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Designing research collaboratively: Socioenvironmental systems research in the French Basque Country

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ABSTRACT

Highly participatory research and the co-production of knowledge are widely recognized as key to advancing sustainability research that produces useful and usable results. There is great variety in how different teams approach collaborative work, but the initial problem-framing stage is a critical moment of engagement. In this article, we describe our efforts to create a collaborative research project on climate and pastoralism in the northern Basque Country (southwestern France), focusing on our process for determining the research focus. We use the various funding proposals submitted along the way to illustrate concretely the ways in which integrating our different ways of knowing and different approaches led to different research questions than would have been the case had the scientists developed the project alone. We also discuss the difficult choices that must sometimes be made. Researchers and pastoralists worked together to produce this analysis and to make recommendations to others interested in following a similar path.

RÉSUMÉ

La recherche participative et la co-production de connaissances sont largement reconnues comme des éléments clés pour faire progresser la recherche en durabilité par la production de résultats utiles et utilisables. Il existe une grande diversité dans les façons dont les équipes abordent le travail collaboratif, mais l'étape initiale de définition de la problématique est un moment crucial d'engagement. Dans cet article, nous décrivons nos efforts pour créer un projet de recherche collaboratif sur le climat et le pastoralisme dans le Pays Basque nord (sud-ouest de la France) en se concentrant sur notre processus de définition des priorités de recherche. Nous utilisons les différentes applications pour des financements soumises en cours de route pour illustrer comment l'intégration de nos différents savoirs et façons d'aborder les questions de recherche a mené à des questions différentes de celles que les scientifiques auraient développées seuls. Nous abordons également les choix difficiles qu'il faut parfois faire. Chercheurs et éleveurs ont travaillé ensemble pour produire cette analyse et formuler des recommandations pour ceux qui souhaiteraient suivre une voie similaire.

IMPLICATIONS

This article provides concrete recommendations for how scientists and community members can work together to design and implement a research project. Drawing on lessons from working together to create a large, interdisciplinary project, both farmers and scientists reflect on: 1) how our collaboration produced a different project than scientists would have designed alone; and 2) the elements that have made our partnership work. Key among these is taking the time to do it well. We suggest that temporarily setting aside scientific goals to focus fully on building authentic and lasting relationships may be a key component of establishing a successful collaboration and that even once relationships are established, partners should give ideas time to develop and mature. All of this necessitates that funders prioritize supporting this critical preparatory work.

SOCIAL MEDIA STATEMENT

Scientists and community members often work together to find ways to live better in a changing climate … but what makes these partnerships productive? This story from the French Basque Country emphasizes the importance of building relationships for the long haul.

KEYWORDS

Basque Country (Euskal Herria); climate change; knowledge co-production; pastoralism; research co-design

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Highly participatory research has become a normative and methodological gold standard, particularly for sustainability research (Gerlak et al. 2023; Norström et al. 2020). There is strong evidence that approaches that integrate communities and affected parties early in the research process help teams address wicked problems (Galvin et al. 2020; Polk 2015), produce useful knowledge (Meadow et al. 2015; Matuk et al. 2020; Roque de Pinho 2020), and advance democratization and decolonization of knowledge production (Beck and Forsyth 2015; Pennesi 2020; Reyes-García et al. 2020; Welch-Devine, Sourdril, and Burke 2020; Zanotti et al. 2020). Several new toolkits for collaborative research attest to the promise of these approaches (see Kliskey et al. 2021 for a synthesis; also Chambers et al. 2021; Djenontin and Meadow 2018; Meadow and Owen 2021; van den Broek et al. 2020). However, lessons from other participatory traditions, and recent data on knowledge co-production in the environmental sciences, show how far we have to go to shift research practice.

Mills and colleagues describe knowledge co-production as "an iterative, collaborative process of building partnerships that bring together multiple sources and types of knowledge to develop a systems-oriented understanding of a problem and identify potential solutions" (2023, 1). Ideally, co-production should result in more nuanced understandings, while fostering deeper respect for and the empowerment of research-affected communities. However, as we describe below, co-production has become a buzzword that, in practice, does not guarantee empowerment (Zurba et al. 2022). In this article—which we hope will be inspiring and useful for scholars, practitioners, and community members—we describe our efforts to build a collaborative research project on climate, agriculture, and cultural sustainability in the Basque region of the French Pyrenees. We illustrate how collaboration between the scientists and farmers from the earliest stages of the project led to more scientifically and practically robust research. According to recent reviews (Galende-Sánchez and Sorman 2021; Gerlak et al. 2023; Kliskey et al. 2021), co-design is rarely included in research co-production, but we consider it essential for the most significant and most equitable integration of research and community knowledge.

Collaborative problem framing

Scholars have identified and described a broad spectrum of participation in research, ranging from examples of engagement that seem purely performative to approaches that fundamentally challenge and transform power relations (Arnstein 1969; Cornwall 2008; White 1996). Analyses from participatory research traditions in various fields, including international development, rural development, public health, popular education, urban planning, and applied anthropology, clearly show that there are no easy recipes for participation nor unqualified good or bad outcomes (Arnstein 1969; Brown and Tandon 1983; Chambers 1983; Fals Borda 2001; Freire 1982; Gaventa and Horton 1981; Minkler and Wallersetin 2003; Rhoades and Booth 1982; Van Willigen 2002; Vetter 2011). Participation may be "tyranny" or "liberation," or both at the same time (Cooke and Kothari 2001; Hickey and Mohan 2004). It can lead to empowerment, or it can mask more entrenched, material forms of colonization, exploitation, and power (Burke and Heynen 2014; Cornwall 2008; Latulippe and Klenk 2020; Nadasdy 2005; Tuck and Yang 2012; Whyte 2017; Zurba et al. 2022).

Not all types of participation are appropriate for all topics, communities, and moments (Burke 2022; Maughan and Anderson 2023; Zurba et al. 2022), and the type or level of participation is likely to change at different stages of a single project (Gerlak et al. 2023; Lemos and Morehouse 2005; Norström et al. 2020). Keeping in mind these cautions, it is well accepted that the deepest forms of participation involve collaboration across all stages of a project, from problem framing and question development to dissemination and follow-up actions (Lemos and Morehouse 2005; Minkler and Wallersetin 2003; Rhoades and Booth 1982). The earliest stages are especially important (Zurba et al. 2022). As White noted, "sharing through participation does not necessarily mean sharing in power" (1996, 143). Often, scientists ask their non-science research partners to engage in projects after the research theme, objective, and questions have been framed, effectively constructing collaboration atop an unequal and uncollaborative foundation (Turnhout et al. 2020).

If what we are concerned with is authentic sharing of power, the data on community participation in environmental science are somewhat discouraging. Gerlak and colleagues' (2023) review of 109 "co-produced" environmental research projects found that 95% reported engaging affected parties[1] during data collection, but only 30% involved them in project framing or data analysis, 23% in sharing results, and 13% in co-authorship. Kliskey et al. (2021) found a similar pattern in their review of food, energy, and water research and revealed how deceptive "participation in data collection" can be. Of the 45 studies

they reviewed, "20 used questionnaires, surveys, in-person interviews, or focus groups to gather data and reported it as community or stakeholder engagement" (Kliskey et al. 2021, 4). According to this definition, all social science is a form of participatory engagement, even when partners are "not involved in guiding or critiquing the research project in any meaningful way and [serve] only to provide data for research" (Kliskey et al. 2021, 4). Only three of the studies Kliskey and colleagues reviewed gave communities a role in developing research questions. Similarly, Galende-Sánchez and Sorman (2021) found that only 12% of 182 cases of climate science or policy co-production involved community partnership or power, while the rest kept decision-making fully in the hands of scientists.

The slow adoption of knowledge co-production in research, particularly the co-design of the research itself, results from multiple challenges, including institutional and professional disincentives to dedicate time to co-production, lack of funding and other resources, and the difficulty of fully shedding cultural and ideological adherence to knowledge hierarchies (Page et al. 2016). As Burke and Heynen note, "(t)o begin from community priorities is a challenge to scientists, because these rarely correspond with disciplined knowledge and often include explicitly normative goals like community action and policy change. Perhaps most importantly, this entire process requires an inversion and leveling of traditional hierarchies" (2014, 16). Leveling those hierarchies "involves providing space for reshaping the rules and norms governing the relationships of co-production of knowledge and structures that can distribute decision making power" (Tengö et al. 2017, 19). In other words, it requires scientists to make way for communities to lead (Maclean et al. 2022).

Adding to the picture painted by Gerlak (2023), Kliskey et al. (2021), and Galende-Sánchez and Sorman (2021), which shows limited community involvement in problem-framing, Busse and colleagues (2023) distinguish between intervention-based collaborations and those focused on research. In their systematic review of co-design, they found 76 projects "aimed at jointly developing problem-solving interventions for sustainable transformations" but only 12 that "seek to collaboratively develop research questions or agendas" (2023, 1). Page and colleagues (2016) provide a notable example in their description of a process to develop a knowledge network and research framework, together with government and private sector practitioners. They did so by hosting a 3-day workshop with 25 participants, which was preceded by surveys and included additional post-workshop engagement. They chose to leave the topical area open, focusing only on transformation, which "allowed emergence of a more generic research question that focuses on understanding the nature and role of deliberate practices for facilitating significant personal, community and systems change" (2016, 90). Similarly, Galvin and colleagues (2016) brought together researchers and practitioners from Kenya, Mongolia, and western US to outline a research-to-action project on rangelands in these regions. Before the workshop, they had "no pre-conceived notions of the common problems, the research questions, and what methodologies to use and by whom" (2016, 10). Both of these efforts provide lessons on co-designing research, but both focus on incorporating the voices of non-researcher professionals, and neither integrates the resource users themselves. There is great opportunity to share more stories of how scientists and non-scientist community members collaborate to develop questions and how they resolve the thorny issues that prevent authentic power sharing.

Project and site background

Our work was initially envisaged as a comparative exchange between the northern Basque Country (France) and Southern Appalachia (US), although as discussed below, we ultimately chose to work only in the Basque Country. The Basque Country straddles the western portion of the border between France and Spain, and our research is located in Xiberoa (Soule, in French), the smallest and most isolated of the French Basque provinces (Figure 1).[2] Xiberoa is characterized by valley-bottom villages, mid-elevation forests, and high elevation grazing commons. It has a strong agricultural economy, robust traditional pastoral system, and multi-level governance of the collective pastures used for transhumant grazing by more than half of its farms (Bagdassarian, Peneranda, and Baron 2019; Welch-Devine 2008).

Our research examines the pastoral system in Xiberoa as an integrated socio-ecological system. Since shepherding began approximately 7,200 years ago, interactions between the natural environment and land management have created a landscape characterized by highly productive high-altitude grasslands, forest patches, a rich diversity of plant and animal life, and a socioeconomic system based on transhumance, collective management of the commons, and mutual aid (Cunchinabe et al. 2011; De Bortoli et al. 2008; Galop et al. 2013; Leigh, Gragson, and Coughlan 2015; Mazier et al. 2009; Meuret and Provenza 2014).

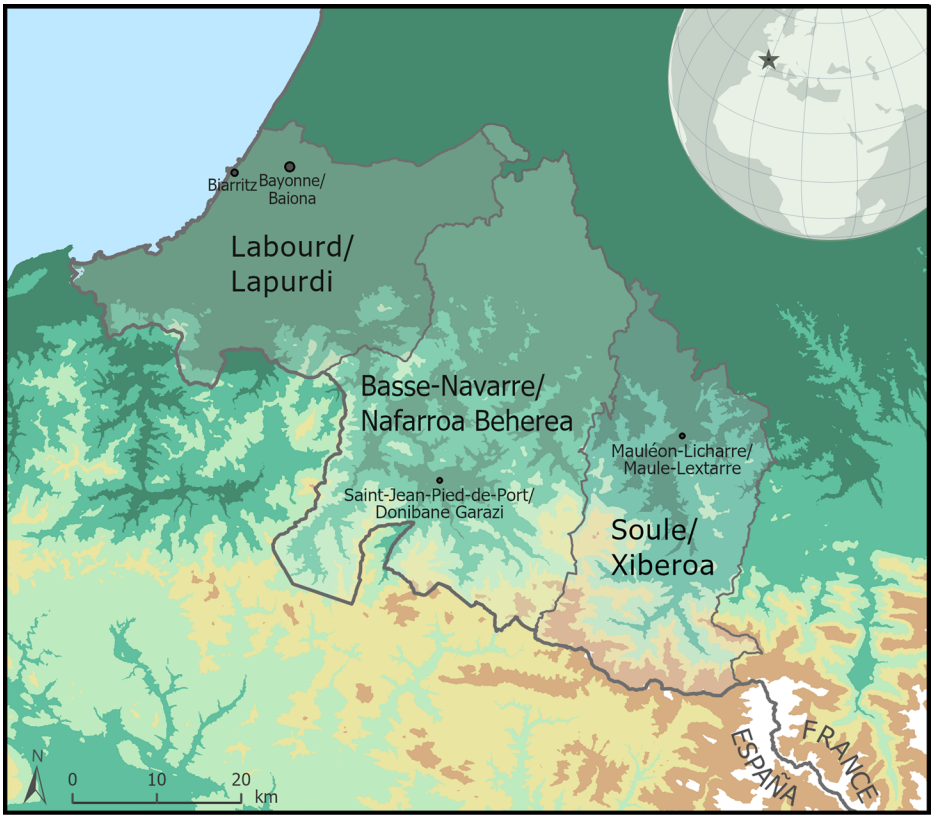

Figure 1. Map of the French Basque Country (Credit: Sonrisa Reed).

Basque culture was and is central to both the landscape and socialscape, providing a language, worldview, norms, and social relations that sustain this pastoral system (Desplat 1986).

This system, however, is facing mounting challenges due to climate change, European agricultural policy, a decline in the number of farms, and a transition to more intensive agriculture (Ott 1993; Richer 1998; Syndicate of Soule, pers. comm. 2021; Welch-Devine and Murray 2011). Farmers feel these changes acutely. As more farms are abandoned, farmers find themselves increasingly alone, without the emotional, cultural, and socioeconomic support of neighbors and collaborators. Our research has evolved to try to understand the future evolution of these challenges and possible responses.

Collaboratively determining the research question

Our motivation for co-designing a research project in Xiberoa was a desire to generate useful research that would speak to farmer concerns and contribute to interdisciplinary environmental science. To describe how co-production shaped our research questions, we use funding proposals as artifacts for analysis. Grant proposals, with their fixed deadlines and mandates to clearly describe questions and methodologies, provide useful snapshots that clearly demonstrate the evolution and impacts of our work together.

In the following, we discuss three grant proposals. The first—submitted to the U.S. National Science Foundation (NSF) and the Thomas Jefferson Fund of the FACE Foundation and the French Embassy (in 2018)—was for seed funding. With that initial support, we later submitted two proposals, in 2020 and 2021, to NSF's Dynamics of Integrated Socioenvironmental Systems (DISES) program, the second of which was funded. These proposals and the experiences of developing them constitute our data for this article. The scholars on our team analyzed and interpreted those data by reconstructing the timeline and charting key changes and decision-points; the farmers analyzed and interpreted the data by reflecting on their experience in group discussions.

Grant proposal submission 1

We submitted our proposal for seed funding to the Thomas Jefferson Fund in March 2018 and submitted a workshop proposal to NSF's Cultural Anthropology program shortly thereafter. In these, we proposed to

bring farmers and researchers together to chart an ambitious research agenda that would center farmer interests and priorities. Although the proposals requested funding to co-design the research program, the team was required to sketch out an initial set of research questions. At this point, Meredith had worked in Xiberoa for more than ten years and had deep familiarity with the region, the priorities of farmers, and the challenges on the horizon. However, slow internet connections, different time zones, and demanding farm schedules made real-time collaboration challenging, and the researchers developed questions without the benefit of regular and frequent exchange with the farmers. At this point, the team included Meredith, Anne, and Brian, as well as a geographer focused on local food systems and a scientist specializing in lifecycle analysis. Two farmers—Pierre and a US-based animal raiser—were included as named partners.

Meredith, Anne, and Brian wanted to focus on climate change and began from the idea that agriculture is simultaneously a driver of climate change, a sector that will be heavily impacted by it, and a sector that can contribute to mitigation, adaptation, and coping (Vermeulen, Campbell, and Ingram 2012). They wrote:

> [I]t is becoming increasingly urgent to determine what kinds of food systems are both good for climate and good for people living through changing climates. This research will examine local and alternative food systems to identify approaches that can decrease the climate impacts of… agriculture and make farmers and their communities more resilient to the changes they face.

From her prior work, Meredith knew that farmers in this region had multiple strategies for navigating historical threats and challenges, so they proposed beginning with these existing strategies, such as direct-to-consumer sales, organic production, cooperatives, labeling schemes, and agritourism. They proposed to examine "1) the climate impact of these approaches (e.g., direct local sales reduce food miles while agritourism involves increased circulation of people), and 2) how effectively these approaches build resiliency in the face of historical challenges plus the 'threat multiplier' of climate change."

As envisioned at the time, the goals of the project were to: (1) comprehensively survey existing knowledge, published and unpublished, about farming strategies that mitigate climate change while enhancing farmer and community resilience; and (2) seek funding for a project that would examine these strategies via lifecycle analysis, economic and policy analysis, and ethnography. They wrote: "Our objective is to understand which types of alternative food systems might produce win-win solutions that decrease climate impacts and increase resilience… [t]hrough collaborative (farmer + researcher), comparative analysis of food system innovations in Appalachia and Southwest France." The research team was disproportionately, though not entirely, made up of social scientists, as reflected in these research goals.

The team received the grants (approximately $30,000 of direct costs) and brought US, French, and Basque farmers and researchers together in two multi-day workshops—one in Xiberoa and one in Western North Carolina. The workshops were scheduled to accommodate farm rhythms, hosting the French workshop in May, when US farmers felt they had a small window of opportunity, and the US workshop in October, between the haymaking and lambing seasons in Xiberoa. Pierre, Hélène, and Beñat joined the team at this point and participated in both workshops. Iker Elosegi, the director of a Basque farming advocacy and support group, had been asked to help publicize the opportunity to farmers, and he participated himself: "I tried to get farmers to come, and I couldn't, so I came instead. Why? I was intrigued. I understood the objective was to construct research questions, but I'm not from the world of research. We do ask questions about what the future will be and how we can influence it, so it's intriguing to see how you [scientists] approach it" (September 2021). Several other farmers hosted farm tours and attended meetings in-country. We had less success recruiting US farmers to travel. Despite assistance by the director of Blue Ridge Women in Agriculture (BRWIA), Dave Walker, we were unable to find full-time farmers to travel to France. Like Iker, Dave, who also farms, decided to participate in the workshops himself. Several other US farmers hosted farm tours.

Each trip lasted five days, during which we toured farms and locally important institutions, such as a cooperative creamery and a food distribution hub, informally discussing the different production systems and interdependencies within regional food systems. In our formal meetings, farmers took the lead in discussing the challenges and opportunities they saw for improvement or innovation, as well as their bigger picture goals and visions. We sought to understand the range of adaptations in use, their economic, social, and climatic significance, and the most pressing areas of concern. Together we created maps, or models, of the farming systems that included major components and the ways in which those components influenced each other, all with the goal of helping us narrow in

on a research question that would address farmer concerns (Figure 2).

We stayed in shared lodging, and in the evenings, we had unstructured time to reflect and discuss more freely and to dream together about what our partnership might bring. We relaxed, cooked, ate, and hiked together. Building relationships was key. In each site, we hosted community gatherings—at a community building in the village of Aussurucq in France, and at the public library in Boone, NC—to introduce the project and foreign farming practices to other local farmers and the general public. Each meeting had approximately 30–40 attendees and generated thoughtful discussion on possible research directions.

Despite their different social and political contexts, US and Basque farmers had remarkably consistent goals and challenges. They sought to provide for their families, produce a quality product, and enjoy the work, while respecting the environment. Given the initial research questions and goals, the researchers repeatedly inquired about farmers' experiences and concerns with climate change. The responses were not often fruitful—farmers described climate change as a globally important phenomenon that would have little impact in these particular regions, or they pointed to very fine-grained concerns that were difficult to generalize.

One key difference between the two groups was the Basque farmers' focus on transmitting farms to children or to someone else "so that the farm continues, and the village too, and the whole Basque Country." While transmission had been an important theme in Meredith's work (Welch-Devine 2008), it took on a different character. Rather than solely perpetuating family heritage, transmission was now seen as important to the larger community and culture. While the farmers listed several challenges—invasive plants, increased pest pressures, and lack of person-power—the one that most consistently provoked concern was the large number of farmers nearing retirement without an identified successor. In many ways, their overarching concerns and questions came down to: "What does this place look like in 50 years? Are there farms? Are there farmers?"

As the researchers immersed themselves in the farmers' worlds, they began to translate questions and challenges into their own language. Concerns about continuity and transmission led researchers to reflect on adaptive capacity. If farms, villages, and regional farming systems are to persist across generations, what will enable them to adapt? The farmers, though, were not simply interested in persistence. One farmer we visited framed her goals as "wealth and health in three areas: financial, biological or environmental, and social or community, with well-rested and well-balanced people at the center." As farmers elaborated on this concept of thriving versus surviving, researchers began to think more in terms of *transformative* capacity and what positions farmers to construct the socio-ecological systems they want for themselves. Our area of common ground was based on the idea of social and cultural reproduction, that is, reproducing the household, but more specifically reproducing the household as it is embedded within a particular socio-ecological milieu. Farmers emphasized that climate concerns are inextricable from other concerns and that the team should shift our focus toward understanding how farms are passed to new generations of farmers. If

Figure 2. Farmers and researchers working together in Boone, NC. October 2019 (Credit: Iker Elosegi).

transmission is the key moment for socio-cultural and socio-ecological reproduction, then climate, culture, policy, and economics all weave together to influence it. The concepts of transformative capacity and socio-cultural reproduction became bridging concepts that allowed our mixed team to translate our emerging ideas into language understandable to academic communities and funders.

We began during these workshops to build relationships among newer members of the team and to increase investment on the part of all members. We also began to better understand the kinds of expertise we would need to approach the questions that were coming into focus and how different members would work together. We took into consideration that team composition could not be determined by expertise alone. Any team member (researcher or farmer) had to have strong collaborative skills and a real desire to work as equals across areas of expertise. These workshops culminated in the November 2020 submission of a Dynamics of Integrated Socioenvironmental Systems (DISES) proposal to the U.S. National Science Foundation, with the French and Basque farming partners fully integrated as team members.

Grant proposal submission 2

In our first proposal for the DISES program—which sought projects that examine interconnected social and environmental systems through interdisciplinary, multi-scalar approaches—Basque farmers' concerns with farm transmission and sustainable futures were central. We wrote: "There is an urgent need to understand the relationships that underpin the creation and re-creation of these [pastoral] systems, how shifts in social or ecological dynamics may change these systems, and what interventions might lead to more sustainable socio-environmental futures." Our objectives were to:

1. Determine how changes in key social and environmental conditions shape agricultural land management and production practices and how, in turn, land management and production practices drive changes in social and environmental conditions.
2. Given these changing socio-environmental feedbacks and their temporal and spatial scales, determine the probable future trajectories of the pastoral system over the next fifty years and the strategies that exist for Basque farmers to manage the system to achieve desired ends.

In developing this proposal, we shifted the focus entirely to the Basque Country, dropping southern Appalachia as a research site. This choice was partly budgetary, partly due to the greater depth of historical data and archives available in the Basque Country, and partly due to the greater interest shown by partners in Xiberoa. Pierre, Hélène, and Beñat were listed in the proposal's Management Plan as "collaborators." We also added several natural scientists to the team to better address the research questions.

Our first DISES proposal was unsuccessful because there was insufficient integration of data from different domains and "there seem[ed] to be a missed opportunity for co-production of knowledge with herders in relation to the ecological research" (NSF Panel Summary). The reviewers were astute; at this point, only our social scientists had relationships with the farmers. We believed these problems were easily remediable, and we made plans to revisit the team composition and to engage our natural scientists more deeply in work with farmers.

Including the farmers in proposal revision from a distance, in technical English, proved difficult. Internet connections are spotty, and time differences were challenging. Further, while writing proposals was expected of researchers, the farmers were neither compensated nor otherwise recognized for this type of work. We therefore divided our labor in a way that reflected these realities. The researchers met once per week for most of the year, and we engaged farmers more sporadically, initially via email, WhatsApp, or the occasional call, and then with a one-week visit in the month before proposal submission.

The team that traveled to the Basque Country in September 2021 to facilitate collaboration ahead of resubmission included two anthropologists—Meredith and Jennifer—and a soil scientist, Aaron Thompson. Over the week, Meredith, Jennifer, and Aaron spent time walking fields with Beñat, Pierre, and Hélène to gain a better understanding of the landscape and land use decisions, particularly as they related to ecological questions and concerns. These interactions were critical for our natural scientists (Aaron reported back to Rebecca McCulley, who was unable to join the trip) to better understand the nuanced interactions between grazing and plant communities and to refine our model and questions. This deeper understanding of how cultural practices, economic decision-making, weather, and forage were interlinked helped us better conceptualize and communicate how different sources of data would be

integrated and how farmers could be engaged across the disciplines.

In addition to discussing the shifts that farmers were seeing in plant communities and the reasons underlying those shifts, we dug deeply into the role of climate change. While farmers were somewhat equivocal about the role of climate change affecting plant species, one thing had certainly changed since our earlier workshops. In summer 2020, Xiberoa experienced a severe drought that, coupled with intensive pest pressure, led many to leave the mountain pastures earlier than planned. These developments, and farmers' increasing concern over climate, led us to bring climate change back into the proposal more centrally, and we added climate scientist Thomas Mote to the team. This is a clear example of how long-term engagement and iterative discussions allowed us to identify changes in community concerns and to understand those concerns in a more nuanced way than had we simply used a single time point survey or focus group to develop the research questions.

This trip reinforced the idea of transmission not only mattering for the farms themselves but for the broader community and culture, and for the preservation of traditional ecological knowledge. Iker is the director of Euskal Herriko Laborantza Ganbara, an organization that supports farmers and farming in the northern Basque Country. EHLG has developed several programs to facilitate farm transmission—especially to people who are not family members, many of whom are from outside of Xiberoa and are not Basque. The time we spent in discussion with Iker and his team raised important questions: What challenges do people from the outside face, if they are not raised with embodied knowledge of the landscape and of the animals? While we already understood the importance of farm transmission, this reframed our focus toward the transmission of knowledge, farming practices, and social relations. We altered the ethnographic research design to include longitudinal work with six pairs of retiring farmers and those taking over the farm, including transmission among family members and to non-family members.

During this trip, the anthropologists often worked as brokers, helping move between farmers' immediate concerns (e.g., the increasing abundance of a noxious plant) and researchers' need to analyze broader issues and processes. Having the farmers, natural scientists, and social scientists working together allowed us to develop a conceptual framework demonstrating linkages between system components and a sampling plan based on a landscape typology developed by the farmers.

Grant proposal submission 3

In November 2021, we resubmitted the DISES proposal. This proposal formalized roles for Hélène, Beñat, and Pierre by creating a steering committee and compensating them with grant funds and included consulting funding for EHLG. We also reframed the overarching goals. The proposal, designed to communicate to scientists, is laced with academic-speak, but when the layers are peeled back, the guiding principle is still to answer the question of what Xiberoa will become in the future: "… our overarching goals are a) to understand the relationship among factors that influence farm transmission, continuity of pastoral practice, and the resilience of this landscape and its ecosystem functions, and b) to develop a process for the co-production of socio-environmental knowledge with pastoralists that improves scientific knowledge and strengthens local governance institutions." We proposed to use ethnographic research, archival research, and analysis of soil and vegetative samples to understand the factors that influence farm transmission, pastoral practice, and the resilience of the landscape. We proposed to use downscaled climate scenarios and cross-scale policy analysis to account for the influence of macroscale processes on what we observe locally and to use a series of participatory workshops to broaden the co-production of socio-environmental knowledge beyond what our steering committee could provide. At the conclusion of our work together, we will present scenarios of probable futures that local farmers and decisionmakers can use in community conversations about the futures they want and strategies to achieve them.

In sum, from the initial proposal to the Thomas Jefferson Fund and NSF to the funded DISES proposal, the main insights that we gained by working together, as farmers and researchers, were in three key areas:

Climate change

Initially, farmers were less concerned about climate change as a local issue, and climate models suggested they were right that they would be less impacted than farmers elsewhere. However, after difficult years, farmers changed their views about the effects of climate change on their futures. Concerns about climate change are inextricable from other concerns that drive everyday decision making and longer-term decisions. We cannot understand the future of pastoralism without understanding climate change, but using the lens of climate change as the primary way to investigate

pastoralism might lead us to miss other dynamics that are equally or more important. Our approach must be synthetic, treating climate as one important factor in a suite of drivers.

The cultural role of farm transmission

While researchers knew that farm transmission was a critical moment in which the future of a farm is often determined (i.e., continued more or less as-is, dramatically transformed, or abandoned), our work together underscored the importance of farm transmission not only for familial heritage but also for larger-scale socio-cultural reproduction and transmission of local ecological knowledge. As a result, we began to look more closely at mutual aid and collectivism as key components of this system and at transmission to non-locals.

From adaptation to transformation

Diverse farmers revealed that their goals were not only to continue farming by adapting to new conditions, but to transform farming so that it enables people to thrive. This perspective led the team to pay significantly more attention to the labor and life conditions of farmers, and to investigate (rather than take for granted) the dreams and aspirations of new farmers.

Discussion

In this discussion section, we include quotes from both scientists and farmers. We co-produced this analysis of our collaboration orally, and at times it has felt appropriate to represent our contributions in this way, rather than by integrating them into the "single voice" of most of this piece. In our conversations, we have continually returned to the idea of *relationships* as essential for knowledge co-production, perhaps even more so for research co-design. Prior scholarship on co-production is clear that good relationships matter for understanding the research context and building buy-in (cf. Kliskey et al. 2021); however, we want to highlight a few key components of relationship-building that have received less attention.

Build authentic relationships first

Kliskey et al. (2021) emphasize that there is substantial work to be done *before* scientists and non-scientists even begin discussing research questions and methods. Their vision begins with two phases that pre-date formal research activities: first is developing situational awareness of "historical, cultural, ecological, governance, and institutional contexts," and second is the establishment of a culture of sharing, respect, and trust (2021, 9). Core members of our team have worked together for more than 15 years. These existing relationships have helped scientists understand which issues are good starting points for discussion and who needs to be at the table, and they have given farmers the motivation necessary to engage in this somewhat nebulous process. As Monique explained: "If it wasn't Meredith who proposed this study, I don't know if you'd have a steering committee. It's because we've known her for a long time. It's about people, too [not just the topic of the project]." The members of the steering committee give generously of their own time, but they also encourage others to engage, which would be difficult if they did not trust the team and the process and feel ownership over the project. Building these deep relationships—friendships—takes time, and at least some members of the team should have this sort of rapport *before* attempting to design a project together. It is not necessary for all team members to know each other before beginning, but they must be layered around a core of established partners.

Much of the literature on co-production highlights the importance of trust (Tengö et al. 2017). We feel it is important that we not only trust each other to "do no harm," but also that we respect each other's knowledge and expertise and trust that we are competent and have the ability to make this useful. Throughout our discussion of this article, there was some good-natured ribbing of researchers. Pierre said, "You know, when you talk about a researcher you say 'ouuf,' you don't even want to get close. You say 'yeah, we're going to go let him research himself, that one.'" Several farmers also said they sometimes struggled to understand why what they show us is important when it is just "our day to day" (cf. Maraud and Roturier 2023). What is important is that we respect each other's expertise. At one point, Simon asked the farmers if they thought the social scientists on the team were useful, or if they were mostly interested in the findings of the natural scientists. The farmers emphatically answered that everything in this system is linked, and that you cannot understand the natural components without understanding the people. This understanding and appreciation of what we all bring to the table is a helpful foundation for collaboration, and it is a reminder that scientists need to do a better job of helping farmers understand their own contributions and the likely, or at least possible, outcomes of our work together.

Embrace manageable messiness/comfortable chaos

Uncertainty is uncomfortable, yet necessary, for authentic co-production. As we reflected on our work together to date, the farmers mentioned repeatedly that they wanted more clarity on the project in the early stages. This, of course, is a key tension. If we want to truly co-design a research question, it has to be unclear at the outset what we might end up doing together and what might come of it. Pierre reflected, "It was going in all different directions!" Hélène added: "It would have been helpful to understand [the goal] earlier, and to understand [why we should be involved]. Not why we should be interested in the project, but what impact or usefulness we could bring to the project. It took several years, for me anyway, to try to understand that." Hélène went on to say that, because of the messiness at the beginning, if the farmers had not already trusted the researchers, they would have disengaged. Power-sharing is critical to authentic collaboration (Muhammad et al. 2015), and there must be "space" for community partners to lead (Maclean et al. 2022), but this space should not feel like a vacuum. On our team, the researchers realized during this discussion that they could and should have done a better job of explaining how we would find a question together and just how long that might take; they needed to provide tools and roadmaps to make the messiness feel more manageable and natural for the farmers. One of our hopes is that this article might be a tool for other researchers to communicate with potential partners about what this process looks like and why it might be valuable.

Slow down to allow new (shared) knowledge to mature

Co-production is slow and requires patience. It takes time for teams to identify or build concepts that illuminate shared concerns and excite people enough for sustained engagement. Brian reflected on that process of finding shared knowledge:

> I distinctly remember being in the Aussurucq school and feeling really frustrated because we were prodding and prodding about climate and environment, and the farmers just weren't giving us much. And when they did, it was these hyper-detailed questions about X weed. I just felt like there was this disconnect in how we were thinking and at what scales—not that one was better or worse, just a disconnect. But through repetition we started to be more capable of bridging that and of creating a whole new set of shared questions.

Many before us have noted that relationships must be built over time, but we want to emphasize that the element of time is about more than just working out our common language or building trust; time also allows knowledge to build and become more nuanced, and it allows discussions to evolve from the polished, pat exchanges of acquaintances to the more authentic thinking-out-loud of collaborators. This is perhaps the larger purpose of iteration. It is not just about having a chance to confirm what everyone said last time. Teams need to allow time for ideas to evolve or they risk "fixing" ideas prematurely (and often in more academic terms).

It matters, also, how teams spend their time together. Shared exploration was important to our group. In addition to socializing and bonding, our travels together created situations in which different people were, in turn, experts and learners. We all had enough of an understanding to be genuinely and deeply curious, and we each took turns sharing our expertise with others. Through these travels and workshops, we began to develop our shared experiences and framework for understanding the pastoral systems and to develop bridging concepts that allowed us to integrate farmer and researcher knowledge and priorities (e.g., transformative capacity). Even the less formal time together was valuable, not only for building relationships but also for building knowledge. Hélène stayed with Jennifer and Aaron when she was in the US, and she noted "Jenn is an anthropologist, too [like Meredith], but Aaron is more of an agronomist, and it was there [in the hanging out time] that I really realized that it wasn't just about anthropology." Slow work, though, can often mean work that is expensive. Funders need to support the activities that foster co-production (Mills et al. 2023; Welch-Devine and Lazrus 2023).

Bring the right people to the team

Co-designing research necessarily requires team members who are open to negotiating the direction of the project. For all parties, this requires a willingness to engage in something that is not guaranteed to bear fruit and, for academics, a radical surrender of control. In choosing the right community partners, we sought out people who were open, inquisitive, knowledgeable about their domains, able to put time into an uncertain endeavor, and willing to speak up (cf. Page et al. 2016 on the importance of having people who are willing to take risks). To address concerns of representation (cf. Tengö et al. 2017), the steering committee is composed of farmers at different career stages, in different production systems, and of

different origins and genders. In choosing the science partners, we sought not only to ensure the appropriate mix of expertise to suit our evolving questions, but also to ensure that the science partners had the desire and ability to cede a substantial measure of control over the project to the farmers. We reconfigured the team multiple times as we learned that inviting the right people to the team is crucial, but so is removing those whose expertise or attitudes are not a fit. Equally important to having the right team is ensuring that the team members are appropriately empowered for impact (Taddei 2011) and that team leadership sets the right tone for respectful and impactful collaboration (Kliskey et al. 2021). This may mean helping team members be flexible by having explicit conversations that prepare them to contribute to the project in various ways depending on how it evolves. Doing so can help them think creatively about where the project could go and lays the groundwork for a graceful exit if the project takes a different turn.

Evaluate whether it is the right place and time for co-production

While co-production is likely *possible* anywhere, the dynamics and challenges it entails will vary by site. Some places are characterized by intense competition for prestige, which can create jealousy. In those contexts, working with a core group could be destructive, risking creating mistrust and feelings of exclusion (Burke 2022). In Xiberoa, however, jealousy is relatively low, and being involved in a project such as ours was not seen as a strong source of pride or esteem. This makes it easier for those not in the core group to step up and participate when appropriate and to step back without feeling excluded. We believe that the long history of collective action and mutual aid in Xiberoa may better position the farming partners for collaborative work in which the potential outcomes are not immediately clear. The careful attention to relations and collaboration over hundreds, even thousands, of years perhaps makes them more willing to invest in relationships and to trust that something good may eventually come of it. This means, though, that teams must sometimes make the hard choice to abandon certain fieldsites or contexts or to simply engage in more traditional forms of research.

More co-production is not necessarily better co-production

While some researchers seem to suggest that teams should integrate local partners as deeply as possible in all stages of the work, we want to introduce some cautions. Research is in the job expectations of most scholars on our team, but it certainly is not expected of the farmers. This work can be long and burdensome, so team leaders must consider when and how to engage partners in meaningful, substantive (vs. performative) ways. It makes sense to think about "layering" co-production, that is, engaging a small number of key partners who collaborate substantively around problem framing, research design, interpretation, and outreach—the critical elements of project *co-design*—then pairing that with other kinds of knowledge co-production activities with broader groups of participants.

Similarly, not all researchers need to be, or can be, fully integrated into all conversations with local partners. Teams must be mindful of the expectations placed on students and junior scholars, who have less flexibility to pursue projects that might not produce tangible, academically-recognized products. In our case, language differences are also a barrier to collaboration, as is the sheer size of the team. Our researchers who are less fluent in French have engaged in fewer direct conversations with local partners—which is sometimes frustrating for the farmers—but because they are fully committed to the collaborative endeavor, they ask questions of the "brokers" on the team and are willing to change their ideas and approaches as a result of what they learn, even when they do not learn it directly from community partners.

A key question, though, is how teams can "know" when deep co-production activities are necessary and when the researchers on the team should do some of the work on their own. Ensuring that the work has a solid grounding in the priorities of all team members, even when those team members are not actively engaged, requires deep and broad contextual knowledge. Because Meredith has worked in the region for so many years and because her prior work had already exposed her to a variety of perspectives and experiences, she can sometimes bring in the voices of the local partners and remind others on the team of the diversity and nuance that exists. We believe having someone play this role—in our case a researcher external to the community, but it could be a community member—is critical to all project discussions. Likewise, team leaders, or other natural brokers, must be alert to the involvement of the researchers on the team, ensuring that those who are more peripheral are pulled in at appropriate moments.

Relationship-building is an ongoing affair

Like all relationships, co-production relations must be nurtured. Pierre commented on the contrast between

his image of typical researchers, who pop in and out to enjoy the beauty and exoticism of transhumance, and our process of long-term presence:

> Yeah, [with this group] it's more about the long term, you know. Because the one-off things… it annoys me. You know, when every year they show up for the transhumance. So they go to where there are bells on the day the animals go to the mountain … and then nobody cares afterwards! (laughs) I mean, it's on that day only…. No, I prefer things that are established over time … where they really ask you what it is, how you experience it…. It's much richer, you know.

The importance of long-term engagement is likely not foreign to the social scientists reading this piece, but we think it is worth noting for our colleagues in other disciplines, and because it is a critical point to which we kept returning in our discussions as a team.

Long-term commitment to a place and its evolving questions also entails and enables thinking about a future beyond those core relationships. Even in Xiberoa, we were initially unsuccessful at broadening the team beyond relationships and friendships that we had already developed. Bringing in a new set of collaborators is proving more feasible now that we have funding and have received some attention from local media and politicians in the region. These new relationships are, of course, building the foundation for the collaborations of the future, collaborations that the current core team will hand off to those who follow. Norström et al. (2020, 183) note that "co-production processes produce more than just knowledge; they develop capacity, build networks, foster social capital, and implement actions that contribute to sustainability." Ultimately, the relationships and networks that are being developed through this project may be more important than near and medium-term tangible outputs, as they may set the stage for larger-scale transformations to come (Zurba et al. 2022).

Conclusion

Achieving authentically transformative, empowering collaborations requires more than just a methodological toolkit. It also requires a wide range of personal characteristics: genuine commitment, time, deep trust, and strong partnerships (Austin 2004); a nuanced understanding of power and strategy (Burke and Heynen 2014; Turnhout et al. 2020); and humility, a healthy dose of good luck, careful decision-making, and cultural and interpersonal competence. Our experiences have underscored to us the importance of taking great care with co-production, slowing down, committing for the long-term, and placing relationships above all else. It may be that co-production is more about the *co* than the *production*. Perhaps we, as a community of scholars and practitioners, will be more successful if we focus less on transactions and producing outputs and focus more on building relationships that are based on shared learning, mutual curiosity, and exploration, and that inspire faith that "something good will come… I don't know what… but this relationship is worth it." The project we are pursuing together is much stronger *scientifically* because of the deep engagement of local partners, but sometimes teams must temporarily set aside that scientific goal to focus on building the foundations of a good team.

The researchers on the team want to give the last word to the non-scientist partners, because they offer a perspective that is relatively unique in the literature. As we finished our discussions about this manuscript, Simon asked Monique, Beñat, Hélène, and Pierre what advice they would give people who want to do this kind of work. They suggest that researchers must know the place, the people, and the social codes before attempting a project, and they encourage community partners to be patient and persistent. During an October 2023 conversation, Brian asked Pierre why he agreed to participate, and Pierre replied: "It's about getting to know people who come from other places. I find that very interesting. It's very enriching for us, too… The most important is that we know each other and that we maintain these relationships with Meredith, with you, with Simon. I said to myself that this is, in fact, the richness."

Notes

1. While the Gerlak et al. and Kliskey et al. papers reference "stakeholders," we have chosen not to use this term (cf. Reed et al. 2024, but also Sharfstein 2016).
2. Xiberoa is the spelling in the local dialect. The name of the province is also written Zuberoa.

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Disclosure statement

No potential conflict of interest was reported by the author(s).

Ethical statement

This study was approved by the Institutional Review Board of the University of Georgia and determined to be DHHS Exempt 2(ii). The farmers included as authors in this manuscript have signed consent forms for their participation in the project and are members of the steering committee. In

the article, we often use individual's names; we do so to honor each person's contributions and to help illustrate the importance of different insights that derive from our various positionalities. All individuals named are either authors or were acting in official capacities.

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References

Arnstein, S. R. 1969. "A Ladder of Citizen Participation." *Journal of the American Institute of Planners* 35 (4): 216–224. https://doi.org/10.1080/01944366908977225.

Austin, D. E. 2004. "Partnerships, Not Projects! Improving the Environment through Collaborative Research and Action." *Human Organization* 63 (4): 419–430. https://www.jstor.org/stable/44127388. https://doi.org/10.17730/humo.63.4.v7x1t5mwqfl1xl3v.

Bagdassarian, I., A. Peneranda, and C. Baron. 2019. "Évolution d'un commun d'altitude: entre matérialité et immatérialité: le cas de la montagne Basque de Soule en Pyrénées-Atlantiques." *Développement Durable et Territoires* 10 (1): 13377. https://doi.org/10.4000/developpementdurable.13377.

Beck, S., and T. Forsyth. 2015. "Co-pProduction and Democratizing Global Environmental Expertise." In *Science and Democracy: Making Knowledge and Making Power in the Biosciences and Beyond*, edited by S. Hilgartner, C. Miller, and R. Hagendijk, 113–132. New York: Routledge.

Brown, L. D., and R. Tandon. 1983. "Ideology and Political Economy in Inquiry: Action Research and Participatory Research." *The Journal of Applied Behavioral Science* 19 (3): 277–294. https://doi.org/10.1177/002188638301900.

Burke, B. J. 2022. *Social Exchange: Barter as Economic and Cultural Activism in Medellin, Colombia*. New Brunswick: Rutgers University Press.

Burke, B. J., and N. Heynen. 2014. "Transforming Participatory Science into Socioecological Praxis: Valuing Marginalized Environmental Knowledges in the Face of the Neoliberalization of Nature and Science." *Environment and Society* 5 (1): 7–27. https://doi.org/10.3167/ares.2014.050102.

Busse, M., J. Zscheischler, F. Zoll, S. Rogga, R. Siebert. 2023. "Co-design approaches in land use related sustainability science – A systematic review." *Land Use Policy* 129: 106623. https://doi.org/10.1016/j.landusepol.2023.106623.

Chambers, J. M., C. Wyborn, M. E. Ryan, R. S. Reid, M. Riechers, A. Serban, N. J. Bennett, 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.

Chambers, R. 1983. *Rural Development: Putting the Last First*. New York: Routledge.

Cooke, B., and U. Kothari, eds. 2001. *Participation: The New Tyranny?* London: Zed Books.

Cornwall, A. 2008. "Unpacking 'Participation': Models, Meanings and Practices." *Community Development Journal* 43 (3): 269–283. https://doi.org/10.1093/cdj/bsn010.

Cunchinabe, D., P. Palu, D. De Bortoli, and M.-P. Lavergne. 2011. Histoire de l'écosystème cultive et de la biodiversité à Larrau: analyse de l'impact agropastoral dans la gestion du milieu. https://halshs.archives-ouvertes.fr/halshs-00785900

De Bortoli, D., D. Cunchinabe, F. Hautefeuille, P. Heiniger-Casteret, M.-P. Lavergne, and P. Palu. 2008. "Stratégies familiales et construction des milieux en Soule." Rapport de Synthèse. Laboratoire Identités, Territoires, Expressions, Mobilités, Univeristé de Pau et des Pays de L'Adour https://halshs.archives-ouvertes.fr/halshs-00785872.

Desplat, C. 1986. "Famille et communauté: contraintes et lois morales de la fin du XVe siècle au début du XIXe siècle." In *Société, politique, culture en Pays Basque*. Edited by P. Bidart, 45–82. Donostia, Spain: Elkar.

Djenontin, I. N. S., and A. M. Meadow. 2018. "The Art of co-Production of Knowledge in Environmental Sciences and Management: Lessons from International Practice." *Environmental Management* 61 (6): 885–903. https://doi.org/10.1007/s00267-018-1028-3.

Fals Borda, O. 2001. "Participatory (Action) Research in Social Theory: Origins and Challenges." In *Handbook of Action Research: Participative Inquiry and Practice*, edited by P. Reason and H. Bradbury, 27–37. London: Sage.

Freire, P. 1982. "Creating Alternative Research Methods: Learning to Do It by Doing It." In *Creating Knowledge: A Monopoly? Participatory Research in Development*, edited by B. L. Hall, A. Gilette, and R. Tandon, 29–38. New Delhi: Society for Participatory Research in Asia.

Galende-Sánchez, E., and A. H. Sorman. 2021. "From Consultation toward co-Production in Science and Policy: A Critical Systematic Review of Participatory Climate and Energy Initiatives." *Energy Research & Social Science* 73: 101907. https://doi.org/10.1016/j.erss.2020.101907.

Galop, D., Rius Damien, C. Cugny, and F. Mazier. 2013. "A History of Long-Term Human-Environment Interactions in the French Pyrenees Inferred from the Pollen Data." In *Continuity and Change in Cultural Adaptation to Mountain Environments: From Prehistory to Contemporary Threats*, edited by L. R. Lozny, 19–30. New York: Springer.

Galvin, K. A., T. Even, R. S. Reid, J. Njoka, J. Roque de Pinho, P. Thornton, and K. Saylor. 2020. "Understanding Climate from the Ground up: Knowledge of Environmental Changes in the East African Savannas." In *Changing Climate, Changing Worlds: Local Knowledge and the Challenges of Social and Ecological Change*, edited by M. Welch-Devine, A. Sourdril, and B. J. Burke, 221–242. New York: Springer. https://doi.org/10.1007/978-3-030-37312-2.

Gaventa, J., and B. D. Horton. 1981. "A Citizen's Research Project in Appalachia." *USA. Convergence* 14 (3): 30–42.

Gerlak, A. K., J. Guido, G. Owen, M. S. Rodriguez McGoffin, E. Louder, J. Davies, K. J. Smith, et al. 2023. "Stakeholder Engagement in the Co-Production of Knowledge for Environmental Decision-Making." *World Development* 170: 106336. https://doi.org/10.1016/j.worlddev.2023.106336.

Hickey, S., and G. Mohan, eds. 2004. *Participation: From Tyranny to Transformation? Exploring New Approaches to Participation in Development*. London: Zed Books.

Kliskey, A., P. Williams, D. L. Griffith, V. H. Dale, C. Schelly, A.-M. Marshall, V. S. Gagnon, W. M. Eaton, and K. Floress. 2021. "Thinking Big and Thinking Small: A Conceptual Framework for Best Practices in Community and Stakeholder Engagement in Food, Energy, and Water Systems." *Sustainability* 13 (4): 2160. https://doi.org/10.3390/su13042160.

Latulippe, N., and N. Klenk. 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: 7–14. https://doi.org/10.1016/j.cosust.2019.10.010.

Leigh, D. S., T. L. Gragson, and M. R. Coughlan. 2015. "Chronology and Pedogenic Effects of Mid- to late-Holocene Conversion of Forests to Pastures in the French Western Pyrenees." *Zeitschrift Für Geomorphologie, Supplementary Issues* 59 (2): 225–245. https://doi.org/10.1127/zfg_suppl/2015/S-59212.

Lemos, M. C., and B. J. Morehouse. 2005. "The co-Production of Science and Policy in Integrated Climate Assessments." *Global Environmental Change* 15 (1): 57–68. https://doi.org/10.1016/j.gloenvcha.2004.09.004.

Maclean, K., E. Woodward, D. Jarvis, G. Turpin, D. Rowland, and P. Rist. 2022. "Decolonising Knowledge co-Production: Examining the Role of Positionality and Partnerships to Support Indigenous-Led Bush Product Enterprises in Northern Australia." *Sustainability Science* 17 (2): 333–350. https://doi.org/10.1007/s11625-021-00973-4.

Maraud, S., and S. Roturier. 2023. "Producing Futures for the Arctic: What Agency for Indigenous Communities in Foresight Arenas?" *Futures* 153: 103240. https://doi.org/10.1016/j.futures.2023.103240.

Matuk, F. A., E. Turnhout, L. Fleskens, E. F. do Amaral, M. Haverroth, and J. H. Behagel. 2020. "Allying Knowledge Integration and co-Production for Knowledge Legitimacy and Usability: The Amazonian SISA Policy and the Kaxinawá Indigenous People Case." *Environmental Science & Policy* 112: 1–9. https://doi.org/10.1016/j.envsci.2020.04.018.

Maughan, C., and C. R. Anderson. 2023. "A Shared Human Endeavor': Farmer Participation and Knowledge co-Production in Agroecological Research." *Frontiers in Sustainable Food Systems* 7: 1162658. https://doi.org/10.3389/fsufs.2023.1162658.

Mazier, F., D. Galop, M. J. Gaillard, C. Rendu, C. Cugny, A. Legaz, O. Peyron, and A. Buttler. 2009. "Multidisciplinary Approach to Reconstructing Local Pastoral Activities: An Example from the Pyrenean Mountains (Pays Basque)." *The Holocene* 19 (2): 171–188. https://doi.org/10.1177/0959683608098956.

Meadow, A. M., D. B. Ferguson, Z. Guido, A. Horangic, G. Owen, and T. Wall. 2015. "Moving toward the Deliberate Co-Production of Climate Science Knowledge." *Weather, Climate, and Society* 7 (2): 179–191. https://doi.org/10.1175/WCAS-D-14-00050.1.

Meadow, A. M., and G. Owen. 2021. *Planning and Evaluating the Societal Impacts of Climate Change Research Projects: A Guidebook for Natural and Physical Scientists Looking to Make a Difference*. Tucson: University of Arizona. https://doi.org/10.2458/10150.658313.

Meuret, M., and F. Provenza, eds. 2014. *The Art & Science of Shepherding: Tapping the Wisdom of French Herders*. Viroqua, WI: Acres.

Mills, K. E., D. Armitage, J. G. Eurich, K. M. Kleisner, G. T. Pecl, and K. Tokunaga. 2023. "Co-Production of Knowledge and Strategies to Support Climate Resilient Fisheries." *ICES Journal of Marine Science* 80 (2): 358–361. https://doi.org/10.1093/icesjms/fsac110.

Minkler, M., and N. Wallersetin, eds. 2003. *Community Based Participatory Research for Health: Process to Outcomes*. San Francisco, CA: Jossey Bass.

Muhammad, M., N. Wallerstein, A. L. Sussman, M. Avila, L. Belone, and B. Duran. 2015. "Reflections on Researcher Identity and Power: The Impact of Positionality on Community Based Participatory Research (CBPR) Processes and Outcomes." *Critical Sociology* 41 (7-8): 1045–1063. https://doi.org/10.1177/0896920513516025.

Nadasdy, P. 2005. "The Anti-Politics of TEK: The Institutionalization of Co-Management Discourse and Practice." *Anthropologica* 47 (2): 215–232.

Norström, A. V., C. Cvitanovic, M. E. Löf, S. West, C. Wyborn, P. Balvanera, A. T. Bednarek, et al. 2020. "Principles for Knowledge Co-Production in Sustainability Research." *Nature Sustainability* 3 (3): 182–190. https://doi.org/10.1038/s41893-019-0448-2.

Ott, S. 1993. *The Circle of Mountains: A Basque Shepherding Community*. Reno: University of Nevada Press.

Page, G. G., R. M. Wise, L. Lindenfeld, P. Moug, A. Hodgson, C. Wyborn, and I. Fazey. 2016. "Co-Designing Transformation Research: lessons Learned from Research on Deliberate Practices for Transformation." *Current Opinion in Environmental Sustainability* 20: 86–92. https://doi.org/10.1016/j.cosust.2016.09.001.

Pennesi, K. 2020. "Understanding Global Change: From Documentation and Collaboration to Social Transformation." In *Changing Climate, Changing Worlds: Local Knowledge and the Challenges of Social and Ecological Change*, edited by M. Welch-Devine, A. Sourdril, and B. J. Burke, 243–258. New York: Springer. https://doi.org/10.1007/978-3-030-37312-2.

Polk, M. 2015. "Transdisciplinary Co-Production: Designing and Testing a Transdisciplinary Research Framework for Societal Problem Solving." *Futures* 65: 110–122. https://doi.org/10.1016/j.futures.2014.11.001.

Reed, M. S., B. G. Merkle, E. J. Cook, C. Hafferty, A. P. Hejnowicz, R. Holliman, I. D. Marder, et al. 2024. "Reimagining the Language of Engagement in a Post-Stakeholder World." *Sustainability Science* 19 (4): 1481–1490. https://doi.org/10.1007/s11625-024-01496-4.

Reyes-García, V., A. Fernández-Llamazares, D. García-del-Amo, and M. Cabeza. 2020. "Operationalizing Local Ecological Knowledge in Climate Change Research: Challenges and Opportunities of Citizen Science." In *Changing Climate, Changing Worlds: Local Knowledge and the Challenges of Social and Ecological Change*, edited by M. Welch-Devine, A. Sourdril, and B. J. Burke, 183–198. New York: Springer. https://doi.org/10.1007/978-3-030-37312-2.

Rhoades, R. E., and R. H. Booth. 1982. "Farmer-Back-to-Farmer: A Model for Generating Acceptable Agricultural Technology." *Agricultural Administration* 11 (2): 127–137. https://doi.org/10.1016/0309-586X(82)90056-5.

Richer, M. 1998. "Le Cayolar en Soule." *Azpilcueta* 13: 123–130. http://www.eusko-ikaskuntza.eus/PDFAnlt/azpilcueta/13/13123130.pdf.

Roque de Pinho, J. 2020. "The Year People Helped Zebras to Stand up: Climatic Variability and Extreme Weather Observed and Portrayed by Kenyan Maasai Pastoralists." In *Changing Climate, Changing Worlds: Local Knowledge and the Challenges of Social and Ecological Change*, edited by M. Welch-Devine, A. Sourdril, and B. J. Burke, 145–182. New York: Springer. https://doi.org/10.1007/978-3-030-37312-2.

Sharfstein, J. M. 2016. "Banishing "Stakeholders." *The Milbank Quarterly* 94 (3): 476–479. https://doi.org/10.1111/1468-0009.12208.

Taddei, R. 2011. "Watered-down Democratization: Modernization versus Social Participation in Water Management in Northeast Brazil." *Agriculture and Human Values* 28 (1): 109–121. https://doi.org/10.1007/s10460-010-9259-9.

Tengö, M., R. Hill, P. Malmer, C. M. Raymond, M. Spierenburg, F. Danielsen, T. Elmqvist, and C. Folke. 2017. "Weaving Knowledge Systems in IPBES, CBD and beyond—Lessons Learned for Sustainability." *Current Opinion in Environmental Sustainability* 26-27: 17–25. https://doi.org/10.1016/j.cosust.2016.12.005.

Tuck, E., and K. W. Yang. 2012. "Decolonization is Not a Metaphor. Decolonization." *Indigeneity, Education, & Society* 1 (1): 1–40.

Turnhout, E., T. Metze, C. Wyborn, N. Klenk, and E. Louder. 2020. "The Politics of co-Production: Participation, Power, and Transformation." *Current Opinion in Environmental Sustainability* 42: 15–21. https://doi.org/10.1016/j.cosust.2019.11.009.

van den Broek, K., J. Luomba, H. O. Onyango, M. Musobya, and S. A. Klein. 2020. "A Framework for co-Developing Conservation Research Projects with Stakeholders: A Lake Victoria Case Study." *Lakes & Reservoirs: Science, Policy and Management for Sustainable Use* 25 (4): 403–412. https://doi.org/10.1111/lre.12342.

Van Willigen, J. 2002. *Applied Anthropology: An Introduction*. Westport: Bergin & Garvey.

Vermeulen, S. J., B. M. Campbell, and J. S. I. Ingram. 2012. "Climate Change and Food Systems." *Annual Review of Environment and Resources* 37 (1): 195–222. https://doi.org/10.1146/annurev-environ-020411-130608.

Vetter, J. 2011. "Introduction: Lay Participation in the History of Scientific Observation." *Science in Context* 24 (2): 127–141. https://doi.org/10.1017/s0269889711000032.

Welch-Devine, M. 2008. "From Common Property to Co-Management: Implementing Natura 2000 in Soule.,."

PhD dissertation. Department of Anthropology, University of Georgia, Athens.

Welch-Devine, M., and H. Lazrus. 2023. "Re-Fielding Climate Change in Cultural Anthropology." In *Anthropology and Climate Change: From Transformations to World Making*, edited by S. A. Crate and P. Nuttall, 47–61. New York: Routledge.

Welch-Devine, M., and D. S. Murray. 2011. "We're European Farmers Now': Transitions and Transformations in Basque Agricultural Practices." *Anth J Euro Cult* 20 (1): 69–88.

Welch-Devine, M., A. Sourdril, and B. J. Burke, eds. 2020. *Changing Climate, Changing Worlds: Local Knowledge and the Challenges of Social and Ecological Change*. New York: Springer. https://doi.org/10.1007/978-3-030-37312-2.

White, S. C. 1996. "Depoliticising Development: The Uses and Abuses of Participation." *Development in Practice* 6 (1): 6–15. https://doi.org/10.1080/0961452961000157564.

Whyte, K. P. 2017. "Indigenous Climate Change Studies: Indigenizing Futures, Decolonizing the Anthropocene." *English Language Notes* 55 (1-2): 153–162. https://doi.org/10.1215/00138282-55.1-2.153.

Zanotti, L., C. Carothers, C. A. Apok, S. Huang, J. Coleman, and C. Ambrozek. 2020. "Political Ecology and Decolonial Research: Co-Production with the Iñupiat in Utqiaġvik." *Journal of Political Ecology* 27 (1): 43–66. https://doi.org/10.2458/v27i1.23335.

Zurba, M., M. A. Petriello, C. Madge, P. McCarney, B. Bishop, S. McBeth, M. Denniston, H. Bodwitch, and M. Bailey. 2022. "Learning from Knowledge co-Production Research and Practice in the Twenty-First Century: Global Lessons and What They Mean for Collaborative Research in Nunatsiavut." *Sustainability Science* 17 (2): 449–467. https://doi.org/10.1007/s11625-021-00996-x.