollinators are so important for agriculture. It is because they are industrious workers. Without these pollinators, the food system would collapse.

Another problem with industrialised agriculture is the commodification of life and the complexities this brings. To illustrate this, I turn my attention very briefly to commodified seeds. Commodified seeds, especially those which are gene edited or genetically modified, are produced through technological processes (**Price, 2022a; Shiva, 2016**). These commodified seeds reduce biological diversity as well as dispossessing farmers of their seed rights (**Shiva, 2016**). The way in which commodified seeds are produced means farmers have to purchase new seed every year from seed providers, and are forced into monoculture farming where only a single crop type is grown (**Moore, 2015, Vasavi, 1994**). Commodification is problematic because it concerns power and control. The power and control associated with monocultures is a form of ecological violence and is a 'declaration of war against nature's diverse species. The violence not only pushes species toward extinction, but controls and maintains monocultures themselves' (**Shiva, 2016: 102**). A diversity of crops and crop varieties are lost (**Moore, 2015; Patel, 2013**). Monoculture crops are also where agrochemicals are widely used (**Moore, 2015; Shiva, 2016**). Besides biodiversity loss, commodification and the owning of life also removes agriculture from its broader social, cultural and environmental functions (**Thivet, 2014**). As Vasavi (**1994: 294**) argues, where commodification occurs 'it largely displaces the local knowledge and autonomy of agriculturalists and substitutes the uniform and market-oriented prescriptions of the bureaucracy'. In the case of commodified seeds, farmers are prevented from saving, using, selling, and exchanging seeds (**Shiva, 2016; Thivet, 2014; Vasavi, 1994**). Instead of local communities shaping food systems, it is corporate actors (**Clapp, 2022**).

Artificial pollinators are similar to commodified seeds. Patents to these pollination technologies belong to the companies who develop and design them. Without insect pollinators, power and control of crop pollination lies with those who develop and design artificial pollinators. The companies designing and developing artificial pollination technologies do not aim to address the underlying problems of insect pollinator decline such as habitat loss and climate change (**Price, 2022a**). Not addressing insect pollinator decline means artificial pollination will likely be required.

Sustainability can imply continuity and survival in agriculture (**Lang, 2021**). Artificial pollination is a digital technology that falls under the remit of the fourth agricultural revolution or Agriculture 4.0 (**Barrett & Rose, 2020; Klerkx et al., 2019; Klerkx & Rose, 2020; Price, 2022a; Rose & Chilvers, 2018**). The technological solutions developed as part of Agriculture 4.0 are changing the manner in which problems are dealt with. Artificial pollination is particularly complex.

The choices made by farmers will depend on how problems are framed and how uncertainties are dealt with. Scoones and Stirling make an eloquent point about uncertainties:

> *Too often, ideas of transformation and sustainability are framed around particular, expert-defined "solutions", with uncertainties blanked out. Typically asserted with great confidence, burgeoning notions around, for example, "smart cities", "climate-smart agriculture", "clean development", "geo-engineering", "green growth" or "zero-carbon economies" act to suppress appreciation of many forms of uncertainty.* (**Scoones & Stirling, 2020: 1**)

With agriculture, there is the uncertainty of a lack of honeybees or wild insect pollinators to pollinate crops. Uncertainties can create anxieties, fear, and concerns (**Scoones and Stirling, 2020**). Pollination is an area where uncertainties could be amplified especially in relation for the need for pollination of food crops. Artificial pollination could be used to address the uncertainties surrounding pollination. However, it is important to recognise the uncertainties surrounding pollination have been created by humans. By not addressing the problems creating these uncertainties, technological solutions will be required. As Jasanoff (**2021: 846**) argues, it is difficult to 'roll back behaviours that had for so long treated nature mainly as a resource for satisfying the hunger of human wants'. This is why there are pollinator declines. Nature has been exploited to ensure human survival.

From a techno-fix perspective, ensuring the continued survival of humans means artificial pollination will be required. However, if the emphasis is on science and technology to provide solutions to problems, innovation and progress tends to focus on who is leading the way and who must catch-up rather than who is gaining and who is losing from new innovations (**Scoones & Stirling, 2020**). Solving a problem with a technical approach involves a singular pathway of technological progress (**van Zwanenberg, 2020**). Proceeding with artificial pollination could potentially mean abandoning the idea of trying to address the pollinator crisis. In industrialised agriculture, insect pollinators are valued only for their pollination function and for the benefits they bring to humans as opposed to the pollination role they play in ecosystems and the plant-insect

interactions necessary for sustaining life (**Nimmo, 2021**). If insect pollinators are only valued for the benefits they bring to humans, it is easier to turn to a digital technological solution. This idea of abandonment may be further enhanced when you consider technology can potentially 'reduce costs, restore reliability, and increase productivity and profitability' (**Nimmo, 2021: 8**). If artificial pollination increases industrialised agriculture's productivity and profitability, it is likely to be adopted by large scale farming operations. This may disenfranchise farmers with small agricultural operations especially as they may have skills unsuited to working with digital technologies, a lack of capital, and be situated in rural areas which lack infrastructure (**Price, 2022a**). Digital technologies such as artificial pollination may reinforce existing power structures (**Rose et al., 2022**).

The pollination of crops is a concern for farmers. The decline in honeybees and wild insect pollinators is a problem that requires solving. However, it is also important to consider who is providing solutions to problems such as pollinator loss. Jasanoff (**2021: 850**) argues that 'engineers still conceive of big technological solutions for big problems'. This is why the route to solving a problem is often technological. The problems 'that get chosen and solutions that are offered reflect the values of the people involved in innovation' (**Stilgoe, 2020: 33**). These innovations will not always benefit the needs of society or the environment. Who actually benefits is exacerbated when technologies are developed. Technologies are not independent of social influences, and human values enter into the design and use of technologies (**Jasanoff, 2016**). The designers of artificial pollination technologies will be bringing their own values to the table. This means that moral codes are developed for technological systems with public values catching up later (**Ibid**). What needs to be asked is: do farmers want artificial pollinators to replace honeybees and wild insect pollinators? Or do they want to try and avert the decline of honeybees and wild insect pollinators?

Entanglements and Pollination

Entanglements between the more-than-human world and humans are essential for agriculture if food is to be successfully grown or reared. Anna Lowenhaupt Tsing (**2015**) in the book, *The Mushroom at the End of the World*, describes how agriculture consists of polyphonic assemblages with rhythms between plants, animals, humans, climate, weather, seasons, and daylight. There are relationships between plants and pollinators, sowing and harvesting. What happens when these rhythms are interrupted by artificial pollination? Who is controlling pollination? In trying to answer these questions, it is useful to refer to Karen Barad and Donna Haraway.

If farmers become reliant on artificial pollination, then entanglements alter. Artificial pollination means turning to machinic labour. The reconfiguring of labour is alluded to by Barad who suggests:

> *Machinic agency is part of the ongoing contestation and reconfiguring of relations of production. The point is not that management and workers become cyborgs in their relationship to machines, but rather the point is that machines and humans differentially emerge and are iteratively reworked through specific entanglements of agencies that trouble the notion that there are determinate distinctions between humans and nonhumans.* (**Barad, 2007: 239**)

A cyborg is a rejection of the boundaries which separate human from other species and humans from machines. Cyborgs are organisms when concerned with labour and communication, humans when involved with the practices and objects of technoscience, and machines with connections to information and systems (**Haraway, 2016**). With artificial pollination, power moves away from the systems found on Earth which exist within and between ecosystems, and instead moves to technological systems. The rhythms which once existed between pollinator and crop are replaced by a new rhythm between the farmer, the crop and artificial pollination. It is the algorithms controlling the artificial pollination technologies that become responsible for crop pollination. Power lies with the algorithms.

Addressing problems such as pollinator loss with the use of digital technology puts humanity onto the course of uncertain futures. There is no reconciliation between the human and more-than-human entanglements present on Earth (**Lorimer, 2017**). Instead of acting with humility, the favoured response is hubris (**Bonneuil & Fressoz, 2017; Jasanoff, 2021**) as nature is replaced by digital technology. The Earth becomes 'simply a cybernetic machine, rather than a dynamic becoming and a history' (**Bonneuil & Fressoz, 2017: 86**). The high speed modification of Earth through technological interventions also means the slow violence of ecological degradation which harms both humans and the more-than-human world (**Nixon, 2011**). Insect pollinators are one part of this ecological degradation. Biodiversity loss and ecological degradation is troubling. Conditions such as the temperature or the ecosystems found on Earth act as boundaries for humans' existence (**Chakrabarty, 2009; Liboiron, 2021; Morton, 2013; Rose et al., 2017**). There are nine key Earth processes which act as planetary boundaries. These are changes to the climate system, land use, biodiversity loss, freshwater availability, the biogeochemical cycles of nitrogen and phosphorus, stratospheric ozone depletion, aerosol loading, ocean acidification, and novel entities (**Rockström et al., 2009; Sage, 2022a; Steffen et al., 2015**). Whilst the

thresholds of these planetary boundaries are seen as the limits of safe operating space for human societies (**Rockström et al., 2009; Steffen et al., 2015**), I argue these should also been seen as the thresholds for the limits of safe operating spaces for the more-than-human world. Humans are now disrupting and destabilising these parameters.

Humility, Multispecies Justice and Pollinator Loss

An altogether different future is possible if humans act with humility. I briefly explain why humility is important before explaining what humility means for the pollinator crisis. The term 'Anthropocene' is troubling for Bonneuil and Fressoz (**2017: 71**) because it masks 'the great differentiation of responsibilities and incidences between the classes, sexes and peoples'. This in turn impacts the solutions which are put forward in order to address issues such as climate change, biodiversity loss and ecological destruction. In addressing these fundamental issues, I will argue that the turn needs to be made towards humility. This means recognising and acknowledging there is much for western cultures to learn. For example, the binary distinction of humans and non-humans and nature and culture which are central to European thought, do not feature in many other cultures (**Braidotti, 2020**). The binary between nature and culture means that scientific knowledge dominates and traditional knowledges are swept aside (**Haraway, 1988; TallBear 2014**). As TallBear (**2011**) argues, 'for many indigenous peoples, our nonhuman others may not be understood in even critical western frameworks as living'. Inanimate objects and natural forces including stones, trees, and thunder are important to Indigenous communities (**Nadasdy, 2007**). This connection with the world means that Indigenous peoples 'often see themselves as participating in cultural and political systems that, from hundreds even thousands of years of experience, are explicitly designed to adapt to environmental change' (**Whyte, 2017: 102**). These cultural and political systems enable landscapes to be cultivated, ensuring sustainability whilst also maintaining resilience against environmental change (**Whyte, 2018a, 2018b**).

Dismissing Indigenous knowledge when addressing problems such as climate change or biodiversity loss is counterproductive. Western scientific thinking has a lot to learn from Indigenous knowledge making practices. Indigenous Environmental Studies and Sciences (IESS) is an emerging field which focuses on Indigenous 'historical heritages, living intellectual traditions, research approaches, education practices, and political advocacy to investigate how humans can live respectfully within dynamic ecosystems' (**Whyte, 2018a: 138**). In building resilience, emphasis is placed on responsibility, justice and spirituality. By considering alternative knowledges alongside scientific knowledge, humans can act with humility.

The research of Fikile Nxumalo with preschool children on understanding declines of Western bumble bee populations and bee deaths shows how we can learn with other species (**Nxumalo, 2018, 2020**). This work took place with preschool children from Greater Vancouver on unceded Coast Salish territories in British Columbia, Canada. Nxumalo (**2020**) argues that if children's learning is only centred on Western scientific knowledge, bees are considered as 'workers' and are required for pollination for crops for settler humans, and can lead to the erasure of Indigenous knowledge which sees bees and Indigenous people in complex and entangled relationships. Instead, if children learn with bees, they are more attuned to the world they have inherited and the issues contributing to pollinator decline (**Nxumalo, 2018**).

Being attuned to the world means being present in the moment. With this in mind, when navigating problems such as pollinator loss, it is useful to turn to Haraway's discussion on staying with the trouble. This idea is particularly pertinent with pollinator decline:

> *In urgent times, many of us are tempted to address trouble in terms of making an imagined future safe, of stopping something from happening that looms in the future, of clearing away the present and the past in order to make futures for coming generations. Staying with the trouble does not require such a relationship to times called the future. In fact, staying with the trouble requires learning to be truly present, not as a vanishing pivot between awful or edenic pasts and apocalyptic or salvific futures, but as mortal critters entwined in myriad unfinished configurations of places, times, matters, meanings.* (**Haraway, 2016: 1**)

Staying with the trouble means taking moral responsibility and acknowledging humans and the more-than-human world are in difficult and troubling times. It is not about preventing something from happening or imagining safe futures. Staying with the trouble means ''We'-who-are-not-one-and-the-same-but-are-in-this-convergence-together' (**Braidotti 2019: 182**) rely on one another in unexpected collaborations and entanglements. Staying with the trouble also means we enact response-ability. Response-ability is about 'absence and presence, killing and nurturing, living and dying' (**Haraway 2016: 28**). Response-abilities need to be shared. This enables humans to confront and respond to uncertainties (**Scoones & Stirling, 2020**). Living with pollinator loss means response-ability needs to be enacted. It is important that 'response-abilities toward "others" with whom we are bound together, visibly or not, in everyday practices of production, consumption, and reproduction' are nurtured so that the world changes (**Tschakert et al., 2021: 6**). Enacting response-ability means employing and engaging with fundamentally

different ways of knowing, thinking and being (**Celermajer et al., 2021**) whilst always trying to do better (**Haraway, 2016, 2018**). Response-ability means dismissing the belief that humans are superior and attending to imaginings that are sympathetic to humans and the more-than human world (**Celermajer et al., 2021; Tschakert et al., 2021**). Insect pollinators need to be recognised as being just as important as humans. One approach to enact response-ability is to consider multispecies justice.

There are already scholars arguing for justice to be addressed through a multispecies lens (**Celermajer et al., 2020; Celermajer et al., 2021; Chao, 2021; Chao et al., 2022; Haraway, 2018; Roy, 2018; Tschakert, 2020; Tschakert et al., 2021**). For Tschakert et al. (**2021: 4**) multispecies justice means 'shifting the focus and subject of justice from the individual and exceptional human being to a wide range of living and non-living entities, and their interactions and processes. Such a relational approach acknowledges the differential histories and practices of environmental and ecological violence while opening pathways toward more just, even if uncertain, futures'. Although uncertain, these futures have the potential to offer hope for multispecies flourishing (**Kirksey & Chao, 2022**). This approach will help humans ethically navigate the problems facing the world, including the pollinator crisis.

Rethinking Food Crop Pollination with Multispecies Justice

Thinking through pollinator loss through the lens of multispecies justice puts us on an altogether different course from that of using artificial pollination. With multispecies justice, honeybees and wild insect pollinators are considered just as important as humans. Instead of saving insect pollinators purely for the survival of humans, insect pollinators are saved because they are considered important in their own right. Multispecies justice for honeybees and wild insect pollinators requires rethinking how our food is produced. As Tim Lang (**2021: 243**) argues: 'The future of food security requires nature to be protected by food production as well, not despite it'. Industrialised agriculture has enabled cheap food to be produced through cheap labour, care, raw materials and energy (**Patel & Moore, 2020**). This has led to food outputs being maximised in the short-term, but has created less resilient and more fragile food systems (**Standing, 2019**).

In the UK, farming organisations are reassessing approaches to agriculture. Although the emphasis is on addressing climate change and reaching net zero in the agricultural sector, The National Farmers Union is looking towards land sparing (**Ward, 2023**). This is likely to enable land to be given over to other uses such as planting trees or wildflower meadows which would benefit wildlife (**Lang, 2021; Sage, 2022b; Ward, 2023**). An alternative approach is suggested by the Food, Farming and Countryside

Commission (**2022**) which is a move to agroecology. The Food and Agriculture Organisation of the United Nations (FAO) define agroecology as:

> *A holistic and integrated approach that simultaneously applies ecological and social concepts and principles to the design and management of sustainable agriculture and food systems. It seeks to optimize the interactions between plants, animals, humans and the environment while also addressing the need for socially equitable food systems within which people can exercise choice over what they eat and how and where it is produced.* (**FAO, 2022**)

Not only is this approach endorsed by The Food, Farming and Countryside Commission, but also the Food Ethics Council (**2022**). There is the potential for multispecies justice to be enacted due to the principles of agroecology. Colin Sage outlines four of the principles of agroecology:

1) Diversity: a diversity of plant and animal species and varieties, intercropping, and crop rotations. The enhancement of ecosystem services including pollination and soil health. The simultaneous cultivation (polyculture) of different crops.

2) Knowledge: knowledge tailored for local situations so it is context-specific. The co-creation of knowledge and knowledge exchange.

3) Efficiency: the avoidance of external inputs such as chemical fertilisers and agro-chemicals. Integrated pest management replaces chemical pesticides, and planting legumes fixes nitrogen in the soil mitigating the need for chemical fertilisers.

4) Circular and solidarity economy: local markets are prioritised and local economic development is supported. (**Adapted from Sage 2022b: 24 – 25**).

Whilst Sage (**2022b: 24**) states that 'agroecology restores the essential connection between food, people, and place', it is also possible to see how the entanglements between humans and insect pollinators can be restored. Insects (both pollinators and non-pollinators) are foregrounded as essential to healthy and resilient food systems. Although healthy and resilient food systems speak as though humans are favoured, it is never possible to set humans apart from the more-than-human world (**van Dooren, 2017**). As Anna Tsing (**2012: 144, emphasis in original**) notes: '*Human nature is an interspecies relationship*' with 'varied webs of interspecies dependence'. Humans cannot survive without the more-than-human world.

Whilst humans need insect pollinators for food crop pollination, insect pollinators are also needed by wild plants. 80% of European wildflowers are dependent on insect pollination (**Friends of the Earth, 2022**). Once pollinated, plants and trees will set seed, providing food and habitat for other species. These different forms of life are entangled in knowing and living together (**Rose et al., 2017**). Industrialised agriculture has broken these entanglements of life through the chemical control of perceived pests and diseases (**Paredes, 2022**), and land use change resulting in habitat loss (**Moore, 2015**). Changes to the way our food is produced are needed if the pollinator decline is to be halted. If we do not, we are likely to be facing extinction events with some of our insect pollinators (**Rose et. al., 2017**).

Although futures may be uncertain, they are less likely to be unjust when applying a multispecies approach to problem solving. There is also the opportunity to address ecological degradation which pollinators are part of. Addressing pollinator loss through a multispecies approach means acknowledging the harms (**Celermajer et al., 2020**) that have been caused to honeybees and wild insect pollinators through the heavy use of insecticides and pesticides, habitat loss, climate change, non-native invasive species, the spread of diseases and light pollution. Once these harms are acknowledged it is then possible to move forwards with an approach that helps navigate the pollinator loss crisis. A more ethical and just future can be built when we understand the processes and the ties which unite humans and insect pollinators. Whilst industrialised agriculture has caused a decline in honeybee and wild insect pollinator numbers, by enacting response-ability, pollinators can be helped to recover. Rethinking how our food systems operate to include approaches such as agroecology could enable response-ability to be enacted and encourage multispecies flourishing.

Conclusion

In the introduction of this article, I asked the question: do we need artificial pollination if we have multispecies justice in the Anthropocene? I have shown that declining pollinator numbers is a catastrophe for both the human and more-than-human world. The entanglements of life have been broken by industrialised agriculture through the chemical control of perceived pests and diseases (**Paredes, 2022**), and land use change resulting in habitat loss (**Moore, 2015**). This has contributed to the decline in honeybee and wild insect pollinator numbers. Industrialised agriculture has exploited ecosystems to such an extent that eventually they will no longer support human survival (**Moore, 2015**). However, due to the overexploitation of ecosystems, artificial pollination should not be viewed as a silver bullet. Questions still need to be addressed. What happens if we

proceed with digital technologies such as artificial pollination which do not address the issues causing insect pollinator loss? Can we effectively find solutions for the collapse of natural ecosystems if artificial pollination appears to fill the gap of missing insect pollinators?

Whilst artificial pollination could present a solution to pollinating food crops due to declining insect pollinator numbers, we should not overlook why this problem is arising. Looking to the problem of industrialised agriculture could help us save our insect pollinators and address the pollinator crisis. We should be trying to solve the problems which are causing insect pollinators to decline before turning to digital technology. Artificial pollination should be a technology of last resort.

Addressing problems such as pollinator loss with the use of digital technology puts humanity onto the course of uncertain futures. Artificial pollination could potentially mean abandoning the idea of trying to reduce honeybee and wild insect pollinator decline. In this scenario, human survival is the important outcome and this is achieved by ensuring food crops will be pollinated. In order to eliminate the need for hand pollination by humans, artificial pollination technologies such as Edete, Olombria, and RoboBee are being developed.

An alternative future could be achieved if we turn to multispecies justice as this would enable 'us to reimagine our futures and transitions to these futures, ensuring they are just, democratic, diverse and sustainable for both humans and the more-than-human world' (**Price, 2022b: 542**). This would mean that changes to the way food is produced would need to occur. In the UK, farming organisations are already reassessing approaches to food production. One suggestion is a move to agroecology (**Sage, 2022b**). By adopting this approach, the broken entanglements resulting from industrial agriculture could potentially be restored. Food systems could become more healthy and resilient and there is the potential to halt the decline of wild insect pollinators and honeybees. Because it is never possible to set humans apart from the more-than-human world (**van Dooren, 2017**), changes to agricultural production systems are required in order to prevent ecosystem failures which would be catastrophic for both the human and more-than-human world.

Finally, humanity is at a crossroads and faces a choice. Humanity continues on its current path or it turns towards humility and multispecies justice whilst acknowledging previous mistakes. It considers not only the inequalities which exist in the human world but also those that exist between the human and more-than-human world. Addressing the insect pollinator crisis with humility and multispecies justice would be a better path to take. Instead of a world without insect pollinators, there is hope for multispecies flourishing.

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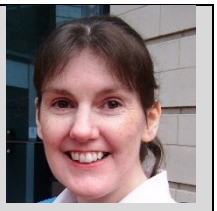

Catherine Price is a Research Fellow in the School of Geography, University of Nottingham. Her research interests include climate change and just transitions to low carbon societies, the social and ethical impacts of agricultural technologies, and relationships between humans and more-than-human worlds. She leads the British Academy funded project, *The Anthropocene and More-Than-Human World Writing Workshop Series*.

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Title Corals, Geo-Sociality, and Anthropocene Dwelling

Justin Westgate

Independent researcher, Auckland, New Zealand
Correspondence: jw@justinwestgate.com
Twitter: @justin_westgate
ORCID: 0000-0001-5537-7030

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Abstract

Foreboding reports of the Australian Great Barrier Reef's peril signal not only a fraught politics but the site's significance as a potent global environmental imaginary and Anthropocene signifier. In this paper I draw on the site's ecological emergency and consider what humans could learn from coral life through its evolved fluid-dynamic and planetary relationships. Corals, I argue, offer novel insight into more-than-human ontologies, revealing constitutively solid-fluid ways of being responsive to planetary flux and churn. The research responds to increased interest with multi-disciplinary more-than-human investigation of the ways in which human and nonhuman are inextricably connected, as well as work taking Anthropocene ideas as a generative epistemological and ontological opening.

Drawing on fieldwork in Cairns and on the Great Barrier Reef itself, I use embodied methods to trace encounters both above and below the water. The properties of water and fluidity lead me to contemplate further qualities that liquid and ocean phenomena bring to understanding planetary sociality, revealing a dimensionality and relationality beyond surface and fixed readings. Paradoxically, whilst corals and the Great Barrier Reef are commonly framed as needing our protection, they demonstrate enduring structural resilience and tenacity. Such qualities are highly relevant in contemplating strategies responsive to Anthropocene instability and flux.

Keywords: Great Barrier Reef; corals; geo-sociality; Anthropocene

Introduction

Foreboding reports of the Australian Great Barrier Reef's peril signal not only a fraught politics but the site's significance as a potent global environmental imaginary and Anthropocene signifier. Threats such as pollution, overuse, invasive species, and warming ocean temperatures have severely impacted Reef health. Where public discussion focuses on alarming reports of the Reef's 'death' (**Jacobsen, 2016; Wright & Watson, 2018; Purkis, 2021**), marine scientists argue the need for transformative marine ecosystem thinking and governance responsive to unprecedented Anthropocene conditions (**Morrison et al., 2020**). In this paper I focus on the Great Barrier Reef's disturbance with a different aim, drawing on more-than-human ontologies and the mutable qualities of corals and pelagic life as a way to think through ideas of solid-fluid materialities and planetary geo-sociality.

The Anthropocene is a proposed geological epoch superseding the Holocene, in which the activity of some humans is argued to have significant planetary influence (**Crutzen & Stoermer, 2000; Crutzen, 2002**); disrupting biochemical cycles, altering the distribution of living organisms, impacting biodiversity, and creating material shifts in the stratigraphic record. This idea importantly brings earth system thinking into relationship with planetary-scale human activity. Beyond its geo-physical ambit, the Anthropocene has profound implications for social thought both unsettling and provocative. It poses profound questions for the figure of the human, 'its composition, its presence, its figuration' (**Latour, 2018, 85**), challenging conceptions of what humans are and what they are capable of as 'planetary creatures' (**Spivak, 2003: 73**) – able to induce geological-scale impacts. However, it is argued that 'we lack the stories, theories or concepts fit for the task of what it means for human agents to find themselves behaving like Earth or cosmic forces' (**Clark & Szerszynski, 2020, 16**). The Anthropocene, therefore, presents both a provocation and opportunity to think life through the Earth and to rethink and reimagine ways of human being, and with reconfiguring the human relationship with the non-human world.

This research responds to cultural dimensions of Anthropocene inquiry, taking critical interest in wider philosophical, cultural, and political implications. It does so by engaging with environmental humanities, a field of investigation which operates across disciplinary boundaries focusing on the human relationship with the non-human world encompassing modes of perception, cultural framings, systems and measures of value, imaginative and creative production, and emotional and affective responses (**Castree, 2014: 234**). Within this field, Anthropocene disturbances are further evidence for challenging dominant modes of

thinking about and investigating the world, serving as reminder of the significant more-than-human agencies and constitutional relationships (**Instone & Taylor, 2015: 139**; **see also: Whatmore, 2002; Haraway, 2008**). Influenced by feminist ideas drawn into ecological concerns (**Murphy, 2011: 580**), environmental humanities work returns an epistemological efficacy to the body and to affective qualities of being human in a world which seeks to render it precarious; as well, seeking to better elucidate fundamental relations between humans and the more-than-human world (**Mickey, 2016; Adams, 2019**).

More specifically, this article draws on cultural-geographic engagement with vital materialisms, the more-than-human, and the geo-planetary. Such a combination is due to the unique and hybrid qualities of coral life. Corals have a fundamental relationship with water and ocean currents, and it is in aquatic environments that they collectively fabricate huge reef assemblages which serve as significant ecological sites. However, reefs are substantively *geological*: large and durable enough to become topographical features. Reef ecosystems are also highly sensitive to planetary climate fluctuations – hence concern for the Great Barrier Reef's health alongside other reef systems around the globe.

Vitalism is a philosophy that recognises the intrinsic matter-energy of the nonhuman world. Inspired by the material turn, which focused attention on objects and materiality, geographers have attended to the vibrant, creative, and inventive qualities of matter (**Braun, 2008; Bennett, 2009; Whatmore, 2006; Bingham & Hinchliffe, 2008; Anderson and Wylie, 2009**), and its capacity to actively contribute to the constitution of the world (**Greenhough, 2010**). The Anthropocene's formal definition is predicated on human planetary mattering, that is through significant distribution of carbon, concrete, plastics, or radioactive isotopes and the like serving as geological indicators. More profoundly, though, Anthropocene ideas decentre the figure of the human from any presumed exceptionalism through agency or composition. Constitutively humans are not *just* human but entangled with webs of non-human life, matter and agencies.

The 'more-than-human' proposal was intended to capture those worlds both encompassing and surpassing human boundaries, integrating complex webs of interdependencies between innumerous beings that share terrestrial dwelling (**Abram, 1996**); ultimately expanding and reconfiguring the human-nature dichotomy prevalent in Western intellectual thought. More-than-human research is broad and influenced by ideas that cut across disciplinary boundaries, including, for example, post-phenomenology (**Ash & Simpson, 2016**), actor-network theory (**Latour, 2005**), non-representational theories (**Thrift, 2008**), assemblage

theory (**DeLanda, 2006**), new and vital materialism (**Coole & Frost, 2010; Bennett, 2009**); eco-feminisms (**de La Bellacasa, 2017; Tsing, 2015**), and post-humanisms (**Haraway, 2008; 2016**). Such interest in the 'livingness' of the non-human world (**Choi 2016**) has resulted in wide engagement with the more-than-human, leading geographers to challenge prevalent humanist approaches to nature-society relations. Themes have included biosecurity (**Bingham, 2006; Buller, 2008; Hinchliffe and Bingham, 2008; Greenhough, 2012**), food (**Stassart & Whatmore, 2003; Hayes-Conroy and Martin, 2010**), animal geographies (**Cloke and Perkins, 2005; Bear and Eden, 2011; Barua, 2014**) and conservation (**Hinchliffe, 2008; Lorimer and Driessen 2013; Lorimer 2015**).

Significant for this article is a parallel strand of more-than-human Anthropocene inquiry concerned with essential *planetary* relationships. As Nigel Clark and Bronislaw Syzersynski (**2020**) argue, humans, fundamentally, are *geo-social* subjects not just dwelling on the planet's surface but intimately enmeshed within geo-material and -temporal dynamics. The Earth, they remind us, possesses a *planetary multiplicity*: is highly dynamic, with real-world physical systems having the potential to shift between wide-ranging operating states. To better understand human nature, and to formulate alternative strategies for navigating inconstant Anthropocene conditions, we must look 'beyond conventional terrain of the social, through the contact zone of human and nonhuman process, and deep into the times and spaces of the Earth itself.' (**Clark & Syzersynski, 2020: 4**)

The Anthropocene therefore foregrounds deceptively dynamic qualities of the world, prompting a re-evaluation of 'fixed' conceptual attachments to linear and solid-state Western modernist logics, urging attunement to ineffaceable uncertainty, volatility and flux. Far from static, the world has a deceptively 'solid-fluid' constitution (**Ingold & Simonetti, 2021**), always in a state of perpetual becoming: neither solid nor fluid, but rather solid-becoming-fluid or fluid-becoming-solid (**Serres, 2018**). The recent stable climatic period of the Holocene is merely a brief intermission within the planet's mercurial chronology, yet geological changes are obfuscated by such large timescales. Consequently, continents drift and are reshaped over eons; mountain ranges rise and are eroded; glaciers expand and retreat.

Corals, with both liquid-oceanic and geological associations, offer pertinent insight into solid-fluid materialities. Their pelagic attachment invites us to expand fixed and terrestrial-based thinking (especially for geographers), and draw on developing interest with liquid and fluid ontologies (**Anderson & Peters, 2014; Steinberg and Peters, 2015**). Thinking 'from' or 'through' the ocean – it's three-dimensionality, its

dynamic and liquid qualities – opens up spatial conceptions of the world that, far from being static and bounded, is rather fluctuating, changeable, processual, and in a constant state of becoming.

An 'oceanic turn' emerged post WWII as global interests in the territorialisation of ocean space expanded. Later, the 1970's 'spatial turn' saw the loosening of nationally-bounded modes of thinking about capital and space as ideas of globalisation materialised. During the 1990s, postcolonial thinking took interest with the material-historical dimensions of the oceans, and with flows outside the territorial and legislative of limitations of the state (**see Steinberg, 2001; DeLoughrey, 2007: 22**). In the 21st Century oceans have become an important focus prompted not only by threats of climate change and forecasts of global sea-level rise, but with expanded appreciation of significant multispecies entanglements between oceans and planetary life. Within the environmental humanities, 'ocean studies' (**DeLoughrey, 2019**) or 'blue humanities' (**Alaimo, 2019**) has emerged, influenced by feminist posthumanities and the nonhuman turn (**Giffney & Hird, 2008**). Such study brings focus to the political ontologies of the sea and its implication for multispecies temporalities, aesthetics, and expanded more-than-human ethics in the Anthropocene. Influences on such research trace back to Rachel Carson's (**1951, 1955**) forward-thinking biomarine writings, anti-colonial work incorporating cultural dimension of ocean space such as Paul Gilroy's *The Black Atlantic* (**1993**), and feminist multispecies thinking such as that by Anna Tsing (**2015**) and Donna Haraway (**2016**). Drawing on a range of geographical, historical, and cultural thinking, a key focus for blue humanities work has been with understanding the oceans as a *force* rather than a *place* to be managed (**see Steinberg & Peters, 2015; DeLoughrey, 2017**). Emerging work led by feminist and decolonial thinking applies embodied approaches and indigenous frameworks to further expand thinking, perception, and relationship with oceans (**see Ingersoll, 2016; Neimanis, 2019; Jue, 2020; Gumb, 2020**).

This research draws on these overlapping oeuvres of environmental humanities and feminist posthumanities seeking to unsettle divisions between land and ocean, solid and fluid, and offer conceptual insight into relational dwelling responsive to planetary flux and churn. I focus on the Great Barrier Reef not only because of its role as a significant environmental imaginary threatened by both anthropogenic and Anthropocenic hazards, but because of its unique constitutive qualities as a complex multi-species organism both biological and geological. It is an assemblage which unsettles fixed and fluid categories. As such, coral life may offer apposite insights for thinking about qualities of resilience and endurance, and being differently as humans grapple with reimagining and renarrating strategies of dwelling on and with a changing planet.

To begin, I outline the methodological approach undertaken which draws on ethnographic and embodied methods. I then introduce the Great Barrier Reef, its composition, as well as the current plight of corals before moving to in-field experiences which document encounters above and below the water as a way to 'flesh out' and bring depth to this expansive structure and wider relational mesh. Qualities of water and fluidity lead me to contemplate ontological unsettling that ocean phenomena bring to understanding planetary being, revealing a dimensionality and relationality beyond surface and fixed readings. I then return to consider conceptual insights that coral's constitutive qualities bring to contemplating and configuring human response to Anthropocene dwelling.

Approach and Methodology

This article draws on work undertaken for doctoral research. The larger project itself was couched in both experimental and non-representational geographies, taking interest with phenomenological dimensions of Anthropocene experience. Within experimental geographies researchers undertake conceptual and methodological experiments with the aim of exploring new modes of doing geography, which includes mixed-method and transdisciplinary approaches (**see Paglen, 2009; Instone, 2010; Last, 2012**). Non-representational research, while diverse in scope, encompasses work that 'seeks to better cope with our self-evidently more-than-human, more-than-textual, multisensual worlds' (**Lorimer, 2005: 83**), and with registers often exceeding representation (**Longhurst et al., 2009**).

Donna Haraway's (**2016**) invocation of 'staying with the trouble' serves as guiding provocation: taking the Anthropocene's unsettling as a prompt to re-think and re-imagine what it is to be human and reassemble our relationships to each other and to other forms of life. Such an approach aligns with existential philosophical ideas exhorting moral responsibility against life's difficulties. Existentialism is not a unified school of thought but rather a collection of connected attitudes and approaches that grapple with individual choice in how to live a good and authentic life, especially in the face of worldly troubling (**Aho, 2014**). Apposite themes of disturbance and unsettling pervade environmental humanities, especially multispecies studies (**van Dooren et al., 2016**), extinction studies (**Rose et al., 2017**) dark ecology (**Morton, 2016**), and geo-philosophy (**Clark, 2011; 2017**). Within the Anthropocene and the figuration of a post-human condition such ecologically-focused work expands existentialism's scope giving rise to 'coexistentialism' which more effectively reintegrates humans within the wider relational mesh of planetary life and 'inter-being' (**see Mickey, 2016**).

Staying with such adversity is not an invocation to put up with it or acclimatise but rather to allow oneself to be affected and changed by the experience. Such a stance is described in non-representational terms as a mode of 'witnessing': allowing a researcher to be 'in tune [with] the vitality of the world as it unfolds' (**Dewsbury, 200: 1923**). Being witness to events in the world requires attentiveness not only to external phenomena but internal and affective registers which are just as important in providing insight about the world (**Anderson & Smith, 2001: 8**). Within the emergency of the Anthropocene Jean-Luc Nancy (**2015**) calls this remaining 'exposed': allowing ourselves to endure encounters of catastrophic loss by allowing ourselves to sense it.

The experimental, consequently, has affinities with the existential: opening one up to the world as messy and contingent; asking the researcher to remain open to emergent possibilities – as well as their own ignorance. A politics of experimentation is argued to be a necessary background concern under conditions of the Anthropocene (**Battistoni, 2013**); a requirement for leveraging 'cracks' of possibility, and opening up new political imaginaries. In practical terms this led to an interest in sites with capacity to disturb modern and Holocene perspectives and illuminate unsettled, relational, and coexistential qualities. Visiting the Great Barrier Reef during a severe coral bleaching event served as a case study. Ongoing threats to the Reef's ecology have led to the aforementioned claims of its 'death', and continued ocean warming will threaten the ability of corals to survive under such conditions.

Fieldwork was ethnographic in style, drawing from anthropologist Timothy Ingold's (**2007; 2011; 2015**) approach to mobile ethnography. This takes interest with dynamic qualities of being in the world and with tracing the *movement* of things through it. 'Wayfaring' for Ingold (**2011**) is an extension of Heidegger's more static conception of dwelling. A focus on movement brings a vitality to dwelling where *pathway* becomes the primary condition of being rather than *place*. This approach opens investigation up to the fluid and dynamic constitution of phenomena (**Sheller & Urry, 2006**), including subjects' movements in the world, but also the researcher's 'co-present immersion' where they not only observe what is happening but are also required to attend to their own experiences and feelings (**Novoa, 2015**). Such embodied experience has been a focus within geographical research following interests with everyday life (**Lefebvre, 1958**) and corporeality (**Merleau-Ponty, 1962**). 'Embodiment' is not just about the body, but rather brings focus to culture and experience from the standpoint of bodily being-in-the-world (**Strathern & Stewart, 2011: 389**).

The turn towards embodied research in human geography and related disciplines has followed wider engagement with participatory approaches (**Mason, 2015**) and calls for the co-production and decolonisation of knowledge (**Denzin & Lincoln, 2008**). Embodied research does not in itself challenge forms of racism, ablism, and sexism or suppressed knowledges, yet it provides multiple ways of sensing and knowing the world enabling both researchers and participants to interrogate dominant ideas about knowing and being (**Pierre et al., 2019**).

Environmental humanities scholars have employed embodied and autoethnographic methods to bring novel insight to relational ontologies and concomitant intersections with water and liquid ontologies. This includes Kate Wright's (**2017**) work tracing her own movements through, and seeking to decolonise her relationship to, country ('home-place'). Pauline Couper (**2018**) explores blue urban natures drawing on her experience of learning to sail. Michael Adams (**2017**) dives deeply into water, using the bodily experience of freediving to contemplate personal histories and relationship with his father. Olga Cielemecka and Cecilia Åsberg **(2019)** explore embodiment at the micro level focusing on water contamination and the ways that it leeches into and affects human bodies. Astrida Neimanis (**2019**) proposes a hydro-feminist philosophy, rethinking embodiment as watery and as more-than-human hydrocommons. Karin Amimoto Ingersoll (**2016**) draws on indigenous Hawaiian ways of knowing, developing the concept of seascape epistemology to articulate a sensorial, intellectual and embodied literacy of the ocean. Alexis Pauline Gumbs (**2020**) brings Black feminist insight to oceans, and to the wisdom that marine mammals might reveal to us. While my own research shares methodological affinities, my aim of experiencing unsettledness through more-than-human oceanic encounters is undertaken to galvanise conceptual insight into aforementioned geo-social dimensions of Anthropocene dwelling.

I undertook fieldwork in late-2017 – springtime in Australia, and at the end of the busy winter tourism season in the tropical north given cooler, drier, and more settled conditions. Based in Cairns, a key access point to the Great Barrier Reef, I spent a week undertaking activities both on land and water. Such an approach commonplace within geographic research where brief periods of 'ethnographic contact' are undertaken followed by detailed analysis of data gathered (**see Garrett, 2012: 42**). This wayfaring approach was both planned and unplanned. I had pre-arranged to undertake interviews with local knowledge experts, however activities such as a tourism trip further up the Queensland coast, Reef diving and attending local events, including a Reef education presentation, were organised on the fly. These unplanned activities offered opportunities to move through the landscape, providing a range of experiences though

which I was able to develop a wider understanding of Cairns, the coastal area, and the Reef itself. Acting as participant observer in such instances I was able to interact with a variety of people, both locals and visitors, taking field notes to record observations, thoughts and feelings, as well as employing photography.

Such an experimental research approach has both benefits and limitations. This approach can be effective for following 'vague' research strands where the investigative focus is unclear at the outset. Similar to grounded theory (**Ralph et al., 2015**) that invites emergence though the investigative process, a wayfaring ethnography allows for unplanned and surprising themes to be revealed. Of course, success is not guaranteed, and neither are outcomes anywhere close to those anticipated. The investigative process also requires the researcher to be sensitive to process; to detect potentially weak but interesting signals. In doing so, it makes this methodology highly subjective and sensitive to the orientation and proclivities of the individual researcher.

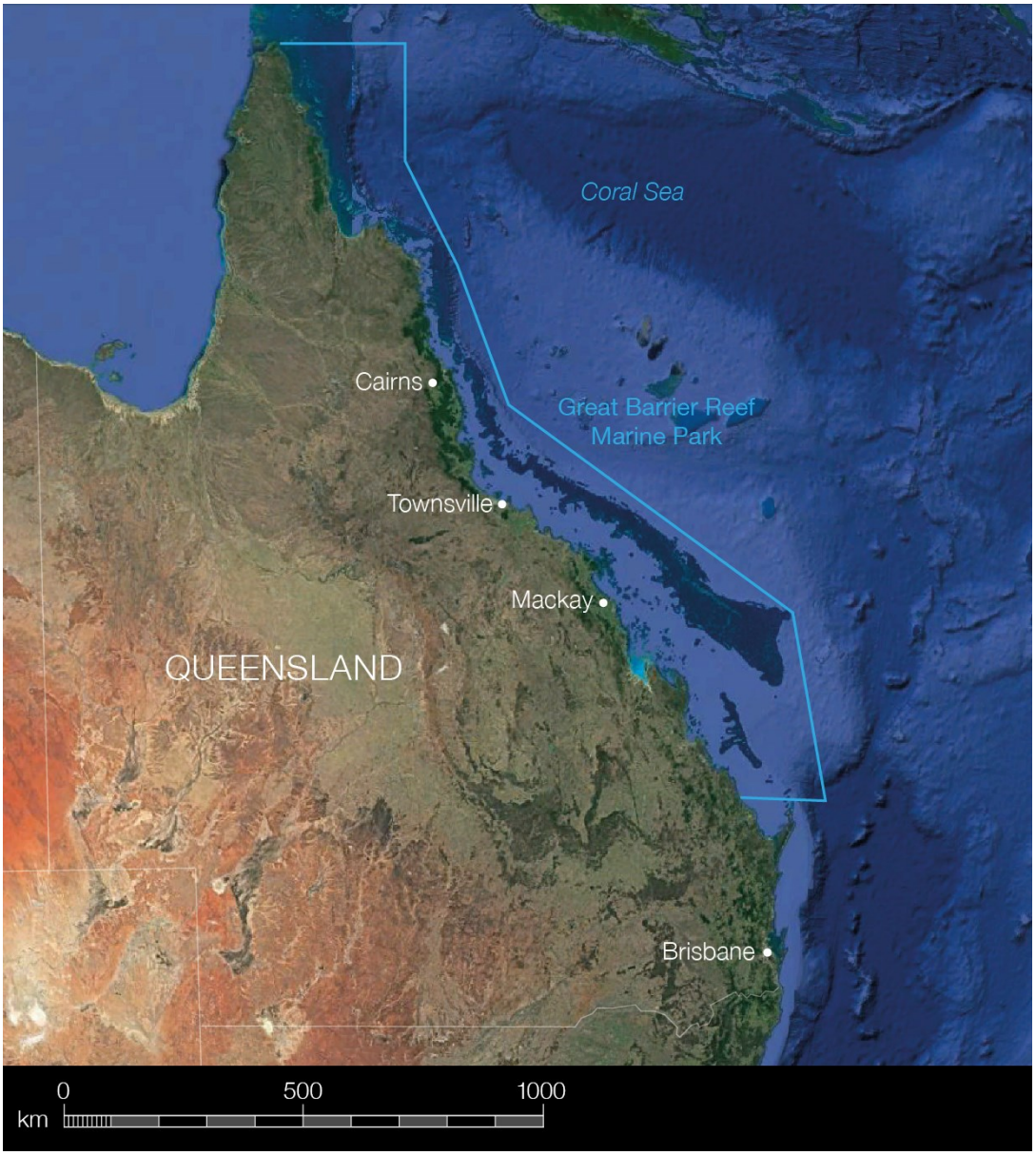
For this research I am cognisant of my own affinities and positionality. My experience of being human is informed by my subjectivity as a European cis-gender male, middle-aged, and well-educated. Additionally, where previous research (**Westgate, 2016; 2020**) has drawn on an enduring relationship to place, including knowledge of indigenous worldview, in Australia I have shorter-term attachments having been resident for only some eight years.[i] However, such experience is informed by longstanding engagement both personally and professionally with global environmental issues, as well as formative experience growing up around marine environments, and being both a long-time scuba diver and surfer. Research which draws on introspective methods such as this can be at risk of having narcissistic and solipsistic tendencies (**Pile & Thrift, 1995; see also Steingo, 2021**). In this case I seek to apply critical and reflexive process, aiming to avoid inflating my own experience and interpretation, or misrepresenting other perspectives. Alongside such personal attachments and the foregrounded openness to being 'exposed', I bring an allegiance with creative possibilism: creative and conceptual potentials responding to the Anthropocene (**Davis & Turpin, 2015**), particularly those that work to re-story the world (**Davidson, 2015**) and amplify ideas of geo-social dwelling (**Clark & Syzersynski, 2020**).

Locating the Great Barrier Reef

The Great Barrier Reef is the largest of the world's coral reef ecosystems, made up of more than 2,900 individual reefs and some 900 islands that border the coast of north-eastern Australia (**see Figure 1**), spanning over 2,300 kilometres and covering some 344,000 square kilometres (**GBRMPA, 2021a**). The Reef is big – hence the name – and accounts for 70 percent of

the world's designated World Heritage reef area. It is also the single largest structure made by living organisms.

Figure 1: Map of north-eastern Australia showing the location of the Great Barrier Reef Marine Park. The reef systems show as dark against the blue of the ocean. Satellite imagery: Google Earth/CNES/Astrium Image Landsat/Copernicus.



Coral reefs are biologically diverse, supporting more species per unit of area than any other marine environment. While they occupy less than one percent of our oceans, they are home to nearly one-third of all marine species, including an estimated 4,000 species of fish, 800 species of hard corals, and hundreds of other marine animals (**Mulhall, 2009; Fuchs, 2013**). Reefs are also important for sea and marine birds, as well as reptiles such as snakes, crocodiles, and turtles. Crucially, reef formations serve as a protective breeding ground for many ocean-going fish and marine life.

Corals are found predominately in tropical regions, growing in warm shallow waters. Corals are colonies of small animals that live in calcium

carbonate shells formed for protection. Over time, accretion of limestone forms unique shapes distinctive to particular coral species. Reefs are formed over long time periods as corals slowly form layers of sedimentary limestone. Depending on size, reef formation can take anywhere between 100,000 and 30 million years (**Barnes & Hughes, 1999; Veron, 2017**).

The Great Barrier Reef has formed over hundreds of millions of years in different stages, with the current configuration emerging approximately 2.6 million years ago (**Veron, 2008**). Human interaction with the Reef environment began some 60,000 years ago when Australian Aboriginal and Torres Strait Islander peoples settled the region, taking advantage of the site's natural resources (**GBRMPA, 2021b**). European explorers characterised the Reef environment as 'wild' and 'unnavigable' (**see McCalman, 2013**), with utilisation of the area's natural amenities being only a recent endeavour. Recreational use began only in the latter half of the twentieth century and is governed by the Great Barrier Reef Marine Park Authority (GBRMPA) which now manages the marine park in conjunction with the Government of Queensland.

The Great Barrier Reef has become a significant environmental imaginary and tourist destination. Being awarded UNESCO World Heritage Site status in 1981, conferred 'as being important to the collective interests of humanity' (**UNESCO, 2016**), set the Reef on a global stage alongside other landmark sites including the Giza Pyramids in Egypt, Machu Picchu in Peru, and the Taj Mahal in India. The Reef has become a 'bucket-list' travel destination (**Condé Nast Traveller, 2020**), and is highly significant to Australian tourism – being worth some A$6.4 billion to the Australian economy, and generating over 64,000 jobs (**O'Mahoney et al., 2017**).

Concerns with Reef health and management began in the early twentieth century and were amplified by rising environmental awareness during the 1960s and 70s. Even with a unified Reef management plan and instigation of the GBRMPA, the conservative tenor of Queensland politics has continued to undervalue environmental concerns, support resource exploitation, as well as expanded Queensland coastal development.

Such exploitation, however, poses a threat to the Reef's World Heritage status, and at multiple times over the last decade an 'in danger' reclassification has been assessed and only narrowly avoided – controversially due to Australian Government lobbying tactics (**Readfearn, 2021**). The Reef remains officially under watch, with the World Heritage Committee requiring updates on the Reef's condition.

However, more concerning over the last few decades is the global threat of planetary warming. Increased ocean temperatures have led to a series of severe coral bleaching events during summer months. 'Bleaching'

describes a condition where coral tissue turns pale or white. It is not a disease but a stress response where the coloured zooxanthellae photosynthetic algae that live in the coral wall are expelled. Under adverse conditions, such as increased water temperature, the algae produce excess oxygen which is toxic to the coral. Bleached coral is not dead: coral can survive for a short period in a bleached state and recover if the stress is removed (**Dove & Hoegh-Guldberg, 2006**). However, prolonged bleaching will kill the coral. Coral bleaching is not unique to the Great Barrier Reef, all corals experience bleaching under adverse conditions. The phenomenon was first recorded in the Caribbean in the early 1980s, with bleaching events at the Great Barrier Reef occurring during 1980, 1982, 1992, 1994, 1998, 2002, 2006, 2016–2017 (**AIMS, 2016**) – as well as 2020. Coral bleaching appears to be a recent (and anthropogenic) phenomenon given that bleaching events have killed coral shown to be up to 500 years old (**Veron, 2008: 58**). Reef recovery from coral bleaching die-off takes decades, but with bleaching events forecast to become an annual occurrence (**Bleuel et al., 2021**) the prognosis for the Great Barrier Reef looks grim. And it was such forecasts that have prompted alarming reports of the Reef's 'death' (**see Jacobsen, 2016**).

Seeing it Before it's too Late

Upon arriving in Cairns, I spent my first few days orientating myself by undertaking land-based activities, which included a day trip up the Queensland coast, attending a Reef educational event, as well as undertaking interviews with Reef and oceans knowledge experts. In this article, for brevity, I focus attention on my Reef-based experience, however this reconnaissance work was useful in providing me with a sense of broader, popular Reef narratives. Somewhat surprisingly, everything appeared normal. The Reef was the key drawcard for tourism visitors, who talked eagerly about their experiences. Locals extolled the Reef's features, making suggestions on different activities to undertake. The tourism marketing I encountered invited visitors to have an amazing experiences swimming, snorkelling, diving, and holidaying on the Reef. However, this was at a time of one of the most severe coral bleaching events to date, yet the only public evidence of this was through occasional news articles. And it was only academic experts that I spoke with who discussed the coral bleaching issue at all.

Booking a multi-day trip on a Reef dive boat allowed me to spend time on and in the water, as well as developing additional insight into people's perceptions. I found that visitors to the Reef were aware of what a unique marine environment it was – a 'must do' when visiting Australia. However, there appeared to be a lack of understanding of the Reef's ecological significance or indeed the specific threats faced. Ironically, though, many I

spoke with revealed subconscious anxieties. One well-travelled Brit living and working in Sydney half-jokingly admitted she would 'like to see the Reef before it's too late!' Another young visitor had been gifted a diving trip by her father – a keen scuba diver – but admitted she felt somewhat uneasy because of the environmental impact. Such anecdotes are reflective of increasing 'last-chance tourism', which has become a key motivator for visiting the Reef (**Piggott-McKellar & McNamara, 2016**).

The Reef landscape above is deceptively barren, giving little indication of the complex topography below the water line (**see Figure 2**). Boats dot the horizon, some still, fixed to the reef below as permanent on-water accommodation; others move slowly across the water, making their way to designated dive sites or shuttling visitors to and from Cairns. The calm above is occasionally interrupted by the sound of a helicopter ferrying well-heeled visitors across the Reef.

Figure 2: The stark above-water landscape. A crew member watches over snorkelers. Another dive boat is visible in the background. Source: Author.

Dive boats operate to a tight schedule, receiving new passengers, navigating a set pattern of dive spots, providing food and dive briefings. My boat ran five dives per day for stay-on visitors and received boatloads of day-visitors every morning who were ferried back to the mainland later that afternoon (**see Figure 3**).

The crew were familiar with each dive site, able to point out individual features for divers to investigate: a hidden channel; a large clam; the site where clownfish could be found; the habitual swimming path of a sea turtle. Animated post-dive discussion centred largely around notable encounters with charismatic marine fauna – fish, turtles, sharks – and crossing these off a diver's wish list.

I noticed that for all the concern with seeing particular species of marine life there was no formal time spent discussing any aspect of marine biology or the Reef ecosystem. During our introductory tour we were shown the

location of the boat's 'library', a small collection of reference books which could be used to identify marine species if needed. Echoing my previous experience, there was any absence of any discussion had about issues affecting the Reef, nor any mention about current coral bleaching.

Figure 3: Reef visitors snorkelling over a coral bommie, with dive boat in the background. Source: author.

A Fluid Marine Mesh

During my time on the Reef I had the opportunity to dive multiple times. For simplicity (and to the bewilderment of other divers), I opted to free dive – 'snorkel' – rather than scuba dive. Although I have previous scuba diving experience, being underwater without technological constraints and air supply limitations afforded me a more unencumbered freedom where I could take my time and focus on bodily awareness.

Conditions at the time were perfect: a pleasant 24 degrees Celsius, slight overhead cloud, and still. The ocean temperature was as warm as the air. The water was a deep hazy blue, which limited visibility to about 20 metres before details blurred into a bluish nothing. Very otherworldly.

Each dive site is a unique assemblage formed by layers of accreted calcium carbonate covered by living coral and other marine life. A coral outcrop is referred to as a 'bommie'. In shallow water this can be a small or large mound and in deeper water can rise like a column from the sea floor below. The average depth of the Great Barrier Reef is just 35 meters, and it is this shallow coastal topography that allows corals to form.

For each dive location I focused on a single bommie, swimming around the site first and then literally floating above it, remaining still to observe activity. Watching the mesh of life was fascinating. It felt very alien to me being both a land-based creature and schooled largely in terrestrial geographical concerns. In this instance, of course, I was very much the alien (**see Figure 4**).

Figure 4:View of coral assemblage, top of bommie. Source: Author.

And even though observations were made during the day, which is not a particularly active time for reef life, I became enthralled in watching quotidian reef dynamics. Small fish manoeuvred themselves close to coral, likely for safety, while larger fish slowly cruised the underwater landscape indifferent to my presence. I watched sharp-beaked Parrot fish snack on living coral, hearing muffled crunching sounds. I observed smaller fish perform what seemed to be territorial behaviour, chasing away encroaching intruders. I floated over corals of myriad shapes and colours lit by dappled sunlight. Observing such activity, I began to see each coral bommie as a community of creatures, some making permanent homes amongst labyrinthine coral formations, others just passing through.

I remained vigilant for signs of bleached and dead coral, although sighted only one small patch during my dives (**Figure 5**). This may have been because the worst bleaching had occurred in the Reef's northern reaches north of Cairns, but also dive boats might have adjusted tours to avoid heavily impacted areas.

Figure 5: A small patch of bleached and possibly dead branching coral (Acropora species) encountered during one of the author's dive sessions. Source: Author.

My short sampling of Reef-related activity both human and non-human left me with fuller appreciation of the complex dynamic assemblage of life that constitutes this distinctive ecosystem. Witnessing the everyday activities of marine life left me with expanded empathy for the delicately entangled lines that constitute the ecological mesh of Reef life. While it is

all too easy to think of marine life as 'alien' (**Jameison et al., 2021**), by focusing on those recognisable and relatable 'fleshy' constituencies that humans have in common with other beings makes shared vulnerabilities to insidious environmental threats more tangible. I am better able to conceive my entangled relationship with the lives of these beings amidst the larger delicate Reef-mesh; and I am struck by how fragile and precarious this fabric seems.

Additionally, is a sense of intimate dimensionality. By this I mean that within the marine – water – environment the liquid medium affords a more immersive, embodied experience than that of terrestrial space. That is, one has a sense of physically entering *into* and engaging *with* environmental space, subsequently extending one's relationship with others through the more substantial surrounding medium. For instance, I became mindful that the sunscreen applied to my skin may well leach into the water and affect other marine life. A small concern on the scale of impacts to be sure, but one which foregrounded a sense of intimate entanglement. Indeed, the challenged status of the Great Barrier Reef – and indeed all coral reef ecosystems – reflect such planetary enmeshment. In this way we don't have to visit the site in person to impact it, any activity undertaken will have some small influence on planetary systems. Consequently, we can't *not* visit the Reef.

Such observations reveal the Reef's multi-species interconnectedness, but also gesture towards its significant material and geological associations. Coral life has successfully navigated epochal planetary fluctuations across hundreds of millions of years, adapting to and being shaped by planetary multiplicities which have engendered sold-fluid constitutive qualities.

Adaptive Solid-Fluidity

With both liquid-oceanic and rocklike geologic constitutive qualities, corals are a unique example of organic solid-fluid enfoldment. Such attributes are admittedly difficult to discern *prima facie* and require a broader understanding of coral biology and its evolution. To better appreciate the solid-fluid character of both corals and the assemblage of the Great Barrier Reef, it is necessary to look beyond the visible present and examine wider pelagic and geologic entanglements through deep time.

The Reef modern humans know today has been shaped by ongoing geological processes also responsible for current continental land formations and oceans (**Veron, 2008**). Fossil remains of corals that grew from 120 to 30 million years ago can be found in the Reef's present location. Such corals formed during geological epochs with favourable warm conditions but were interrupted by glacial climatic periods. Stable conditions only returned 2.6 million years ago at the beginning of the

Pleistocene, allowing corals to grow and again form reef structures. Formation of the Great Barrier Reef we are familiar with today appears to have begun around some 600,000 years ago (**Pandolfi & Kelley, 2008: 40**).

Even within the recent stable period ongoing natural oscillations have altered the shape of the Reef. Climatic fluctuations – notably ice ages – impacted the Reef's biological composition due to cooler water temperatures but, more dramatically, changes in sea levels forced coral formations to relocate (**Pandolfi & Kelley, 2008: 41**). For around 50 percent of this recent period sea levels were much lower, and the area of the Great Barrier Reef now covered with shallow water was dry, existing as scrub-covered plain. The coast lay further east than present with corals surviving in coastal waters. As sea levels subsequently rose over thousands of years and reclaimed the plain, corals re-established themselves. For the other approximately 30 percent of time, the Reef site was a mix of coral reefs and islands in an interstitial state. For only 10–20 percent of the Reef's recent history would it have looked like it does now.

Thus, the Reef we see today is the result of very recent sea level stabilisation. Sea levels reached their most-recent low 20,000 years ago: some 130 metres below today's levels. It then took over 10,000 years for sea levels to return to present-day height (a level that last existed some 120,000 years ago) and thousands of years for current coral formations to re-establish themselves (**Veron, 2008: 156**). The present configuration of the Great Barrier Reef is, therefore, very recent in geological terms – only some 6,000 years old (**Wallace, 2008**) – and, significantly, it is far from being either stable or permanent.

Importantly, coral life possesses resilient qualities shaped by adaptation to a fluid and ever-changing ocean environment. Over their 500-plus million years of existence corals have had to cope with highly varied conditions. Long favourable periods have been followed by mass extinction events during which many species did not survive. Corals existing today are the survivors of half-a-billion years of extreme planetary fluctuations and have managed to do so only because of an evolved genetic plasticity. And, beyond such climatic influences, corals have been constitutively shaped by the fluid medium in which they live, relying on ocean currents for reproductive dispersal (**Todd, 2008**). A coral species may 'break apart' if currents are insufficient to disperse coral spawn widely enough, having the ability to become many different species due to a hybrid genetic composition. Conversely, a species may also 'reform' when currents are favourable, bringing together spawn of the same species. This genetic re-packaging process is termed reticulate evolution and differs markedly from traditional Darwinian evolution. While such hybridisation is not completely unique it provides a mechanism by which a bounded

population is able to make the most of a limited genetic pool and adapt to new conditions more effectively than by random mutation alone (**Arnold, 1997**). [ii] The mechanism has allowed corals to survive ongoing fluctuations by, in effect, mimicking the unstable and fluid qualities of their environment, meaning that, if stressed, corals are able to respond to changing conditions and, over time, adapt.

Such biological fluidity has not been lost on those concerned with marine life and coral reef health. Researchers are actively investigating coral's genetic plasticity, aiming to increase resilience to adverse environmental conditions. Human-assisted evolution seeks to accelerate corals' ability to hybridise and adapt given that environmental changes are occurring at a much faster rate than normal, including such mechanisms as coral stress conditioning, assisted gene flow, hybridisation, and symbiont algal modification (**Cornwall, 2019**). Additionally, those tasked with managing marine ecosystems are exploring multi-faceted interventions such as multiscale governance which calls for multiple governing authorities at different scales to engage in self-organisation and mutual adjustment (**Morrison et al., 2020**). Yet, even if such management approaches, along with coral hybridisation, prove effective the Great Barrier Reef will be dramatically changed, becoming compositionally altered. The shape and location of the Reef will also adjust in response to circumstances beyond control: climate and weather fluctuations, rising sea levels, and unanticipated ecosystem interactions.

An environmental imaginary of the Great Barrier Reef as vibrant and lively yet *stable* is therefore misguided. Corals and coral reefs are anything but static or fixed. Corals demonstrate an intimate geo-planetary relationality that has served to shape not only where they assemble, but their very constitution. The genetic fluidity of corals is perhaps their most surprising feature. While not fully oceanic – that is, free within the ocean's medium – corals make use of hydrographic movements and dynamics, and in turn are shaped by them. Far from existing in a world that is fixed they have resourcefully navigated their way through the rhythmic turbulence of an inherently dynamic planet. Within an Anthropocene world, corals serve as a reminder of life's wider geo-sociality. Beyond qualities of interdependence and interbeing, the fluid resilience and constitutional malleability may offer insight for how human life can best dwell through ongoing planetary dynamism and flux.

Inventive Geo-Sociality and Anthropocene dwelling

With foreboding planetary shifts forecast, there is an increasing need to re-story or re-narrate human dwelling within and through unfamiliar and precarious Anthropocene terrain. Looking outside of conventional – and dominant Western – narratives that have shaped modern planetary

conditions, we might look to cases, such as corals, that expand understanding of more-than-human inter-being and opens up generative geo-social insight.

In the case of the Great Barrier Reef, I am also mindful of the longstanding relationship Aboriginal peoples have had with the region and feature. During my fieldwork I noted of an absence of Aboriginal histories or perspectives – a marked difference to more familiar ground in Aotearoa New Zealand where mātauranga Māori (knowledge) and tikanga (practices) make up an expanding segment within the tourism sector (**Statistics New Zealand, 2015**). For the Great Barrier Reef, stories collected from the region, such as those of the Yidindji people of the Cairns area, recalls a time when the ancestors of these people lived at the coast where the Reef now stands, chronicling the land being inundated by the ocean. A study by Nunn and Reid (**2016**) examined such oral histories, suggesting these document changes brought about by the end of the last ice age, some 13,000 years ago, and subsequent coastal transformation. Such narratives reveal a consistent pattern of adapting and sense-making, living amidst uncertainty on an ever-changing earth-ocean interface over thousands of years, and is a reminder that there are humans in this very place who have already shown how to dwell with oceanic unease across the longer term.

From an Anthropocene geologic perspective, geologist Jan Zalasiewicz (**2008**) reminds us that humans and corals share a key similarity: they are both forms of biological life fabricating rock or Earth strata. Coral life, however, has prevailed over millions of years evolving an enduring resilience, having been changed by and adapting to ongoing planetary flux – and from which humans may be able to learn. This could be, in the first instance, attuning sensibilities to dimensionality, fluidity, and deep time; enfolding such qualities into the production of new forms and structures that have capacities beyond those with linear, surface and fixed attachments. Additionally, corals demonstrate efficacies of collectivism through both their symbiotic biology and capacity to work with other corals and marine life assembling enduring reef formations. As Clark and Syzersynski (**2020: 98**) discuss, such qualities illuminate the potentials of collective and participatory process and through creative trial and error. Indeed, strategies of 'emergent design' apply ideas of simple iterative creative processes in responding to the vacillating conditions of a 'white water' world (**see Pendleton-Julian & Seely Brown, 2018**). Drift is another apposite quality utilised by corals through oceanic currents. Working *with* natural flows, agencies and differentials (**see Syzersynski, 2019**) offers both conceptual and practical avenues in exploring alternatives, for example with power and mobility which in the modern era have been energetically forced and controlled. Returning conceptual thinking to

dimensional and dynamic planetary capacities, reengages humans and human activity with intrinsic geo-sociality – underscoring vicissitudes of Anthropocene dwelling which repudiate notions of human dominion and call for relational reattunement to vital flux, flows and agencies of a planet in a constant state of becoming.

Conclusion

In this paper I have taken the ecological emergency of Australia's Great Barrier Reef as a prompt for interrogating wider planetary Anthropocene disturbance, employing ideas from more-than-human ontologies, vital materialisms and geophilosophy. An existentially informed methodological approach sought to engage distressed conditions and sensations. Ethnographic and embodied methods were used for in-filed investigation as a means of bearing witness to events, allowing bodily and affective qualities to inform research. Such methods helped with the project's conceptual development, illuminating shared precarities and intimate coexistentiality between humans and reef life, as well as expanding thinking though more-than-human material dimensions via coral's micro and macro solid-fluid attachments.

Coral's liquid-oceanic and geological constitutive properties challenge conventional fixed and terrestrial-based thinking. Rather, thinking through the ocean's dimensionality and dynamic-liquid qualities invites apposite fluid and liquid conceptions of the world that, far from being static and bounded, is conversely fluctuating, changeable, processual, and in a constant state of becoming. Furthermore, corals are an amalgamation of both solid and fluid – structurally and biologically – affording them an advantageous malleability. They have survived over 500 million years by adapting to ever-changing planetary conditions, evidencing a geo-sociality responsive to geological and -temporal dynamics. Humans might draw insights form such planetary geo-sociality. The solid-fluidity of corals and reef assemblages is conceptually useful in expanding linear and solid-state Western modernist logics as humans grapple with changing Anthropocene-effected planetary conditions.

Returning to the article's entry point and concern with the Great Barrier Reef's impending 'death', this can be read in a more nuanced and generative light. Such demise relates more to an imagined state of the world – namely that built upon fixed and stable Holocene attachments. While modern humans might construe the Reef as a large solid and static feature, this belies its relational complexity and fluidity: coral reefs are anything but fixed. Ultimately, the Reef of today is different from yesterday, and will be different again tomorrow. This is not to trivialise deleterious anthropogenic impacts but rather expand analysis through wider material, geo-temporal and relational attributes. Coral life possesses

a constitutional resilience and tenacity, serving as an illuminating example of more-than-human geo-social life both adaptive and resourceful, and which offers percipient insight into sensibilities and strategies for human living and dwelling with and through vicissitudes of ongoing planetary flux.

I'm a transdisciplinary research and creative practitioner. My professional work has focused on social and political design and creative projects. Recent research focuses on the human-nature nexus, post-natural dwelling, as well as planetary and exo futures.

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Endnotes

[i] Having grown up in Aotearoa New Zealand, I have formed an understanding of te ao Māori (worldview) through both personal and professional engagement.

[ii] Such hybridisation also comes with negative consequences to a genetic pool: it can allow undesirable genes into the pool, or reproductive sterility.

Whales Lost and Found: Rescuing a history of biodiversity loss in early modern Brazil

Nina Vieira

CHAM, Faculdade de Ciências Sociais e Humanas, FCSH, Universidade NOVA de Lisboa, 1069-061, Portugal
Correspondence: ninavieira@fcsh.unl.pt
Twitter: @PtNina
ORCID: 0000-0002-6280-9951

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Abstract

Worldwide, whales have been hunted to the brink of extinction. In Brazil, whaling was a royal monopoly between 1614 and 1801. Within the dynamics of the Portuguese Empire, it was a stimulus that promoted wealth and the circulation of knowledge, practices, and products. The development of whaling stations in four coastal sites fostered the construction of littoral spaces, shaped the ways people perceived and used the ocean and marine animals, and left an impact on whale populations in a truly entangled history between humans and the non-human world. In this article, we aim to identify the main target species and number of animals caught through the analysis of historical sources from the 17th and 18th centuries. Southern Right Whale and Humpback Whale were the main target species, to a different extent, between the north-eastern and south-eastern whaling sites, but occasionally hunted simultaneously. We accounted for a total of 9080 animals captured in 41 years, between 1627 and 1801, and addressed hunting loss and calf-securing practices. In discussing biodiversity loss in the era of the Anthropocene, we expect to contribute to a better understanding of early impacts on marine life in the 1600-1800 period.

Keywords: whaling; southern right whale; humpback whale; Portuguese Empire; marine environmental history

Introducing Whales and the Early Modern Whaling of Brazil

Around 1614 a whaling monopoly was established in Brazil which lasted until 1801. It began at a time of union between the crowns of Portugal and Spain (1580-1640) and benefited from its origins from Basque whaling techniques and from the abundance of whales in those coastal waters (**Hansen, 2016; Vieira, 2018a**). From 1640 onwards, the activity was managed and expanded by the Portuguese crown, its officials and settlers, within the context of European expansion in South America (**Ellis, 1969; Vieira, 2020a**). The establishment and development of whaling stations on shore fostered the construction of coastal spaces in Bahia, Rio de Janeiro, São Paulo, and Santa Catarina, and shaped the ways people perceived and appropriated marine animals (**Castellucci Junior, 2009; Comerlato, 2011; Vieira, 2020a**). This activity worked as a strategy and a stimulus to the production of wealth and to the circulation of knowledge, practices, and products to be consumed both in South America and in Lisbon. Whale oil was used mainly as fuel to light houses, sugar mills, workshops and, later, also the streets of the main cities in Brazil (**Ellis, 1969; Castellucci Junior, 2009**). Contrary to what has been assumed, whale oil was also an important commodity arriving in Lisbon. At least from the second half of the 18th century, regular shipments of whale oil arrived from about half of the total production produced. Baleen was also used and sent entirely to Lisbon (**Vieira, 2020a**).

This early modern whaling operation had an Iberian matrix in South America, harvested South Atlantic whale populations and was performed by European settlers and African enslaved people. This is a case that emphasizes the role of the ocean and of natural marine populations as forces at work in the 'wet globalization' (**Mentz, 2020**) and that demonstrates the interconnection between empire-making and environmental change.

Since then and until 1986, the hunting of whales has been practiced in Brazilian waters sustaining human coastal dwellers and leaving its impact on South Atlantic whale populations. Whale species inhabiting the waters of Brazil have been the target of different hunting operations, from American whaling offshore to Norwegian and Japanese factory ships **(Castellucci Junior, 2009; Hart & Edmundson, 2017**). This long duration activity has left its wound in South Atlantic whale populations which are still today recovering from centuries of exploitation.

In the scope of marine environmental history, and while analysing biodiversity loss, it is useful and necessary to understand historical changes in marine ecosystems, namely in the period of 1600-1800, much before the Great Acceleration of the 20th century which jump-started the Anthropocene (**McNeill & Engelke, 2014**). Globally, whaling was one of the

most extensive and intensive activities of marine extraction in the long term and one of the most profitable industries ever undertaken. It was probably the extractive activity that, more than any other, impacted marine life in pre-industrial times, which is why understanding whaling history is essential to any analysis of the human impact towards the ocean (**Reeves & Smith 2003; Holm, 2022**).

Although research and literature on whaling is extensive, more focus has been given to the Northern Oceans catches (**e.g., McLeod et al., 2008; Jones, 2013; Richards, 2014**) or whaling operations from the second half of the 18th century onwards, mainly referring to the American style and based on the exhaustive logbooks that resulted from it (**e.g. Smith & Reeves, 2006; Smith et al., 2012; Smith, n.d.**). In recent years, an effort has been developed to cover whaling history in the waters of the South Hemisphere (**e.g., Castellucci Junior & Quiroz, 2018; Jones & Wanhalla, 2019; Quiroz, 2020**). While some authors have attempted to estimate how many whales were captured in Brazilian waters (**e.g., Morais et al., 2017; Romero et al., 2022**), data in those studies come mostly from literature review, not digging into primary historical documentation, and not including catches for periods before the mid-18th century. Within the dynamics of the Portuguese Expansion of the 1600-1800 period, whaling has been an understudied theme so far and the extension and impact of this operation is still not known.

Although it is increasingly accepted that humans had a significant long-term impact on marine ecosystems' structure and functioning, we are still ignorant of the long history of depredation towards the ocean (**Thurstan, 2022**). Great whales – the non-taxonomic group comprising baleen whales and the sperm whale (the largest toothed whale) – had a major influence on marine ecosystems before commercial whaling and their profound decline has likely altered the structure and function of the oceans (**Roman et al., 2014**). Studying encounters, extraction, and significance of marine animals allows us to identify anthropogenic impacts and ecological changes of the past, highlights the agency of the more-than-human (oceanic) world, and uncovers 'ghosts', signs of past ways of life, traces of human and more-than-human histories, as proposed by Anna Tsing and colleagues (**2017**). Whales of the past are our ghosts, since we are not certain about which species were hunted in each whaling site nor the extent of that exploitation.

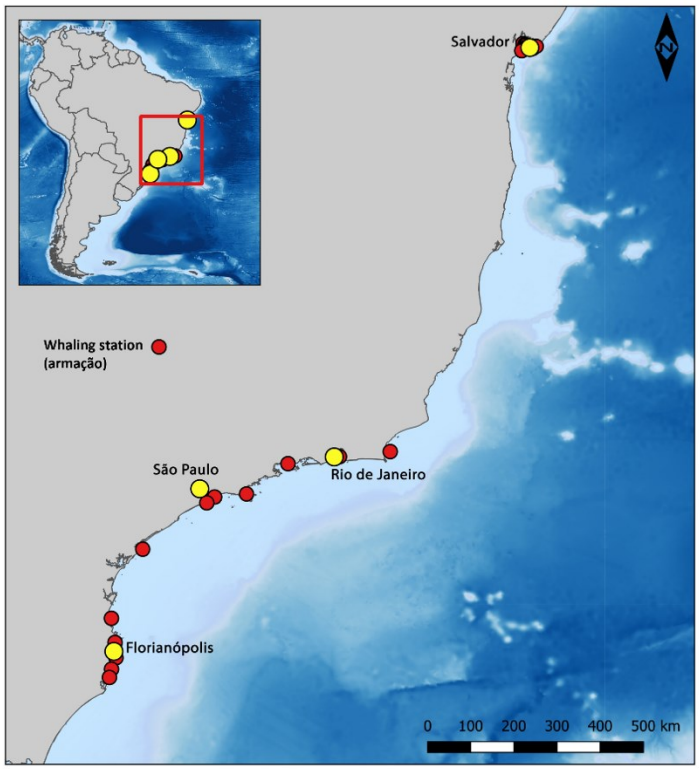
Our aim in this article was to analyse and discuss data from archival evidence of the 17th and 18th centuries with the goal of identifying target whale species and estimate number of animals caught in Brazil. Our historical research included mostly written sources complemented with iconography. One of the most important digital collections used in this

study was that of the Arquivo Histórico Ultramarino (AHU) [Overseas Historical Archive], through the project 'Resgate de Documentação Histórica Barão do Rio Branco'.[i] From here, around 440 documents (mostly manuscripts) related to whales and/or whaling were identified, which include correspondence, letters, petitions, contracts, and royal orders, among others, covering the period between 1613 and 1821. These references were collected and made available in an open access supporting document (**Vieira, 2020b**). Additionally, a wide range of typologies of sources was used, namely natural history memoirs, chronicles, economic essays, among others.

Identifying Species in Written and Visual Sources

During the monopoly period, four whaling sites were developed along the Brazilian coast – Bahia (1603), Rio de Janeiro (c. 1620), São Paulo (c. 1730), and Santa Catarina (c. 1740) (**Figure 1**). It is commonly accepted that, along the monopoly period, the target species were two baleen species (Mysticeti) – the Southern Right whale (*Eubalaena australis* Desmoulins, 1822) and the Humpback whale (*Megaptera novaeangliae* Borowski, 1781) – and for a short period also a toothed species (Odontoceti), the Sperm whale (*Physeter macrocephalus* Linnaeus, 1758) (**Ellis, 1969; Reeves & Smith, 2003; Richards, 2009; Comerlato, 2010; Morais et al., 2017**). Some authors suggest discrimination in the species targeted between the northern whaling region (Bahia) – Humpback whales – and the southern whaling region (Rio de Janeiro, São Paulo, and Santa Catarina) – Southern Right whales.

Figure 1: Map of the whaling sites in Brazil during the monopoly period (1614-1801), based on Ellis (1969). Authorship: Nina Vieira and Patrick Hayes, 2019.



Despite the in-depth literature review that these studies present, species identification is often based on studies of ecology and distribution patterns that have begun since the end of the 20th century or based on the whaling data from the 19th century onwards. These assumptions can lead to a collective unawareness of past marine ecological changes and can result in a gradual accommodation of the disappearance of a species or population and in appropriate reference points for evaluating losses or identifying targets for rehabilitation (the shifting baseline syndrome) (**Pauly, 1995; Thurstan, 2022**).

Southern Right and Humpback whales are migratory species, performing annual movements between polar and circumpolar waters to tropical and subtropical regions. The Southern Right whale, limited to the Southern Hemisphere, is in everything very similar to its counterpart North Atlantic Right whale (*Eubalaena glacialis* Müller, 1776), one of the main targets of Basque whalers in the Bay of Biscay and North Atlantic, providing more oil and better baleen plates than other species (**Laist, 2017**). On the South American Atlantic coast, its current area of occupation covers the waters of Brazil and Argentina. Santa Catarina is the region with the highest concentration of animals where whales remain for weeks or several months to give birth or accompanied by juveniles, occupying bays and areas sheltered from south-easterly winds, in the proximity of estuaries, sandy bottom areas and not very steep slopes, preferentially in very

shallow areas, and close to the breaching zone (**Simões-Lopes & Ximenez, 1993; Seyboth et al., 2015; Groch, 2018**).

The Humpback whale is a cosmopolitan species with a global distribution, and Brazilian waters are one of the breeding areas for the South Atlantic population. The species appears in large numbers in the Abrolhos Bank, a protected area under the Abrolhos National Marine Park in Bahia. This is a preferential zone for females to give birth, or for mother-calf pairs, due to the calm waters and the low depth of that bank. However, although its distribution along the coast is poorly known, this population appears to extend along the Brazilian coast, between the northern coast of Bahia in the north and the waters of São Paulo in the south (**Zerbini et al., 2004; Martins et al., 2013**).

For the most part of the studied period (17th and 18th centuries), whales were named by their common generic Portuguese name *Baleas* or *Balleyas* (the current typing form being *Baleias*). In 1767, the whaling contractors hired Martins Dhiribarren, a French expert in refining whale oil, for a period of four years with the mission of finding sperm whales and demonstrating the proper methods of transforming blubber and spermaceti into good quality and highly priced products. His first-hand account, 'Relation véridique' (**Dhiribarren, n.d.**), resultant from his journey through several whaling stations along the Brazilian coast, is one of the few documents providing nomenclature for the species targeted and making a clear distinction between the animals caught. [ii] Dhiribarren stated that all the animals hunted in Bahia (northeast coast) were *Gibarts* / *Gibars* (**Ibid: fls. 3, 9**) and in Santa Catarina (southeast coast) they were *Sardes* whales (**Ibid: fls. 5, 9**). A partner of the whaling contract, Baltazar dos Reis, who accompanied Dhiribarren in his mission and was possibly influenced or informed by him, would write some years later that '*in the seas of Bahia they don't fish Sardas Whales, which are the ones with baleen, but only Gibartes'* (**AHU_ACL_CU_021, Cx. 6, D. 405**).[iii]

The *Gibarts*=*Gibars*=*Gibartes* whales are Humpback whales. We will also find a contemporary mention of *Gibartes* in the Portuguese economics publication *Diccionario Do Commercio* of Alberto Jacqueri de Sales (1761-1773), which is an adaptation of the contents of the *Dictionnaire universel de commerce* by Jacques Sabary des Bruslons, published in 1741. This is a miscellany of information about species from the northern and southern hemispheres, with Portuguese and French nomenclature, but again it reinforces the exploitation of the Humpback whale in Bahia.

A few decades later two renowned academic scholars and naturalists, Domenico Vandelli (**1789**) and José Bonifácio de Andrada e Silva (**1790**), affirmed in their essays that the 'Balaena physalus of Linneo' was probably the species caught in Brazil. It is worth reinforcing that Andrada e Silva was

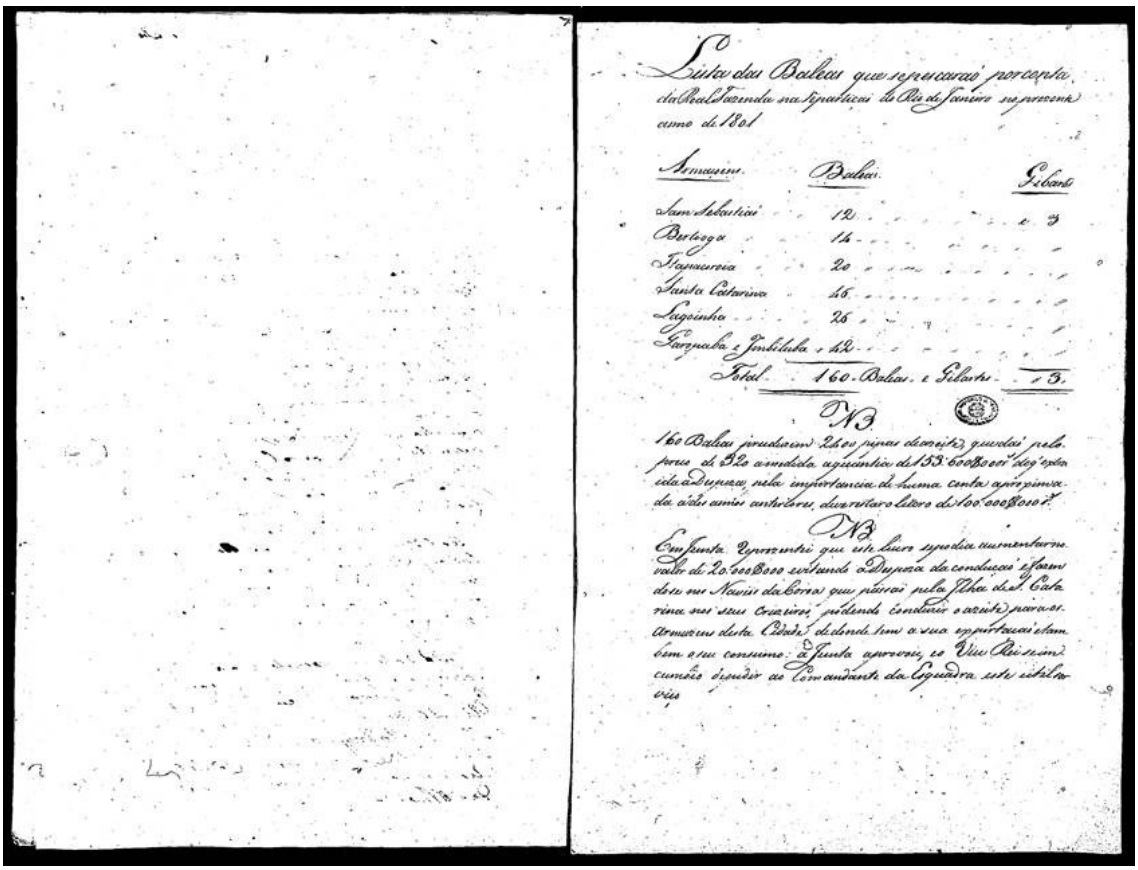
born and lived in Brazil until the age of 17, and 'has seen and observed' the work at the whaling factories as he himself wrote in his text. Nevertheless, it seems very unlikely that a balaenopterid whale, which was said to produce less and poorest oil, and which had aggressive behaviour towards the boats, has been actively chased at sea by rowing boats and stroke by hand-harpoons. Balaenopterid species like the Fin whale (*Balaenoptera physalus* Linnaeus, 1758), the Blue whale (*Balaenoptera musculus* Linnaeus, 1758), the Bryde's whale (*Balaenoptera edeni* Anderson, 1879), or the Minke whale (*Balaenoptera acutorostrata* Lacépède, 1804), among others, became targets of industrial whaling of the 20th century in South Atlantic, including in the waters off Brazil, with the introduction of the mechanical harpoon and the steam whaling boats that could keep up with the speed of the animals and support their huge size (**Andriolo et al. 2010; Hart & Edmundson, 2017**). The *Gibbar* whale – and not Gibarte or Gibart – appears in the works of Mathurin Jacques Brisson (**1756: 352**) and Bonnaterre (**1789: 4**) as a counterpart of the *Finfish* or the *Fin-whale* of Linnaeus (1758), so we may question if Andrada e Silva was misinterpreting the species based on the works of coeval naturalists and due to the similarity in nomenclature. For its part, *Sardas* is the name given by Basque whalers to the North Atlantic Right whales (**Van Beneden, 1886; Du Pasquier, 1986; Loewen, 2009**), and that was then applied to its counterpart of the South Atlantic, the Southern Right Whale.[iv]

Considering the analysis of visual material of two representations of whaling stations in São Paulo and Rio de Janeiro (**Figure 2**), and although the animals are not detailed in their morphological characteristics, their pectoral fins appear to be short in relation to the length of the body, resembling those of Right whales.

Figure 2: Depictions of whales in São Paulo (left) Source: Detail of Plan no. 19 'Obras novas da fortaleza da Barra de Santos' in Cartas Topograficas do Continente do Sul e parte Meridional da America Portugueza.[v] *; and Rio de Janeiro (right) Source: Detail of the painting 'Pesca da Baleia na Baía de Guanabara' by Leandro Joaquim, 18th century, National History Museum Collection, Rio de Janeiro.*[vi]

In the administrative documentation an important document discriminating the species can be found for the year 1801. This was the last year of the whaling monopoly, and the profit of the activity was being discussed among estate administrators. The list presented here (**Figure 3**) refers to the numbers of whales caught in the whaling stations of Rio de Janeiro and discriminates between *Baleas* and *Gibartes*, respectively Right whales and Humpback whales.

Figure 3: List of the whales caught in the year 1801 in different whaling stations of Rio de Janeiro, with a clear distinction between Baleas and Gibartes, or Right whales and Humpback whales, respectively. Source: AHU_ACL_CU_017, Cx. 197, D. 14021.



We can count 160 *Baleas* and 3 *Gibartes*, all captured by the whalers of one single whaling station, Armação de S. Sebastião. The difference in numbers between the two species leads us to believe that the first species would be preferred while the second would be caught in the absence of the first. Note also that it was the whaling station with the lowest number of catches and that Humpback whales (*Gibartes*) represented ¼ of the total catches (n=12).

In fact, even in Bahia it is possible that the two species were occasionally captured. A memory written by the representative of the whaling company can give some clues on that since the author points to the reasons that led to the end of the monopoly and state that the profits of the whaling stations of Bahia were low because 'they consist of fishing *Gibartes* (one of the twenty or so species of whales) which only yield 8 to 12 barrels of oil, the baleen being useless, and much by chance a whale of the South Sea [*Baleia do mar do Sul*] is fished in those seas, more profitable in oil, and with a useful baleen' (**Jacinto Jorge dos Anjos Correa, 1820 in Araujo, 1822**). An article in the newspaper *Musaico*, of 1845 reported that in the early years of 1800 Right whales were captured in Bahia. The author referred to those whales as '*peixe verdadeiro*' – literally translated as 'real fish' – of extraordinary greatness and giving an excessive quantity of very

good oil (**Moscoso, 1845: 244**). The same designation was also found in a document of 1675 describing that five 'real fishes' have been hunted, among 50 animals characterized as being females, males, and calves (**AHU_CU_005-02, Cx. 22, D. 2640-2641**).

This new data points to the possibility of both species being hunted, processed and their oils mixed. In this way, two distinct species may have become a 'single' whale. Both are large baleen whale species with a thick layer of fat, providing significant amounts of oil. The way to access the animals, to hunt, kill and process them may have been identical. Moreover, the two species are sympatric, i.e., their occurrence overlaps. Currently, Humpback whales seem to appear in the coastal waters of the states of São Paulo, Rio de Janeiro and Espírito Santo, mainly between July and October, with a high percentage in the presence of mother-calf pairs (**Lodi & Rodrigues, 2007**).[vii] Plus, off Salvador (Bahia), both Humpback and Right whales have been sporadically reported together in the past (**Richards, 2009**), and the latter may not occur in large numbers today because historical habitats may have not yet been re-occupied by the recovering population (**Morais et al., 2017**). All of this reinforces the idea that whale populations are enlarging their range of distribution off Brazil and occupying the waters they inhabit since before the early modern whaling era and that is why historical data is so important to track signs of ecological change.

Regarding the Sperm whale, within this whaling operation, an effort to chase the species in open waters was made between 1774 and 1777, which resulted in 186 animals being processed (**Vieira et al., 2019; Vieira, 2020a**). The higher investment required to catch this species does not seem to have paid off and no further information has been found so far. Thus, an in-depth study on this issue deserves to be developed in the future.

Animals Caught, and Animals Discharged

The number of animals captured depended on numerous factors concerning both the people who hunted and those who managed the activity. Along the four whaling sites, the stations had different sizes and capacities, depending on the investment, the number of boats, the workforce, and the facilities. For the 17th century and early decades of the following, it has proven to be very difficult to determine capture levels with accuracy. Nevertheless, data from non-systematized documentation such as chronicles and administrative correspondence was compiled and analysed, from 1627 to 1801. As different types of sources were consulted, some data obtained refer to only one whaling region (Bahia, Rio de Janeiro, São Paulo, or Santa Catarina), while others refer to the total

catches of a particular year for all whaling stations, as identified in the following graph and table (**Figure 4; Table I**).

Within the administrative correspondence, requests from whaling contracts asking the discharge of taxes and fees due to the low income of certain whaling seasons are often found. These documents are important in the absence of systematised records since they provide information on the number of whales captured in years of low yield, allowing us to distinguish between an ideal number of animals or a low number that led to the failure of the contract in a year or period. The contractors' testimonies differ on what should be a good catch rate, some pointing that no less than 20 whales were caught, others around 70, sometimes reaching 100 captured animals. This fluctuation in the numbers reported is consistent with other operations of the second half of the 17th century, namely that of Long Island in the Atlantic coast of North America (**e.g., Reeves & Mitchell, 1986**).

Figure 4: Numbers of baleen whales captured in Brazil between 1627 and 1801.

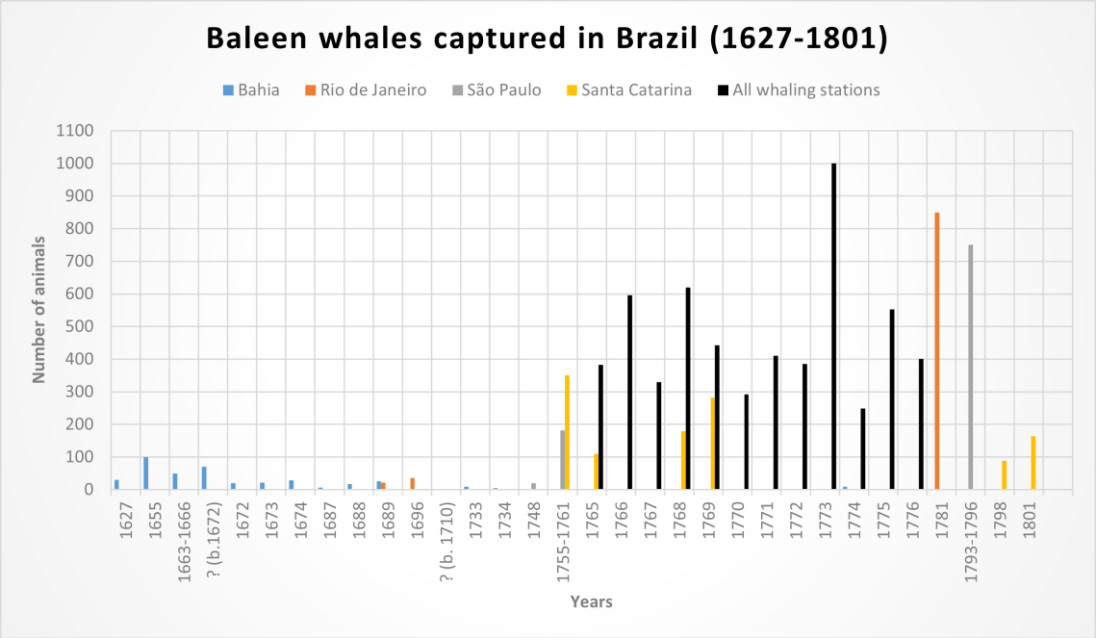


Table 1: Reported number of baleen whales captured per whaling region and in all whaling stations, in Brazil between 1627 and 1801.

	Bahia	*Rio de Janeiro*	*São Paulo*	*Santa Catarina*	*All whaling stations*
1627	30	-	-	-	-
1655	100	-	-	-	-
1663-1666	50	-	-	-	-
? (b.1672)	70	-	-	-	-
1672	20	-	-	-	-
1673	22	-	-	-	-
1674	28	-	-	-	-
1687	6	-	-	-	-
1688	17	-	-	-	-
1689	25	22	-	-	-
1696	-	35	-	-	-
? (b. 1710)	-	-	-	-	-
1733	9	-	-	-	-
1734	5	-	-	-	-
1748	-	-	20		
1755-1761	-	-	182	350	
1765	-	-	-	110	383
1766	-	-	-	-	596
1767	-	-	-	-	329
1768	-	-	-	179	619
1769	-	-	-	282	442
1770	-	-	-	-	292
1771	-	-	-	-	410
1772	-	-	-	-	385
1773	-	-	-	-	1000
1774	9	-	-	-	249
1775	-	-	-	-	552
1776	-	-	-	-	401
1781	-	850	-	-	-
1793-1796	-	-	750	-	-
1798	-	-	-	88	-
1801	-	-	-	163	-

By the second half of the 18th century, the number considered enough to satisfy the demand was much higher in Bahia than previously, reporting catches of 120 or 130 animals each year, sometimes 200, other times only 50, and that a minimum of 60 or 70 whales allowed the contract not to be detrimental (**AHU_ACL_CU_005, Cx. 45, D. 8440**). In the 1760s decade, it was reported that in the stations of São Paulo around 60 whales were captured in each whaling season (**AHU_ACL_CU_023-01, Cx. 23, D. 2167**) and in Santa Catarina around 200 animals (**AHU_ACL_CU_017, Cx. 62, D. 5931**). Despite being the captaincy with the shortest time of whaling operation, the stations in Santa Catarina were the largest and best equipped, which, consequently, led to the largest number of animals captured during their time of operation.

Only one document has been found with a systematized record of baleen whales captured, 'Mapa do q' tem porduzido as 12 pescas de Baléas abaixo declaradas' (**AHU_ACL_CU_017, Cx. 103, D. 8770**) concerning the period 1765-1776, which can be justified by the establishment of the Whaling Company 'Companhia da Pescaria das Baleyas' in 1765, and corresponding to a new logic of economic, scientific, and administrative development in Portugal and overseas. This source relates quantities of oil and baleen plates produced with the number of animals, totalizing 5,668 whales processed in the four whaling sites for that period.

Counting the total period, from 1627 to 1801, and considering that data is only available for 41 years, the total of 9080 animals would mean around 220 animals per year. We should not rule out the hypothesis of contractors declaring different numbers from those that had been caught but in the absence of more robust data to date we are assuming these data as proxies of animals processed, contributing to the overall understanding of this activity in the period under study. We also believe these numbers must be conservative, since there is a hunting loss associated with this type of open boat/hand-harpoon whaling considering the number of animals struck and lost (**Reeves & Mitchell, 1986; Vighi et al., 2000**) as also an unquantifiable number of animals killed or captured but not processed. This occurred in small whaling stations where there were not enough boilers and tanks to process and store the oil of all the whales caught and it was reported that 'in taking two animals one was lost' (**AHU_CU_017-01, Cx. 11, D. 2065-2068**). With no capstans available to hoist all the animals or tanks filled to their maximum capacity, whales ended up being dumped on the beaches. Several times the only utility was the baleen which was removed, cleaned, and packed in bales to be transported to Lisbon. The rest of the animal was discharged on the beach, decomposing and rotting in the adjacent intertidal area, a situation that caused great discomfort to the population, due to the smell of putrefying remains and even led to the proposal of a fine for the contractors (**Vieira, 2020a**).

This was a constant during the monopoly period, being reported in the documentation of 1600 and 1700 regarding different whaling areas, and that by the mid-18th century drew the attention of the captaincies' governors. The exploitation of whales beyond the capacity to process them began to be seen as excessive with consequences for the profit of the activity and for the Crown. A governor wrote, in 1759, that 'this exorbitant fishing will drive the whales away, and in future years we will experience a shortage of whales, which is infallible because of the present waste' (**AHU_ACL_CU_005, Cx. 55, D. 5423**). And years later another governor advised that 'it is much more convenient, for example, to kill two [whales] in each day, and take advantage of them, than to kill four, and lose them all for lack of time' (**Mourão, 1896 [1766]).** Of course, those men were interested in a long and profitable industry but, simultaneously, their statements and administration measures appealed to an extraction with less loss and waste, and somehow the administration of the monopoly ended up resulting, in a certain way, in a measure of resource management.

The whales that were captured but not processed can hardly be accounted and result in underestimated catch rates, a fact that must be taken into consideration in a future estimative of whale populations in the Brazilian seas of the past. Another very important issue is the capture of calves and juveniles as a way of keeping the adult female nearby to be harpooned more easily. This was a practice also inherited from the Basque whaling techniques and that is mirrored in the documental sources, and eventually illustrated in the figure above (Figure 2 - left), where animals of different sizes can be seen. In some cases when the numbers of hunted animals have been recorded, different designations are found, namely for females (*madrigios*), females that had recently given birth (*paridos*), suckling calves (*seguilhotes*) and juveniles (*baleotes*). As an example, in the whaling season of 1768 in Bahia, a total of 179 were caught, 146 being female and 33 calves (**AHU_CU_005-01, Cx. 47, D. 8789-8796**).

In a very rough assessment from four documents where a discrimination of animals exists (**AHU_CU_005-02, Cx. 22, D. 2640-2641; AHU_CU_005-02, Cx. 30, D. 3888; AHU_CU_005-02, Cx. 29, D. 3705-3706; AHU_CU_005-01, Cx. 47, D. 8789-8796**), referring to 1663-1665, 1672-1674, 1688-1689, 1768 and 1775, we estimated a rate of around 40% of offspring/juveniles killed. If this percentage is confirmed in a future study with more robust data, this is a very high capture rate that must have had a significant impact on the population dynamics of these animals. At the end of the 18th century, the practice of hunting mainly females and calves would be pointed out by some naturalists (**Câmara, 1789; Silva, 1790**) as highly destructive. The authors warned that diminishing the offspring would affect whale populations but also the whaling activity itself, which was

conducted in a non-sustainable way. Touching current concepts of ecology and conservation biology, their works articulated economy, science, and ecosystem dynamics with empirical and scientific knowledge and were at the basis of 18th century's emergent notions regarding resource management (**Pádua, 2004; Vieira et al., 2020**).

Final Remarks: Whales lost in history and now found

Through a deep collection and analysis of historical sources of 1600-1800, we presented here an attempt to infer about target species and catch rates of baleen whales in the waters of Brazil. It was clear that a dispersed and non-systematized documentation of that period does not allow a precise identification of the species along the four whaling sites but, nevertheless, some conclusions can be drawn. It seems most likely that the Southern Right whale has been the preferred species in southern Brazil (Rio de Janeiro, São Paulo, and Santa Catarina), as reinforced by other studies (**e.g., Morais et al., 2017**) but the historical evidences here provided also point to the simultaneous capture of both Southern Right and Humpback, even if sporadically, in all regions. Also, in accordance with Morais and colleagues (**Ibid**) it is likely that Humpback whales constituted the main target species in the north-eastern coast (Bahia), at least for the 18th century. However, the fragmentary information concerning 17th century documentary sources prevent us from asserting with confidence which species was targeted. Thus, to prevent the gradual shift of the baseline and a collective unawareness of past marine ecological changes, one must keep questioning if, as we have done elsewhere (**Vieira, 2018b**), a decrease in the availability of one species may have provoked a sequential change in the preferential target, from the Southern Right to the Humpback whale.

Considering the number of animals captured, this study was a new and updated attempt to calculate catches from such an early period. Our estimate of 9080 animals processed, between 1627 and 1801, should be interpreted as an underestimate catch number because this only refers to data from 42 years within that period, also due to hunting loss and calf-securing practices. This coastal whaling operation may seem the least intensive in terms of catching effort, compared to the following, but its two centuries of duration meant that its impact on natural whale populations must represent a total cumulative removal of thousands of animals, as asserted also by Reeves and Smith (**2003**).

This study makes clear that whales and whaling had an important role, as agents and as a stimulus, in the imperial dynamics of Portugal in South America and were part of the scientific, economic, and political agendas. These animals and their exploitation are intrinsically connected with the construction of littoral spaces, patterns of consumption, construction of

scientific knowledge, and even with nature management and conservation.

Since 2008, the conservation status of the Southern Right whale and Humpback whale species, by the IUCN, is 'Least Concern', having evolved since 1965 from 'Endangered' and 'Vulnerable' categories. Whaling is a paradigmatic case of marine exploitation and of the relationships of people with the ocean worldwide (**Jones, 2013; Richter, 2015; Brito et al., 2019**), but many other aquatic and oceanic animals have been profoundly affected in Brazilian waters (**Vieira et al., 2020; Brito, 2019, Brito, 2022**). We expect to have drawn attention to the importance of going deeper into historical data to understand patterns of change, trajectories, and responses of both human and animal populations to each other.

Digging into the past can allow us to understand when an ecosystem moves outside of its historical range of variability, or when influences upon ecosystems move from being dominated by natural to human drivers (**Thurstan, 2022**). Historical data is particularly relevant while discussing biodiversity loss within the concept of the Anthropocene. It requires a deeper assessment of environmental changes and impacts and to do that we should prevent our current knowledge from interfering in such assessment about the past of natural populations (**Lotze & Mcclenachan, 2014; Tsing et al., 2017**). Pre-industrial levels of extraction of living marine organisms are being revealed in the last years with increasing detail and revealing greater impacts on populations and ecosystems than previously known (**e.g., Holm et al., 2019**). We can only measure the long-term interaction of humans with the sea by, besides keeping an open mind, acknowledging that deeper and multiple relationships have been occurring throughout history (**Holmes et al., 2020; Brito, 2022**).

In this framework, supported by the ongoing United Nations Decade of Ocean Science for Sustainable Development (2021-2030), Humanities are being called to act. New efforts such as the Manifesto: Humanities 4 the Ocean[viii] and the *Human Oceans Past* research agenda are expected to lead to a fundamental revision in our understanding of the historical role of marine resources in the development of human societies (**Holm et al., 2022**).

Humanities can give a unique contribution by rescuing understudied historical events, building on what was lost or modified, appealing to empathy for those beings with whom we share the past and the present world, contributing to rethinking and rewrite the history of oceans and marine animals, where human and non-human agencies are intrinsically involved. Here is our story of whales lost from the sea and now found.

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Nina Vieira has a training background in Biology and Marine Ecology and holds a PhD in History. She is a researcher at CHAM-Centre for the Humanities (NOVA FCSH), where she is a member of the Executive Board and a team member of the ERC Synergy Grant *4-Oceans: A human history of marine life* and of the UNESCO Chair *The Ocean's Cultural Heritage*. She is currently the regional representative of Portugal at the Environmental Society for Environmental History. Her research focuses on interactions between people and marine animals, mainly on the exploitation of marine mammals and their economic, cultural, and ecological significance.

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Endnotes

[i] This is available online at: http://resgate.bn.br/.

[ii] At this point, we are not aware about the academic background, or the knowledge Martins Ghiribarren possessed, nor the literature he consumed. Since this document has not been studied in detailed, we are still conducting preliminary research on the author's bibliography and his mission to Brazil.

[iii] Items with the AHU ACL CU preface are archival documents from the Arquivo Histórico Ultramarino (Overseas Historical Archive), Administração Central, Conselho Ultramarino. For access link see note [i] above.

[iv] Following Loewen (**2009**) the meaning of *Sarda* was a generic Basque name for a large group of fish or animals that was first given to the population of Basque whalers encountered off Canada.

[v] Available at the Digital collection of the National Library of Brazil, via http://bdlb.bn.gov.br/acervo/handle/20.500.12156.3/427497.

[vi] Online exhibition available at https://artsandculture.google.com/partner/museu-historico-nacional.

[vii] Cf. *RIO DE JANEIRO TEM GRANDE NÚMERO DE JUBARTES REGISTRADAS*, available online at: https://www.baleiajubarte.org.br/post/rio-de-janeiro-tem-grande-n%C3%BAmero-de-jubartes-registradas

[viii] This is available online at: https://www.tcd.ie/tceh/projects/manifesto/.

Res(crip)ting the Gaze: Agency and the aesthetics of disability in 'Animal's People'

Sonakshi Srivastava

Guru Gobind Singh Indraprastha University, Dwarka, Delhi, India
Correspondence: ss.11.taken@gmail.com

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Abstract

The interaction between human and humans, and the environment is crucial to understand the signature of the human impact upon human bodies as well the environment.

This article takes into consideration Indra Sinha's 'Animal's People' that unravels the life of the eponymous character, Animal – a victim of a gas leak in his village of Khaufpur (alluding to the Bhopal Gas Tragedy). Animal comes to be known so after the gas leak twists his spine, rendering him to walk on all-fours.

I will engage in a close reading of the primary text, placing it in conversation with the theories of Jasbir K. Puar, Tobin Siebers, and Rosemarie Garland-Thomson. I will investigate the porous boundaries of dis/ability in the face of Anthropocenic disasters, the aesthetics of disability politics – the visibility of the disabled protagonist who refuses to be obliterated and strikes back by negotiating his peripheral and perilous position bringing to the fore the biopolitics that plays out in the Anthropocenic age, thereby linking ecology and civilization in adamantine chains.

Keywords: agency; disability; disaster; Anthropocene; body; religion; logo; simplicity; memorability; versatility; distinctness; appropriateness

Introduction

To launch directly into a reading of 'Animal's People' is bound to be a restrictive exercise, since the text is layered 'voices' (**Sinha, 2007: 44**) that require a hearing, a background for a better understanding.

'Animal's People' is set in the fictional town of Khaufpur (roughly translating to 'the city of terror' in English). The town is actually a stand-in for Bhopal, and the gas leak is a direct reference to the Bhopal Gas Tragedy, the 'Kampani' is the Union Carbide Company. The Bhopal Gas Tragedy is counted as one of the world's worst industrial disasters, and as Veena Das succinctly sums up the disaster:

> *a multinational corporation was engaged in the production and storage of an extremely hazardous industrial chemical for which it had been given license to operate by the Indian government, Despite the known hazards of industrial isocyanates and diisocyanates, neither the multinational corporation nor its Indian subsidiary nor the Government of India had considered it important or necessary to enquire into the nature of the hazard to the people posed by the manufacture and storage of this toxic material between the setting up of the factory and the pillage of the gas. The people of Bhopal, and especially those staying around the factory, had not been warned of the dangers posed to them by these industrial activities, nor had any regulations been made and implemented about the placement of such factories. The result of all these activities, geared towards the development and industrialization of India was that more than 300,000 people were suddenly, one night, blighted by a crippling disease, of which more than 2500 died horrible deaths, yet the people declared incompetent and irresponsible were neither the multinational nor the government but the sufferers.* (**Das, 2018: 160 – 1**)

This shifting of blame upon the victims, the 'sufferers', and their being declared 'incompetent' and 'irresponsible' provides a good starting point to un-layer the novel, placing it in an intricate matrix of biopolitics.

Whose Disability is it Anyway?

'Animal's People' is a text at the intersection of disability and environment, a convergence of the unnatural and the natural. Sharon Betcher (**2015**) connects the dots between the environment and disability in her essay, 'The Picture of Health', wherein she writes that 'images of health in body' inform able nationalism (**Ibid: 2**), conversely then disability is 'failed health'. Her point finds further substance in M.R. Reich's scholarship which mapped the relation between chemical disasters and the responses they elicited to pronounce the 'construction of normality' in a society. He

observed, 'chemical disasters appear by surprise (emphasis mine). They represent an extraordinary event that disrupts the normal flow of social life. But paradoxically, such crises in society create windows on normality. Through the windows of a chemical disaster, once can peer at political and social processes not usually accessible or visible' (**Reich, 1982: 1**).

The society accommodates, or rather skews the 'surprise' through its exercise on the most tangible representation of the self– the body. The body becomes the contested site, where violence manifests.

Tobin Siebers (**2008**) in 'Disability in Theory: From Social Constructivism to the New Realism of the Body' writes of the anxiety that disability poses to the representation of the body, 'usually it means that the disabled body provides an insight that all bodies are socially constructed- that social attitudes and institutions determine the greater than biological fact- the representation of the body's reality' (**Ibid: 2**), echoing Rosemarie Garland-Thomson (**1997**) in her 'Extraordinary Bodies': 'physical disability is not an absolute, inferior state or a personal misfortune. Instead, disability is a representation, a cultural interpretation of physical transformation or configuration, and a comparison of bodies that structures social relations and institutions. Disability then, is the attribution of corporeal deviance – not so much a property of bodies as a product of cultural rules about what bodies should be or do' (**Ibid: 16**).

Disability scholars opine that disability is a 'representation' that needs to be made comprehensible. The need for comprehensibility arises out of the urgency to 'make the world seem knowable and predictable' (**Garland-Thomson, 1997: 21**). Relegating disability to the realm of the unknowable, or the random exposes the 'complex constructedness of society, culture, language, and meaning' (**Ibid: 2**). Garland-Thomson analyses disability as 'social dirt', the 'matter out of place' (**Ibid: 43**). It is 'aberrant', 'anomalous', 'does not fit the place of ordinary', it is extra-ordinary, a freak, a monster, thriving on the margins.

The need to make the world 'knowable' places one at odds in the face of disasters such as the Bhopal Gas Tragedy, Chernobyl, as well the Agent Orange incident. When such events occur 'by chance', the mutilation and the amputation accrued is by no 'chance'. Deleuze and Guattari read such accidents as events that are 'part of the biopolitical scripting of populations available for injury, whether through labouring or through warring or through both' (**Puar, 2017: 64**), allowing biopolitics to gain agency.

This 'randomness of fate' (**Garland–Thomson, 1997: 94**) is reasoned out in the interstice of religion, 'theodicy' as articulated in Lerner's 'Just World' Theory, as well as by Veena Das (**2018: 137**). In 'Animal's People',

discussions abound of 'thighs of fate' (**Sinha, 2007: 111**), of understanding disability as 'god's knot in humanity' (**Ibid: 123**). Animal draws attention to the condition of the victims of 'that night' – Shambhu believes his condition to be 'god's will' and resigns to his fate (**Ibid: 147**).

In an eloquent passage, Elli reasons why she 'fell out with her god' (**Ibid: 203**) when she realized that her 'mother's illness could not be cured by prayer, or by (my) own force..., we went our separate ways, he to demonstrate his strange way of loving human beings, while for me began the long process of learning how to heal their broken bodies and minds' (**Ibid: 203**). Religion offers a vista for reform in the novel, hence Farouq's request to Animal to 'embrace a religion... get to Paradise' (**Ibid: 206**), for if he fails to prove his purity while walking on the 'fire', he will go to 'hell' to which he retorts that he has 'already been to hell' (**Ibid: 207**). Chunaram, a Hindu offers another point of view to demystify the mysteries of the universe – for him, Animal 'suffers' in the present because he sinned in his past life (**Ibid: 207**). Animal's disability elicits interpretational responses that are grounded in religious or superstitious beliefs. Even death is rationalised through religion- the 'Angel of Death' upon seeing a 'healthy image' of Alia who is wearing a 'fancy new dress' will believe that he has 'made a mistake' and will spare Alia (**Ibid: 326**).

It is also crucial to note that the entire accident of 'that night' is talked about in theodic terms – Ma Franci interprets it as the 'Apokalips', and the 'fire scene' at the mosque which highlighted the way bodies are used as sites of violence be it for the sake of Holy Wars (the murder in Karbala) (**Ibid: 221**) or the 'accident' of 'that night', to visualizing Ma Franci as Ma Kali, the harbinger of the 'Apokalips', the 'Qayamat', to Isa resurrecting to 'fix' Animal's body with glue (**Ibid: 334**), to his further inebriated rendezvous in the jungle where after a cathartic rejection by the animals who declare him to be 'human' (**Ibid: 346**), he 'rejects all gods including deities.....policemen...conmen, the living, the dead', the tripartite of Power- Religion, Medicine, and Politics, he finds himself in a unified 'Brahma', the 'Paradise', placing himself in a pre-lapsarian state, after coming to terms with himself as well as the 'suffering' and 'cruelty' on Earth. (**Ibid: 352**)

Animal also subtly brings to the surface another 'biocidal' disaster, if I may hazard to say- the 'Agent Orange' incident and the mention of the Vietnam War when Elli recounts her days in 'Amrika' (**Ibid: 137 – 9**). Wars are deliberate actions on the body – the enemy's body and seek an erasure of the same. The use of chemicals in the Vietnam War- napalm (white phosphorus), as well as Agent Orange reveal the atrocities that humans readily inflict upon one another, misusing and damaging ecosystems in the process.

Disasters such as the Bhopal Gas Tragedy cause the body to respond to the environment by means of which it is at risk – the catalogue of all the victims of the Kampani- Somnath, Gargi, Shambhu, the nursing mother who cannot breastfeed her baby since her milk is 'poisonous' (**Ibid: 107**) imply the long term risks such disasters pose to humans and their environment, they are victims of 'slow violence' (**Nixon, 2009: 13**).

In the face of the 'supposed inevitability', how are the crips to claim agency, their own 'picture of health'? Betcher posits the view that 'as a picture of health, the crip refuses to resent the world. S/he exercises forbearance with humanity, given that environmentally induced disabilities in the Anthropocene are not innocent of human on human injustice, of human on human violence' (**Betcher, 2015: 21**). This leads us into a 'post human' realm- of understanding 'environmentally induced disabilities' as mutation, a way of survival, a reminder of 'more fluid relation between capacity and debility' (**Puar, 2017: 168**), something that was apprehended by the disabilities scholar David Mitchell who re-interpreted the Darwinian theory and hailed 'randomness and non-directed nature' along with 'adaptive interactions with the environment' (**Mitchell, 2000, 25**). Rosemarie Garland-Thomson too, writes of an 'alternative vision of nature wherein the picture of health refers not to bounded self-enclosure or its dream of purity but to living with carnivalesque vigour amidst the human and planetary manifold, having learned to abide the unexpected, to live with dissonance, to rein in the impulse to control' (**Garland-Thomson, 1997: 348**).

This 'refiguring' of the 'somatic wholeness' allows the 'Eyes' for an unsettling confrontation 'with the abject, entailing those fragile states where man strays on the territories of animal'. The abject in Kristevian scholarship is the 'rupturing of systematic order and sealed identity from within' (**Kristeva, 1982: 23**). Animal occupies this porous boundary- the uneasy spot between human and non-human, and due to this liminality becomes the 'post human changeling' (**Nixon, 2009: 14**). Fiedler (**1993**) opines that 'the true Freak, however stirs both supernatural terror and natural sympathy, since unlike the fabulous monsters, he is one of us, the human child of human parents, however, altered by forces we do not quite understand into something mystic and mysterious, as no more cripple ever is.. Only the true Freak challenges the conventional boundaries between the male and the female, human and animal, and consequently between reality and illusion, experience and fantasy, fact and myth' (**Ibid: 24**). The Freak, thus can be said to embody abjection, and Animal is a 'freak' of 'that night' – becoming a '(corpo)realized entity of our worst fears and anxieties' (**Kristeva, 1982: 160**), alluding to somatic mutations and other 'such accidents'.

In 'The History of Disability', Henri-Jacques Stiker (**2015**) writes that the integration of the disabled in the society will 'prove inadequate if it must be on the terms of the dominant culture's normalizing criteria' which is concerned more with 'eugenics', a sanitized way of looking at, and containing things, 'curing' them, 'disciplining', and 'regulating them'. So, what is to be done?

Mitchell and Snyder in 'Narrative Prosthesis', write, 'like other social movements, advocates for disability rights, artists, and scholars have recognized the power available in resignifying terms such as cripple and gimp. As opposed to substituting more palatable terms, the ironic embrace of derogatory terminology has provided the leverage that belongs to openly transgressive displays. The power of transgression always originates at the moment when the derided object embraces its deviance as value. Perversely championing the terms of their own stigmatization, marginal peoples alarm the dominant culture with a canniness about their own subjugation. The embrace of denigrating terminology forces the dominant culture to face its violence head-on because the authority of devaluation has been claimed openly and ironically. Thus, the minority culture deflects the stigmatizing definition back on to the offenders by openly advertising them in public discourse. The effect shames the dominant culture into a recognition of its own dehumanizing precepts. What was most devalued is now righted by a self-naming that detracts from the original power of the condescending terms. Disability representation explicitly evokes powerful sentiments within the safe space of textual interactions. These 'powerful sentiments' emanate from the transgressive power signified by physical and cognitive differences. Readers are seduced into an encounter with their most extreme reactions as a way of facing up to the imagined threat that they pose' (**Mitchell & Snyder, 2000: 52**).

Indra Sinha allows Animal a platform to tell his story, to catharticulate; allowing the 'crip to strike back'.

The Crip Strikes Back: On Animal's agency

The novel can be considered as autoethnographic account – Animal's audio tapes are transcribed to words, a project that allows Animal agency to 'voice' his story, opening 'focus beyond the individual life to examine the culture in which it is embedded, and in the case of disability especially, it has the power to expose how dramatically social representations determine the nature of the disabled body and the forms of the self-knowing attached to it, providing a convincing example of the explanatory power of the social construction model' **(Siebers, 2008: 196**).

Disabled characters appear in literary texts as marginal characters or as 'uncomplicated figures or exotic aliens whose bodily configurations operate as spectacles, eliciting responses from other characters or producing rhetorical effects that depend on disability's cultural resonance. Indeed, main characters almost never have physical disabilities. Even though mainstream critics have long discussed how literary characters look at disabled characters metaphorically or aesthetically, reading them without political awareness as conventional elements of the sentimental, romantic, Gothic, or grotesque traditions' (**Garland-Thomson, 1997: 209**).

Disabled characters have functioned as 'narrative prosthesis', their representation dominating two popular modes address; either as 'overheated symbolic imagery' or as a 'persuasive tool of artistic characterization' (**Mitchell & Snyder, 2000: 32**). Almost all theorists of disability studies have voiced concern over the 'negative imagery' of disabled characters- disability is viewed as 'a restrictive pattern of characterization that usually sacrificed the humanity of the protagonists and villains alike' (**Ibid: 34**), thus 'misrepresenting or flattening the experience real people have of their own or other's disabilities' (**Garland-Thomson, 1997: 214**).

'Animal's People' marks a departure from the 'literary traffic in metaphors' that tends to disable the understanding of the stigma that attaches itself to disabled bodies. The text is an ensemble of Animal's recordings ('Tapes') along with a hyperlink to the information on Khaufpur, and an Editor's Note - a collection of para-texts that further disembody the book to en-able the disabled voices.

Animal, the eponymous character 'used to be human once', something that he is 'told' but 'does not remember it (himself)..... (I) walked on two feet just like a human being' (**Sinha: 2007: 1**).

Tape One and Tape Two not only materialize Animal's voice into text but also pronounce the anxiety that is projected upon disabled bodies, a mix of compassion and pity.

Born a few days before 'that night' in 'Khaufpur' (literally translating to 'City of Terror'), an allusion to the Bhopal Gas Tragedy of 1984, Animal is one of the victims of the methyl isocyanate leak from the 'Kampani's plant' (again, an allusion to the Union Carbide India Limited Plant) that contorts his spine, rendering him to walk on all fours.

Animal is continuously reassured of what he once was – 'such a beautiful boy you were', 'so sweet you were, a naughty little angel. You'd stand up on tiptoe' by Ma Franci, a French nun who is rendered unstable and converses only in French post 'that night'.

Animal iterates that he is told that he could 'walk upright' but refuses to be 'comforted' by such 'news' and aligns himself further with the peripheral bodies and objects – blind men, corpses, and turd.

Animal no longer wishes to be 'human' and consciously makes an effort to 'avoid mirrors' but cannot avoid his shadow. Mirrors are most often than not, 'sites of trauma' for people who are 'different', but function as a 'site and sight of affirmation for dominant groups' (**Mirzoeff, 2015: 54**). He has internalized the 'raw disgust' so much so that he is 'filled with rage' at 'all things that go or even stand on two feet', and his catalogue includes not only Ma Franci (who is rendered senile after 'that night' but otherwise shows no visible sign of disability), the watchman Chukku, women carrying pots on their heads, waiters carrying four plates per arm but also 'performing bears, stilt-walkers, one-leg-and-crutch beggar at Pir Gate, herons, ladders leaning against walls, and Farouq's bicycle' (**Sinha, 2007: 2**).

Animal further charts his peripheral position and at the same time becomes a mouthpiece for the disabled community when he realizes that 'the world of human is meant to be viewed from eye level. Your eyes' adhering to the 'normative' discourse of viewing and being viewed, and later exclaiming that 'at least standing on two feet' should ameliorate one's misery.

Animal furthers the idea of crip as a 'spectacle' when he talks of the 'Kakadu Jarnalis' whose 'eyes lit up' when he sees Animal, but later assumes a solemn garb, speaking in a 'hushed respect as if he were speaking a prayer in the presence of the lord of the death' (**Ibid: 4**).

Animal sees through the 'Jarnalis' who asks him to talk about 'the usual' – 'ous raat, that night, cette nuit, always that fucking night.' Animal is a living, 'freak'ing testimony of 'that night'.

Animal understands that he is a freak on display, that the 'jarnalis are like vultures, who suck (our) stories from us, so strangers in far off countries can marvel there's so much pain in the world. 'What I say becomes a picture and the eyes settle on it like flies' (**Ibid: 5**).

He gauges his disabled position- understands the jarnalis' gaze and strikes back – 'don't fucking stare or I won't speak'. The bodily difference between the two is pronounced when Animal likens the jarnalis' eyes to 'buttons' and his to 'buttonholes', very thoroughly aware of the lack that he is.

Had it not been for his corkscrewed spine, Animal is aware that he would have cut a 'handsome figure had he not been sullen' with a 'chest as deep as a wrestler's, pawled legs like hanks of ropes...' (**Ibid: 5**).

Thousands of people 'look through (jarnalis') eyes) – 'thousands staring at me through the holes in your head. Their curiosity feels like acid on my skin' (**Ibid: 2007: 7**). It is this 'awful idea' that titillates viewers and exhibit disabled people as 'objects of suspicion' (**Mitchell & Snyder, 2000: 36)**.

Disabled characters are either extolled or defeated according to their ability to adjust or overcome their tragic situation. Animal then is an exception. He derides the jarnalis and lashes out at the image of disabled people fostered by the able-bodied consumers – 'Jarnalis, I am a hard bastard, I hide my feelings. Ask people they'll tell you. I'm the same as ever, anyone in Khaufpur will point me out. There he is! Look! It's Animal. Goes on four feet, that one. See, it's him, bent double by his own bitterness. People see the outside but it is the inside where the real things happen, no one looks in there, maybe they don't dare.....' (**Sinha, 2007: 11**).

Animal takes command and prevents appropriation of his voice, he is ready to res(crip) this story.

I have already posited the view of Animal as a 'post human agent'. According to Bart Simon, 'post human is figured not as a radical break from humanism but rather as implicated in the ongoing critique of what it means to be human' (**Simon, 2003: 67**), an opinion that gains currency by Badmington who believes that the 'Posthumanist cultural criticism is forever happening within humanism itself' (**Ibid: 5**).

So Much Longing, So Little Space: On Animal's resistance

If Animal embodies the 'abject', his 'intimate side is suffering, and horror its public feature' (**Kristeva, 1982: 34**), and his narrative is the 'most elaborate, next to syntactic competence to situate a speaking being between his desires and their prohibitions' (**Ibid: 45**).

Animal is aware that he is 'no longer talking to the Jarnalis. (I am) talking to the eyes that are reading these words.' (**Sinha: 2007, 12**). Animal recounts the horror of 'that night', and while doing so, extricates himself from the garb of religion, declaring, 'I am not a Muslim, I am not a Hindu, I am not an Isayi, I am an animal, I'd be lying if I said religion meant a damn thing to me. Where was god the cunt when we needed him the most' (**Ibid: 14**). Animal refuses to embrace any theodic reasoning to justify his way of corporeal being. The name 'Animal' sticks to him, 'like the mud', it leaves behind a stain that makes him super aware of the corporeal difference.

Animal survives by befriending the outlaws and the outcasts, who, like him occupy the periphery, unassimilated by society. His friends include Ali Faqri, a beggar on the crutch who cons people by assuming the role of a witch 'doctor', Anjali, a prostitute, and Jara, the bitch. His human and non-

human companions make him feel comfortable, if not at home by integrating his corporal difference into their daily lives.

Animal is hyper-aware of the 'disgust' his body elicits from the onlookers, and despite Nisha treating him as 'normal', or Zafar declaring him to be 'specially abled', Animal knows that the 'best (I) could expect was disgust or maybe a kicking' (**Ibid: 19**). Tobin Siebers furthers the disability aesthetics. In his essay of the same title, Siebers writes, 'aesthetics tracks the emotions that some bodies feel in the presence of other bodies. But all bodies are not created equal when it comes to aesthetic response. Taste and disgust are the volatile reactions that reveal the dis/ease with which one body might incorporate another. Continuing in the same tone is Fiedler's (**1993**) observation, 'the terror of the challenge to the self's boundaries which are believed to be more or less absolute suggests that the spectacle of the extraordinary bodily difference upsets the viewer's faith in his/her own biological integrity. The viewer of the freakish spectacle does not experience a feeling of superiority in his or her closer proximity to the normal ideal, but rather senses his or her own body to be at risk. The power is in the challenge of the self's stability rather than its security.'

Animal is strongly attracted to Nisha but in a case of role reversal, declares that 'she is not my type.' Drawing from contemporary culture, he views his life parallel to a movie that ironically goes by the name, 'Dil Hi Dil Mein'. Nisha embarks upon a journey to teach Animal- breaking his name to 'Jan-var – the one who lives', praising him to be worthy enough of getting into Harvard, and applauding him for his 'uniqueness.' By coming in contact with Nisha's social circle, Animal navigates through the intricacies of society – despite his moniker and the physical evidence of disability, Animal is entrusted with duties that demand honesty and trust – be it carrying money on Zafar's behalf, or 'jamisponding.'

All in all, Animal despite claiming that he is one real animal, reveals his bare bones of humanity- he envies Zafar and believes him to be his 'rival in love', he gradually tries to poison him, he deliberately does not disclose to Somnath Ellie's secret for the simple fear of breaking his heart, he cares about Alia, he cares about Farouq, he makes Zafar see through his unintentional joke about his 'gallop', and he regrets 'poisoning' Zafar amongst other things.

He is the mouthpiece for the critique of 'democracy' as a farce, when he realises that 'the democracy is a meeting where everyone does what Zafar wants' (**Sinha, 2007: 123**), as well as the flawed medical practices that keep 'samples' (Kha-in –the Jar) but fail to deliver in the times of need. Through his sharp observations, he strips through the falsities of imposed layered identities, and reveals that there are 'just humans'.

An important episode in 'Animal's People', and perhaps, Animal's life is Holi. Reading it through the Bakhtinian lens would lend a carnivalesque shade to it. However, I am wary of such an interpretation because it is important to understand that hierarchies in Khaufpur have already overturned post 'that night'. It is in chaos, and the festival of Holi brings order in Animal's life. However, this order is uncanny for Animal because he had been an animal for too long. Nevertheless, Animal gets to share physical proximity, an erotic encounter (despite him being inebriated), with Anjali, a prostitute.

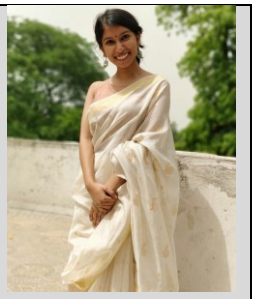
Animal from the onset had always been vocal about his urges- and he as a voyeur, satisfies his urges (quite unethically) by peeping on Nisha (claiming it to protect her 'honour') and 'blue jeans', Ellie. A refusal from Nisha too, resigns him to his lot- that he will never articulate his erotic desires.

However, the festival of Holi allows him the opportunity to satisfy his urge, to foray into the 'privileged domain of ability to have sex' (**Siebers, 2008: 149**). It is noteworthy that Anjali does not find Animal's body repulsive- and if were to study Animal as a potential 'mutant', 'a post human agent', then his success at being able to perform sex bestows upon him a sexual identity that firstly proves that 'disability is not a defect that needs to be overcome to have sex but as a complex embodiment that enhances sexual activities and pleasure', and secondly, it promises a 'political dimension' – the right to reproduce, the right to be recognized as 'sexual citizens' who need not be 'quarantined' to fulfil the State or Society's eugenics drive (**Ibid: 153**).

By refusing to undergo corrective surgery, Animal exercises his agency as a 'free human', and towards the end of the book, he keeps his name, he is the only Animal with a capital A- who is not an 'upright human' a term suitable for his condition. By exercising his agency, Animal's body offers a new interpretation, a new site of resistance- the new potentials that the body manifests in keeping up with the dynamic environment.

The porous boundaries of dis/ability navigated by Animal – renders only one thing true- the 'Apokalips' does not distinguish between bodies, all bodies are at risk to the 'accidents', the 'disasters' that the humans have unleashed on and within one another in the Age of the Anthropocene. However, bearing in mind the spatio-temporal co-ordinates, it may be nothing short of a truism, that some bodies are more disposable than others.

Sonakshi Srivastava graduated from the University of Delhi, in 2020, and is an MPhil candidate at Indraprastha University, Delhi, where she researches on the Anthropocene, and Speculative Fictions. She was also an Oceanvale Scholar for the Spring-Autumn session at Kirori Mal College, University of Delhi, where she researched on the representation of emotions in Kobo Abe's works. She is also one of the translation fellows with the South Asia Speaks programme. Her other areas of interests include aesthetics and critical theory, memory and trauma studies, bioethics, food studies, and Indian Writing in English among others



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Teaching to Care for Land as Home: Thinking beyond the Anthropocene in environmental education

Alejandra Melian-Morse

Department of Anthropology/Faculty of Arts & Science, McGill University, Canada
Correspondence: Alejandra.Melian-Morse@mail.mcgill.ca
Twitter: @alejmelian

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Abstract

Can a feminist, justice-oriented approach to environmental care function through the concept of the Anthropocene? This article argues that by foregrounding girlhood and young women's experiences, an ecofeminist approach to environmental education benefits the outdoor education field and environmentalist action alike. The argument is based on ethnographic research from 2018 at Cottonwood Gulch—an outdoor education program based in New Mexico, USA. It focuses on an all-girls group and the relationships they created with wildlife and wild spaces throughout their time in the outdoors immersion program. The article explores how an ecofeminist approach to the girls' education strengthened their responsible relationships with environments. Cottonwood Gulch created a sense of home in the landscapes it explored, and it encouraged intimacy between participants and between participants and wildlife. Through this approach the girls came to know 'land as home' and to understand caretaking as central to ecological responsibility and environmentalism. The article explores the entanglement of environmentalism and feminism discussed through ecofeminist approaches and problematizes the Anthropocene through this lens. It asks us to look beyond the concept of the Anthropocene and instead take up understanding of the Capitalocene, allowing ecofeminist thought and work to inspire a justice-oriented approach to environmentalism and environmental education.

Keywords: Capitalocenee Anthropocene; environmental education; outdoor education; climate change; ethnography

Introduction

In an age of devastating environmental collapse, the approaches we take to our relationships with the species that share the earth with human beings might genuinely decide the fate of our planet. Further, how we understand what this age of collapse *is*, how we identify the problem, shapes the ways in which we understand our current environmental relationships and our approaches to healing them. In recent years, the concept of the *Anthropocene* has been a popular way of conceptualizing our current era, yet the term is problematically rooted in the assumption that our current crisis is the fault of *all* of humanity, as the sweeping generalization inherent in the prefix *Anthropo* suggests. In this contribution to the conversation around the *Anthropocene*, I explore some of the limitations of the term. Drawing on ecofeminist literature, I suggest, instead, a move towards an alternative that Moore (**2017a**), has labelled the *Capitalocene*. Specifically, I explore the liberatory possibilities of ecofeminist teaching in outdoor education and posit that teaching a relationship to 'land as home' (**Kimmerer, 2013**) allows for a future that moves beyond the Anthropocene and allows for healing.

Throughout this contribution I ask: How can we move beyond the limitations of Anthropocene thinking and towards the possibilities of enacting our relationships with land as home? The impact and popularity the Anthropocene has had makes this an important issue for scholars who are looking to understand and combat our current environmental crisis as it allows us to see a path forward through environmental justice. I ask as well: How can an outdoor education program enact ecofeminist politics to teach a relationship to the land as home? The ways in which we form relationships with the land are taught—either culturally transmitted or formally, such as in outdoor education. Education is one area in which future generations can be taught a more sustainable, interconnected relationship to their environments and so is crucial for a culture change that dismantles the ecocidal practices of capitalism. I explore these questions through a look at ethnographic research I conducted at the outdoor education program, Cottonwood Gulch, in 2018. I engaged in participant observation working as a staff member for the Turquoise Trail all-girls trek group. I observed the ways the participants in the program learned to change their relational practices both with each other and the non-humans they shared the Southwest with. I also conducted interviews both with the program participants and other staff members to dig into the processes of both teaching and relearning ethical multispecies relations. My research led me to the conclusion that thinking through the Anthropocene is not sufficient for imagining the possibilities of a healed environmental future. It is the justice-oriented ecofeminist approach to

combating the Capitalocene that allows for an understanding of our relationship to the land as home.

Cottonwood Gulch and the Turquoise Trail

The Turquoise Trail trek group had just reached the end of the hike to the ruins Keet Seel, a strenuous 17-mile round-trip hike which we completed in one day. I brought up the rear of this group of young women who, already exhausted, were now climbing the steepest incline of the hike yet. They struggled to find their footing in the dry, rocky dust and often pulled themselves forward with their hands to steady themselves and to give their tired legs a brief rest. At this point their water bottles were mostly empty and although we approached evening, the Arizona sun weighed heavily on us all. After endless words of encouragement from staff members, the group finally made it to the top and one by one we pulled ourselves onto the welcome flat ground of the plateau that awaited us. Despite their sweat and heavy breathing, the young faces looking back at me glowed as I joined them at the top. They had accomplished many feats that summer, but this would be their main point of pride. The feeling that came with this moment is a common one in outdoor education—the feeling of strength and accomplishment 'out in nature'. That feeling was common at this program, Cottonwood Gulch, too. There were countless moments of pride and accomplishment during my time there. Yet, to get at the core of Cottonwood Gulch one must go beyond those clear, shining moments. At Cottonwood Gulch, the approach to the environment was to create a sense of *home* in the American Southwest and it is this approach that created the conditions for ecofeminist teaching. The way that Turquoise Trail was run, and the lessons learned in collaboration with the Southwestern landscape and its beings allowed these young women to build healthy, strengthening relationships that made them feel capable in the wild context—that made them feel that they belonged in nature and helped them form a healthy relationship with it.

Cottonwood Gulch was founded by a carpenter and teacher from Indianapolis, named Hillis Howie, in 1926. That year, Route 66 had been paved and Howie began to fear that the introduction of the 'modern world' would ruin the wild spirit of the Southwest he loved. In order to share the Southwest with America's youth before it disappeared, as he saw it, he banded together a group of boys on the first ever Prairie Trek, an expedition which would eventually evolve into Cottonwood Gulch. This first Prairie Trek continued as an all-boys group for almost a decade until 1934 when an all-girls trek called Turquoise Trail was added to explore the Southwest parallel to the boys. That year also brought a home for the program when Howie purchased a 440-acre ranch to use as Basecamp in Thoreau, a small town in the Northwest corner of New Mexico. The

program still takes place in the Southwest, based out of the original Basecamp, and now explores the Four-Corners region of New Mexico, Arizona, Utah, and Colorado. The 'on the road' mentality of the original Prairie Trek stuck and is a vital part of the Cottonwood Gulch experience. Organizers and staff at Cottonwood Gulch made sure to distinguish the organization from other outdoor education programs. The Gulch's director at the time of my research told me that while many outdoor education programs strive to 'grow great kids', the goal of the Gulch was first and foremost about showing and teaching children about the Southwest. While Howie's fear of the Southwest 'disappearing' may no longer be relevant, the goal of the organization has stayed largely the same.

Turquoise Trail (TT) was started in 1934, likely at the suggestions of Hillis's wife, Elizabeth Howie. Preceded only by the Girl Scouts of America, which was founded in 1912 (**Girl Scouts, n.d.**), the idea of an all-girls group expedition into the 'Wild West' was unprecedented at the time. The girls left Indianapolis for the desert in Model Ts dressed in ankle length skirts and, 'just like the boys, but better' (**Cottonwood Gulch, n.d.**), hiked and camped through the mountains and canyons of the West. My group in the summer of 2018 included our group leader, Tori, our cook, Taylor, myself, and nine young women between the ages of 14 and 17 living through their period of adolescence.

As this article will show, the Gulch is exemplary of how foregrounding girlhood and young women's contributions and experiences benefit outdoor education and environmentalist teaching by teaching how to care for the land as home. By foregrounding girlhood and young women's experiences, the example of the Turquoise Trail highlights the importance of looking at the specific relationships within an ecosystem, and that different forms of interacting with an environment have different effects—those relationships that go against the values of capitalism and resist the Capitalocene are more generative and offer up better opportunities for environmental healing—highlighting the shortcomings of the Anthropocene.

Towards the Capitalocene

Although the separation of nature and culture was central throughout the history of anthropology as a discipline, in more recent, post-symbolic anthropology, the stark nature/culture dichotomy has broken down. There are several moments I could point to which inspired this shift, but most relevant in the context of this special issue of *Exchanges,* is the introduction to anthropology of the concept of the *Anthropocene.* Defined originally by geologists, the Anthropocene is the epoch in which humans are 'the most important force shaping the Earth' (**Latour, 2017: 250**). The Anthropocene makes clear that the human relationship with the Earth is

one of enormous impact, to the point that it is impossible to draw a line between where humans end (not only ourselves but our plastics, technologies, chemicals, etc.) and the Earth begins.

Writing almost ten years before scholars named this epoch the Anthropocene, Donna Haraway (**2003**) coined the term *natureculture*s in *The Companion Species Manifesto* and used the term as a feminist perspective on the possibilities of more-than-human care and companionship which played a crucial role in the breakdown of the nature/culture dichotomy in the social sciences. *Natureculture* rejects the nature/culture dichotomy, however some Anthropocene scholars (Latour, most notably) critique the term as suggesting an implosion of two separate sides. Latour argues that the power of the nature/culture dichotomy is such that people often interpret the Anthropocene as a reconciliation of the two (**Latour, 2017: 258**). He states that more than a reconciliation of opposites, the Anthropocene circumvents the dividing line entirely (**Ibid: 262**).

However, the Anthropocene concept itself has been accused of a similar problem. Critics of the term point out that the use of the prefix 'Anthropo' groups all of humanity together as the main actors in our current crisis. By suggesting that all of humanity is equally responsible, 'Anthropocene' puts humanity on one side of a conflict and nature on the other. As Malm and Hornborg (**2014: 65**) point out, proponents of the Anthropocene may argue that from the standpoint of the biosphere, what matters is that ecological catastrophe originates from *within* the human species 'and so a species-based term for the new geological epoch is warranted'. However, blaming climate change on humanity in general suggests that the problem must exist in the properties of our species. 'Anything less,' they state, 'would make it a geology of some smaller entity, perhaps some subset of *Homo sapiens*' (**Ibid: 63**). This is why the generalization of the 'Anthropo' to discuss this era is troublesome. It suggests that the destruction of ecosystems and our environments is part of our human nature and thus ecological crisis as a 'natural inevitability' (**Ibid, 2014: 66**). This generalization does not hold up. As Di Chiro points out:

> *In contrast to the Anthropocene's labelling humans as the controllers and tormentors of non-human nature, indigenous theories of the interdependence of humans and the environment produce structures of organization integrating political, societal, cultural, religious, and familial institutions that tie together humans and multiple living, non-living, and spiritual beings, and natural interdependent collectives, including forested areas, species habitats, and water cycles.* (**Di Chiro, 2017: 497**)

Thinking with the diversity within human experience as opposed to melding it together into a general panhumanism is crucial. As Malm and Hornborg (**2014: 63**) state, 'the physical mixing of nature and society does not warrant the abandonment of their *analytical* distinction. Rather, precisely this increasing recognition of the potency of social relations of power to transform the very conditions of human existence should justify a more profound engagement with social and cultural theory'. By failing to respect the complexities of power, history, and responsibility within the 'Anthropo', the Anthropocene falls into the dichotomy it was working to avoid and 'fits easily within a conventional description —and analytic logic—that separates humanity from the web of life' (**Moore, 2017a: 595**). While the Anthropocene's strength lies in the unification of humans and the earth system within a singular narrative, its weakness lies within the *way* in which it unifies the two (**Moore, 2017b: 238**) and its inability to resolve the human/nature dualism in favour of a new synthesis (**Ibid: 239**).

One alternative to the Anthropocene is Timothy Ingold's explanation of the whole-organism-in-its-environment, seeing the organism plus its environment to be 'one indivisible totality' (**Ingold, 2000: 19**). He also explains that this system 'is not a bounded entity but a *process* in real time: a process, that is, of growth or development' (**Ibid: 20**). In his explanation of the whole-organism-in-its-environment, Ingold breaks down the nature/culture dichotomy; in understanding humans as organisms, humans become inseparable from their environment, and one cannot exist without the other. In contrast to the Anthropocene, it is not a joining of two separate things, but a recognition of an ecosystem as one ever-changing and co-constituting process of life which includes human social, historical, and political contexts. By understanding the environment, or whole-organism-in-its-environment, as a process, Ingold places focus on the actions of individuals involved.

This move away from environment as object and towards the process and creation of environment-making, transcending the 'historical limits co-produced by humans and the rest of nature' (**Moore, 2017b: 267**) is crucial. It allows us to see ourselves, humans, as whole-organisms-in-our-environments and to trouble the form of our relationships with said environments. More specifically, it allows us to consider human constructs such as capitalism as part of nature (**Moore, 2017a: 595**). The origins of our ecological crisis do not lie within human nature, not 'the *Anthropos*: humanity as an undifferentiated whole' (**Ibid**) but within a capitalist system which requires a process of relationships 'dependent on finding and coproducing Cheap Natures' (**Ibid**). Moore offers the *Capitalocene* as an alternative to *Anthropocene* thinking, shifting the perspective away from the 'age of the human' as the root of ecological collapse and towards the 'age of capital' (**Ibid: 597**). The Capitalocene highlights capitalism, in

which commodity production and exchange depend on the exploitation of both human and non-human natures (**Ibid: 606**), as the root of the crisis, aligning itself with eco-feminist thinking which holds justice and emancipation for human and non-humans as inseparable. Our processes of relationship with each other, our approaches to and treatment of other humans as well as other species, determine our environments' health.

At Cottonwood Gulch, although concepts such as *Anthropocene* or *Capitalocene* were never explicitly discussed with children, the way programs were designed, and the way staff taught the children about their relationship with the Earth prepared them for a care-filled life. Cottonwood Gulch went beyond Anthropocene thinking through teaching its participants that if 'humans are the most important force shaping the Earth' (**Latour, 2017: 250**), then the *way* they shaped it mattered. It taught them to shape it through a relationship to the land that was home-centred. The land-as-home mentality at Cottonwood Gulch prepared children to shift away from a capitalist extractive relationship with the environment and to understand themselves as part of the Earth, not apart from it.

Ecofeminism at Cottonwood Gulch

Most leadership roles at Cottonwood Gulch were held by women including, at the time of my research, the lead coordinator of the program. Although complex gender dynamics *did* exist at the Gulch, a feminist approach to teaching, learning, and relationships between individuals was central to the culture of the program. It is often assumed that outdoor education always provides a level playing field between men and women (**Gray, 2016: 26**), however while outdoor education can help develop a sense of empowerment and physical and psychological wellbeing for young women (**Ibid**) the *way* in which that empowerment often manifests can also be harmful. This is especially true in terms of the 'masculine' or 'feminine' traits that outdoor education leaders are expected to embody. There is no one way to define 'masculine' or 'feminine' traits, since the masculine and feminine are not, as Butler argues, dispositions but accomplishments (**Butler, 1995: 168**). However, we can still define traits as masculine or feminine based on how they have been encouraged in, and expected of, people *as* masculine or feminine in order to accomplish societal expectations. Moving forward, I will label those *traditionally masculine* or *traditionally feminine* traits while fully acknowledging that there is nothing inherent about them, and that the tradition to which they call back is indeed specific to time and place. Davies et al. include on their list of traditionally masculine leadership traits: 'autonomy, competitiveness, strength, determination, authoritarianism, domination, independence, assertiveness, and control' (**Davies et al., 2019: 220**) while traditionally feminine leadership is seen as 'democratic, collaborative,

interpersonally oriented, emotionally expressive, mediating, less action-oriented, and non-aggressive' (**Ibid**). Because, as Bond and Rose's (**2019**) research on outdoor education shows, the traditionally 'masculine' traits are those seen as most useful or important in an outdoor setting, women often have to take them up in order to be acknowledged as competent leaders.

This was not the case at Cottonwood Gulch. Women leaders there often took a more ecofeminist approach to their leadership styles, and hence much of the theory I am using here is based in ecofeminist thinking. This approach to environmentalism and feminism became most prevalent in the 1990s, its main premise being that 'the ideology which authorizes oppressions such as those based on race, class, gender, sexuality, physical abilities, and species is the same ideology which sanctions the oppression of nature' (**Gaard, 1995: 1**). From an ecofeminist standpoint, justice for one is not possible without justice for all and, most relevant for our purposes here, attempts to liberate women will also encourage the liberation of nature and vice versa. One cannot properly account for the domination of nature without accounting for other forms of oppression (**Plumwood, 2012: 1**).

Central to the arguments of the ecofeminists I cite here is the nature/culture dichotomy. These theorists argue that this dualism is rooted in patriarchal thought, and they instead locate humans *within* nature (**Gaard, 1995: 6**) and interconnected with all life (**Ibid: 1**). This is an important distinction when it comes to approaches to environmentalism. Environmental ethics that maintain the separation between humanity and nature tend to operate on the basis of *rights* or *justice* while interconnected, ecofeminist approaches operate on a basis of *responsibilities* or *care* (**Ibid: 2**). An approach to one's environment based on responsibility to it instead of rights to it is also a central idea in much Indigenous law with each species holding gifts that also determine their responsibilities to the earth (**Kimmerer, 2013: 173**). An ethic of rights as opposed to responsibilities allows for the lone hero approach to relating to nature which is prevalent in approaches to outdoor education based in traditional ideas of masculinity. As much ecofeminist thinking shows, this approach is detrimental to women who wish to succeed in a professional outdoor context. Further, ecofeminists see the disconnected sense of self as the root of the ecological crisis (**Ibid**). But this basis of interconnection should not be confused with the problematic *holistic paradigm* which purports that we are all one and which denies differences between beings (**Plumwood, 2012: 6**). Overcoming the nature/culture dualism requires holding space for both continuity and difference, acknowledging nature as neither discontinuous from human beings nor an extension of human beings (**Ibid**). Acknowledging interconnection allows for an ideology that

goes beyond a vision of ecology as pure competition, what Heller points to as 'internalized capitalism' (**Heller, 1995: 231**), where only the strongest survive to the detriment of all others.

The nature/culture dichotomy does more than separate humans from nature; it also separates women from men. In her 1974 chapter, *Is Female to Male as Nature is to Culture?*, Sherry Ortner explains the equation of men with culture and the perception of women as being more rooted in nature (**Ortner, 1974: 73**). Further, she equates the notion of culture with human consciousness or, as she states, 'the products of human consciousness (i.e., systems of thought and technology), by means of which humanity attempts to assert control over nature' (**Ibid: 72**). This attention to control is key. As patriarchal power has sought to control non-human nature, it has also controlled any groups of humans associated with nature. Thus, as Plumwood (**2012: 4**) points out, 'racism, colonialism, and sexism have drawn their conceptual strength from casting sexual, racial and ethnic difference as closer to the animal and the body construed as a sphere of inferiority, as a lesser form of humanity lacking the full measure of rationality of culture'. The oppression is simultaneous.

In the case of women, the feminization of nature and the naturalization of women has served as justification for the simultaneous domination of both (**Gaard, 1995: 5**). Ortner (**1974: 71**) takes the secondary status of women as a universal given, and though one might argue that much has changed since she was writing in 1974, given that feminine-associated leadership qualities continue to be valued less in outdoor education, we can see that this perspective remains relevant. In the context of outdoor education, if women are perceived as being more rooted in nature, then why aren't their leadership styles valued in that context? Ortner **(Ibid: 80)** explains that when work is 'lower-level' (i.e., closer to the home) it is associated with women, but when the same work is professionalized and done in the public sphere it is associated with men. While nature in general might be feminized, professional work in that context, as in the example of outdoor education, is still seen as masculine.

In the late 1800s, Ellen Swallow coined the term *ecology* to describe the intimate relationship between a person and their home environment (**Heller, 1995: 233**). This original view of ecology neither romanticized a separate nature nor reduced it to an expendable resource, but as a science that cared for an intertwined social and ecological ecosystem (**Ibid: 234**). This home ecology rejects the romantic wilderness ideal and instead focuses on the 'wildness in our own backyards' (**Cronon, 1996: 22**). It expresses a love of nature through active care for social eco-communities (**Heller, 1995: 234**). This does not mean that women should be expected to become the environmental movement's 'janitorial martyrs' (**Ibid: 233**).

Instead, this approach to ecosystems that has been associated with the feminine, the labour of care, should be the base of the entire movement.

This approach does not fit within Anthropocene thinking. As Di Chiro (**2017: 489**) states, 'the Anthropocene retells the masculinist origin/self-birthing story that inevitably culminates in *Man* as the master creation, the Master of the Universe, and now its destroyer, and possibly, its saviour'. Considering that 82% of the original Anthropocene Working Group were men, the majority from Global North countries (**Ibid: 488**), it is not surprising that the concept holds many problematic patriarchal approaches to environment that '[reinforce] individualistic approaches to environmental and climate responsiveness, which stereotypically [cast] women in the roles of either vulnerable climate victims or hardy climate heroes' (**Ibid: 489**). The Anthropocene's generalization of humanity as the root of environmental catastrophe does not leave room for the collaborative actions taken by environmental justice and feminist scholars which envision 'a more robust perspective of the 'collective we' [that put forward] new policies and practices for just, sustainable, and genuinely resilient communities' (**Ibid**). Di Chiro offers the Idle No More movement as an example of how a forceful critique of the 'climate-destroying, exploitative, and extractivist mind-set of modern industrial society' (**Di Chiro: 497**) does not require a framing of the problem as human vs. nature. Instead, it sees the 'hetero-patriarchal, genocidal, and ecocidal industrial worldview that lies at the heart of settler colonialism' (**Ibid**) as a major cause of climate crisis and roots their activism in an 'interconnected eco-politics grounded in multi-species relationality' (**Ibid**). If, instead of the Anthropocene, we frame the problem through the lens of the Capitalocene, it shifts from our existence on Earth as humans to a changeable system of power. We can, then, come to understand our power to change this system and resist the Capitalocene. Relearning our process of relationship to nature through a resistance to capitalism and extractivist mentalities makes overcoming ecological crisis possible.

In her book *Braiding Sweetgrass,* Robbin Wall Kimmerer outlines this relational transition exactly. She describes various ways that humans can approach their relationships to the land, beginning with *land as capital* (**Kimmerer, 2013: 329**) and ending with *land as home* (**Ibid: 340**). She describes *land as home* as a space where all those who share it take care of one another. When humans learn to truly care for the land, they can treat it as home, but they must also learn to feel the space as home in order to truly care for it.

The idea of *home* precisely illustrates the children's experiences at Cottonwood Gulch as home and points to a specific kind of caring. María Puig de la Bellacasa's *Matters of Care* (**2017**), looks at care ecologically

between species and even between kingdoms. The care she explores in the book takes many forms and has many different effects. As she states in her introduction: 'To care can feel good; it can also feel awful. It can do good; it can oppress' (**Bellacasa, 2017: 1**). I choose to focus on Cottonwood Gulch's pedagogy of creating home because while caring is inextricably entangled with homemaking, not all forms of care or acts of caring create home. At the Gulch, children were taught *how* to care in a way that would create a sense of land as home. By rejecting the patriarchy at the root of the human/nature dichotomy, the relationships practiced at the Gulch, the Turquoise Trail group in particular, were liberatory for all involved. Looking at the participants experiences in the program through the lens of resistance to the Capitalocene allows us to see a possibility beyond it.

Creating Home on the Turquoise Trail

Towards the end of the summer, after having spent the better part of two months as a group, TT set out to climb Mount Tukuhnikivatz, a peak of the La Sal Mountains not far from Moab, Utah. This is a difficult peak, and an endeavour only the older groups pursue. Mountain climbing is also one of the activities that often comes with patriarchal, imperialist language attached. One sets out to 'conquer a mountain'; the goal of summitting is associated with competition with and domination of the mountain itself. TT certainly worked hard as we made our way up to the peak of Mount Tukuhnikivatz. We often hiked in silence, focusing on our breathing, and at the end of each day it was a struggle to get the girls to set up their tarps properly in their exhaustion. But despite the level of difficulty and our hard work, nothing about our climb up Mount Tukuhnikivatz was a conquest.

Each morning on the mountain we would take down the bear bags we had hung from a high branch away from camp, eat our breakfast granola or oatmeal, and pack up our tarps and bags, making sure to leave very little trace of our stay behind. But once the group was packed, instead of hitting the trail right away, the girls would wander off to gather some of the wildflowers that stretched over the mountainside in purple, yellow, and white as far as we could see. When they returned with handfuls of stems and petals they would sit in a circle and spend the next little while braiding the flowers into each other's hair. As Kimmerer puts it, 'There is such tenderness in braiding the hair of someone you love. Kindness and something more flow between the braider and the braided, the two connected by the cord of the plait' (**Kimmerer, 2013: 5**). They started each day with this tenderness. It was tenderness towards one another but also towards the mountain itself. They braided the beauty of the land into themselves with care and love for both. This time staff allowed the girls for braiding was crucial. If the only goal of the climb had been to reach the top of the mountain it wouldn't have been permitted, as the braiding took a

good hour of cool morning air out of hiking time. But the goal was not to conquer the mountain. The goal was to get to know the mountain. In each hour staff allowed for this ritual of love and care, the land began to feel more like home.

When the braiding was done, we put our packs on and continued up the mountain, the girls now feeling part-mountain themselves. As Tori led, I brought up the rear of the group admiring the beauty of the flowers and braids as the girls carried their heavy packs for 20 miles a day in the desert heat. These girls were strong. Being in a context with other girls and women staff allowed the prettiness and the ruggedness to be compatible, and this feeling stuck. I interviewed a staff member named Camille who had herself been a trekker at Cottonwood Gulch for many years before she worked there. For her, it was important that her femininity and outdoor experience go hand in hand. She told me:

> *I always say that my favourite way to paint myself kind of in a word picture is a rock climber wearing nail polish. And that's my thing. I love the femininity in a rugged and strong context. I've backpacked for like two weeks [this summer] and I wore my necklaces, my earrings, and my rings the whole time and it's very much a part of who I am. But I also love the fact that I've got wide shoulders and strong legs and that's kind of, I don't know, that's one of my favourite things about myself.* (**Field Interview, July 15, 2018**)

Being able to express themselves and their femininity in whatever way they wanted to, allowed the girls to feel at home on the land. Camille told me that participating in TT made her feel like she belonged outdoors. Not only that, but *all of her* belonged outdoors. There was no need to perform masculinity to be seen as proficient in that environment. The prettiness itself played an important role, as my conversation with Camille illustrated. But the flowers and braids were more than prettiness alone. The tenderness and care that filled the time the girls took to braid created an intimacy between themselves and with the mountain. The image that sticks out in my memory of the sweet brilliance of the wildflowers in their hair as they carried their heavy packs up the mountain is not one of contrast. It was their support of one another and the support they received from the mountain that provided the strength that allowed them to climb. Moments of intimacy and care such as the braiding were crucial to building that support.

Of all the beings TT became acquainted with that summer, the group developed the deepest affection with the quaking aspen. The groves of aspens that peppered the mountains provided us with shelter from the Utah sun and seemed to stretch on as we hiked, giving us time to get to know them. When the terrain got steep, we would hold onto their trunks

to pull ourselves up and when we let go our hands would be painted with the white powder the aspens shed, old bark cells giving way so that the sunlight could reach the new. When we reached out to them for support, we brought them with us, carrying the cells of the forest on our own skin as we climbed. We would either leave the powder there on our hands like climbing chalk or brush it off on our clothes and ending up covered in quaking aspen.

The trees supported us in other ways as well. Aspen leaves are attached to their branches by a thin stem, flatter and thinner than many other species. The flexible stem allows for the leaves to dance when the wind comes through, and their pale undersides reflect the sunshine, making the whole forest sparkle. The wind in those leaves makes a sound like rushing water. On one particularly steep stretch through the aspens, the wind picked up and sent its glitter and rustle through the canopy. One of the TT girls turned to me and through her tired, sweaty grin she said, 'It sounds like they're cheering us on!'. We hiked the rest of the trail that day to the sound of the aspen's applause.

Not all of TT's excursions were as strenuous as Mount Tukuhnikivatz. Tori had planned two backpacking trips for the summer. Mount Tukuhnikivatz was the second, more challenging one. The first was a hike along the Gila River in New Mexico, a long, winding route that was relatively flat and with the added pleasure of walking along the water the entire time. It was during this easier trip that Tori planned to teach the TT girls to love and care for the spaces they were in so that they would be able to do the same during the more challenging backpack. There was plenty to love along the Gila, including a natural hot spring where we spent the better part of one afternoon. But the moments when the girls showed the most love and care were the mundane ones.

One evening, after we had all eaten our beans and rice from our stainless-steel cups, the staff members cleaned up around the campsite while the girls took the dirty dishes to the riverbank for washing. We had taught them how to use sand to scrub the dried-on bits before washing in water. This method, combined with the simple meals eaten out of the dishes, meant there was no soap needed and the water could stay clean. I found a forgotten spoon on the ground and when I brought it to them, I found them talking quietly and laughing with each other as they washed. The scene was intimate, and I decided to wash the spoon where I was and not intrude in their conversation. They seemed to be enjoying their time and space away from staff. I was struck by how classic of an image it was. How many other ethnographic descriptions exist of women talking privately amongst themselves while washing in a river? But beyond the classic

nature of the scene, two things stuck out to me—who it was they were washing for, and how this labour connected them to the space.

What was special about this instance was that they were doing washing entirely for themselves. They were washing only their own dishes and the pots that had cooked the food they ate. They were not washing up for boys and men who were off doing other things, this work was for them. This fact gave the labour different meaning. There was no resentment attached to the fact that it had to be done, and since they were able to take their time and enjoy the water while they were doing it, they could see the value in the work and the beauty of the care they were enacting. They were caring for themselves by cleaning their things, caring for each other through intimate conversation, and caring for the river by using cleaning practices that would not harm it.

The domesticity of the labour also worked to mould our campsite into a home space. Because of its proximity to the hot spring, we had decided to maintain our camp there for a few days and hike out from there in different directions each day. This allowed the group to build more intimacy with the space. The girls went back to the same spot on the river each time they did the washing, they strung ropes between trees to hang wet clothes, and they ingeniously tied all their tarps together into one large piece so that they could all sleep together in the same shelter. They learned the spots in the river where the most frogs could be found, and it was in that spot that the group had some of its best campfire conversations. The engagement with the Gila River was not about how far the group could hike along it, but about the time taken to get to know it, to feel at home along its banks and in the water itself.

The way that the staff and children at Cottonwood Gulch built home for themselves there mirrored the way that the Gulch itself had created home in the Southwest. One theme that staff consistently repeated to me during interviews was that the Gulch was non-reproducible. Unlike programs like Outward Bound, which runs trips and excursions all over the world, staff members told me that Cottonwood Gulch could not exist anywhere other than where it was in New Mexico. The philosophy and structure perhaps could be reproduced or used as a model for other programs, but they would not be Cottonwood Gulch. Being the Gulch meant being intimately connected to the land it was on, nurturing relationships with local Diné families that went back generations, and being rooted, ultimately, in Hillis Howie's love for the beauty of the American Southwest, specifically. Cottonwood Gulch had made its home there, and both children and staff were expected to do the same. Having the best experience possible at the Gulch depended on building a sense of home there. This was true both at Basecamp and on the road. So, the qualities associated with

homemaking—caring, nurturance, love, patience, and so on—were the qualities most valued and encouraged by staff. It is, of course, no coincidence that these qualities associated with homemaking are also those that have been associated with femininity. That is what made the Gulch's feminism so particular. Yes, the girls learned to be tough. I watched TT climb mountains, dig a truck out of a ditch, and bushwhack through thorny brush. These things were celebrated, but not at the expense of the more 'feminine qualities'. The same went for the boys. They were encouraged to test their strength throughout their experience there, but also their nurturing qualities. The scene I described of the girls washing up in the river was mirrored by the all-boys group. The boys also learned how to gently care for the plants on the farm. The feminism at the Gulch was about empowerment, yes. But it was not only about empowering young women in their physical strength and in their technical skills, though it did that. It was about empowering young people of all genders to create home in the spaces they were in, to care for and love the Southwest.

However, there is significant room for improvement in terms of who is encouraged to make home in the Southwestern outdoors at the Gulch. It is crucial that I recognize that only one of the girls on TT trek in the summer of 2018 identified as a person of colour, and none of them identified as Black. In fact, there were only two Black trekkers at Cottonwood Gulch that summer and only one Black staff member. I can only speculate on the reasons for this. However, Finney (**2014: 4**) explains that economic disparity and limited access to resources can be a major factor in determining Black people's participation in outdoor experiences. While the price of a summer at Cottonwood Gulch was certainly an inhibiting factor to many families/children, the program's marketing tactics and materials, intergenerational legacies and connections, and lack of diversity in staffing may also have contributed to a majority white participant demographic. The lack of diversity at the Gulch was a problem not only because children from all backgrounds deserve enriching experiences like it, but because of the message an almost entirely white outdoor education space communicates. As Finney states: 'Racialization and representation are not passive processes; they also have the power to determine who actually participates in environment-related activities and who does not; which voices are heard in environmental debates and which are not' (**Ibid: 3**). I have argued throughout that Cottonwood Gulch's approach to its environmental programming was an ecofeminist one. However, ecofeminism requires an account of racial oppression as well and, as Plumwood (**2012: 1**) puts it, 'an adequate account of the domination of nature must draw widely on accounts of other forms of oppression and has an important integrating role'.

Most of the children who spent their summers there were not from the Southwest. So perhaps encouraging them to create home there when at the end of the summer they would go back to their own corners of the world was misguided. However, I find their learning at the Gulch to be in line with what Kimmerer (**2013: 213**) calls 'becoming Indigenous'. After all, while many of the children at the Gulch were not from the Southwest, those of us who are the descendants of colonizers are not Indigenous to the places we live either. When Kimmerer speaks of 'becoming Indigenous' she is not suggesting claiming a cultural or ethnic identity that is not your own, but instead she is opening up the possibility of creating a home in a place in which you are as dedicated to it as it is to you. The way the Gulch taught the children to make home in the Southwest helped them to learn how to 'become Indigenous' to a place—a skill they will hopefully carry with them to their own spaces, and truly create home there.

Although perhaps not explicitly, Cottonwood Gulch's approach to both environment and its participants was an ecofeminist one deeply rooted in pursuing a world beyond the Capitalocene. The central tenet of ecofeminism is that any attempt to liberate women must equally attempt to liberate nature (**Gaard, 1995: 1**) and it was clear that within Cottonwood Gulch's teaching the two were connected. It was an understanding of the environment as a space of care—where each being, including human beings, is intimately entangled with every other—that allowed the qualities associated with the feminine to be valued and encouraged in conjunction with physical strength, technical skill, etc. In valuing feminized qualities in both girls and boys, the Gulch taught an environmental ethic that would allow its participants to connect to their spaces, to love them, and to care for them, embodying ecofeminist philosophies. Understanding a world beyond the Capitalocene means understanding that the Earth's problems are coming from within, but it also means understanding that the solutions must, as well. They can no longer be based in the paternalistic separation typical of conservation's past. By teaching to care for the land as home, Cottonwood Gulch taught participants how to heal the Earth by truly being a part of it. As Kimmerer so eloquently explains, 'Knowing that you love the earth changes you, activates you to defend and protect and celebrate. But when you feel that the earth loves you in return, that feeling transforms the relationship from a one-way street to a sacred bond' (**Kimmerer, 2013: 125**). It is this sacred bond, creating a sense of land as 'home,' that Cottonwood Gulch's ecofeminist approach hoped to instil in those who spent time there.

By my last night at Cottonwood Gulch the weather had cooled. The nights were chilly, and I often slept layered in sweatshirts in my sleeping bag. But seeing that it was my last night I decided to 'sleep out', away from the protection of my tent and directly under the stars. Tired, I fell asleep fast,

but I woke up not long after. I am not sure what woke me, but when my eyes opened the sky above me was falling. As I would find out the next morning, I had awoken to the peak of the Perseid Meteor shower and the gift of 100 meteors crossing the sky above me every minute. I stayed awake as long as I could, but as I drifted to sleep again, I thanked that place for its spectacular goodbye. My time there had taught me that Perseid could exist completely separately from me but also be there for me personally. I fell asleep filled with love for the desert around me, and in the sky above me I could see it loving me back. That, as the Gulch taught me and so many others, was what it could feel like to have a relationship with land as home.

Conclusion

This research conducted at Cottonwood Gulch is one excellent example of successful ecofeminist teaching. The practices used at the Gulch stand in contrast to the assumptions of innate human destructiveness proposed by the Anthropocene and show a possibility beyond. Through a discussion on the limitations and insufficiencies of Anthropocene thinking, this article has suggested a conceptualization of our era as the Capitalocene instead. This is not simply a matter of semantics. The implication that all humans are responsible for ecological collapse pushes our thinking dangerously close to a nihilistic acceptance that the current state of our planet is, while unfortunate, unavoidable. Thinking with the Capitalocene instead places credit for the crisis where it is due and in so doing allows for a chance at dismantling the system that is to blame. My research at Cottonwood Gulch showed the possibilities of an ecofeminist approach that teaches a relationship to land as home to children. Teaching this relationship to future generations is important, but considering the immediacy of the issue, this shift in perspective must be learned by those with the power to enact change now, as well. We can and must all relearn our environmental relationships in a way that combats the Capitalocene and provides a chance to move beyond it.

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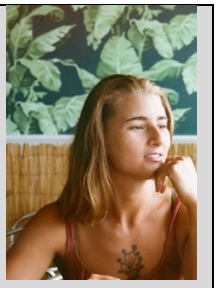
Alejandra Melián-Morse is an anthropologist and ethnographic filmmaker researching at the intersection of environmental and media anthropology. Her work unpacks the representation of nature in the media, particularly in the industry of Natural History filmmaking. It considers the consequences and implications of rhetoric within the media that maintains the nature/culture dichotomy and tracks the current changes within the industry as this type of rhetoric becomes less acceptable on a damaged planet. Her visual work explores the possibilities of combining ethnographic and natural history styles of filmmaking.



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Caring with the Non-Human: Reciprocity in market gardening

Michiel van de Pavert[1], Adriana Ressiore[2]

Knowledge, Technology, and Innovation, Wageningen University, Netherlands
Correspondence: [1]Michiel.vandepavert@wur.nl,
[2]Adriana.ressiorecampodonio@wur.nl
Twitter: @ARessioreC
ORCID: [1]0000-0002-2283-815X, [2]0000-0003-0973-7810

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Abstract

The Anthropocene draws our attention to damaging relations we have with other planet beings. Taking that as a starting point, this article combines the cycle of care and an immersion at a market garden. Complementing theory and practices, two researchers from Wageningen University dialogue about how in soil care, there is complementarity and tension between caring for/with/about plants, livelihoods, people, and biodiversity. From a number of conversations this dialogue developed into a work of creative writing with critical reflections on the data gathered through participant observation. We shed light on questions about the relationality of caring with soil in practice, reciprocity between humans, non-humans and entanglement of care practices. The dialogue format allows us to discuss a broader range of facets around soil care. It is clear from the empirical material that soil care is never only about gardening practices. So, in line with our relational approach we let ourselves discuss various topics. Moreover, the dialogue format allows us to express ourselves in our own words, again staying closer to the empirical reality. This article contributes to the existing literature by (i) providing an example of a productive market garden that allows for the flourishing of all non-human beings; (ii) further developing the cycle of care theory by applying it to a real case; and finally, (iii) exploring various considerations around reciprocity in caring with soil.

Keywords:
cycle of care; market gardening; soil care; relationality; reciprocity

Introduction

This article is a dialogue between Michiel van de Pavert and Adriana Ressiore. We are both PhD candidates at Wageningen University. We meet regularly in the GEOS research project[i], in which we bring together philosophical and empirical research on global negotiations of knowledge and social-environmental challenges. Michiel just came back from six months of fieldwork at a market garden and Adriana has delved deeply into theories of care. In this conversation we look at the empirical material through a lens of care and we explore the care theories with the freshly obtained data. In this dialogue we illustrate the wider web of connections around soil care practices. Soil care is not just about soil, but also plants, livelihoods, people, and biodiversity. This article is part of a special issue on the Anthropocene. Our contribution to discussions on the Anthropocene is to describe how human practices are always interrelated with the world. It feels encouraging to realise how soil care practices can have a positive impact on not just the soil, but on so many more objects of care.

Michiel spent six months working at TERRA[ii], a flourishing market garden in Luxembourg. We produced fruit and vegetables for 230 families on only 1.5 hectares. The vegetables were grown in between the fruit trees and the garden was surrounded by a forest, which gave such a natural vibe to it. We often got visitors such as deer, rabbits, foxes, crows, bees, and so much more. TERRA is a CSA, which stands for community-supported agriculture. That essentially means that 230 members pay a subscription upfront and pick up their basket with fruit and vegetables every week. As a participant observer Michiel spent five days a week working in the garden, learning about the practices they used and how they cared for their soil. Market gardening is typically small-scale farming where manual tools are used to plant, weed, and harvest. Michiel's project paid special attention to the affective dimension of soil care.

Adriana has been working a lot on theories of care. Drawing inspiration from Joan Tronto (**2013**), Maria Puig de la Bellacasa (**2015; 2017**), Marian Barnes (**2012**), Angela Moriggi and colleagues (**2020a; 2020b; 2021**), Annemarie Mol (**2008, 2010**), among others. She works with a concept of more-than-human care (**Ressiore, 2022**) in her PhD, which is about care relations between humans and non-humans. To reach this concept, she was highly interested and influenced by the cycle of care. This framework was created by Moriggi and colleagues (**2020a**) and took inspiration from Tronto's five stages in the process of care - present on *Caring Democracies* (**2013: 22-23**).

The cycle is a reiterative process that includes five stages: *caring about* relates to attentiveness; *caring for* is about responsibility; *care giving*

connects to competence; *care receiving* is responsiveness; and *caring with* about reciprocity. A framework that is very rich to reflect with practices. It helps to think about different affective dimensions, and it includes the non-humans.

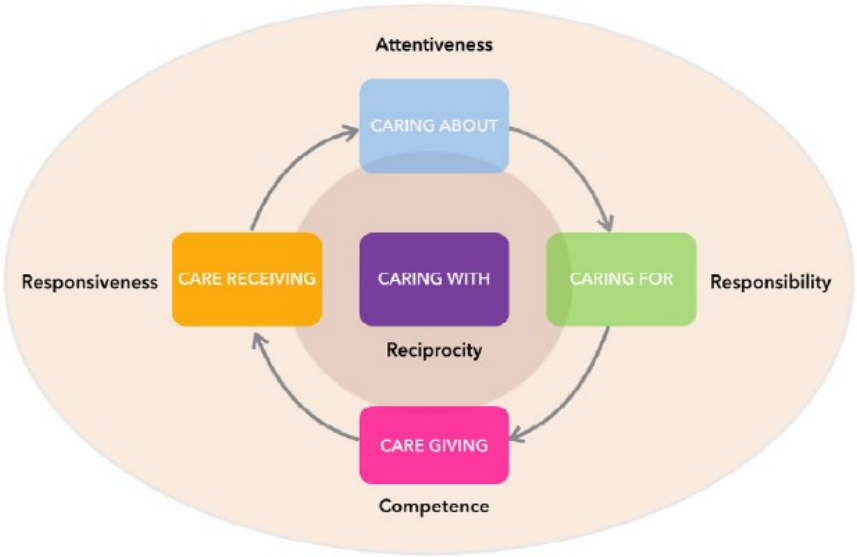
Discussions

Adriana Ressiore: Hello Michiel, how are you? I hear you are just back from your first fieldwork. How incredible. How was it?

Michiel van de Pavert: Hey Adriana, I really enjoyed working in the field and learning about soil care. And what have you been up to?

Adriana: I've been working with the cycle of care, have you read about it? The cycle has five stages as you can see in this image (**Figure 1**).

*Figure 1: Stages of care inspired by Tronto (**2013**) in Moriggi (**2021: 85**)*



Adriana: The cycle of care has inspired my theoretical framework and helped me reflect on my relationship with my research and the actors involved on it. Although it has been very rich for my reflections, I wonder how these phases play on daily-life. I also wonder how each of these stages would be enacted and in different 'real-life' practices... Were you able to identify care-full relations and practices at TERRA?

Michiel: Yes, we took great care of the soil. I went to TERRA to see how they can have such a productive system and at the same time build soil health. In the business plan written just before starting the farm, they put as the first goal to increase fertility and carbon content in the soil. So, building soil health has been a primary objective for TERRA since day one.

Adriana: Ah, do you think that could then fit into the *caring for* stages of the framework? Caring for is about designing and planning care. It is about making your intentions explicit. Who and what will you *care for*?

Michiel: Yes. Ideally, the intentions are not to disturb the soil, feed it, protect it, and to let it recover.

Adriana: *Caring for* can be understood as a response-ability and not necessarily an obligation. Which is the ability to respond and take responsibility for the needs identified in everyday practices. It is about revising your intentions also when care is being given.

Michiel: Then, what's the difference between *caring for* and *caring about*?

Adriana: *Caring about* is a stage in which we are attentive, or we notice possible 'unmet needs around us'. This does not necessarily need to be with someone or something in our proximity, it can happen between distant others (**Moriggi, 2021: 84**). It can often be sparked by a sense of mutuality (or, possibly, empathy). What do you think the core team at TERRA is attentive to?

Michiel: I suppose the core team must have noticed the unmet needs of soils around the world. I'm sure they had a concern for soil degradation, although they didn't talk so much about the problems in this world. They're more interested in realising solutions.

Adriana: So, this attentiveness to soil degradation, that sparked their interest to have non-degrading practices would be one of the things they care about. What about *caring for,* was it only focused on soil?

Michiel: Soil care was, and still is, a primary intention, but early into the fieldwork I realised that soil care cannot be the only objective at a viable market garden. The core team at TERRA told me that soon after starting the farm they realised that there is a need to create a productive system.

Adriana: Hmm… And did you see tensions between productivity and time pressure vs. aiming to be care-full about the soil practices?

Michiel: Yes. In the middle of the growing season the next crop needed to go in as quickly as possible. After harvesting one crop we had to remove the remaining stalks of the plants as well as the weeds, including their root systems. In my opinion, pulling out the root systems disturbed the top layer of the soil too much. It broke up fungal networks and sped up the decomposition of the organic matter in the soil. So, the need to produce plentiful baskets meant disturbing the soil (in my opinion) too much. As one person at TERRA put it: 'the need to produce is kind of limiting the time that we can extend to caring for the systems more broadly'.

Adriana: I find this super interesting. It brings us to the *care giving* stage, which is about how practices are implemented. Exactly like the ones you just mentioned about pulling out the plants… *Care giving* relates to both the competence, in other words, the skills and readiness to perform the care work, as well as a set of moral and ethical principles that guides the care work (**Moriggi et al., 2020; Tronto, 2013**). But I think it would be interesting if we focus on the tensions that are created when we have good intentions (*caring for*), but when trying to put them in practice, we encounter difficulties (*care giving*).

Michiel: But there isn't always a tension between soil care and productivity. This is what makes TERRA such an interesting case. They manage to optimise care in a highly productive system. The way we used compost is a great example of this. After having cleared a field of weeds, we left compost on top of the soil. We let the soil life incorporate the organic matter and convert the nutrients into plant-available form. Leaving the compost on top also protected the soil against intense sunshine and heavy rain. Moreover, as we didn't incorporate the compost into the soil, we didn't cause any disturbance. Distributing compost was a quick job. It was only a matter of walking up and down with a wheelbarrow four times. It would take ten minutes, plus maybe five minutes to spread the compost equally over the beds.

Adriana: Okay, so it's ideal for the soil and it doesn't take too much time, but you say 'optimise' care… that sounds odd to me. Wouldn't that somehow also transform care into a buzzword and/or subordinate it to the neoliberal imperative of increasing efficiency? Or wouldn't it legitimize certain degrading activities? We have seen such processes in many neoliberal food production and global soil erosion cases.

By saying buzzword, I am thinking that many words often seem very powerful in politics and in a mainstream audience. However, when used a lot, and having a capacity to embrace a multitude of possible meanings, and they can become vague (**Cornwall and Eade, 2010**). When I say *to legitimize degrading activities,* it becomes the classic *development* example. In the name of 'progress' and 'development' so much harm has been done, especially in the Global South (**Escobar, 1995**).

Michiel: I see... Perhaps we can say that the objective of having a productive market garden is also a form of care. It is about making sure that these gardeners receive a decent income. The way I see productivity it is also about producing healthy food for the members. So, these are two forms of caring for humans that are important for the core team at TERRA. Still, I see the issue with saying productivity, and I suppose that optimization also connotes with the neoliberal discourse. What word would you suggest is better suited?

Adriana: I am not sure yet... TERRA takes many care aspects into account, is it really that harmonious?

Michiel: Not really. As I mentioned before during the growing season, we ended up disturbing the soil as we had to pull out weeds. I asked the core team what we could do to reduce the weed pressure. They all said that the problem is with the weed seeds that fly in from the surroundings. For example, in the photo (**Figure 2**) you can see how the carrots are enclosed by tall standing weeds that are about to spread their seeds.

Figure 2: Weeds surrounding a field of carrots. Photograph from author's personal collection

If it was my garden, I would have eliminated all those weeds, but for the core team at TERRA that is not a desirable option. For them, the wild growth is a valuable source of nectar and habitat for many insects. Over the course of my fieldwork, I noticed that I started to say wild growth, rather than weeds. The term weeds has a negative connotation. What is implied is that what is growing is undesirable. More and more I started talking about wild growth, recognizing its added value for the natural world. It took me a while to believe that insects are truly valued, but the team kept bringing up the argument consistently. Now I see TERRA as a productive space where they try to improve soil health and give space for wildlife.

Adriana: Oh, I see. Wildlife and biodiversity also receive attention and are cared for… How do you see these forms of care relating to each other?

Michiel: So far, we have identified three domains that receive care. Firstly, soil care. Secondly, *care for* humans by producing healthy vegetables for the members and by making decent livelihoods for the gardeners. Thirdly, biodiversity care, because they allow for a rich assemblage of species. They're attentive to the insects providing them with food and habitat. By creating a plural environment, they answer to the problem of biodiversity loss. We can identify more domains that receive care. For example, plants receive plenty of care. This overlaps with soil care, because as they told me: a healthy soil results in nutritious crops. Plant care also overlaps with livelihood care because a healthy crop results in an abundant harvest.

Adriana: Wow, it seems to me then that a better word might be entanglement. In livelihood-soil-plant-people-biodiversity care there is complementarity and tension. For example, soil care is not always opposed to livelihood care. They can come together, for example in economic activities of market gardening… It seems that so far the cycle of care helped us to identify the concerns and intentions. With *care giving* we found that different domains of care can overlap or conflict. The following two stages of the cycle of care framework draw our attention to the relational character of care.... Particularly, these two stages of *care receiving* and *caring with* that includes an aspect of feedback and reciprocity.

Michiel: Are they the ones closing the cycle?

Adriana: Well, the cycle is a reiterative process, I am not sure if it ever ends. The way Moriggi et al. (**2020a**) see it is that *care receiving* is linked to responsiveness. The subject of care responds to the care that is being received. Thus, this is when the quality and effectiveness of the care received is expressed. In this process, new needs could be identified, and the cycle can restart or continue (**Moriggi et al., 2020a: 4-5**).

Michiel: Right, so when the gardeners observe improvements in crop growth, they know their soil care is having beneficial effects.

Adriana: I guess it is interesting to go beyond the beneficial effects to humans (avoiding an anthropocentric perspective). So, it is interesting to think from the perspective of the soil and the living beings on it. By identifying soil and wildlife needs, they seem to be aiming to do that. That is when, in my opinion, the most interesting part of the cycle comes in: *caring with*. In taking the perspective of the non-humans it helps to realize that we are always part of that entanglement. So far, you've talked about how humans *care for* the soil and wildlife, but for me it makes no sense to think of care as a human-only activity. In that sense, I share Tronto's (**2013**) definition of care as a life sustaining web of activities. In care practices the non-humans are always somehow present. If you think of healthcare, to

function, it needs machinery, energy, raw material, food, medicines, all of them come from non-human sources to allow the care process to happen.

Caring with is about thinking from the non-human or from the soil perspective because we know that the soil cannot respond verbally. Due to this lack of verbal communication, we are not always aware of the asymmetrical power relations.

Michiel: I suppose that in their day-to-day activities, the core team at TERRA has little time to pay attention to such asymmetries. They have to manage the volunteers and plan what to harvest and when to plant. They basically have to ensure that the business runs smoothly. So, the asymmetry can escape their attention.

Adriana: Thus, to deal with the issue of asymmetries between humans and non-humans, *caring with* is rooted in the principle of reciprocity (**Moriggi et al., 2020a: 4**). In the sense that there is a solidary exchange in the cycle that is not always symmetrical or proportional but is based on reciprocity.

Michiel: In a reciprocal relationship there is an exchange in which both parties have some gain. So, would you say that in a caring relationship there is always some mutual benefit?

Adriana: That would be a bit of an instrumental form of looking at care. As well as there are asymmetries on the power relations there are also unequal 'benefits', but we should aim for a relation in which you often try to put yourself in the shoes of the other. You will still be you, but trying to look at the question from another position. I believe that thinking with, living with (**Turnhout et al., 2012**), *caring with* allows us to listen, we pay attention, we build patience to develop care-full practices that aim to sustain lives, whether they're human or non-human, in the best way possible.

Michiel: So, in the end, reciprocity is about paying attention and having patience?

Adriana: I would say it is a big part of it. Caring with (reciprocity) brings up a few essential roles in the care practice: (a) it permeates and complements all stages; (b) it brings the non-human and opens the possibility for them to also 'sit at the table'; (c) it reminds us to pay attention; and, (d) it brings up the need for patience - essential when we think of the different timing that plants or soil need and the time pressure that we humans are often under.

Sometimes I think that the Anthropocene is a result of or the era of carelessness (**Puig de la Bellacasa, 2018**). It brought to us climate change, biodiversity loss, absurd inequalities, marginalization, poverty, and hunger. However, it also comes with many of us trying to hold hands and

doing all that is in our power to bring change. One great example of that is all the people engaged in care-full practices, which seems to me that is what TERRA has been doing as well. How would you say that reciprocity looks like at TERRA? How does it work in practice between humans and non-humans?

Michiel: At TERRA they encourage the flourishing of all beings. Considering the care cycle, I would say they practice with reciprocal gardener-soil relations, identifying the needs of the soil becomes part of a larger effort to take the perspective of the non-humans. They no longer see the non-human as a distant 'other'. The soil at TERRA is not a background on which they grow vegetables. Rather, it is full of living beings that can potentially help with the production of healthy food. Moreover, the people at TERRA learnt to have more patience. Having patience is important in soil care. When I asked, the people at TERRA explained that they have observed improvements over the last eight years. The soil is darker, which means that it contains more organic matter. The vegetable plants are bigger and stronger. Moreover, the weeds they have now are much easier to pull out. To them that suggests that the soil is healthier. Personally, I was also very impressed with the amount of creatures moving around on the soil surface. Mostly worms, small spiders, and ants. It gives the impression that a lot more is going on underneath the surface. When the gardeners decide to try a new practice, they are not immediately going to be able to observe improvements in soil health. This requires patience. Perhaps even more so, because the soil cannot provide feedback on the care received in the same way as humans can.

Adriana: This seems like a great note to finish on. The care cycle invites us to be aware of the other (these can be humans and non-humans), and by doing so, we can become another self. And, by becoming, and transforming, we enable new practices, thoughts and projects that shine light into the dark roads of the Anthropocene.

Conclusions

In this dialogue we discussed soil care at TERRA a market garden, using the cycle of care (**Tronto, 2013; Moriggi 2021: 85**). Since before the founding of TERRA, the core team set the intention to *care for* the soil. Soon into the first year they realized that to continue caring for the soil, the business had to work financially. So, another important intention became to produce enough to be able to harvest plentiful baskets. The need to plant the next crop as soon as possible meant that in terms of *care giving* soil care was at times somewhat limited. However, there is not always a tension between care and productivity. The way we worked with compost is an example of soil care that can be achieved in a productive way. So, the fast pace of productivity is not necessarily at odds with soil care. An opportunity to

further reduce the workload would be to eliminate all the weeds surrounding the growing beds. That would mean less work and less soil disturbance from weeding. However, the core team values having habitat for insects. This shows the complementarity and tension in livelihood-soil-plant-people-biodiversity care. One of our contributions to the cycle of care is showing that care-receiving is never singular. In any care relation there are always multiple recipients that need to be taken into account.

In this entanglement, we highlight the relational character of the process between the caregivers and the care receivers. In *care receiving*, the non-human should be able to give feedback on the quality of the care. However, non-human care receivers cannot verbally respond to the care given, which is one of the issues that caring with comes to address. Central for *caring with* is reciprocity, which does not exist without asymmetrical power relations as well as it brings up the patience required in human non-human relations. In taking the perspectives of the non-humans we realize that usually humans have more power and control in caring relations. A complexity of *caring with* is that it permeates the entire cycle of care. Through the process of writing the second half of this article we learnt that is can be difficult to pinpoint exactly what is reciprocal about caring relations. Rather than thinking about how the nonhuman responds to care, perhaps we should be thinking about what conditions we create for nonhuman beings to respond (**Moriggi, 2021**). We suggest to scholars working on care to think through what is reciprocal about the care relations that they study.

One of the tensions faced in the dialogue was also the fact that the cycle of care theory is often great, cohesive and tends to have many answers for many questions. However, when put in the real case, we were challenged to go beyond the theory, to question it. We learned and re-learned and sometimes transformed our perspectives and views. The process of working with theory and the 'real-life' case, involved constant change and adaptation (**Cooper, 2014: 4**). In the end, we agreed that reciprocity seemed essential to careful practices, however seeing, expressing and explaining it in daily activities is much more challenging than abstractly talking about it. Theorizing and academically discussing care interactions between humans and non-humans is messy, but essential. We learnt and concluded that care and reciprocity with the soil has the power to teach (**Moriggi et al., 2020a; Moriggi, 2021**), to question, and transform both practices and theories.

Further Research

The cycle of care enabled us to think through what is being cared for and how. Some important questions remain. One regards the issue of motivation. How do people stay motivated to continue caring over time?

The issue of motivation came up at TERRA and it is important that market gardeners continue their caring work. Another question that remains open is on the place that care receives in everyday discourse. Michiel will explore these questions in his dissertation. At various points in this dialogue, it is suggested that in order for us to care well we need to slow down. However, the case of TERRA shows that many forms of care can be achieved with only minimal ways of slowing down. So, when exactly is there a need for slowing down and when can care be part of a productive system?

For Adriana, questions around caring with the non-human are still lingering. For example, how to act when the soil perspective (on what itself would consider ideal) is not clear? How do we build fruitful reciprocal relations with nonhuman beings? Finally, what methods allow us to further understand the non-human perspective? These will be further explored in her future investigations.

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After a master's in International Development Studies at Wageningen University, Michiel is now conducting a PhD on soil care in market gardening. How does caring with soil work in practice? How can we think more holistically about the affective dimension of soil care? Based on prolonged ethnographic engagements for two seasons now I have been able to feel the life regenerating processes. I also zoom out to see soil care in the wider context of land (un)availability. With creative non-fiction I engage readers affectively in the soil-centred stories that hopefully inspire eco-positive mindset shifts for transformative change.

Adriana Ressiore Campodonio PhD research is based at Wageningen University. Currently she works on the conceptual and practical potentials of more-than-human care. She performs a multi-scale analysis - local, regional, and national cases in her home country, Brazil - to understand how more-than-human care potentials can improve decision-making for local biodiversity. The research starts from the premise that it is essential to bring marginalized human and non-human perspectives to decision-making processes. To explore these potentials art-based methods, participatory-action research and feminist approaches ground her research. Adriana is graduated in International Relations, has MA in Artic Studies and MA in International Development Studies.

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Endnotes

[i] GEOS stands for Global Epistemologies and Ontologies Research Project. See https://www.geos-project.org/. The project is also active on Twitter as @ProjectGeos.

[ii] TERRA stands for Transition and Education for Resilient and Regenerative Agriculture. See https://www.terra-coop.lu/

Multispecies, More-Than-Human, Non-Human, Other-Than-Human: Reimagining idioms of animacy in an age of planetary unmaking

Catherine Price[1] & Sophie Chao[2]

[1]School of Geography, University of Nottingham, UK; [2]Department of Anthropology, University of Sydney, Australia
Correspondence: [1]catherine.price@nottingham.ac.uk; [2]sophie.chao@sydney.edu.au
Twitter: [1]@catherinejprice; [2]@Sophie_MH_Chao
ORCID: [1]0000-0003-1846-5407; [2]0000-0002-5434-9238

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Abstract

Life on Earth is sustained by interconnected more-than-human entanglements. In the era of the Anthropocene, many of these webs are unravelling due to climate change, biodiversity loss, toxicity and pollution, natural resource extraction, and water and soil depletion. In order to help address these challenges, The Anthropocene and More-Than-Human Writing Workshop Series, funded by the British Academy, brought together early career researchers from different disciplines to share ideas and knowledges. As part of The Anthropocene and More-Than-Human World Writing Workshop Series, Sophie Chao, presented her collaborative research project, The Promise of Multispecies Justice. Following this presentation, Catherine Price and Sophie Chao took the opportunity to discuss the terms multispecies, non-human, and more-than-human, amongst others. These terms are increasingly appearing in interdisciplinary scholarship in the space of multispecies studies, posthumanism, the environmental humanities and others. The epistemological assumptions and ethical stakes involved in using these terms are also considered. The conversation illustrates that in trying to define terms such as multispecies or the more-than-human, complexities are not explained away. Instead, these terms reveal how incredibly – and generatively – messy beyond-human worlds really are. The terms discussed are also fundamental to understanding and addressing the Anthropocene as an epoch of planetary unmaking.

Keywords: multispecies; more-than-human; non-human; other-than-human; assemblages; posthuman; relationality

Introduction

In the age of the Anthropocene, industrial processes are increasingly uncoupling life from death, diminishing death's capacity to channel vitality back to the living. Colonial-capitalist logics continue to naturalize the exploitation of natural resources for human ends and the subjection of humans to racialized hierarchies of worth. Against this backdrop, emerging posthumanist currents such as the environmental humanities, multispecies studies, and new materialisms have foregrounded the entanglements of humans with plants, animals, microbes, and fungi, whose meaningful lives and deaths are thoroughly, if unevenly, intertwined with human social worlds. In doing so, these currents invite us to reframe other-than-human entities as matters of concern and care within a broader epoch of eco-social unravelling.

In this conversation with , we problematize the empirical and conceptual strengths and limitations of some key terms deployed within posthumanist scholarship to characterize planetary lifeforms. These terms include multispecies, more-than-human, other-than-human, and non-human. We also offer alternative or complementary idioms of animacy that can help us grapple with the ontology of planetary lifeforms as world-dwellers and world-makers. In doing so, we seek to reflect critically upon, and generatively expand, the ways in which we characterize, represent, and relate to the diverse beings who together compose the more-than-human world.

This conversation follows from a seminar delivered by Dr. Chao within The *Anthropocene and More-Than-Human World Writing Workshop Series* (**Price & Dennis, 2021**), funded by the British Academy and bringing together early career researchers from different disciplines to share ideas and knowledges. In her seminar, Dr. Chao presented key findings from *The Promise of Multispecies Justice* (**Chao et al., 2022**), a collaborative research project that seeks to transform the scope and subject of justice beyond the individual and the human. In the conversation that follows, Dr. Catherine Price and Dr. Sophie Chao draw on their respective areas of existing and emergent research to critically reassess central concepts within posthumanist scholarship and their relative usefulness in understanding humans' situated embeddedness within more-than-human landscapes.

Dr. Chao is Discovery Early Career Researcher Award (DECRA) Fellow and Lecturer at the Department of Anthropology, University of Sydney. Her research investigates the intersections of Indigeneity, ecology, capitalism, health, and justice in the Pacific. Dr. Chao is author of *In the Shadow of the Palms: More-Than-Human Becomings in West Papua* (Duke University Press, 2022), which received the Duke University Press Scholars of Color

First Book Award in 2021. She is also co-editor, with Karin Bolender and Eben Kirksey, of *The Promise of Multispecies Justice* (Duke University Press, 2022). Dr. Chao previously worked for the human rights organization Forest Peoples Programme in Indonesia, supporting the rights of forest-dwelling Indigenous peoples to their customary lands, resources, and livelihoods. For more information, please visit www.morethanhumanworlds.com.

Dr. Price is a Research Fellow in the School of Geography, University of Nottingham. Her research interests include climate change and just transitions to low carbon societies, the social and ethical impacts of agricultural technologies, and relationships between humans and more-than-human worlds. She leads the British Academy funded project *The Anthropocene and More-Than-Human World Writing Workshop Series*.

Thinking with Different Terms

Catherine Price: Hello Sophie and thank you for joining me. First question, are the terms multispecies, non-human and more-than-human useful in grappling with matter and agency in beyond-human worlds?

Sophie Chao: Thank you for being in conversation with me, Catherine. The terms you've invoked are prominent within interdisciplinary currents such as multispecies studies, posthumanism, and the environmental humanities, that attend to the situated relationships of humans to plants, animals, microbes, fungi, and other kinds of lifeforms.

Before I share some thoughts on these idioms, allow me to offer a few important caveats. First of all, I don't think these terms are in any way mutually exclusive, let alone exhaustive in characterizing beyond-human worlds or processes. For this reason, I think it's important to bear in mind the context within, and the audiences for whom, we deploy these idioms as scholars, as this can help us decide which might be more pertinent, accurate, generative, or simply intelligible in any given setting.

Secondly, it's worth bearing in mind that these terms each derive from particular intellectual genealogies, disciplines, and theorists. In using one idiom over another, one can sometime tether oneself to a particular trajectory of thinking. There's nothing wrong with that – but it's important to understand where and how the terms we use came into being.

And finally, while words and language certainly matter in the way they inflect or direct attention to particular objects of inquiry, I think it's important not to get too caught up in terminology. What matters more is the difference these differences make – in other words, what light they shed on beyond-human realities, and what they might silence or obscure

in the process. With that, let's start by thinking about the term multispecies.

The term multispecies was coined by feminist theorist and Science and Technology Studies scholar Donna Haraway in her seminal book, *When Species Meet* (**2008**). Multispecies is helpful in that it does not centre or take the human as its primary referent in the way 'non-human' or 'more-than-human' do. In that regard, the term could be said to push against notions of human exceptionalism or anthropocentrism that are central within many dominant Western epistemologies. Instead, and as the term implies, multispecies draws attention to the 'species' as a potentially more generative unit of analysis – including the human as a species. It foregrounds the diversity or multiplicity of organisms that humans become-with and, who also themselves have biological, cultural, historical, and political lives (**Van Dooren et al., 2016**). We're talking animals, plants, microbes, viruses, and fungi – the diverse array of critters that humans unevenly share the planet with.

The term more-than-human has a rather different point of origin – namely, a science fiction novel by American writer Theodore Sturgeon (**1953**), titled *More Than Human*. It has since been widely picked up by scholars in the social sciences and humanities. For me, more-than-human is generative in the way it engages with the idea of 'more than'. Why is that generative? Well, because one of the central drives of multispecies or posthumanist literature is to move away from the paradigm of human exceptionalism, or the idea that humans are somehow superior to or more worthy than other kinds of lifeforms. More-than-human, on the other hand, invokes a counter-ethos of humility – one that challenged the primacy of superior human worth or value. Rather, it acknowledges the existence of a diversity of beings that together participate in the making of our multiplicitous and ongoingly transforming worlds (**Tsing, 2014**). In other words, there are always *more than* (just) human actors and agencies involved in the production of landscapes and communities. The term more-than-human thus invites an ethical or reflexive reckoning with our relative positionality within a broader spectrum of life that I've always found quite attractive as a theoretical stance, and also as a philosophy of life and co-existence (**Chao & Enari, 2021**).

The term non-human is still widely used in the social sciences and humanities, as a kind of blanket term for all organismic lifeforms situated outside the human category. But I think many scholars are turning away from this framing and towards multispecies or more-than-human because of the problematic dichotomy at the heart of non-human. To describe someone as non-human is a bit like describing a woman as non-man, or black as non-white, or nature as non-culture. We're creating a binary that

replicates precisely the kind of dichotomies of nature/culture, body/mind etc., that posthumanist scholarship is trying to push against. Binaries are problematic in that they often tend to flatten the multiplicity or the diversity internal to any particular construct or category. The human, for instance, is a diverse composite of cultures, societies, bodies, relations norms and practices. And the non-human encompasses a whole array of different plants, animals and other kinds of organisms. Each of these beings are equipped with their own specific affordances, attributes and agencies. It is often these specific differences that matter most – and a blanket term like 'non-human' struggles to capture such complexities.

Price: I completely agree with you on all counts. The difficulty I have with the term multispecies is how to consider the non-living. For example, soil consists of minerals as well as living organisms. I struggle with the idea of multispecies for soil, rivers or water. If you bring in technologies, algorithms and artificial intelligence into the mix as I have with my work, you've got additional non-biological connections to consider. For me, I find more-than-human easier to think with.

Chao: Although the titles of some my recent publications might suggest otherwise, I too am very much shifting away from multispecies to more-than-human idioms in part for precisely the reason that you've invoked. Even as a multispecies framing seeks to expand the scope of subjects beyond the human, it still restricts itself to what dominant secular scientific frameworks consider as *bios* or the biological. More-than-human invites us to think *beyond bios* and to incorporate and accommodate exactly the sort of range of actors that you're describing – actors that don't fit within the boxes and boundaries of *bios* per se, but that are nonetheless animate, agentive, and consequential in their own kinds of ways. These entities include soils, water, fire, mountains, glaciers, technologies and data, but also all kinds of transcendent entities, who also matter in Indigenous and other non-Western cosmologies, including spirits, ancestors, ghosts, ghouls and the deceased. All of these other entities are also co-shapers of our situated worlds. When approached from this angle, the range of actors who participate in making worldly stories and storied worlds multiplies. I'm totally on the same page as you on this point.

Another thing to be aware of in using multispecies – and part of the reason why I myself don't use the term much anymore – is the notion of 'species' inherent to this framing. The construct of species draws from a very particular genealogy and epistemology – that of dominant secular scientific traditions and frameworks. Linnean taxonomies and systems of classification are themselves very much tethered to colonial and imperial practices of ordering the world, that were driven by a desire to better understand this world in order to better exploit it. I think it's really

important to be conscious of this colonial past and its legacies, as they manifest in the classificatory schemes we have inherited and that we often take for granted rather than question. For me, the move away from 'multispecies' is in large part driven by the fact that I work with Indigenous Peoples in Papua who do not speak of, or story, lifeforms through the notion of species as categories, but rather through lifeforms' distinctive relations to *other* kinds of lifeforms, as well as with elements and ecosystems (**Chao, 2022a**). These Indigenous epistemologies, for me, offer far more capacious and relational ways of thinking about life than a species-specific, taxonomic framing. I'm not suggesting that these two ways of understanding other-than-human beings are necessarily mutually exclusive or incompatible. But I think it matters that we reflect critically on the premises, assumptions, and histories that undergird the systems of classification and identification we choose to rely upon and deploy in our analyses.

Price: What other terms do you think we could use instead?

Chao: That's a great question. It reminds me of Anna Tsing, Marisol de la Cadena, and others' invitation to play with unruly grammars in this epoch of planetary undoing – to creatively use words in the wrong context in order to generate surprise and the unexpected. Anna Tsing (**2013**) describes this as *catachresis*. While I don't think all of our intellectual energies should be invested in debates over terminology or the coining of neologisms, experimenting with language can play an important part in generating alternative ways of understanding our identities and relationships to beyond-human lifeforms in this age of 'self-devouring growth'.

One term I increasingly use myself is other-than-human – including, notably, in lieu of more-than-human. As critical race scholars have pointed out, to invoke the hierarchizing idiom of *more*-than-human when talking about plants and animals can problematically obscure the fact that many human communities across the world, historically and in the present, continue to be treated as *sub*-human, *less*-than-human, or even *non*-human under entrenched racializing assemblages (**Weheliye, 2014**). I use other-than-human rather than more-than-human to avoid replicating these hierarchies of worth – hierarchies that find root in imperial-colonial logics and that operate not just across species lines, but also within the very construct of the human, determining who is deemed killable, disposable, or non-grievable (**Butler, 2010; Wynter, 2003**).

Another term that is good to think with is multi-being. This term was coined by my colleague Sue Reid at the University of Sydney (**Celermajer et al., 2020**). The reasons I find it useful hark back to your earlier comment about the exclusions of certain kinds of actors, animacies and agencies in

the multispecies framing. Multi-being is a more encompassing way of thinking about elements, infrastructure and technologies as things that are, that become and that belong, in different ways across space and time. Multi-being, as such, expands ontology and epistemology beyond a biocentric angle and makes space for all these other kinds of protagonists.

The term multi-world, articulated by my collaborator Michael Marder – a philosopher of plants at the University of the Basque Country, Vitoria-Gasteiz – offers another generative pathway for grappling with beyond-human realities (**Chao, Bolender, and Kirksey, 2022)**. Thinking with worlds invites us to think not just with entities, but with relations. This includes relations within worlds, but also relations across worlds and the plurality of worlds that humans and other-than-human beings inhabit. The world angle is really fascinating because it brings up all kinds of questions about whose world counts, or who counts in the world (**Chao, 2022b**). Where do different worlds rub up against each other, and what kinds of frictions arise between these different worlds? Can we ever really claim to be able to enter the perceptual lifeworld of a plant or an animal? All kinds of interesting ethical, methodological, and political questions come into the mix when we start to think with worlds and worldings, and more broadly, with this spatio-temporal epoch of planetary *un*worlding that has come to be known as the Anthropocene.

As for other terms, a lot of my research has centred on understanding the idioms, perspectives and experiences of the people who are themselves living at the very heart of ecological devastation. Over the course of long-term immersive participant-observation and ethnographic fieldwork on the West Papuan plantation frontier, I've had the privilege to think with and learn from the Indigenous Marind Peoples, who have their own, incredibly rich, grammars for describing or storying what we might call a plant, an animal, a species, or an ecosystem. Marind talk about shared skin or wetness. They speak about a shared vitality or animacy or energy that binds different lifeforms across their different skins and bodies. One of my go-to moves as an anthropologist has been to stick to emic terms, or terms that are used by people themselves in the field and in everyday life. I try to bring those terms into conversation with conceptual or theoretical idioms that are used in the scholarly space. Bringing these diversely situated terminologies and grammars into the mix can help push against the colonial and extractive approach to knowledge production that continues to dominate in much of the academic world – by this I mean an approach that assumes that theory is produced by and for the Global North, based on realities that somehow just 'happen' in the Global South (**Stewart-Harawira, 2013**). It's also an approach that speaks to my own sense of accountability and responsibility towards the people whose worlds I'm trying to understand and whom I've had the gift to learn from.

Who or what we see ourselves as responsible towards, of course, will differ according to one's field site, interlocutors, and objects of inquiry. But I think it's an important question to ask ourselves in deciding which idioms we deploy in our analyses.

Price: Yes, that's very important. We should be using terms that are used by our interlocutors – including in your case, by Indigenous peoples.

The other term I've used is assemblage. In my article, *Covid-19: When Species and Data Meet* (**Price, 2020**), I examined human-virus-data relations. I used the example of contact-tracing apps to examine how species meet and intra-act. In this article, I argued that when we have intra-actions between humans, other biological entities, and the digital, the concept, postdigital hybrid assemblage could be usefully adopted. I wanted to show that technologies are becoming more prevalent in society, and this often occurs before debates and conversations have taken place concerning their introduction. I discussed how these debates and conversations are needed in order to ensure social justice and multispecies ecojustice are implemented. This enables a fair and just world for all.

Chao: Yes, assemblages are really good to think-with because they open space for analyzing constellations of persons, practices, ideas, movements, things, commodities, and affects. For me, the question of assemblages has always been following Marilyn Strathern (**1996**), where do you cut the network? There is a rhizomatic tendency with assemblage-thinking to travel down countless capillaries of connections, in ways that can end up making you feel somewhat overwhelmed. In a world where everything is entangled, where do you stop with the connections and with the connecting, and why? These are all important questions to ask ourselves.

Price: Yes, that's something I have trouble with. As you're discussing connections, this brings me on to the next question. Can we actually define multispecies, non-human, more-than-human, or any other terms that we wish to use, or is the world just too entangled and complex?

Chao: For many of us working in the posthumanist space, the ethical drive to centre multispecies, non-human, or more-than-human idioms stems from the fact that countless lifeforms are deeply and interestingly vulnerable to and threatened by anthropogenic industrial activities across the planet. There's an ethical urgency to attend to the situated lifeways and deathways of these diverse beings and the implications of our actions on their flourishing and continuity, both in the present and in the future. That's one side of the story.

For me, uncovering and understanding the complex entanglements of humans and other-than-humans is not an attempt to explain those complexities away. Instead, it is an invitation to stay with the trouble of

living and dying in incredibly messy worlds – worlds of unevenly distributed justice and injustice and worlds that continue to be profoundly governed by the dominant logic of anthropocentricism and human exceptionalism. One way I've tried to work around the issues of complexity and entanglement is to think with situatedness. This is a concept that Donna Haraway (**1988**) and many other feminist theorists have brought to the conversation. Situatedness draws attention to the specificity of ways in which different people become-with and understand other-than-human beings in particular places, at particular times, in the context of particular material and ideological assemblages. Situatedness is therefore a wonderful optic for an anthropologist and ethnographer like myself who is interested in the nitty gritty and the granularity of the field, within specific locales, where relations of interspecies care and violence are integral to everyday life.

Another concept that is good to think with is relationality – although I should say that relationality is by no means a way out of the complexity we're discussing! If anything, it's an invitation to dig deeper into that complexity. Alongside the work of many influential Indigenous scholars who continue to inspire my thinking (**Kimmerer 2013; Todd 2017; Winter 2022**), I find science and technology studies expert Karen Barad's (**2007**) concept of intra-action is helpful in working through questions of relationality. Barad offers the concept of intra-action to examine relations between space, time and matter. Intra-action differs from interaction in the sense that it assumes that things or entities don't exist before they come into relation with one another. We're very much pushing against a static, objectifying logic here. Instead, we're fully delving into the relation *itself* as what matters, and as what needs to be healed or transformed in some way to counter assumptions of human individuality and autonomy from the more-than-human world. That's why thinking through relations is also a great place to start – even if one never knows where exactly one will end up!

Another way of working through the complexity is to follow the life of beings or commodities across time and space. This is something I've done a lot with palm oil, which is a plant, a cash crop, and also a global commodity (**Chao, 2022b**). What I try to do in my research is to trace how this entity transforms from seed to plant to product to commodity, to trace the imaginaries and discourses that surround it, and to identify the ethical, environmental, and economic stakes involved in its cultivation and commodification. Thinking through dispersion as much as through diffraction and refraction helps me approach this complexity from different angles. Often, the results can be inconclusive - and by necessity, in the sense that they refuse to reduce complex, situated processes to any single reality. This way of thinking can be very useful in staying with the

messiness of what it means to live well with others, both human and other-than-human.

Price: Yes, I'm trying to use Karen Barad's work currently to think through connections with my research on biochar. Biochar looks a lot like charcoal although it is very different. Biochar is produced by heating organic material such as wood or straw to a very high temperature with limited oxygen. The material produced (biochar) locks away any carbon that was present in the organic material it was produced from. Biochar can be applied to soil where it is stores carbon for hundreds, possibly thousands of years. There are lots of intra-actions between the biochar, minerals present in soils, micro-organisms, earthworms, bacteria, and viruses. I find Barad's work very helpful for thinking through intra-actions but it can become very entangled and messy. And it can be difficult to decide where and when to stop following the intra-actions.

Chao: It's exhilarating to start a new project and follow all these different connections. In part it's exciting because you discover unexpected links between your research and your own everyday life and consumer practices, all of which are important to reckon with and part of the story.

The question of where to cut the network is, to some extent, a practical decision in that it depends on the time and resources available to you. But it's also a political and ethical question. Where one draws the boundaries and why also merits discussion and critical reflection. On a related note, whilst Karen Barad's work on intra-actions was very helpful for me in thinking with relations, I also had to constantly remind myself that even as everything might come into being through relations, not all relations are good (**Govindrajan, 2018; TallBear, 2022**). This fact can sometimes get a little bit lost in multispecies scholarship that shrouds intra-species emergence in a warming aura of generativity, love, or care. Whilst love and care are certainly part of the picture, they are often not the *whole* story. We have to remind ourselves that not all relations are life-sustaining for everyone involved. Instead, we might follow Susan Leigh Star (**1991**) and ask ourselves: who benefits from more-than-human entanglements?

Price: Yes, I definitely agree with you. Who benefits or loses from more-than-human entanglements is vitally important. This leads on to my next question. How can we talk or write about multispecies, the non-human, or more-than-human without favouring humans?

Chao: There are multiple ways I could answer this question. The first thing I want to say is that when we talk about favouring humans it's important to distinguish between anthropocentrism and anthropomorphism. These two terms often get glossed over, and there's a lot of slippage between them in the literature. Anthropocentrism comes with an assumption of

hierarchies of worth and value, wherein everything is calculated with the human as the central and primordial reference point. Anthropomorphism is different as it speaks to a projection or identification of sameness with other-than-human beings. This can be in morphological terms or in terms of agencies or desires and so forth. Many Indigenous and other non-Western cultures do engage in anthropomorphization in the sense that there is often an identification of shared traits across humans, animals, and plants, but, importantly, *without* the hierarchies of consequent worth or value that tend to accompany anthropocentrism. I think it's important to start by figuring out which dynamic is at play in the settings we are researching, and to avoid the dangerous equation of anthropocentrism with anthropomorphization.

The second question for me is whether it is even possible – or desirable – to attempt to write about other-than-humans without favouring human perspectives from the outset. How, for instance, can we every really know other-than-human lifeworlds given our particular affordances and capacities as human beings? Can we even begin to imagine empathy with animals when their perceptual bubbles are often beyond our sensory and cognitive grasp? These questions become even more tricky in the context of plants as beings who embody a really quite radical alterity when compared to humans and animals. Embracing humility, relinquishing epistemic mastery, and accepting the unknowability of other-than-human beings is thus a central dimension of storying more-than-human entanglements. By this I mean we need to acknowledge the limits of our capacity to know our other others. This constitutes a form of respect for alterity and for differences that can sometimes be insurmountable or incommensurable (**Chatterjee & Neimanis 2020**).

The third thing I'd say is that this question of how to write without favouring humans cannot be dissociated from the question of *which humans we are favouring*. Here, we're going back to the question of race, of cultural difference, of the sorts of entrenched regimes of discrimination that continue to plague our world. In exploring more-than-human worlds, we need to ask ourselves: which human stories are we backgrounding or foregrounding in our narratives? Whose voices get obscured or silenced in the process? What kinds of hierarchies of power are our stories either pushing against, or unwittingly replicating? And how do we position ourselves reflexively as scholars within these existing power dynamics?

Another important thing to bear in mind is to avoid reducing or flattening any particular human society or culture or groups' understanding of the more-than-human world. For instance, to essentialize Indigenous epistemologies as singular and static is to do immense violence to the complex heterogeneity and internal differences that operate within these

societies across gender divides, across class divides, across rural and urban divides, and more. These internal differences may profoundly shape the ways in which particular individuals and groups within any community understand and engage with more-than-human worlds and relations.

The final thing I want to offer here goes back to the question of connections and relations. One productive way to avoid recreating hierarchies of favouritism in the stories we tell is to adopt more-than-human, multi-sited and multi-actor approaches to whatever entity or relation we are studying. But of course, that's also a political decision. The stories I've told, for instance, primarily centre Indigenous perspectives and experiences, and there are political and ethical reasons why I do that. Donna Haraway (**2016**) talks about stories storying stories and worlds worlding worlds. She reminds us that storying is always an ethical and political choice. Choices are shaped by all kinds of different factors – personal, intellectual, institutional, and political. To engage with that question of the choices we make in the stories we tell is of fundamental importance. It shouldn't take the form of a tokenistic paragraph on positionality, buried somewhere in a footnote. Rather, it should be a recurring motif or tenet that runs across and throughout our analysis. This allows the reader to stay with the kind of troubles and questions that the answers one offers often inevitably – and generatively – raise.

Price: What you've just been discussing makes me think about objects. Noortje Marres work on material participation examines engagement with everyday objects. In *Material Participation: Technology, the Environment and Everyday Publics*, Marres (**2015**) discusses carbon accounting devices, and eco-homes. This work shows how everyday items, devices, and environments have the capacity to engage and to mediate involvement with public affairs. I think centring on the object being investigated is a useful approach to think through connections, and to bring those connections into discussions.

Chao: Yes, absolutely. Jane Bennett's (**2010**) work on vibrant matter has certainly been influential to my own thinking with and about everyday objects. The everydayness you're invoking really matters for those of us working on questions of climate change or the planetary crisis – both of which constitute what Timothy Morton (**2013**) calls hyperobjects. In many ways, climate change and planetary unravelling exceed the scales of human perception and understanding. How, then, do we avoid the paralysing politics of despair that can arise in these times of seemingly insurmountable crisis? One way is to take as one's starting point the everyday and the seemingly mundane. Doing so opens space for tracing the roots or the rhizomes of our situated connections to seemingly out-of-the-way places, and to plants, animals, and ecosystems inhabiting these

seemingly remote places, whose fates and futures we are all more or less implicated in through our everyday practices as consumers and as dwellers of an increasingly vulnerable planet.

Alongside everyday objects and practices, one can take as one's starting point one's own body. This is something I was enskilled in through the mentorship of my Indigenous companions in West Papua, who taught me how to harness my senses to become aware of, to attune to, or to simply notice everything that's going on around us in this richly diverse more-than-human world. Cultivating this kind of bodily and kinesthetic attunement or engagement is central to the ethos of passionate immersion invoked by Anna Tsing (**2011**) and others (**e.g., Manulani Aluli-Meyer, 2001**). It is also something that Karen Barad has articulated in describing justice as something 'one must ask over and over again with one's body' (**Barad, 2017: 85**). I love the idea of starting from the everyday – including from one's own corporeality and the multiple, entangled realities that this corporeality is always already part of and ongoingly producing.

Price: Yes, I think if we all thought with our bodies more maybe we would be in a better position than we are now with the climate crisis and the biodiversity crisis. We should all be paying more attention to the worlds around us.

Chao: Absolutely. As my Papuan friends would consistently exhort me, stop writing, start walking, stop thinking, start listening!

Price: Good advice! My final question is how can we take our work forward with the terms multispecies, more-than-human, or other-than-human?

Chao: I think we urgently need interdisciplinary approaches to better grapple with the kinds of complex linguistic, epistemological, ontological, ethical, methodological, and representational questions that we've discussed today. More specifically, I think we need an interdisciplinary approach that is synthetic and transformative, rather than purely additive or complementary. By this I mean a kind of interdisciplinarity that engages with other fields in order to rethink the premises and assumptions underlying the diverse ways we ourselves approach, understand, and act upon the more-than-human world based on our own disciplinary trainings. Such an interdisciplinary practice might encourage us to reconsider the questions we believe matter – why, in whose interests, and with what intended or contingent effects. In addition, I think interdisciplinary conversations can be further enriched through iterative dialogue *beyond* the realm of academia – for instance, with activists, practitioners, and artists. For me, these kinds of engagements are key to imagining and enacting a different commons – or rather, to commoning otherwise. This

is exactly what I've been trying to do with my *More-Than-Human World* website which showcases the voices, knowledges, stories, and practices of activists, artists, and academics who are all trying to work in one way or another in reimagining more-than-human relations on this wounded planet.[i] Participating in and creating space for these kinds of interdisciplinary conversations is immensely rewarding because it fosters a vital sense of community and companionship in the midst of increasingly troubled times.

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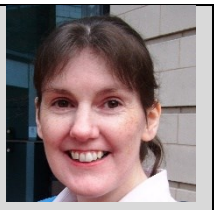

Catherine Price is a Research Fellow in the School of Geography, University of Nottingham. Her research interests include climate change and just transitions to low carbon societies, the social and ethical impacts of agricultural technologies, and relationships between humans and more-than-human worlds. She leads the British Academy funded project *The Anthropocene and More-Than-Human World Writing Workshop Series*.

Sophie Chao is Discovery Early Career Researcher Award (DECRA) Fellow and Lecturer in Anthropology at the University of Sydney. Her research investigates the intersections of Indigeneity, ecology, capitalism, health, and justice in the Pacific. Sophie is author of *In the Shadow of the Palms: More-Than-Human Becomings in West Papua* (Duke University Press, 2022) and co-editor of *The Promise of Multispecies Justice* (Duke University Press, 2022) with Karin Bolender and Eben Kirksey. Sophie previously worked for the human rights organization Forest Peoples Programme in Indonesia, supporting the rights of forest-dwelling Indigenous peoples to their customary lands, resources, and livelihoods. For more information, visit www.morethanhumanworlds.com.

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Endnotes

[i] See Dr Chao's website here: https://www.morethanhumanworlds.com/