

The Co-Production of Knowledge for What and by Whom?: Indigenous and Locally Led Collaborations to Understand and Address Environmental Change

The Forum at the Manhattanville Campus of Columbia University
601 West 125th Street, New York, NY, 10027
March 28, 2024 – March 30, 2024



Our gathering aims to:

- 1) Understand how people from different backgrounds, training, and viewpoints come together to understand changes to social and ecological environments.
- 2) Explore the strengths and weaknesses of different ways to bring diverse people together to address these changes.
- 3) Create a collective vision for Indigenous and locally led *collaborations* and *co-production* based on the needs, priorities, and approaches shared over this conference.

Land acknowledgement:

This conference acknowledges that our gathering is taking place in the politically designated region of New York City on the present day Island of Manhattan (Manahatta), ancestral and contemporary homelands of the Lenape (Lenapehoking), the Canarsie, Haudenosaunee Nation, the Reckgawanc, the Shinnecock, and the Wappinger people - all of whom were forcibly displaced and dispossessed in active campaigns of genocide and cultural erasure through centuries of European settler colonialism. We further acknowledge that the Lenape People maintain close relationships with this land within the ongoing legacy of colonialism and in deep recognition of the Lenape diaspora across North America, including the the Delaware Nation and Delaware Tribe of Indians in Oklahoma; the Powhatan Renape, Nanticoke Lenni-Lenape, and Ramapough Lenape Nations in New Jersey; the Stockbridge-Munsee Community in Wisconsin; and Delaware of Six Nations, Moravian of the Thames First Nation, and the Munsee-Delaware Nation in Ontario, Canada.

But what is *co-production* and why are we here?:

The word *co-production* has become shorthand for the phrases *knowledge co-production*, *co-production of knowledge*, or *joint knowledge production*. Whether written in one or three words, *co-production* is everywhere and slowly becoming everything when talking about climate change and biodiversity conservation. For some, it's a *new* synonym for *collaboration* and *community-engagement* in research. For others, it's a specific way to unite many people towards a common goal. A third interpretation is that *co-production* symbolizes a commitment to balancing the scales between the powerful and the disempowered. These diverse views have emerged from decades of different academic and social traditions that have treated *co-production* as both a collaborative process and a way to understand how science and society shape each other⁽¹⁻⁵⁾. Bringing these views together, *co-production* can be viewed as "the collaborative process of bringing a plurality of knowledge sources and types together to formulate and to address a defined problem and to build a systems-oriented understanding of that problem for an actionable outcome"⁽⁶⁾. However, *co-production* is not just one collaborative process or lens for seeing the world; it represents multiple forms of deep collaboration that bring together different peoples' knowledge and experiences towards shared goals. Indeed, *co-production* approaches are promoted for making collaborations more transparent, trustworthy, inclusive, effective, scientifically rigorous, and socially relevant – all of which hold promising potential of producing new knowledge and outcomes for a rapidly changing world.

Yet the concise description above hides the contested realities of *co-production*. Academics and decision makers are increasingly using *co-production* in a variety of ways to uniformly describe and justify *collaborations* and *community engagement* with Indigenous Peoples and local communities who are most affected by environmental and social change. More cautious people may see *co-production* as a business-as-usual buzzword: yet another jargony word that people in power use to collect partners, money, and recognition mostly to benefit themselves. This means that the benefits and outcomes of *co-production* tend to start and stay with people who are in academic institutions in the Global North, which paradoxically restricts the potential for collective expertise to address environmental change at different scales. As this trend increases, so too does the tendency to frame *co-production* as an academic exercise rather than an opportunity to reshape the paradigms of *collaboration* and *co-production* from the bottom-up. This means that as more researchers from different backgrounds adopt the broad language, intentions, and approaches of *co-production* for research, there are increasing risks to Indigenous Peoples and local communities. These risks can include limitations to Indigenous Peoples and local communities' ability to shape global collaborative agendas, advance their roles beyond being mere sources of data, exercise their sovereignty and self-determination, and reverse centuries-long legacies of scientific oppression, exclusion, and exploitation through research.^(8, 9, 10, 11) Such popularity may motivate people in power to dive headfirst into community-engaged efforts without considering the power, ethics, and politics of that work⁽¹²⁾.

But what does this all mean? Why are we here to talk about this for 2.5 days!?

We are here because *co-production* is becoming the defining spirit, mood, and approach for 21st century efforts to understand and address environmental change^(7, 13, 14). It is the zeitgeist of this era of collaboration, which is reinvigorating old partnerships and fueling new partnerships with Indigenous Peoples and local communities. Individually, you are here because you have lived experience with different forms of *co-production*, *collaboration*, and *community engagement* related to climate change or biodiversity conservation^(e.g., 15-19, among MANY others). From your experience you likely know that everything about *co-production* is complex and contested, from its meaning and the diversity of people who pursue it, to the myriad politics and pathways that support and push against it. Collectively, we are here as a budding community to sort through that complexity and sit with the discomfort that comes from it⁽²⁰⁾ – all of which will help distill shared lessons and agreed-upon practices for bringing different people together and fostering Indigenous and locally led initiatives under the umbrella of *co-production*.

Our gathering will focus on 6 connected themes:^{(expanded from reference 7, see pg. 13]}

1) **People:**

The *People* theme refers to the diversity of collaborators and groups who contribute to and are affected by knowledge co-production efforts at many scales. The diversity of people ranges from individuals and organizations to political bodies and nation-states. At the core of this theme is the recognition that different ways of seeing, being, knowing, and interacting with the world play many roles in the co-production of knowledge – all of which are shaped by individual lived experiences. And these different perspectives influence co-production in visible and invisible ways, such as *determining the purpose of co-production for a group*, framing expectations around relationships among collaborators, and producing tensions due to different leadership styles. **In this conference, activities and sessions with the *People* theme will embrace how our individual and group identities and experiences will shape the direction and community building aspirations of the conference.**

2) **Purpose:**

The *Purpose* theme represents the reasons for pursuing co-production in the contexts of biodiversity loss and climate change. The many meanings and motivations directing co-production efforts are as diverse as the people who contribute to these efforts. For example, people may be motivated to foster cultural revitalization efforts, gather diverse types of information for climate mitigation, develop social services infrastructure, or promote more representative environmental policies. In short, co-production is often motivated by a specific problem. In the context of environmental change, the spectrum of motivations may range from *solving* problems to *reframing* problems - each of which reflects *power relations among people* in co-production. **In this conference, activities and sessions with the *Purpose* theme will allow our conference community to reflect on the meanings and motivations they associate with *co-production*, *collaboration*, and *community engagement*.**

3) Power:

The *Power* theme embodies how *power* and *power relations* within co-production are approached and understood. The concept of power intuitively makes sense to all of us in the same ways we all hold our own assumptions about *co-production*, *collaboration*, and *community engagement*. Yet power is also just as complex. For example, power can mean someone's *power to* make a decision, someone's *power over* the actions of others, the *power with* others that comes from collaboration, and the *power within* ourselves that comes from self-confidence and self-determination. Power also operates at different levels of society, from individual choices to systemic forces. We are leaving power undefined at this time to allow for these many kinds of power that *influence co-production pathways* to be part of our dialogues. **In this conference, activities and sessions with the *Power* theme will ask our conference community to unpack: 1) power relations in their collaborations, and 2) how power relations should be approached through co-production.**

4) Politics:

The *Politics* theme emphasizes how the co-production of knowledge is inherently political, and that the politics of co-production influence *action* and *solutions* towards climate change and biodiversity conservation. Co-production efforts are shaped by people, purposes, and power structures that are all influenced by different political beliefs, priorities, and limitations. For example, political calculations may determine whose knowledge is valued over others in biodiversity and climate change policies. This may occur when funders, national governments, or intergovernmental forums choose to prioritize select types of knowledge when assessing environmental change. Even the words we use to label different types of knowledge, such as "Indigenous" or "Western", can reinforce political power imbalances or break down cultural walls depending on the political context of a co-production effort. Taken together, visible and invisible politics shape the *how* and *why* of co-production. **In this conference, activities and sessions with the *Politics* theme will advance conversations about the ways that politics shape the process and outcomes of co-production.**

5) Pathways:

The *Pathways* theme refers to the tools and strategies that people use to pursue co-production. Unlike the previous themes that largely capture ways of *thinking about* co-production, this theme highlights ways of *doing* co-production. These approaches are nearly as varied as the meanings of the word "co-production", and those approaches tend to align with the beliefs and priorities of the people who make up co-production efforts. Research-focused co-production may host workshops with project partners to co-design their project and co-evaluate their findings. More community-engaged co-production might use road shows to elevate community priorities and relationship building in their efforts. Academics have described these tools and strategies on a spectrum from approaches that *generate social and environmental progress in some form*, from generating *knowledge* to

relationships. In this conference, activities and sessions with the *Pathways* theme ask our conference community to critically reflect on past and present co-production approaches, and envision future strategies for *enacting* co-production.

6) Progress:

The *Progress* theme highlights the aspiration that co-production will generate change of the status quo and advancement in some form, that we call “progress,” which can be used to *refine the purpose* and other elements of co-production efforts. With full awareness of the history of extractive and oppressive practices tied to the term “*progress*,” the word is intentionally used here to acknowledge these histories while keeping open multiple possibilities for aspirational changes at the later stages of co-production in the context of climate change and biodiversity loss, whether it refers to scientific progress, social progress, species progress, decolonial progress, moral progress, or many other forms of progress. For example, scientific *progress* for one co-production group may mean the publication of articles in top-tier academic journals. Other groups may prioritize decolonial *progress* in returning traditional homelands to dispossessed Indigenous communities. These examples show the importance of collectively framing the types of progress that groups aim to achieve, which can be used to continually *refine the purpose* of their co-production efforts. **In this conference, activities and sessions with the *Progress* theme ask our conference community to envision how co-production can facilitate progress for them in understanding and seeking actions towards climate change and biodiversity loss, including the types of progress that they would like to emerge from our gathering.**

Conference program:

Our program is an aspirational blueprint to help us explore the aims of this conference. It is also a template to keep our conversations within the context of the effects of climate change and biodiversity loss on us and the world around us. Each session is accompanied by an *intention*. The *intention* captures the broad yet adaptive purpose of each session. Simply put, the *intentions* are guideposts that may shift with the flow of our conversations rather than prescriptive steps toward a final outcome. The activities within each session are individual and group exercises to assist us as we move from one session (and its *intention*) to the next. In other words, the *intentions* are the contours and stops of our map, and *activities* will help us pave our own paths between each stop and develop shared understandings to move forward. We are all encouraged to keep this framing in mind as we move ahead. Thank you for embarking on this journey!

Conference community:

John Aini, Founder and Director of Ailan Awareness, Papua New Guinea

Yolarnie Amepou, Director of the Piku Biodiversity Network, Papua New Guinea

Katrina Anthony, Inuit Research Coordinator with the Sustainable Nunatsiavut Futures Project in Nunatsiavut, Canada

Sonya Atalay, Director of the Center for Braiding Indigenous Knowledges and Science and Professor of Anthropology, University of Massachusetts Amherst, United States.

Erica Avrami, James Marston Fitch Assistant Professor of Historic Preservation at the Columbia University Graduate School of Architecture, Planning and Preservation, United States.

OreOluwa Badaki, Postdoctoral Fellow in the Tisch Center for Food, Education and Policy and the Media and Social Change Lab at Teachers College, United States.

Kelsey Bisson, Program Scientist for the Ocean Biology and Biogeochemistry Program, National Aeronautics and Space Administration, United States.

Mary Blair, Director of Biodiversity Informatics Research at the Center for Biodiversity and Conservation at the American Museum of Natural History, United States.

Ben Bostick, Lamont Research Professor, Lamont-Doherty Earth Observatory, Columbia University Climate School, United States.

Sean Buffington, Vice President of the Henry Luce Foundation, United States.

Elizabeth Cook, Assistant Professor in Environmental Science at Barnard College, United States.

Ruth DeFries, University Professor and Denning Family Professor of Sustainable Development in the Department of Ecology, Evolution, and Environmental Biology at Columbia University, United States.

Kristina Guild Douglass, Associate Professor of Climate, Columbia University, United States.

Paul Gallay, Director of the Resilient Coastal Communities Project and lecturer in Sustainable Development at Columbia University, United States.

Sandra Goldmark, Associate Professor of Professional Practice in Theatre and Director of Sustainability and Climate Action at Barnard College, Senior Assistant Dean for Interdisciplinary Engagement at the Columbia Climate School, United States.

Eilidh MacLeod, Rapporteur, Climate System Science and History Student at Columbia University, United States.

Alex Mawyer, Director of the Center for Pacific Islands Studies and Acting Chair of the Department of Pacific Islands Studies at the University of Hawai'i at Mānoa, United States.

Alex McAlvay, Research scientist at the New York Botanical Garden and Adjunct Professor of Ecology, Evolution, and Environmental Biology at Columbia University, United States.

Shinjini Mukherjee, Rapporteur, Student at Columbia University, United States.

Ben Mylius, Lecturer in Political Science, Columbia University, United States.

Michael Petriello, Convener, Postdoctoral Research Scholar in the Center for Science and Society, Columbia University, United States.

Ana Luz Porzecanski, Director of the Center for Biodiversity Conservation at the American Museum of Natural History, United States.

Ariel Richer, Co-Founder and Co-Director of the Urban Indigenous Collective in New York City and Assistant Professor in the College of Social Work at the University of Utah, United States.

Naomi Rosenkranz, Associate Director of the Center for Science and Society, Columbia University, United States.

Pamela Smith, Founding Director of the Center for Science and Society and Seth Low Professor of History at Columbia University, United States

Amanda Stronza, Co-Founder of the Applied Biodiversity Science Program and Professor in the Department of Ecology and Conservation Biology at Texas A&M University, United States.

Lillian St. George, Rapporteur, student at Barnard College in New York City and Intern for the Community-Driven Co-Production Earth Network at Columbia University, United States.

Ajit Subramaniam, Lamont Research Professor, Lamont-Doherty Earth Observatory, Columbia University Climate School, United States.

Jozef Sulik, Assistant Director of the Center for Science and Society, Columbia University, United States.

Miriam Supuma, Biocultural Diversity Programme Manager for Synchronicity Earth, United Kingdom.

Caroline Surman, Project and Communications Manager for the Center for Science and Society, Columbia University, United States.

Rachel Talbert, Postdoctoral Fellow with the Institute for Urban and Minority Education at Teachers College, United States

Paige West, Claire Tow Professor of Anthropology, Barnard College and Columbia University, United States.

Alex Whiting, Director of the Environmental Program for the Native Village of Kotzebue (Qikiqtaġruk), Alaska, United States.

Siikauraq Whiting, former Executive Director for the Native Village of Kotzebue (Qikiqtaġruk), Alaska and former Mayor of the Northwest Arctic Borough, United States.

Jacqueline Winters, Inuit Research Coordinator with the Sustainable Nunatsiavut Futures Project, Canada.

Christopher Zappa, Lamont Research Professor, Associate Director of Ocean and Climate Physics, and Lecturer in Earth and Environmental Sciences at Columbia University, United States

Melanie Zurba, Associate Professor in the School for Resource and Environmental Studies at Dalhousie University, Canada.

Conference structure:

The Forum, 601 W. 125th St., New York, NY, 10027			
Day 1: Thursday, March 28, 2024			
Time	Location	Themes	Session
8:45 AM - 9:15 AM	Lobby	<i>People</i>	Sign-in
	Foyer	<i>People</i>	Morning refreshments and meet-and-greet
9:15 AM - 10:30 AM	Auditorium	<i>People, Purpose, Power, Politics, Pathways, & Progress</i>	Day 1 Welcome Plenary <i>Intention:</i> Establish an intellectual and philosophical starting point for the conference and understanding of why we are gathered here.
10:40 AM - 11:30 AM	Foyer	<i>People</i>	Community Building: Who Are We As Individuals? (Part 1) <i>Intention:</i> Introduce ourselves to foster a foundation for community building.
11:30 AM - 11:45 AM	316 & 317	<i>People</i>	Refreshments and movement break
11:45 AM - 12:45 PM	Foyer	<i>People</i>	Community building: Who Are We As Individuals? (Part 2) <i>Intention:</i> See above; also collectively reflect on how our backgrounds shape our views towards collaboration and the environmental issues we aim to understand.
12:45 PM - 1:45 PM	Foyer	<i>People</i>	Lunch Break
1:45 PM - 3:45 PM	Main session: 315 Breakout groups: 315, 316, & 317	<i>People & Purpose</i>	Defining Collaborations: Meaning Making for the Conference as a Group <i>Intention:</i> Discuss and set boundaries around the terms: collaboration, community-engagement, and co-production.
3:45 PM - 4:00 PM	316 & 317	<i>People</i>	Refreshments and movement break
4:00 PM - 5:15 PM	315	<i>People & Purpose</i>	Defining Co-Production: Group Values and Ethics for the Conference <i>Intention:</i> See above; identify the values and ethics shaping our assumptions and ideas about <i>collaboration</i> , <i>co-production</i> , and <i>community-engagement</i> .

5:15 PM - 5:45 PM	315	<i>People & Purpose</i>	Day 1 Wrap-Up <i>Intention and activity:</i> Reflect on how our group's values and ethics reinforce or question prevailing ideas about what counts as <i>co-production</i> .
6:30 PM - 8:30 PM	Le Monde	<i>People</i>	A Shared Meal - Le Monde, 2885 Broadway, New York, NY 10025
Day 2: Friday, March 29, 2024			
Time	Location	Themes	Session
8:45 AM - 9:15 AM	301	<i>People</i>	Morning Refreshments
9:15 AM - 9:30 AM	315	<i>People, Purpose, Power, Politics, Pathways, & Progress</i>	Day 2 Opening remarks <i>Intention:</i> Review our key points from Day 1 to set the stage for Day 2, reminder of what the agreement was, and the structure of the morning.
9:30 AM - 12:30 PM	315	<i>Power</i>	Moving Toward Power, Ethics, and Approaches to Indigenous and Locally Led Collaborations <i>Intention:</i> Dialogue about how power relations can shape collaborations, whether described as <i>community-engaged</i> or <i>co-production</i> .
12:35 PM - 1:35 PM	301	<i>People</i>	Lunch Break
1:45 PM - 3:45 PM	315	<i>Power & Politics</i>	Power and Politics in Collaborations: Co-producing Meaningful Change Through 'Good Practices' (Part 1) <i>Intention:</i> Think together as a group about what the values and ethics (from Day 1) and power relations (from the previous session) say about what "good practices" in co-production may be to us.
3:45 PM - 4:00 PM	316 & 317	<i>People</i>	Refreshments and movement break
4:00 PM - 5:45 PM	Main session: 315 Breakout groups: 315 & 301	<i>Power & Politics</i>	Power and Politics in Collaborations: Co-producing Meaningful Change Through 'Good Practices' (Part 2) <i>Intention:</i> Recognize and work through differences in priorities, values, and expectations among academic-led and <i>community-led</i> collaborations and co-production.
5:45 PM - 6:00 PM	316 & 317	<i>People</i>	Refreshments and movement break

6:00 PM - 6:15 PM	301	<i>Power, Politics, & Pathways</i>	Day 2 Wrap-Up <i>Intention:</i> Reflect on key points from Day 1 on how power and politics shape <i>collaborations</i> and <i>co-production</i> , and what counts as ‘good practices.’
6:30 PM - 8:30 PM	The Forum	<i>People</i>	A Shared Meal at the Forum
Day 3: Saturday, March 30, 2024			
Time	Location	Themes	Session
8:45 AM - 9:15 AM	301	<i>People</i>	Morning Refreshments
9:15 AM - 9:30 AM	315	<i>Pathways</i>	Day 3 Opening remarks <i>Intention:</i> Set the stage for fostering our last day of conversations about translating values, ethics, power, and politics into grounded action.
9:30 AM -11:00 AM	315	<i>Pathways & Progress</i>	Pathways for Indigenous and Locally-Led Collaboration and Co-Production <i>Intention:</i> Share experiences, ideas, and suggestions for putting the strategies and techniques for <i>collaboration</i> and <i>co-production</i> we have discussed into practice.
11:00 AM -12:00 PM	315	<i>People, Purpose, Politics, Power, Pathways, Progress</i>	Conference Final Remarks: Envisioning and Enacting a Co-Production Community of Practice <i>Intention:</i> Discuss how the conference can inform “good practices” in co-production and help us build community around these practices.
12:00 PM -1:00 PM	301	<i>People</i>	Optional Lunch

Acknowledgements:

You are most likely reading this section as a participant. Our profound thanks first go to you for generously contributing your expertise, wisdom, time, and energy to this collective gathering. We are all incredibly fortunate to be key parts of such an accomplished and diverse group. You are central to this effort. Special thanks go to the many community leaders, partners, and community-based practitioners who trust this conference to elevate their perspectives and interests beyond an academic exercise, many of whom have traveled for one to several days based on that trust. This conference would also not be possible without the generous financial and logistic support from our sponsors below: We are very grateful for the support from the Societal Impact Seed Grant awarded by the Provost Office, support from the Lamont Doherty Earth Observatory Climate Center grant, and the Institute for Social and Economic Research and Policy Conference Grant. We are especially indebted to the Center for Science and Society and affiliates, both past and present, for their indispensable support, namely Melinda Miller, Naomi Rosenkranz, Lillian St. George, Jozef Sulik, and Caroline Surman. Additional thanks go to the nine researchers from Columbia University, Barnard College, and Teachers College who volunteered to share their collaborative and co-productive experiences in interviews. Extended thanks go to Claudia López from On the Right Mind for her beautiful graphic recordings, as well as her contributions to the structure and content of this gathering.

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References:

- ⁽¹⁾Ostrom, E. & Whitaker, G. (1973). Does local community control of police make a difference? Some preliminary findings. *American Journal of Political Science* 17(1):48-76. <https://doi.org/10.2307/2110474>.
- ⁽²⁾Wynne, B. (1996). SSK's identity parade: Signing-up, off-and-on. *Social Studies of Science* 26(2):357-391. <https://doi.org/10.1177/030631296026002007>.
- ⁽³⁾Jasanoff, S. (2004). *States of knowledge*. Taylor & Francis.
- ⁽⁴⁾Kofinas, G., and the communities of Aklavik, Arctic Village, Old Crow, and Fort McPherson (2002). Community contributions to ecological monitoring: Knowledge co-production in the U.S.-Canada Arctic Borderlands. In Krupnik, I & Jolly, D. (Eds.), *The earth is faster now: Indigenous observations of Arctic environmental change* (pp. 54-91). Arctic Research Consortium of the United States and the Arctic Studies Center, Smithsonian Institution.
- ⁽⁵⁾Miller, CA & Wyborn, C. (2020). Co-production in global sustainability: Histories and theories. *Environmental Science & Policy* 113:88-95. <https://doi.org/10.1016/j.envsci.2018.01.016>.
- ⁽⁶⁾Muhl, E-K, et al. (2023). Transitioning toward “deep” knowledge co-production in coastal and marine systems: Examining the interplay among governance, power, and knowledge. *Ecology and Society* 28(4):17. <https://doi.org/10.5751/ES-14443-280417>.
- ⁽⁷⁾Chambers, JM, et al. (2021). Six modes of co-production for sustainability. *Nature Sustainability* 4(11): 983-996. <https://doi.org/10.1038/s41893-021-00755-x>.
- ⁽⁸⁾Latulippe, N. & Klenk, N. (2020). Making room and moving over: Knowledge co-production, Indigenous knowledge sovereignty and the politics of global environmental change decision-making. *Current Opinion in Environmental Sustainability* 42:7. <https://doi.org/10.1016/j.cosust.2019.10.010>.
- ⁽⁹⁾Wilkens, J. & Datchoua-Tirvaudey, ARC. (2022). Researching climate justice: A decolonial approach to global climate governance. *International Affairs* 98:1. <http://doi.org/10.1093/ia/iiaab209>.
- ⁽¹⁰⁾Dhillon, CM. (2022). Indigenous-settler climate change boundary organizations contending with US colonialism. *American Behavioral Scientist* 66(7):937-973. <https://doi.org/10.1177/00027642211013389>.
- ⁽¹¹⁾Goldman, MJ et al. (2018). A critical political ecology of human dimensions of climate change: Epistemology, ontology, and ethics. *WIREs: Climate Change* 9(4):e526. <https://doi.org/10.1002/wcc.526>.
- ⁽¹²⁾David-Chavez, D. & Gavin, M. (2018). A global climate assessment of Indigenous community engagement in climate research. *Environmental Research Letters* 13:123005. <https://doi.org/10.1088/1748-9326/aaf300>.
- ⁽¹³⁾Norström et al. (2020). Principles for knowledge co-production in sustainability research. *Nature Sustainability* 3:182-190. <https://doi.org/10.1038/s41893-019-0448-2>.
- ⁽¹⁴⁾Wyborn, C. et al. (2019). Co-producing sustainability: Recording the governance of science, policy, and practice. *Annual Review of Environment and Resources* 44:319-46. <https://doi.org/10.1146/annurev-environ-101718-033103>.
- ⁽¹⁵⁾Aini, J, West, P, Amepou, Y, et al. (2023). Reimagining conservation practice: Indigenous self-determination and collaboration in Papua New Guinea. *Oryx* 57(3):350-359. <https://doi.org/10.1017/S003060532200103X>.
- ⁽¹⁶⁾Atalay, S. (2019). Can archaeology help decolonize the way institutions think? How community-based research is transforming the archaeology training toolbox and helping to transform institutions. *Archaeologies* 15:514-535. <https://doi.org/10.1007/s11759-019-09383-6>.
- ⁽¹⁷⁾Cook, E. et al. (2022). Setting the stage for co-production. In Hamstead, ZA, et al. (Eds), *Resilient urban futures* (pp. 99-112). Springer.
- ⁽¹⁸⁾Hauser, DW, Whiting, AV,...Subramaniam, A...& Zappa, C. (2021). Co-production of knowledge reveals loss of Indigenous hunting opportunities in the face of accelerating Arctic climate change. *Environmental Research Letters* 16:095003. <https://doi.org/10.1088/1748-9326/ac1a36>.
- ⁽¹⁹⁾Petriello, MA, Zurba, M,...Anthony, K,...Winters, J,...et al. (2022). The power and precarity of knowledge co-production: A case study of Sakkijânginnaniattut Nunatsiavut Sivunitsangit (the Sustainable Nunatsiavut Futures Project). In S. Gómez & V. Köpsel (Eds.), *Transdisciplinary Marine Research* (pp. 127-148). Routledge. <https://doi.org/10.4324/9781003311171-9>.
- ⁽²⁰⁾Chambers, JM et al. (2022). Co-productive agility and four collaborative pathways to sustainability transformations. *Global Environmental Change* 72:102422. <https://doi.org/10.1016/j.gloenvcha.2021.102422>.