Traversing transdisciplinary terrain: a journey from knowledge integration to decolonial awareness

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Abstract

Rangelands and the people who live and work in them confront growing complex and "wicked" challenges in the face of interacting environmental, demographic, socio-cultural, economic and political changes. To address these challenges, rangeland scientists increasingly turn to transdisciplinary research approaches—those that span multiple disciplines and engage diverse social actors in the research process—to co-produce actionable knowledge for living with complexity and managing wicked problems. We use a collaborative auto-ethnographic approach to tell stories of our 30-year journey of studying, collaborating and co-producing knowledge with pastoralists and ranchers across three continents. As we reflect on our learnings through the lenses of feminist, decolonial, and Indigenous research theories, methodologies, knowledges, and ethics, we ask how these approaches can be meaningfully applied to pastoral and ranching systems. We celebrate the inherent strengths of rangeland research as an applied and place-based science. Yet, both the literature and our experiences reveal limitations in current applications of transdisciplinary knowledge co-production, largely attributable to inequitable power relations and inadequate ethical frameworks. Such limitations appear rooted in the colonial and productivist paradigms and practices that continue to dominate mainstream academic and research institutions. To achieve more effective and enduring rangeland outcomes, mainstream institutions could transform in ways that enable rather than constrain boundary-spanning research partnerships that center genuine (not transactional) reciprocal relationships with pastoralist communities and Tribal Nations. We envision a future where such partnerships take root in ethical frameworks that respect pastoralists' rights and knowledge sovereignty, consider multi-generational implications of research practices and outcomes, and call for care-full research guided by a critical decolonial approach that considers Indigenous and community concepts of relevance, time, reciprocity, respect, appropriate communication and power relations.

Introduction

Over the past 30 years, rangeland science and management have increasingly recognized the wisdom of traditional pastoralist practices embedded in Indigenous and local knowledge systems (Sharifian *et al.* 2023). Always an inherently interdisciplinary field, rangeland science has also progressively turned to transdisciplinary research approaches that integrate social, ecological and physical sciences and bring together knowledge holders from varied sectors of society to co-produce knowledge for managing the wicked problems that rangeland and pastoral systems increasingly face (Tengö *et al.* 2014; Knapp *et al.* 2019; Reid *et al.* 2021). These diverse and intertwined streams of learning grow out of diverse theories and methodologies, including feminist (Haraway 1988; Harding 1991), Black feminist (Hill Collins 1986; hooks 2000; Hill Collins and Bilge

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2016) and Indigenous and decolonial feminist (Lugones 2010; Kovach 2021) ones, and from our lived experiences as researchers and community members. In this keynote paper, we collectively reflect on the trajectory of transdisciplinary research approaches in rangeland science as represented in the lived experiences and publications of one rangeland social-ecological scientist (MFG). We use this series of collaborative autoethnographic vignettes to highlight successful strategies for combining knowledges from different disciplines, communities and sectors of society in ways that benefit rangeland peoples and landscapes, and to learn from past missteps. Feminist theories help us to consider the ways colonial scientific institutions condition transdisciplinary research approaches and Indigenous methodologies, and offer inspiration for institutional transformation toward a more equitable and relational transdisciplinarity. As Kovach (2021, p. 12) notes, "Indigenous methodologies are well positioned to unpack and unsettle the [Western] research-policy-practice cycle influencing Indigenous life."

Methods

We use collaborative autoethnography (Ellis *et al.* 2010; Lapadat 2017) to describe MFG's lived experiences of traditional knowledge, participatory, and transdisciplinary research and to analyse how they relate to wider cultural and social contexts of these experiences, including the settler colonial culture of US academia and rangeland science specifically, and the Tribal Nations, Indigenous and pastoralist cultures where her research often takes place. The three co-authors first co-developed a process for making meaning from MFG's research experiences, and identified key issues to focus on within and across project narratives: ah-ha moments, Indigenous and feminist insights, structural components, cultural and language barriers, lessons for transdisciplinarity, and visions for the future. Drawing from research memos, published accounts of the projects, and memory, MFG drafted vignettes of six projects spanning her 35-year research career and wrote short reflections on each. RB and CS asked further questions, guided MFG to consider the larger structural forces at work, and wrote responses to MFG's reflections, further contextualizing her experiences and framing them from Indigenous and feminist perspectives. MFG revised each vignette to integrate the most salient learnings, incorporating RB and CS's insights.

In keeping with qualitative and feminist methodologies, we briefly note our positionalities. MFG is a multi-ethnic (predominantly Spanish and Anglo-American), interdisciplinary rangeland scientist from a socio-economically and educationally privileged background, recently retired from her position as Full Professor. RB is a Native and Irish American scholar and a first generation Full Professor. She has worked with Native American organizations and Tribal Nations throughout the U.S. on child maltreatment and her recent work considers the impact and resistance of Native peoples living within a settler colonial state. CS is an AfroLatinx (Puerto Rican and Cape Verdean) first generation Associate Professor whose interdisciplinary work focuses on qualitative inquiry (critical ethnography, testimonio as method and methodology) and Decolonial and Intersectional Feminist theory.

Collaborative Autoethnographic Vignettes

Traditional Ecological Knowledge of Mongolian Pastoralists (TEK): My initial work in Mongolia involves ecological fieldwork and traditional ethnographic research, living alongside herders for months at a time. I want to understand how the major changes in Mongolia's political system and economy would affect herders' lives, livelihoods and land use practices, and how these in turn will impact the rangeland conditions. I am also very interested in the role herders' ecological knowledge plays in their decision-making. I have formal training in both ecology and anthropology. Through months of living with, interviewing and observing herders I come to understand that herders' ecological knowledge is reflected in their everyday practices and norms of pasture use. I find that my observations on pasture management do not fit with the neat conceptual categories in the existing theory about commons governance. Eventually, I realize I need to pay attention to what is, not what theory says should be, and use my observations to revise theory. As I reflect back, I see that the TEK aspect of my work was extractive, shaped by my training in siloed academic disciplines. I lacked a model of participatory research and training in research ethics. I did not co-design the research with herders and it had not clear and immediate benefits for them. I authored articles from my work alone or with my dissertation advisor. Yet I did learn that traditional knowledge is more than biophysical facts and observations, and that it encompasses ways

of doing and thinking, skills and technologies, cultural norms and values, and social relationships like reciprocity. The significance of reciprocity in Mongolian culture became a through-line of my decades of work there, both in terms of its importance to understanding social-ecological dynamics, living relationality and in how it influenced my relationships and work with Mongolian individuals and institutions. Thirty years on, all my subsequent work has been co-authored with Mongolian researchers and much has been co-designed by with herders and products co-developed with and for communities. I have mentored many Mongolian students including three who earned PhDs at my university.

Participatory Rangeland Planning and Curriculum Development with the Tohono O'odham Nation (TON): The Tohono O'odham Nation spans the US border with Mexico and encompasses over 2 million acres of desert grasslands and Sonoran desert ecosystems. O'odham people incorporated livestock into their culture and economy during the Mission period, and cattle continue to play important roles in O'odham society today. In the early 2000s, the Tohono O'odham Nation is taking over management of its natural resources from the US Bureau of Indian Affairs (BIA) under the provisions of the Indian Self-Determination Act (PL 93-638). Unlike in Mongolia, in this case, the Tribe invites me to advise on grazing and rangeland management, and specifically the development of a Tribal grazing code. Our relationship starts with my participation in monthly meetings with the newly formed TO Natural Resources Department, and mostly listening. Two projects eventually grow from this, a pilot participatory rangeland planning project and later, a participatory curriculum development project. After six months, I suggest the idea of a pilot participatory community-based rangeland management project. Past efforts to impose top-down grazing regulations have met with resistance. Maybe working at the community-level with a single grazing district and helping the community come up with its own set of rules could lead to a more bottom-up process that communities would support. After Tribal Council approval, and with guidance and support from a key community member, the Sif Oidak district agrees to take part in this pilot. Masters student John Hays, formerly a working cowboy, serves as a critical link to the community. John participates in 19 round-ups in Sif Oidak over a year, building trust and demonstrating reciprocity by helping with a dangerous and labor-intensive task. He also helps each of Sif Oidak's 9 villages identify and map areas of resource concern and opportunities for restoration. We then help them apply for federal funds to implement restoration. The resulting resource management plan looks different from what we envisioned. It focuses on education and cooperation among villages instead of rules and by-laws (Hays and Fernandez-Gimenez 2005). We learn that support for cooperation and reciprocity is more important than attempting to solve issues through formal rules and sanctions that further fray inter-community relationships (Fernandez-Gimenez *et al.* 2008).

The community's interest in education leads us to apply for another grant in partnership with the TO Resource Conservation District, to develop a rangeland curriculum specific to the Tohono O'odham lands and culture. Another Masters student, Jennifer Arnold, leads the implementation and evaluation. A curriculum advisory committee composed mostly of O'odham cultural experts, ranchers and natural resource professionals guides the project. Thirty-nine individuals participate in the committee over a two-year period, and a core group of seven members are deeply engaged in all phases of the research, including developing the research goals and methods, interpreting the findings, and authoring publications. Instead of a TEK documentation approach, the curriculum committee incorporates O'odham traditional knowledge, values and priorities directly, by shaping the curriculum and participating in the delivery of the workshops. O'odham participants choose what they want to learn and from whom, including a mix of both local O'odham elders and experts and outside non-O'odham presenters, with nearly two thirds of the presentations given in O'odham. The workshop series begins with elders' stories of water and ends with an O'odham presentation about drought, the desert and the monsoon rains (Arnold *et al.* 2007). The advisory committee identifies a goal to "incorporate values of cooperation and community" and their importance for rangeland management into the curriculum. The importance of cooperation emerges in various ways, leading us as academic researchers to draw on the concept of social capital as an analytical lens. One O'odham elder objects to the use of non-O'odham theories to explain O'odham ways, and this leads to an extensive discussion about the project's goals and the role of research on the TON. Ultimately, we use a social capital framework and a core group of O'odham participants help refine the analysis and interpretations, which are supported by political leaders, elders and other community members (Arnold *et al.* 2007). As I reflect on this dynamic today, I wonder if we could have co-created an O'odham

theoretical framework based on the importance of relationality instead of imposing a social capital framework (Kovach 2021).

Mongolian Rangelands and Resilience (MOR2) (Fernandez-Gimenez *et al.* 2019a): Back in Mongolia, it's now 2008, a decade and a half after my original work there in the early 1990s. Rangelands and herders are suffering from increasingly frequent droughts and severe winter storms, exacerbated by declining pasture conditions. To address declining livelihoods and rangeland health, herders, with support from international development organizations, have begun to organize into local community-based rangeland management (CBRM) groups to manage their rangelands, yet there is little communication or coordination among these efforts. Project leaders see the value in learning from diverse project experiences, and with their support we begin to design a research effort. Rangeland social-ecological changes in Mongolia are a wicked problem—one with high complexity, no simple solutions and multiple drivers within and across scales. We need a multi-disciplinary team of researchers with expertise in rangeland ecology, climate change, hydrology, human ecology, geography, policy and sociology. To design a relevant study that asks the right questions to produce information that is credible and usable, representatives from herder communities, conservation and development organizations and government must participate in shaping the questions and design. We bring together researchers from the US and Mongolia with diverse expertise and organize a two week research planning process in Mongolia that begins with a week-long field trip to build trust among members of the newly formed international team, and ground our science in on-the-ground realities. The second week we host a 5-day interactive workshop in the capital of Ulaanbaatar, where scientists, conservation and development practitioners, herders and government officials collectively identify and prioritize key issues affecting Mongolia's rangelands and herders, draw connections among these complex factors, and finally, agree on a primary issue and research question and outline an overall research design.

It takes several years to secure funding to implement our ambitious research plan across 36 districts (*soum*) in Mongolia's 4 major ecological zones. The quasi-experimental design compares the process and outcomes of community-based rangeland management (CBRM) in adjacent districts with and without formally organized CBRM groups. Almost half of our core team are Mongolians, including two PhD students and two post-docs. Each subteam is co-led by Mongolian and US scientists. We train over 50 young Mongolian researchers and students who participate in field teams alongside senior Mongolian and US researchers. We collaborate with other organizations to make the trainings in research design, social and ecological data collection, quantitative and qualitative data analysis, and scientific writing available to students and professionals beyond those on the MOR2 team. We hold annual all-members team meetings in Mongolia to discuss our progress and findings, and plan for the next phases. Our core team includes a social scientist who interviews or surveys each member annually and facilitates an annual reflective retreat that helps us identify and redress power imbalances and communication issues on the team, strengthening trust and mutual accountability and reciprocity. Later, we hold monthly informal day-long analysis and writing retreats that help break down disciplinary barriers and reduce power imbalances between graduate students and faculty.

Consistent with principles of reciprocity and data sovereignty, the expanded project team agrees that all team members will have access to the data collected by the project, and that it will be permanently archived and available for use by Mongolians and other scientists who request it. We develop formal guidelines for data use and authorship. To give Mongolian researchers the experience of peer review and opportunity to present their findings to an international audience, in the final year of the project we organize a major international conference in Ulaanbaatar. All the project participants have a chance to attend, present and publish a peer-reviewed paper in the fully bi-lingual conference proceedings

Following through with reciprocity to 36 different herder communities spread across Mongolia proves challenging. We develop community-specific brief written summaries of interim findings and deliver them in brochure form back to some but not all of the communities. One of the Mongolian post-docs works with one community to develop a book by and for community members. Finally, we organize four regional workshops for herders and local government representatives from each study community where we share findings,

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facilitate interactive discussions to "ground-truth" our scientific results with local knowledge, and engage participants in scenario-planning to consider what our findings might mean for their communities' futures.

Ten years after the project's end, the impacts of MOR2 persist. Many of the young Mongolian researchers who took part in our project and trainings went on the earn graduate degrees at top universities and today contribute their skills within Mongolia to teaching, research, entrepreneurship, and direct action with herder communities. MOR2 was a transformative experience for many of us. The team exemplified respect, responsibility, reflexivity and reciprocity among members. At the same time, the very aspects of it that made it powerful scientifically—the large sample size, quasi-experimental design and broad spatial extent—also made it impossible to develop meaningful long-term and truly reciprocal relationships with all of the participating communities. The funding source and institutional expectations also influenced the power dynamics such that Western science dominated our decision-making and outputs.

Collaborative Adaptive Rangeland Management (CARM) (adapted from Wilmer)***:*** On eastern Colorado's Great Plains, rangelands and ranchers face multiple environmental, social, economic and policy challenges from climate change to land-use change to demographic change and shifting public values related to rangeland ecosystems and animal agriculture. This broad expanse of shortgrass steppe from the foothills of the Rocky Mountains to the mixed grass prairies of Kansas and Nebraska are the traditional homelands of the Ute, Cheyenne and Arapaho Tribes, who were violently expelled during the process of Euro-American colonization and settlement in the 19th century. In the early 20th century, settlers attempted to plow and farm the area, with disastrous consequences, leading to the Dust Bowl, and subsequent creation of the National Grassland system and the US Department of Agriculture's Central Plains Experimental Range (CPER). Over 80 years, CPER generated a strong body of rangeland science, yet the conventional research approach had limitations. It excluded complex social dynamics and public participation and focused mainly on production problems, ignoring wildlife, conservation and social problems.

By the 2010s, challenges to ranch sustainability and conservation have intensified and CPER researchers recognize they need to work in a different way. They ask me to join their team as a social scientist. The team is dominated by ecologists, but also includes me and Hailey Wilmer, as social scientists. Later, a hydrologist and an economist join us. The research team invites a diverse group of stakeholders including representatives from federal and state natural resource agencies, conservation organizations and ranchers from the local grazing association, to participate as co-researchers. The project team designs and implements a comprehensive collaborative adaptive rangeland management (CARM) project with the stakeholder-defined goals of enhancing ranch profitability and drought resilience, bird and plant biodiversity, and social learning. The team divides the experiment station into two, ecologically paired ranches, and manages one with the "business as usual" season-long grazing approach common in the area, and on the other gives decision-making control to the stakeholder group, keeping the stocking rates the same on both halves. Scientists monitor and evaluate outcomes on both ranches, incorporating stakeholder-devised indicators as well as conventional rangeland and wildlife monitoring metrics. The stakeholder group and research team cycle through goal setting, stocking, grazing, prescribed fire and drought decisions, tracking learning as we go. The group commits to this ranch-scale experiment for 10 years. Plenty of time to learn and adapt.

The decade that followed is incredible, and incredibly challenging. Working and learning together in this context is entirely new for both researchers and stakeholders. From the first goal-setting workshop, we realize we face an uphill journey to understand each other's disciplines, goals, and communication styles. Researchers and stakeholders from different backgrounds find we come from entirely different social worlds, with different ways of knowing and learning. Trust – in people and in data – is not a given. Additionally, while everyone agrees on the overarching goals, the stakeholder-managed steers gain less weight than those managed conventionally, efforts to improve bird populations and plant diversity are inconclusive, and ranchers initially reject data that suggested prescribed fires could benefit rangelands, and vote against the use of fire. To top it all off, the roles of researchers as scientists, facilitators and decision-makers become confused. As researchers, aren't we stakeholders, too? How are we influencing the stakeholder group's decisions? Somehow, through a

mix of courage, stubbornness and social cohesion that forms out of time together on the land and flexible, supportive leadership, the CARM process begins to work. Trust begins to develop as all the participants—stakeholders and researchers—learn about each other's social worlds and ways of knowing through informal interactions like a tour of one stakeholder's ranch. They become vulnerable, they listen, and try to understand one another's point of view.

Throughout the project we try to create more opportunities for these informal interactions, and empathy, curiosity and compassion start to build the key ingredient to CARM, trust. Trust supports a culture of flexibility and creativity, experimentation and learning, which in turn leads to scientific productivity and adaptive capacity. Because social science is integrated into the core of the project, we are able to document how the project facilitates social learning, and to reflect honestly on the challenges and opportunities of the approach. Some of the key ingredients to learning and enduring collaboration are: flexible, inclusive problem definition; respect for context and history; effective team leadership and power sharing; long-term investment in relationships and a long time horizon for the project; capacity for collaborative creativity; sufficient resource allocation; and a study design that invited diverse research methods and questions (Wilmer *et al.* 2018; Wilmer *et al.* 2022). CARM has inspired similar approaches in Nebraska and in Idaho, where Hailey Wilmer leads the Rangeland Collaboratory, focused on building relationships among diverse stakeholders and researchers to help ranchers, land managers and conservation organizations manage iconic landscapes for multiple species and values. Despite these successes, I now recognize that we failed to invite key rightsholders, Tribal representatives, to participate in CARM. I wonder how different might the process have been with their participation, and why we omitted them.

Co-Creating Knowledge for Action with Women Pastoralists in Spain (CCK): Extensive livestock management has shaped Spain's landscapes and cultures for 7000 years, but the 20th century saw major structural changes in agriculture that have led to industrialization of animal agriculture, rural depopulation, and transformation of these socially valued landscapes, the ecosystem services they provide and human communities that inhabit them. The number of women-led livestock operations is increasing, yet women pastoralists remain largely invisible in the public eye and absent from decision-making spaces. Inspired by work with women ranchers in the southwestern US (Wilmer and Fernández-Giménez 2016), and my recognition that my own research in Spain and Mongolia have largely overlooked the knowledge and experiences particular to women, I decide to mend this gap. On reflection my blinders here were due in part to disciplinary assumptions in rangeland science and in part to the culture of pastoralism in Spain, where I was told by many experts not to bother interviewing women because they are not directly involved in land and livestock management. This turns out not to be true.

Two colleagues, Elisa Oteros-Rozas and Federica Ravera, and I partner with networks of women pastoralists in Spain (Ganaderas en Red and Ramaderas.cat) to research the lived experiences of Spanish women pastoralists. We take a feminist research approach. For us, this means a rejection of simple binaries and universalizing claims about women's lives. Instead, we are interested in the diversity of women's experiences and how their multiple social locations interact to shape their power and access to pastoral resources and decision-making. We draw on our outsider within perspectives—as women in the male dominated field of rangeland science, and working with women herders in a culture where herding is understood to be a man's job. As feminist researchers, we value multiple ways of knowing and our research has emancipatory as well as scientific goals. We center care in interactions with research participants and co-researchers, and commit to reflexive practice where we regularly examine our process and power relations with one another and our research participants (Ravera et al. 2021).

In contrast to the MOR2 and CARM projects, we have no big funding sources to support the work, but also less pressure to meet funders' expectations regarding research publications. Building on Elisa and Federica's existing relationships with GER and ramaderas.cat, we gain support for the project and women in both networks agree to participate. We visit and interview women in southern, northern and eastern Spain on their farms, frequently in remote areas. We analyse the transcripts together, returning their transcript to each

participant. We organize participatory workshops in each region where we share meals made from the women's products, interpret and refine interview themes, and facilitate discussions of women's priorities for action. During covid, we organize several follow-up virtual workshops with broader audiences. We send copies of our final report in Spanish to all participants and make it freely available on the web. One participant writes a companion essay to a book chapter we write about women pastoralists and climate change. Members of the GER network present at the Society for Range Management, are active in the IYRP, and help women in other countries to establish their own networks.

CCC Workshop: My continuing dis-ease about my positionality as a non-Indigenous researcher and the ways in which, despite a commitment to participatory research, my projects continued to privilege conventional Western scientific outputs over Indigenous science and lasting community benefits, motivate me to work with Center for Collaborative Conservation (CCC) director Robin Reid to organize a workshop on decolonizing collaborative conservation. We also recognize the wealth of knowledge, experience and adaptive capacity held by Indigenous communities and land stewards despite centuries of genocide, displacement and dispossession. We think we were ready to engage in decolonization of collaborative conservation. As we assemble a diverse organizing committee, bring in Indigenous facilitators to work with us, and invite Indigenous people from around the world to participate, we are forced to re-examine our readiness and to recognize that we didn't understand what decolonization means from an Indigenous perspective. Through the workshop, we begin to learn from Indigenous people what a decolonial perspective on collaborative conservation might look like.

The tone and content of the workshop changes immediately once an Indigenous facilitator joins the team, and Indigenous participants report feeling seen and validated based on the process and content of the workshop. The workshop spurs enthusiasm and willingness of the CCC and others at CSU to support and validate Indigenous researchers at CSU and elsewhere. I experience several ah-ha moments during the workshop. First, during the workshop, I am struck by the ongoing harms that Indigenous students experience within colonial education systems that devalue traditional knowledge and erase Indigenous communities and realize that my own work perpetuates the system that causes these harms. Second, I gain appreciation for the importance of history and the value of theory to understanding how and why Indigenous communities have been dispossessed and displaced, and their relationship to their land. Learning this history and theory is essential to being an effective non-Indigenous collaborator and ally. I learn that decolonization is not a metaphor (Tuck and Yang 2012); to decolonize conservation we need to work at practical and policy levels to return land, water and management authority to the original stewards and prioritize Indigenous life ways. Third, I learn the transformative power of holding space for people with marginalized identities to share experiences and support each other across genders and generations. Participants share solutions grounded in healing within Indigenous communities, restoring relationships to land, and developing equitable collaborative partnerships with external allies, governments and research institutions. The workshop leaves me more committed to and hopeful for the possibility of change, and with a deeper understanding of how to collaborate effectively with Indigenous communities.

Discussion, Conclusion and Implications

Feminist philosophers advance the idea that all knowledge is embedded in particular social, cultural, historical and political contexts, and reflects the lived experiences of those who produce it (Haraway 1988; Harding 1991). Decolonial feminist theory embraces the multiplicity of knowledges and experiences and values them equally (Tuhiwai Smith 1999; Kovach 2021). Indigenous methodologies are research by, for and of Indigenous researchers (Tuhiwai Smith 1999), including Indigenous epistemologies, theories, methodologies and methods (Tuhiwai Smith 1999; Kovach 2021).

As transdisciplinary approaches are mainstreamed within rangeland science and management, feminist, decolonial and Indigenous thought can inform and improve our approaches. In the vignettes above, we describe the lived experiences of MFG as a multi-ethnic woman and interdisciplinary researcher working in ecological and social sciences, whose positionality led her to become a boundary-spanner in multiple ways. Reflecting

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on her experiences through decolonial and feminist lenses underscores how institutional culture and structures in academia, steeped in colonial scientific ways of thinking and doing, promoted extractive research practices and created barriers to investing necessary time, resources and heart into building equitable and reciprocal relationships with pastoralist and ranching communities and Tribal Nations. Some of the ways this occurred are obvious in hindsight, such as insufficient graduate training in research ethics, an academic culture that rewards above all else research productivity measured in number of articles, impact factors, and the size and prestige of research grants, and the lack of models and resources for developing genuinely equitable and reciprocal participatory research relationships. Academic culture influences research practices in more subtle ways related to MFG's specific positionality as an interdisciplinary and multiethnic woman researcher. For example, as a junior scholar, more senior faculty discouraged her interdisciplinary aspirations, dismissed traditional Indigenous knowledge as a valid research interest, and questioned her qualifications and abilities, leading her to question herself and to double-down in her efforts to meet and exceed the academy's expectations for productivity. The primacy of Western science remains deeply engrained and internalized, as illustrated in the power relations that played out in the Mongolian TEK, TON and MOR2 vignettes. Twenty years on from the TON project, MFG now has examples of Indigenous theory-building that might have led us to a different approach (Kovach 2021). Thinking about the final vignettes presented here—Co-creating Knowledge for Action with Women Pastoralists in Spain and our workshop on Collaborative Conservation through a Decolonial Lens—we consider how they *felt* different—in the heart and in the body. This different affect, we reflect, results from a different approach—one that prioritizes *care* and *doing things in the right way*--and a different underlying ethic—an *ethic of generosity* that flows from a *philosophy of abundance* and incorporates Indigenous research ethics. This approach stands in contrast to the dynamic of competition in academia, based on a worldview grounded in scarcity.

The challenges outlined above are not unique to these specific vignettes, and are echoed in much of the recent literature on transdisciplinarity (Knapp *et al.* 2019; Reid *et al.* 2021) and knowledge co-production (David-Chavez and Gavin 2018; Chambers *et al.* 2021; Chambers *et al.* 2022). Yet despite the structural and cultural challenges and resulting missteps, the vignettes also highlight examples of positive outcomes, successful transdisciplinary research and constructive mutually beneficial research relationships with rangeland stewards and communities. The practices that supported these outcomes are highly aligned with principles of feminist (Haraway 1988; Harding 1991) and Indigenous research (Kirkness and Barnhardt 1991; Kovach 2021; Montgomery and Blanchard 2021; Tsosie *et al.* 2022; David-Chavez *et al.* 2024). Indigenous research, when it employs Indigenous methodologies, including Indigenous epistemologies and theories, is specific to particular Tribes and cultures, and at times may not be appropriate for all researchers. However, the practices associated with Indigenous and feminist methodologies can apply in a wide range of transdisciplinary and participatory research contexts.

1) "The process is the product" and the importance of *doing things in a good way*. Pragmatically, MFG navigated the productivity demands of academic culture by focusing research on the process of transdisciplinary collaboration. In most of the vignettes above a significant part of the learning came from building in a component of studying the collaborative process, which enabled us to publish widely about the processes of transdisciplinary and participatory research. In CARM, MOR2 and CCK, the learning resulted from a deliberate practive of *reflexivity*, the process of collective critical reflection on power relations in the research process (Ravera *et al.* 2023). An important aspect of Indigenous research and working with Indigenous peoples, RB emphasized the importance of doing things in a good way. In Indigenous research, this includes preparation of the research and the researcher, recognizing and following ethical and cultural protocols, connecting with community, reciprocity (sharing knowledge and food, giving back to the community) and respectfulness (Kovach 2021).

2) *Relationships* form the core of successful transdiscipilanary research. Ideally, relationships develop before research begins (Kovach 2021; David-Chavez *et al.* 2024) and outsider researchers come at the invitation of the community (TON). It takes time to establish trust, which often grows through informal interactions (e.g. shared meals, field trips as in CARM, CCK) and shared experiences like the researcher taking part in and contributing to community life and work (MON TEK, TON). Trust develops through mutual vulnerability—where individuals reveal feelings or ideas that put them at risk. Trust also depends upon respect,

honesty, and integrity. Researchers and community members must follow through with what they say they will do and not promise what they cannot deliver. From an Indigenous perspective, relationships include not only those with people involved in any aspect of the research process, but also understanding and respecting the wider web of relationships and kinship with ancestors, and other living and non-living more-than-human beings (Kovach 2021; Tsosie *et al.* 2022). Relationality thus extends beyond the human relationships to our interdependence with and responsibilities to all beings.

3) *Respect* is a foundation for relationship-building and includes respect for Tribal governance, cultures (Kirkness and Barnhardt 1991), individuals (Tsosie *et al.* 2022) and their social worlds (Fernandez-Gimenez *et al.* 2019b), and in an interdisciplinary context, for different epistemologies and methodologies associated with different disciplines (MOR2, CARM) (Fernandez-Gimenez *et al.* 2019a; Wilmer *et al.* 2022). For outsider researchers working in cultures different from their own, learning the language and cultural protocols is a sign of respect. Fluency in the language improves communication and reduces power differentials in research. Respect also encompasses respect for Indigenous communities' sovereignty, including their right to govern data generated from research (David-Chavez et al. 2024), and respecting methodological preferences and options that include participatory and Indigenous research methodologies. Along similar lines, Wilmer et al. (2021) suggest that respect for community and individual self-determination is a critical component of expanded ethical considerations for transdisciplinary research.

4) *Relevance* in an Indigenous research context includes the salience and appropriateness or research to the specific Indigenous community's experiences, perspectives, ways of knowing and doing, and priorities (Kirkness and Barnhardt 1991; Tsosie *et al.* 2022). In a broader transdisciplinary context, relevance relates the degree to which the research problem and approach are defined by relevant rightsholders and stakeholders (for example, as in TON, MOR2 and CARM), with outcomes that are likely to have a direct impact on managing "wicked" problems and improving community conditions.

5) *Representation* means that particular perspectives are present and included in the research process. For Indigenous communities, representation ensures that they share what is important and relevant to their community (Tsosie *et al.* 2022). Representation may be accomplished through advisory committees (TON) or direct participation by different rightsholders and stakeholders in research design and implementation (TON, CARM). MOR2 ensured that the research team included Mongolian researchers alongside US-based scientists in every discipline, and that the research problem, questions and methodology were co-developed and agreed upon by herders, conservation practitioners, government officials and researchers working together.

6) Responsibility includes honouring ethical and moral responsibilities both in in-person interactions and in with regards to data (David-Chavez *et al.* 2024), and accountability for people and knowledge put in the researcher's trust (Tsosie *et al.* 2022).

7) Reciprocity signifies giving back to a community or individual involved in the research process. It is a continual process of exchange essential to relationship-building and ensures that community members access benefits from the research (David-Chavez et al. 2024). As such, reciprocity can take many forms, but in transdisciplinary research, at minimum, it includes sharing data (e.g. transcripts), knowledge and learning with the community orally (e.g. workshops) and/or in written or other forms (e.g. film, photography) (TON, MOR2, CCK, CARM), or opportunities to co-author research articles or other products (TON, CARM). Other forms of reciprocity in a research context include organizing meals or social events for the community or research participants (CARM, CCK), helping the community with needed work (e.g. TON round-ups), or providing assistance during emergencies (e.g. during the 2023-2024 *dzud* MFG sent cash to Mongolian women in her study whose families were affected by the severe winter weather). We always offer a useful gift to research participants beyond the typical IRB incentive. True reciprocity is not transactional, but rather a demonstration of generosity in the context of an authentic relationship. From a practical standpoint, it is critical to include necessary resources in grant proposals to cover local hiring of community member experts and appropriate costs related to reciprocity (Kovach 2021).

8) *disRuption* represents the emancipatory aim of feminist research (Ulmer 2024). Transdisciplinary research aims to link knowledge with action to solve wicked problems, and participatory action research engages communities in analysing and addressing community-identified challenges. Feminist research contributes to these aims by disrupting patriarchal research institutions and processes, and by supporting research participants and community partners in fighting oppression and advancing their goals for social, economic or environmental change (CCK). CCK worked with existing networks of women pastoralists to support them in reflecting on their experiences of oppression and liberation, and in articulating goals for policy change. By doing research in a care-full way this project also disrupted established academic norms and

provided an example of an alternative research ethic. disRuption also occurs within an Indigenous intersectional lens when "An intersectional analysis becomes important to dismantle settler colonial logics to reveal moments of settler complicity" in classroom settings and also within Western research processes ((Bubar *et al.* 2022) p. 53), as occurred in the CCC workshop.
What kinds of institutions are needed to support research with Indigenous, pastoralist and other rangeland communities and Tribal Nations that is done in a good way, a way that respects these combined principles of Indigenous and feminist research? First, we clarify that, as Kovach (2021) notes, just as not all research with Indigenous Tribes and communities needs to use Indigenous methodologies, with pastoralist communities, a variety of different approaches may be appropriate, depending on the problem and questions. However, transdisciplinary research is often required to address the wicked problems facing pastoralist communities and rangeland systems. Some mainstream academic and research institutions are making incremental changes towards research that addresses some if not all of the 8 Rs above, for example through more and better training for junior scholars in inter- and trans-disciplinary and participatory research methodologies, including research ethics. Yet, the dominant competitive productivist academic culture persists; if anything the competition and pressures on faculty and graduate students grow steadily more intense. How can we work in a good way under these conditions? Kovach (2021) advocates that the academy develop appropriate criteria for evaluating Indigenous research, which would take into account not only peer-reviewed publications and grants, but other kinds of community-valued outputs and outcomes. While we (MFG) advise(s) young scholars committed to "engaged scholarship" to "make the process the product", publishing on participatory and transdisciplinary processes as well as the other types of learning from research captured in more traditional disciplinary publications, this strategy does not address other barriers to implementing research in a good way. We dream of academic and research institutions that invest in building relationships first—following the principles outlined above from Indigenous and feminist methodologies--where research priorities emerge organically from these relationships and the historical and environmental contexts and problems particular to these communities and places. Academics and researchers operate in a competitive environment, where we compete for funding, space, resources and recognition. These pressures to compete infect relationships between researchers and communities, often causing researchers to pressure communities in turn—this is especially true for non-Indigenous researchers who too often engage with Tribes and Indigenous communities in instrumental and transactional ways, rather than building relationships on a foundation of genuine respect, responsibility and reciprocity. This is the opposite of doing things in a good way, and it is driven in part by the productivist culture of mainstream academia, a culture rooted in an ethic of competition for scarce resources as opposed to an ethic of generosity and reciprocity arising from worldview of abundance. Our intent is not to homogenize, idealize or oversimplify diverse Indigenous ontologies or epistemologies. Nor is it to overlook the realities of many historically marginalized and disenfranchised communities. Rather, we ask for a radical rethinking of the ethical foundations for our work.

A year ago, at another rangeland conference, at the end of the Q&A in a concurrent session, a graduate student posed the question to the room—"but how do we engage with these communities?" referencing rural, often conservative, rangeland users in the Western US. I (MFG) responded, "Love is the answer." I did not mean this facetiously. I meant it genuinely, in the sense of Black feminist bell hooks (2000), who writes that love is an active choice and practice to nurture one's own or another's growth. Although saying this to such an audience made me vulnerabile, I did it to call in rather than call out our predominantly white and male field of rangeland ecology and management. Through the gaze of love we see each other's humanity, and that is a starting point. We may look at the world today and consider love is in short supply. War, genocide, dehumanizing treatment of humans by other humans, destruction of Earth. But this is a fallacy, a dangerous mistruth. Love is not a finite resource. Like the beauty of the grasslands, it is infinite. We direct care and generosity towards the objects of our love—including the self. I have had some degree of conventional academic success in my career, in no small part because the discrimination I faced motivated me to overcompensate in the research productivity department. This so-called success also threatened my physical and mental health and my family's well-being. Yet when I think of the most meaningful projects I have taken part in, and what gave them meaning, it has been the relationships with the research team and with our study communities, even more than the scientific insights, publications and broader impacts. Those relationships

weren't just about making me, or other participants, feel good. In fact, a lot of the relationship building was difficult, even painful at times. It was the process of working through those difficulties and learning from them that made these projects work. The relationships, among individuals, communities and institutions were often the most consequential outcomes. At the most essential level, they were about love. Our shared love for rangeland landscapes, for the people that inhabit, steward and study them, and ultimately, for one another. That love is expressed through care, and through recognition, respect, commitment and trust (hooks 2000). Care for one another as individual human beings and communities, care for the rangelands and all their beings, and care for the research process. We do not look at the world through rose-colored glasses. This is hard work, but it is work worth doing. Moreover, because it is hard, this work is not worth doing in any other way than in a good way. We hope these stories from one researcher's life combined with insights from Indigenous and feminist methodologies provide both food for thought and actionable practices relevant to diverse rangeland and pastoral contexts.

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References Cited

Arnold JS, Fernandez-Gimenez M, Tohono O'Odham Curriculum A (2007) Building social capital through participatory research: An analysis of collaboration on Tohono O'odham tribal rangelands in Arizona. *Society & Natural Resources* **20**(6), 481-495. doi:10.1080/08941920701337887

Bubar R, Kelly T, Souza C, Lovato-Romero L, Bundy-Fazioli K (2022) Disrupting settler colonial microaggressions: Implications for social work. *International Journal of Social Work Values and Ethics* **19**(2), 47-77. https://doi.org/10.55521/55510-55019-55206.

Chambers JM, Wyborn C, Klenk NL, Ryan M, Serban A, Bennett NJ, Brennan R, Charli-Joseph L, Fernández-Giménez ME, Galvin KA, Goldstein BE, Haller T, Hill R, Munera C, Nel JL, Österblom H, Reid RS, Riechers M, Spierenburg M, Tengö M, Bennett E, Brandeis A, Chatterton P, Cockburn JJ, Cvitanovic C, Dumrongrojwatthana P, Paz Durán A, Gerber J-D, Green JMH, Gruby R, Guerrero AM, Horcea-Milcu A-I, Montana J, Steyaert P, Zaehringer JG, Bednarek AT, Curran K, Fada SJ, Hutton J, Leimona B, Pickering T, Rondeau R (2022) Co-productive agility and four collaborative pathways to sustainability transformations. *Global Environmental Change* **72**, 102422. doi:https://doi.org/10.1016/j.gloenvcha.2021.102422

Chambers JM, Wyborn C, Ryan ME, Reid RS, Riechers M, Serban A, Bennett NJ, Cvitanovic C, Fernández-Giménez ME, Galvin KA, Goldstein BE, Klenk NL, Tengö M, Brennan R, Cockburn JJ, Hill R, Munera C, Nel JL, Österblom H, Bednarek AT, Bennett EM, Brandeis A, Charli-Joseph L, Chatterton P, Curran K, Dumrongrojwatthana P, Durán AP, Fada SJ, Gerber J-D, Green JMH, Guerrero AM, Haller T, Horcea-Milcu A-I, Leimona B, Montana J, Rondeau R, Spierenburg M, Steyaert P, Zaehringer JG, Gruby R, Hutton J, Pickering T (2021) Six modes of co-production for sustainability. *Nature Sustainability* **4**(11), 983-996. doi:10.1038/s41893-021-00755-x

David-Chavez DM, Gavin MC (2018) A global assessment of Indigenous community engagement in climate research. *Environmental Research Letters* **13**(12), 123005. doi:10.1088/1748-9326/aaf300

David-Chavez DM, Gavin MC, Ortiz N, Valdez S, Carroll SR (2024) A values-centered relational science model: supporting Indigenous rights and reconciliation in research. *Ecology and Society* **29**(2). doi:10.5751/ES-14768-290211

Ellis C, Adams TE, Bochner AP (2010) Autoethnography: An Overview. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research* **12**(1). doi:10.17169/fqs-12.1.1589

Fernandez-Gimenez ME, Allegretti A, Angerer J, Baival B, Batjav B, Fassnacht S, Jamsranjav C, Jamiyansharav K, Laituri M, Reid RS, Thompson J, Ulambayar T, Venable N (2019a) Sustainaing interdisciplinary collaboration across continents and cultures: Lessons from the Mongolian Rangelands and Resilience Project. In 'Collaboration Across Boundaries for Social-Ecological Systems Science: Experiences Around the World'. (Ed. SG Perz) pp. 185-225. (Palmgrave MacMillan: Cham, Switzerland)

Fernandez-Gimenez ME, Augustine DJ, Porensky LM, Wilmer H, Derner JD, Briske DD, Stewart MO (2019b) Complexity fosters learning in collaborative adaptive management. *Ecology and Society* **24**(2). doi:10.5751/es-10963-240229

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Fernandez-Gimenez ME, Hays JU, Huntington HP, Andrew R, Goodwin W (2008) Ambivalence toward formalizing customary resource management norms among Alaska Native beluga whale hunters and Tohono O'odham livestock owners. *Human Organization* **67**(2), 137-150. doi:10.17730/humo.67.2.008083027273n05q

Haraway D (1988) Situated knowledges: The science question in feminism and the privilege of partial perspective. *Feminist Studies* **14**(3), 575-599.

Harding S (1991) 'Whose Science? Whose Knowledge? Thinking from Women's Lives.' (Cornell Univesity Press: Ithica, NY)

Hays JU, Fernandez-Gimenez ME (2005) Community-Based Rangeland Planning on the Tohono O'odham Nation. *Rangelands* **27**(6), 15-19, 15.

Hill Collins P (1986) Learning from the outsider within: The sociological significance of Black feminist thought. *Sociological Problems* **33**(6), S14-S32.

Hill Collins P, Bilge S (2016) 'Intersectionality.' (Polity Press: Malden, MA)

hooks b (2000) 'All About Love: New Visions.' (HarperCollins Publishers, Inc: New York)

Kirkness VJ, Barnhardt R (1991) First Nations and Higher Education: The Four R's - Respect, Relevance, Reciprocity, Responsibility. *Journal of American Indian Education* **30**(3), 1-15.

Knapp CN, Reid RS, Fernandez-Gimenez ME, Klein JA, Galvin KA (2019) Placing Transdisciplinarity in Context: A Review of Approaches to Connect Scholars, Society and Action. *Sustainability* **11**(18). doi:10.3390/su11184899

Kovach M (2021) '2nd Edition Indigenous Methodologies: Characeristics, Conversations and Contexts.' (University of Toronto Press: Toronto)

Lapadat JC (2017) Ethics in Autoethnography and Collaborative Autoethnography. *Qualitative Inquiry* **23**(8), 589-603. doi:10.1177/1077800417704462

Lugones M (2010) Toward a decolonial feminism. *Hypatia* **25**(4), 742-759.

Montgomery M, Blanchard P (2021) Testing justice: new ways to address environmental inequalities. *Solutions* **10**

Ravera F, Fernández-Giménez ME, Oteros-Rozas E (2023) Reflexivity, embodiment, and ethics of care in rangeland political ecology: reflections of three feminist researchers on the experience of transdisciplinary knowledge co-production. *Frontiers in Human Dynamics* **5**. [In English] doi:10.3389/fhumd.2023.1144668

Reid RS, Fernández-Giménez ME, Wilmer H, Pickering T, Kassam K-AS, Yasin A, Porensky LM, Derner JD, Nkedianye D, Jamsranjav C, Jamiyansharav K, Ulambayar T, Oteros-Rozas E, Ravera F, Bulbulshoev U, Kaziev DS, Knapp CN (2021) Using Research to Support Transformative Impacts on Complex, "Wicked Problems" With Pastoral Peoples in Rangelands. *Frontiers in Sustainable Food Systems* **4**. [In English] doi:10.3389/fsufs.2020.600689

Sharifian A, Gantuya B, Wario HT, Kotowski MA, Barani H, Manzano P, Krätli S, Babai D, Biró M, Sáfián L, Erdenetsogt J, Qabel QM, Molnár Z (2023) Global principles in local traditional knowledge: A review of forage plant-livestock-herder interactions. *Journal of Environmental Management* **328**, 116966. doi:https://doi.org/10.1016/j.jenvman.2022.116966

Tengö M, Brondizio ES, Elmqvist T, Malmer P, Spierenburg M (2014) Connecting Diverse Knowledge Systems for Enhanced Ecosystem Governance: The Multiple Evidence Base Approach. *AMBIO* **43**(5), 579-591. doi:10.1007/s13280-014-0501-3

Tsosie RL, Grant AD, Harrington J, Wu K, Thomas A, Chase S, Barnett D, Hill SB, Belcourt A, Brown B, Plenty Sweetgrass-She Kills R (2022) The six Rs of Indigenous research. *Tribal College Journal of American Indian Higher Education* **33**(4).

Tuck E, Yang KW (2012) Decolonization is not a metaphor. *Decolonization: Indigeneity, Education & Society* **1**(1), 1-40.

Tuhiwai Smith L (1999) 'Decolonizing methodologies: Research and Indigenous peoples.' (Zed Books: London)

Ulmer JB (2024) Feminist transdisciplinarity: Multiple configurations and relationalities. In 'The Routledge International Handbook of Transdisciplinary Feminist Research and Methodological Praxis'. (Eds JB Ulmer, C Hughes, M Salazar Perez, CA Taylor) pp. 102-132. (Routledge: New York, NY)

Wilmer H, Derner JD, Fernandez-Gimenez ME, Briske DD, Augustine DJ, Porensky LM, Grp CS (2018) Collaborative Adaptive Rangeland Management Fosters Management-Science Partnerships. *Rangeland Ecology & Management* **71**(5), 646-657. doi:10.1016/j.rama.2017.07.008

Wilmer H, Fernández-Giménez ME (2016) Some years you live like a coyote: Gendered practices of cultural resilience in working rangeland landscapes. *Ambio* **45**(3), 363-372. doi:10.1007/s13280-016-0835-0

Wilmer H, Meadow AM, Brymer AB, Carroll SR, Ferguson DB, Garba I, Greene C, Owen G, Peck DE (2021) Expanded Ethical Principles for Research Partnership and Transdisciplinary Natural Resource Management Science. *Environmental Management* **68**(4), 453-467. doi:10.1007/s00267-021-01508-4

Wilmer H, Schulz T, Fernández-Giménez ME, Derner JD, Porensky LM, Augustine DJ, Ritten J, Dwyer A, Meade R (2022) Social learning lessons from Collaborative Adaptive Rangeland Management. *Rangelands* **44**(5), 316-326. doi:https://doi.org/10.1016/j.rala.2021.02.002

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