


Framing co-productive conservation in partnership with Arctic Indigenous peoples

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Abstract

Indigenous communities at the front lines of climate change and biodiversity loss are increasingly shaping the conservation of lands, waters, and species. The Arctic is a hotbed for emerging local, national, and international conservation efforts, and researchers, managers, and communities alike will benefit from a framework that improves approaches to Indigenous partnerships. Co-productive conservation is a framework that encompasses both the co-production of knowledge and the co-production of public services to pursue ethically conscious, culturally relevant, and fully knowledge-based approaches to biodiversity concerns. Co-productive conservation recognizes that conservation can be practiced in a way that embodies Indigenous perspectives, knowledge, rights, priorities, and livelihoods. Six iterative and reflexive co-production processes (i.e., co-planning, co-prioritizing, co-learning, co-managing, co-delivering, and co-assessing) focus on the human dimensions that allow research, management, and conservation to affect change. By opening discussions on how to structure conservation efforts in partnership with Indigenous communities, the conservation community can move away from narratives that perceive Indigenous participation as an obligation or part of an ethical narrative and instead embrace a process that broadens the evidence base and situates conservation within Indigenous contexts.

KEYWORDS

Indigenous-led conservation, Indigenous partnerships, Indigenous knowledge, co-production of knowledge, co-management, Arctic, traditional ecological knowledge

Resumen

Las comunidades indígenas en la primera línea del cambio climático y pérdida de biodiversidad están configurando cada vez más la conservación de tierras, aguas y especies. El Ártico es un semillero de esfuerzos emergentes de conservación locales, nacionales e internacionales, y los investigadores, gestores y comunidades se beneficiarán de un marco de referencia que mejora las estrategias para las alianzas indígenas. La conservación coproductiva es un marco de referencia que comprende tanto la coproducción de conocimiento y la coproducción de servicios públicos para definir aproximaciones a problemas de la biodiversidad que sean éticamente conscientes, culturalmente relevantes y plenamente basadas en conocimiento. La conservación coproductiva reconoce que la conservación puede llevarse a cabo de manera que incorpore perspectivas, conocimiento, derechos, prioridades y medios de vida indígenas. Seis procesos de coproducción iterativos y reflexivos (i. e., coplaneación, copriorización, coaprendizaje, cogestión, cocapacitación y coevaluación) se concentran en las dimensiones humanas que permiten la investigación, gestión

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y conservación para inducir cambios. Abriendo discusiones sobre cómo estructurar los esfuerzos de conservación en alianza con las comunidades Indígenas, la comunidad conservacionista puede alejarse de las narrativas que perciben la participación Indígena como una obligación o parte de una narrativa ética y en su lugar adoptar un proceso que amplía la base de evidencia y ubica la conservación dentro de los contextos indígenas.

PALABRAS CLAVE

Alianzas Indígenas, Ártico, cogestión, conocimientos ecológicos tradicional, conocimiento Indígena, conservación dirigida por Indígenas, coproducción de conocimiento

INTRODUCTION

The Arctic is the most rapidly warming environment in the world (Post et al., 2019), and its Indigenous peoples are faced with unprecedented change. Many Indigenous communities are apt to address problems of climate change, such as coastal erosion, ocean acidification, pollution, fluctuating and unpredictable wildlife populations, and biodiversity loss. The conservation of lands, waters, and species is quickly gaining traction in the Arctic as a tool for addressing these problems, but current efforts require a new framework as more intentional Indigenous partnerships are advanced to achieve local and global conservation targets and goals.

INDIGENOUS PEOPLES' SHAPING OF CONSERVATION

Indigenous peoples are increasingly recognized for leading conservation efforts around the world. Globally, one-quarter of all land on Earth is owned, managed, used, or occupied by Indigenous peoples, and these lands represent 35% of all formal protected areas and 35% of all remaining terrestrial areas where the level of human intervention is low (Garnett et al., 2018; IPBES, 2019). Within these lands, Indigenous communities' cultural practices are fundamental to conservation because they emphasize the long-term sustainable use of biodiversity and natural resources to support traditional and modern livelihoods, continuity of culture, and environmental monitoring efforts. Recognition for the role of Indigenous-led conservation in achieving global conservation targets and goals is increasingly evident by the growing body of literature on Indigenous protected and conserved areas, which move beyond colonial conservation models and are linked to political, sociocultural, and ecological benefits (Moola & Roth, 2019; Tran et al., 2020).

Indigenous communities in the Arctic are increasingly leading the conservation of wildlife (Brattland et al., 2015; Gadamus & Mustonen, 2018) and the establishment of protected areas (ICC, 2017). The 2019 designation of Tallurutiup Imanga National Marine Conservation Area in Canada and the emergence of other Indigenous-led protected areas, such as Pikiyasorsuaq, are setting a new precedent for conservation initiatives in which Indigenous communities are the direct beneficiaries of the

establishment and development of protected areas and related conservation efforts. Additionally, many species of conservation interest are also critical species for Indigenous subsistence and cultural practices. Many of these species are migratory, transcending ecological, jurisdictional, and political boundaries, while carrying cultural, environmental, and economic significance that spur conflicts of interest in conservation decisions (AHDR, 2004).

The colonial legacy of conservation in Indigenous homelands in the Arctic historically and currently strains relationships among researchers, practitioners, and Indigenous communities. Many researchers and organizations are calling for the end of colonial and neocolonial approaches in favor of those that support Indigenous communities (Eckert et al., ICC, 2015; 2018; Kashwan et al., 2021 Moola & Roth, 2019; Witter & Satterfield, 2019). This comes with recognition that conservation may mitigate biodiversity loss but some strategies burden Indigenous communities (Shackeroff & Campbell, 2007) and may undermine Indigenous knowledge and sovereignty (ICC, 2015, 2020). Despite a growing body of evidence that Indigenous communities support global conservation efforts through traditional management practices (IPBES, 2019; Nakashima et al., 2012), Indigenous peoples continue to be excluded from access (Bennett et al., 2018) and criminalized in their own homelands through externally imposed, top-down policies that lack the flexibility and adaptability required for supporting Indigenous livelihoods and cultural practices (ICC, 2015, 2020).

However, over decades of gains for Indigenous communities in sovereignty, research, policy, and law and an ongoing social shift in perspectives, approaches, and solutions for addressing Arctic issues, innovative conservation approaches are enriching what is collectively possible. Indigenous approaches to natural resource management, planning, and policy are unique because they emphasize values (Artelle et al., 2018.), representation, and Indigenous governance (Raymond-Yacoubian & Daniel, 2018). Furthermore, Indigenous knowledge is increasingly becoming a central focus of management and conservation efforts and has a formal role in national management institutions in the Arctic (Raymond-Yacoubian et al., 2018). Indigenous communities and practitioners are calling for collaborative and co-productive approaches to engagement and research focused on conservation (ICC, 2015; ITK, 2018; Jasanoff, 2004; Wheeler et al., 2019; Wyborn, 2015; Miller & Wyborn, 2018).

THE CASE FOR CO-PRODUCTIVE CONSERVATION

Since its inception, conservation has vastly evolved from its roots in natural resource management. Conservation tools, targets, and goals have progressed to incorporate a diverse array of natural and social needs (Ban et al., 2013; Bennett et al., 2017; Kareiva & Marvier 2012); support for adaptive approaches that account for global environmental change (Colloff et al. 2017; van Kerkhoff et al., 2019; Wyborn et al., 2016); cooperation across communities, governments, and organizations (Armitage et al. 2012; Kareiva & Marvier 2012); and the inclusion of Indigenous knowledge in planning processes (Adams & Sandbrook 2013; Fazey et al., 2006).

Internationally, conservation approaches that consider both science-based and community-based understandings of environmental issues and conditions help achieve community buy-in, ease implementation, and show the value of both scientific and Indigenous knowledge systems (Ban et al., 2008). It is important to note that science-based and community-based understandings exist along a spectrum because many Indigenous researchers operate in communities and many communities conduct their own research. Along a similar continuum, the divide between marine and terrestrial ecosystems present in ecosystem-based management and other conservation norms are challenged because of their limited ability to address important ecosystem connections (Álvarez-Romero et al., 2011), whereas Indigenous approaches bridge this divide with more fluid worldviews and comprehensive approaches to conservation that do not silo ecosystems. This is exemplified in Aasivissuit-Nipisat, which rose from a community-led initiative to a UNESCO World Heritage Site in 2018 and encompasses important marine, terrestrial, and freshwater ecosystems in Greenland. Figure 1 shows ongoing initiatives.

Conservation often strives to be both evidence based and stakeholder driven. These goals require the recognition of Indigenous peoples as rights holders beyond stakeholders, the understanding that Indigenous knowledge provides concrete, validated evidence (Thompson et al., 2019), and the meaningful participation of Indigenous peoples in conservation efforts so they are met with respect and understanding from step one. Because Indigenous communities often serve vital roles in protecting natural resources and spaces (Tran et al. 2020), conservation efforts are increasingly recognizing risks to biodiversity associated with the failure to support Indigenous sovereignty and self-determination (Ban & Frid, 2018; Schmidt & Peterson, 2009). To improve support and efficacy of conservation efforts in Indigenous homelands, conservation must challenge its own colonial legacy and support efforts that pursue co-production, promote partnerships with Indigenous communities methodologies, knowledge, and governance and offer ethically conscious, culturally relevant, and fully knowledge-based practices.

The co-productive conservation framework recognizes that conservation can be practiced in a way that embodies Indigenous values, perspectives, knowledge, rights, priorities, and livelihoods. While conservation efforts typically focus on

research and the co-management of species and natural spaces, and occasionally on the co-production of knowledge, limited effort is spent on the human dimensions and social processes necessary for conservation to affect change (Adams et al. 2014; Ban et al., 2013). By opening discussions on how to structure conservation efforts in partnership with Indigenous communities, conservation work can move beyond narratives that perceive Indigenous participation as an obligation or moral imperative to instead embrace a process that broadens the evidence base and situates conservation efforts within Indigenous contexts.

Conservation within an Indigenous context must embrace diverse motivations and approaches for achieving conservation targets and goals. The 3 leading principles that guide co-productive conservation are that conservation must be ethically conscious, culturally relevant, and fully knowledge based, meaning approaches must be equitable and meaningful and in line with Indigenous sovereignty and self-determination; must be open to traditional methods of management and conservation as guided by Indigenous knowledge and ways of life and must not unnecessarily impede traditional practices; and must trust and respect Indigenous knowledge, its methodologies, and its validation and evaluation processes as legitimate and take Indigenous direction on how Indigenous knowledge and science should be partnered in the creation of a shared evidence base. The concepts presented here, though rooted in Arctic conservation initiatives, are relevant for work in partnership with Indigenous communities elsewhere and may be useful to other conservation and Indigenous contexts.

SIX PROCESSES OF CO-PRODUCTIVE CONSERVATION

Knowledge and action are required to achieve conservation targets and goals (Cook et al., 2013; Lauber et al., 2011; Wyborn, 2015). To this end, co-productive conservation bridges the co-production of knowledge and the co-production of public services in six iterative and reflexive processes – co-planning, co-prioritizing, co-learning, co-managing, co-delivering, and co-assessing (Table 1). Prior literature on co-production of public services, a different yet related field of study, identified co-planning, co-prioritizing, co-managing, co-delivering, and co-assessing (Bovaird & Loffler, 2012). The necessity of adding co-learning is apparent when working with Indigenous communities where researchers, managers, and policy makers must navigate differing world views, cultural practices, and knowledge.

These 6 processes are adjacent to similar discussions in the literature and practice of co-creation, co-design, and knowledge co-production, but are structured to more explicitly present activities that occur within the full breadth of conservation initiatives, which often include conservation planning, research, monitoring, management, and assessment. The processes presented here more explicitly capture the necessary elements of implementation than terms such as *co-creation*, *co-design*, or *knowledge co-production*; however, the literature certainly covers aspects

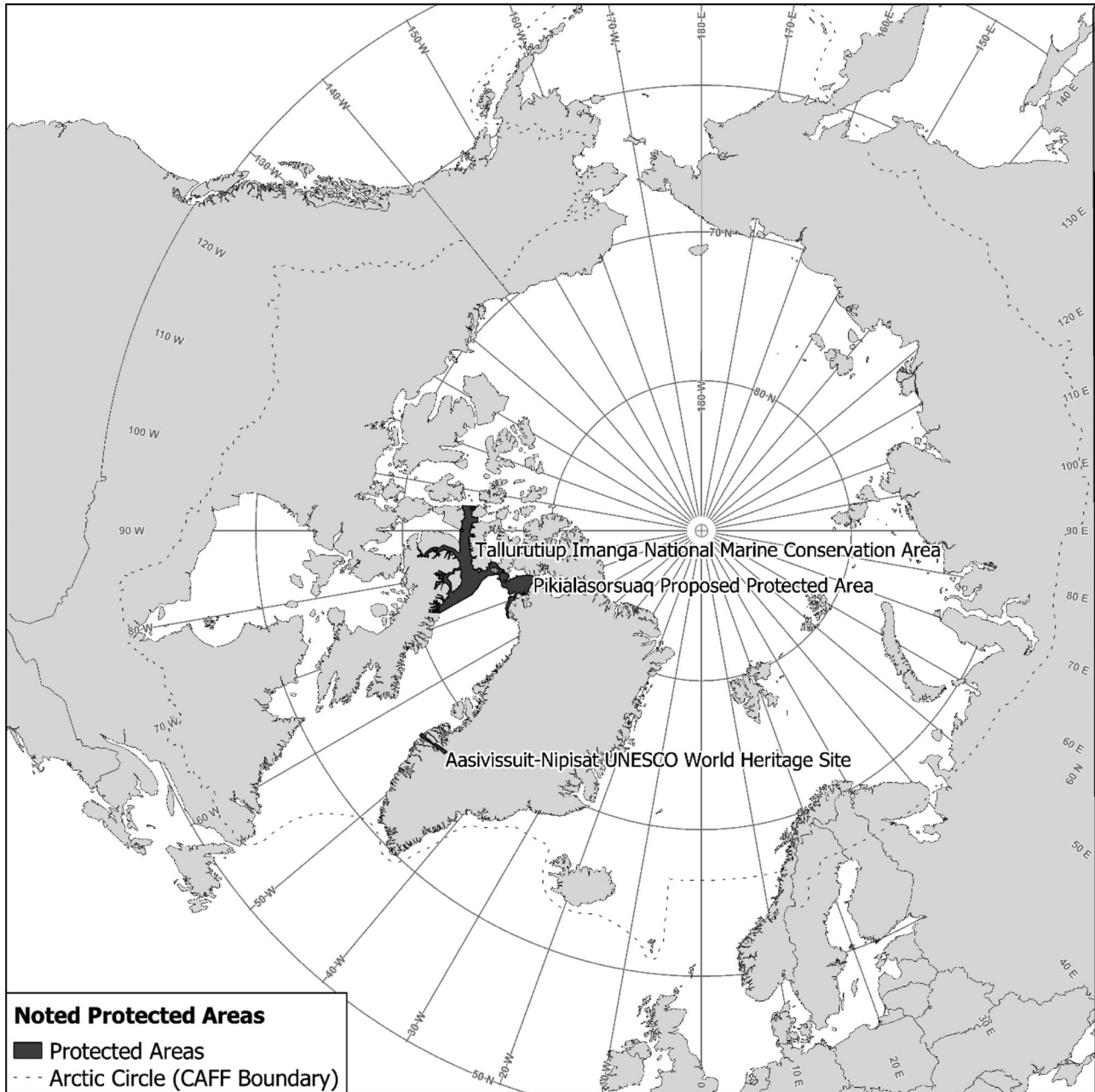


FIGURE 1 Arctic protected areas within the boundaries defined by the Conservation of Arctic Flora and Fauna (CAFF) referenced in this article. These protected areas are recent examples that highlight the unique and diverse nature of Indigenous-led efforts in the Arctic.

of framing partnerships and collaboration that are not explored here.

Figure 2 outlines the 6 co-production processes and their related co-production activities and offers concrete examples of these activities for conservation in a real-world context. By breaking down co-productive conservation into the 6 processes, conservation better acknowledges the foundational processes that go beyond co-management and co-production of knowledge and parses how people direct how, where, and why their collective knowledge supports action. These processes are not intended to be linear, though they are described in the following

order: co-planning, co-prioritizing, co-learning, co-managing, co-delivering, and co-assessing.

Co-planning

Co-planning encompasses an attention to the identification, conceptualization, scoping, and funding of potential conservation projects. In the pursuit of equitable and meaningful conservation initiatives within Indigenous homelands, establishing strong foundations for partnership and engagement is

TABLE 1 Definitions of key terms as they are applied in this article*

Term	Definition
Conservation	The many activities, including Western and Indigenous conceptions of conservation that encompass the management of wild living resources, ecological restoration, biodiversity observing and monitoring efforts, and establishment and management of protected areas through Western and Indigenous practices
Equitable	Goes beyond equality to ensure that everyone has not only equal access to resources and capacity, but also access and capacity to participate fully, even when additional help is needed
Meaningful	Of tangible and self-identified benefit to an Indigenous community and contributing to self-identified positive outcomes
Evidence based	Observation and validation processes present in scientific knowledge and Indigenous knowledge such that the evidence is collected, validated, and held within its own system of knowing
Co-production of knowledge	Understandings, methodologies, and practices related to bringing together science and Indigenous knowledge, represented in a moderate body of literature.
Co-learning	Goes beyond co-production of knowledge; a process by which partners mutually learn how their knowledge, social, and cultural systems work in tandem to address problems and provide solutions; new knowledge does not necessarily need to be created as long as partners trust each other's knowledge system and ability to make good decisions

*Some terms used have different meanings to researchers and academics and even additional meanings to Indigenous communities.

critical. Indigenous communities should be involved at the conception (Ban et al., 2008, 2018) because researchers widely recognize that engaging managers, practitioners, and communities in scoping is a promising first step in achieving conservation goals (Klenk & Hickey, 2012). However, this process is also concerned with building self-capacity for engaging with Indigenous communities by taking advantage of available guidance and materials on research and engagement ethics, understanding Indigenous knowledge, and understanding Indigenous governance structures to prepare researchers without further burdening Indigenous communities and organizations (ICC, 2021; Pedersen et al., 2020). Careful consideration must be given to ensure that Indigenous engagement is more than a list of procedural checkboxes because Indigenous peoples should hold more than an advisory role. Consultation processes are often insufficient forms of engagement because consultation at its best places Indigenous communities in merely an advisory role, whereas consultation at its worst informs an Indigenous community about a predetermined decision. Projects are afforded credibility, legitimacy, and accountability when they are meaningful, inclusive, and reflective of diverse participation and governance structures (Miller & Wyborn, 2018). Special attention should be given to working within Indigenous governance structures, following Indigenous research guidelines, and adhering to the principle of free, prior, and informed consent (Ban et al., 2018; ICC, 2021; Pedersen et al., 2020), even when there is no legal requirement to do so. Communication strategies and participation plans for those involved help ensure the conservation initiative begins from a place of mutual understanding regarding the structure and initial purpose of organizing.

Emerging opportunities for conservation initiatives may surface in community meetings and workshops, governance discussions between Indigenous and non-Indigenous entities, or within environmental organizations. For example, these discussions may lead to the identification of potential protected areas that would benefit both conservation and Indigenous subsis-

tence and cultural interests (Ban et al., 2008), new approaches to wildlife and protected area management efforts, or identification of new funding opportunities. Funding agencies are critical enablers in stimulating and supporting new co-production projects because support is often lacking in places of conventional knowledge production, such as academia (Klenk & Hickey, 2012). Long-term conservation funding opportunities from governments may afford the co-planning process more flexibility than academic grants, under which funders may require a more concrete understanding of the planned activities before awarding. Funding is therefore a primary barrier to conservation efforts because it may be contingent on meeting the funder's priorities, which may not reflect Indigenous needs (ICC, 2020). Additional barriers to co-planning may include navigating a diversity of preferred approaches, needs, and expectations in conceptualizing conservation initiatives.

Co-prioritizing

Co-prioritizing is characterized by collective agenda setting among all involved, including the development of shared vision, purpose, common goals, ownership, and mutual responsibility prior to knowledge creation. What proceeds implementation is a critically important step, may reduce conflict, and gives the process an appropriate direction (Ban et al., 2018; Chuenpagdee & Jentoft, 2007). Co-production processes in Indigenous homelands must necessarily grapple with a diversity of priorities, knowledge, and practical needs, which if not addressed early may present barriers to later stages of co-production. Co-prioritizing conservation agendas may include activities, such as developing a shared vision and purpose for a particular resource or protected area, identifying shared conservation targets and goals and engagement methodologies, and defining norms, roles, and responsibilities, that contribute to a growing sense of project ownership and accountability between communities and others.

Co-learning

Co-learning is the process by which participants embrace opportunities for two-way, mutual learning about the world-views and societies in which conservation initiatives are structured and practiced. Co-learning is more than a co-production or co-creation of knowledge. In rare occasions, a conservation initiative may not need additional evidence for implementation. More likely, co-learning also includes the activities by which participants come together to demonstrate knowledge, build a shared evidence base, identify specific concerns, challenges, and opportunities, and begin to proceed toward shared objectives. The importance of partnering Indigenous knowledge and science toward mutually developed goals while emphasizing Indigenous values, equity, trust, respect, and self-determination has long been recognized (Santiago-Rivera et al., 1998). It is through this process that partners learn how the other participants work, reason, establish methodologies, execute methodologies, interpret evidence, and apply information. Through co-learning, the politics and agendas of the participants shape knowledge with potential consequences for conservation actions and outcomes. During the co-learning process, participants must recognize that public engagement, deliberation, and debate will affect the ability of outputs to empower others toward change (Miller & Wyborn, 2018).

Partnering knowledge systems is perhaps the pinnacle activity of co-production activities, yet the literature largely lacks practical advice for doing so. The co-learning process must grapple with different ways of knowing, such as scientific knowledge coming from academia, experiential knowledge coming from practitioners and communities, and Indigenous and traditional ecological knowledge coming from entirely different world views and cultural references. Co-learning can only be productive when Indigenous knowledge is trusted, valued, and respected and when knowledge holders are given the opportunity to demonstrate the depth and applications of their knowledge to others. A related Indigenous framework is “two-eyed seeing,” which acknowledges the strengths and roles of both knowledge systems simultaneously and equitably and recognizes unique responsibilities for bearing that knowledge (Reid et al., 2021).

Partnering information and evidence from these different knowledge systems is complicated because they each approach the collection and validation of information and evidence in different ways. These ways of knowing additionally manifest in formats that are not easily transferable and lack practical ways to validate information between systems (Tengö et al., 2017). Participants in co-learning processes must include an exploration of what is evidence, how is evidence gathered, how is evidence communicated, and how is evidence validated within its own system of knowing. Within a conservation planning process, conflicting information should be widely discussed and jointly resolved, with special attention to power imbalances in asserting information (Thompson et al., 2020). If conflicting information cannot be reconciled, researchers may use this as an opportunity to continue pursuing research in this area with new perspective (Ban et al., 2018; Berkes & Berkes, 2009).

Co-learning for conservation may take the forms of learning exchanges, literature reviews, participatory mapping of resources, place names, or spatiotemporal population dynamics, community meetings on climate impacts, collecting case studies to identify factors and variable of importance, storytelling, and identifying appropriate scientific and Indigenous methodologies. For example, participatory mapping is a co-learning activity that can highlight the powerfully descriptive nature of Indigenous knowledge, and some mapping projects exemplify that Indigenous knowledge can be more spatially descriptive of species' spatiotemporal population dynamics than is currently available and possible through scientific methodologies, such as remote sensing and satellite tagging (Gadamus & Raymond-Yacoubian, 2015; NWAB, 2016). These kinds of projects produce evidence that is of vital importance to all participants involved, as well as broader management, conservation, and research communities. However, these kinds of projects also illustrate risks to Indigenous knowledge; special attention must be given to ensure that the evidence is guided by Indigenous values and that the Indigenous knowledge is not taken out of context, misunderstood, or used to support initiatives that Indigenous communities oppose (ICC, 2021).

Co-learning may make researchers and practitioners wary because there is no standard processes for partnering Indigenous and scientific knowledges. Despite researchers' and practitioners' calls for the systematic integration of evidence in the co-production process, some scholars argue that there is no single approach to the partnering of knowledge systems and that the ways in which different knowledges are identified, engage with, evaluated, and applied are determined by the unique needs of the particular co-production process (Raymond et al., 2010). The success of this activity relies on its ability to create relevant, effective, and accessible materials (Polk, 2015) in ways that respect Indigenous knowledge and related decision-making processes.

Co-managing

Co-management engages with management, policy, and law through delineation, allocation, and regulation of resources and spaces. This co-production activity is the most widely practiced in relation to Indigenous communities and has the largest body of literature of the six co-production processes. Typically, within the Arctic context, management refers to wildlife or protected area management and encompasses the environmental, social, fiscal, and political challenges of navigating such a process. Co-managing in the context of conservation may encompass marine and terrestrial spatial planning, including the delineation of management zones, protected areas, and shipping routes and wildlife management, such as the regulation of hunting and fishing activities (Álvarez-Romero et al., 2011).

Like the other co-productive processes, co-managing should focus on developing true partnerships between communities, practitioners, and decision makers because it is critical for addressing nationally and internationally recognized Indigenous rights, sovereignty, and self-determination in management and

conservation efforts (Ban & Frid, 2017; ICC, 2020). These partnerships must be ethical and equitable and hold Indigenous communities as the primary beneficiaries of conservation efforts occurring on their homelands. Effective partnerships with Indigenous communities may lead to solutions and goals that differ from conventional conservation efforts and may reach beyond ecosystem-based approaches (Álvarez-Romero et al., 2011) and toward different or more flexible management strategies (Ban et al., 2008; Gadamus et al., 2015).

While co-management often dominates discussions around conservation, co-learning is equally important, and the two are often intertwined in practice because the co-production of knowledge is a key mechanism for learning from and adapting co-management activities. Developing adaptive capacity through co-learning and co-managing is important because the ability to experiment with evidence while change is ongoing allows participants to use evidence effectively toward the stated goals (Armitage et al., 2011). Best practices for successful co-management include supporting social learning in a process by which information and decisions are constantly evolving to meet the needs presented in the environmental and political contexts (Berkes, 2009). These processes may include building cooperation and maintaining relationships between participants, collaborative observing and monitoring in partnership with communities, and downward accountability to those communities (Berkes, 2009; Thompson et al., 2019). Some barriers to co-managing include a lack of institutional capacity, differences in assumptions when interpreting and applying evidence, and other areas of social conflict often present in co-management processes, to which end external partners may help ensure management efforts are treated as more than formalities (Robards et al., 2018). Co-managing may be more successful when the processes are innovative and adaptive, allowing for continual reassessment of environmental factors and continually open opportunities for additional co-learning activities.

Co-delivering

The co-delivering process entails the implementation of additional, nonmanagement activities and the production of materials, typically thought of as outputs. These activities primarily encompass enforcement, research, education, and reporting. The intended beneficiaries of these activities might be communities, co-managing bodies and boards, governing bodies, conservation organizations and cooperatives, Indigenous knowledge networks, research councils, international fora, and academic institutions. Because the purpose of co-production is often to connect knowledge to decision-making, providing the right people with the right information to enact change is paramount to the process. The power of co-productive products or materials to enact change has been called external transformative capacity and represents the intention of co-production to be more than just the creation of knowledge (Polk, 2015).

Enforcement of conservation measures should be decided collectively to ensure they are fair, just, and culturally relevant.

Both legal and social enforcement of these defined rules and regulations should be considered, and Indigenous communities must be included in identifying proper and traditional uses of lands, waters, and species, and related infractions. The enforcement of such uses and the development of criminal punishment should be directed by Indigenous communities so that measures are healing rather than counterproductive to community well-being. For example, an infraction that removes a hunter from their family could be detrimental to family and community food security.

Research and education are continual outputs that allow researchers, practitioners, and communities to incorporate new information that may lead to the necessary changes in management regulations and conservation strategies. When done well, research and education serve as long-term investments in Indigenous communities and may take the form of ongoing projects, community-based monitoring efforts, species assessments, development of spatial products and data packages, community outreach, community liaison, and technician training programs, and stable partnerships that support community members to stay engaged in initiatives. Within both conservation research and education, Indigenous knowledge should be a central component of the design, methodologies, and curriculums of those efforts, thereby producing tangible products, engaging rights holders, and scientists in the science-policy interface and ensuring that Indigenous knowledge holders have space to contribute to the management of their own lands, waters, and species.

Reporting on management and conservation efforts typically involves the development of community briefers, technical reports, academic publications, policy briefs, and data portals. When working with Indigenous communities, special attention must be given to data sovereignty, ownership, and protection because Indigenous knowledge is often collectively owned by communities and is not always acceptable for public dissemination, though direction should always be taken from the communities involved. Materials should also be produced in the appropriate Indigenous languages and their particular dialects to ensure that community members can remain informed and engaged with the initiatives occurring in their homelands. Materials may need to be packaged separately for communities, researchers, practitioners, decision makers, and funders and should be tailored to both scale and jurisdiction (Briley et al., 2015; Lövbrand, 2011).

Co-assessing

Coassessing is the co-production activity of evaluating and adapting the process to be inclusive of new evidence, perspectives, ideas, solutions, circumstances, and other emerging changes. While this activity is presented last, best practices suggest that co-assessment should occur throughout the process iteratively and reflexively (Polk, 2015). New knowledge generated during the co-production process should be incorporated into the evidence base, and how the information performs its function should be continually reassessed to ensure that the

evidence body is serving its intended purpose. Co-assessment may best be facilitated by building in the time to revise and revisit the priorities, products, and materials throughout the co-production process to ensure that the process is supporting its intended purpose while opening opportunities for the process to accommodate new information and areas of interest. Within conservation, formal assessments may take the form of community surveys, project assessments, performance assessments, and conservation target assessments. Findings from co-assessing must be reported and communicated back to the communities involved using means and formats at the direction of those communities or related Indigenous organizations (ICC, 2021; Pedersen et al., 2020).

CONCLUSIONS

Co-productive conservation provides a space for communities, researchers, practitioners, and decision makers to collaborate from the beginning of the process and follow through scoping, data collection, development of a shared evidence base, implementation, monitoring, and adjustments for environmental feedback. Co-productive conservation therefore fosters a follow-through in governance, a responsibility to rights holders and stakeholders in the scientific and decision-making processes, and an opportunity to address the human dimensions of conservation. Over the next decade, we look forward to improved partnerships in conservation efforts, new Arctic protected areas, and a greater recognition for Indigenous contributions to effective governance. Through support from researchers and decision makers, Indigenous communities will continue to shape the future of the Arctic.

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