February 2023

Bridging Knowledge Systems in the Peruvian Andes: Plurality, Co-Creation, and Transformative Socio-Ecological Solutions to Climate Change

Domenique Ciavattone

BRIDGING KNOWLEDGE SYSTEMS IN THE PERUVIAN ANDES: PLURALITY, CO-CREATION AND TRANSFORMATIVE SOCIO-ECOLOGICAL SOLUTIONS TO CLIMATE CHANGE

Domenique Ciavattone

A capstone paper submitted in partial fulfillment of the requirements for a Master of Arts in Climate Change and Global Sustainability at SIT Graduate Institute, USA

July 31, 2022

Advisor: Dr. Alex Alvarez

Consent to Use of Capstone

I hereby grant permission for World Learning to publish my capstone on its websites and in any of its digital/electronic collections, and to reproduce and transmit my CAPSTONE ELECTRONICALLY. I understand that World Learning's websites and digital collections are publicly available via the Internet. I agree that World Learning is NOT responsible for any unauthorized use of my capstone by any third party who might access it on the Internet or otherwise.

Student Name: Domenique Ciavattone

Date: July 31, 2022

Acknowledgements

What a journey this has been! There are so many people that I would like to acknowledge and thank in this Capstone research and writing process. First and foremost, thank you to the *técnicos* and community partners in *Parque de la Papa* and Lares for welcoming me, exchanging knowledge with me, and co-creating with me. Special thanks to my homestay family for opening their home to me so kindly. I am eternally grateful to the entire ANDES staff for their endless support, for their patience with my Spanish, and for collaborating with me on this project. Tammy, I look up to you and the way you approach your work, and I am so grateful for all for your guidance with the Pluriversity. Cass, thank you for your support from the very beginning of my Capstone process. You have been such an invaluable thought-partner, coordinator and friend throughout. To my fellow interns, Leah and Geoffry, I would not have made it through without your camaraderie, without you both as my accountability partners and shoulders to lean on. Alex, I could not have asked for a better advisor in my writing. You elevated my thinking and encouraged me to push the envelope with my research. Richard, you were always available to brainstorm and work through theories and ideas. That dedication and encouragement did not go unnoticed. To Jill, Xavier, Ana Maria, and all of our teams in Iceland and Ecuador, thank you for shaping my academic experiences this year. This research is a culmination of all that I have learned throughout this MA program. And to my classmates (Aiden, Chesley, Danielle, Emma, Haley, Jamie, Mimi, Sam, Soleil) thank you all for being part of this journey – for challenging and supporting me throughout this year. This experience would not have been the same without all of you. To Chris and SherriLynn, thank you for believing me and supporting my application to do this program. And finally, to my family and best friends, thank you from the bottom of my heart for always encouraging me to pursue my dreams, for answering late-night phone calls, dealing with my stress, and loving me always. You are my rocks.

Table of Contents

List of Figures and Tables

Key Abbreviations and Terms

Terms:

There are several Quechua and Spanish terms utilized in this document that have no direct translation, or have a direct translation that cannot fully capture the essence of the word in a different language. Brief descriptions are provided below, and many are expanded upon throughout the paper:

Ayllu – Ayllu is essentially community, individuals with shared principles in relation with spirits, animals, wildlife, crops, mountains, etc. (Argumedo & Wong, 2010).

Ayni – This is the Quechua concept of reciprocity, foundational to the *Ayllus* (Sayre et al., 2017).

Indicadores – This is a Spanish word which directly translates to "indicators" and implies biological and cosmological signs that influence agricultural and life practices.

Pacha Mama – This translates to Mother Earth.

Parque de la Papa – Spanish name which directly translates to "Potato Park".

Sumak Kawsay – This is the Quechua concept of harmonious living, represented by the interdependence of all elements in balance, including wisdom and unity across space and time (ANDES, 2019).

Técnicos (short for *Técnicos Locales*) – This word refers to local experts who work with ANDES and "act as official representatives of their communities to carry out the conservation work of the *Parque* (i.e. working in the seed improvement center, coordinating the seed bank, and planting and harvesting transect plots) as well as acting as the main representatives of the *Parque* for all educational and political activities" (Madden, 2019, p. 28).

Abbreviations:

Asociación ANDES……..ANDES
Farmer Field School……FFS
Parque de la Papa…….....*Parque*

Abstract

In the current era of anthropogenic climate change, Quechua farmers in the Peruvian Andes are some of the most impacted by, yet some of the lowest contributors to global warming. Dominant Western systems alone have proven insufficient in tackling the climate crisis, and there have been increasing efforts to elevate and center Indigenous voices and epistemologies when addressing climate change. Researchers and communities are calling for a bridging of knowledge systems, in which Indigenous and Western methods collaborate to co-create innovative solutions to climate challenges. This research sought to explore methods and successes in bridging Indigenous and Western knowledge systems in *Parque de la Papa* (*Parque*) in the Peruvian Andes through five main inquiries: (1) What are ideal, strong methods for knowledge co-creation? (2) What are the current methods being employed in the *Parque* and what are their benefits and challenges? (3) Who are the bridge actors in this process, and what actions do they take to effectuate change via knowledge co-production? (4) What does it mean to truly co-produce knowledge? (5) Is knowledge co-creation actually possible and effective in the face of climate change? To answer these questions, I utilized a mixed-method approach, employing both Western and decolonial tactics, including: wit(h)nessing; semi-structured, open-ended interviews; auto-ethnography; and co-created reflection sessions. The findings indicate that best methods for knowledge co-creation engage respect, vulnerability and trust, emphasize embodied knowledge exchange, pay attention to logistics, navigate complexities that arise from language differences, utilize tools and visuals, and validate multiple literacies/engage various ways of learning. Many of these methods are already being impactfully employed in the *Parque*. Findings also suggest that bridge actors are key in facilitating knowledge exchange, and they effectuate change through engaging and then teaching/sharing what they have learned with others. Successful knowledge co-creation holds different meaning for different actors, but ultimately centers non-dominant systems and complements them with Western knowledges, creates concrete, tangible outcomes and innovations, produces personal changes for individuals involved, and ripples out beyond co-creative processes. This paper concludes that knowledge bridging is indeed effective and important when addressing and finding solutions to issues related to climate change in the Peruvian Andes and globally.

Objectives

Anthropogenic activity, largely from industry-led fossil fuel extraction, is leading to rapid global warming (Höök & Tang, 2013). Cuzco, Peru is one of the most diverse biological regions in the country, yet it is also highly impacted by climate change (*Asociación* ANDES, 2016). In the past 40 years alone, Cuzco has seen increased temperatures and precipitation during all seasons, significant glacial ice melt, and delays in rain onset which particularly affect farmers and their growing seasons (*Asociación* ANDES, 2016; SENAMHI and PACC, 2012; Taylor et al., 2022; Carey, 2014). Climate change is directly impacting the livelihoods of Quechua communities in the Peruvian Andes who have historically relied on and been stewards of the land that they inhabit and who contribute minimally to the forces influencing climate change (Sayre et al., 2017; Perez et al., 2010). In fact, according to Mistry & Berardi (2016), "satellite imagery suggests that Indigenous lands contribute substantially to maintaining carbon stocks and enhancing biodiversity relative to adjoining territory" (p. 1274).

Current mainstream sustainability and conservation efforts, situated in Western, neoliberal political and economic landscapes, place economic growth at the forefront of development with environmental and social well-being as secondary priorities (Wanner, 2015; Moore, 2015). There is significant international investment in "sustainable development" as a model for maintaining global economic growth while tempering environmental degradation that results from expansion and resource extraction (United Nations, 2021). These dominant, colonial, neoliberal paradigms are leading to the erasure of alternative models, particularly those rooted in Indigenous cosmologies that emphasize the interconnectedness of humans and the earth (Kopnina, 2016). As a result of the neoliberalization of nature, human beings have become increasingly more detached from nature and have begun to see themselves as separate entities, independent from the environment (Kopnina, 2016). Kimmerer (2013) explains that mechanizing

nature likens it to a machine, an object, that we humans run. We become the subjects that dominate and control the land (Kimmerer, 2013). Scholars like Moore (2015) warn of the pitfalls and dangers of embracing environment/society, human/nature dualism and argue instead for a different ontology, embedded in relationality: humanity-in-nature as opposed to humanity vs. nature. Other scholars like Adger et al. (2011) have found that the best way to move forward and make decisions regarding climate change is to recognize and utilize metrics and information that are not driven by markets and that incorporate community input.

Mistry & Berardi (2016) assert that Indigenous peoples, for example, find ways to adapt to climate change that are holistic and responsive to the rippling impacts that global warming and other non-climate related stressors have on communities and livelihoods. Their knowledge systems are at the core of their responses. Andean farmers in Peru, for example, have deep traditional knowledge of agricultural practices, including these practices' origins, uses, names and characteristics, ways to tend to them, and methods of preservation and conservation (*Asociación* ANDES 2016, Sayre et al., 2018).

Currently, more and more communities, activists, organizations and scholars are calling for the inclusion of Indigenous voices and practices in global conversations around climate change mitigation. Many argue that knowledge co-production is crucial and is the best way to engage with climate-related challenges (Harvey et al., 2019; Altamirano, 2014). Harvey et al. (2019) attributes this "to its perceived ability to draw in knowledge from across disciplines; promote shared learning based on collective experience; increase the perceived legitimacy, relevance, and usability of the knowledge being generated among nonacademic stakeholders; and, for some, challenge entrenched norms of 'knowing,' and doing, in the sciences" (Harvey et

al., 2019). Altamirano (2014) calls for Peru to work this into their approaches to policymaking, including more pluralistic methods to create proposals and guidelines for the country.

This research focuses on knowledge co-production in Cuzco, Peru, working closely with Indigenous communities who live in *Parque de la Papa* (*Parque*). The *Parque* consists of approximately 10,000 hectares of High Andes Sacred Valley land located around 50 kilometers outside of Cuzco (*Asociación* ANDES, 2022a; Madden, 2019). It is a bio-cultural territory managed by five of six Indigenous communities of Amaru, Chawaytire, Pampallacta, Paru Paru and Sacaca, with almost 6,000 inhabitants (*Asociación* ANDES, 2022a). The *Parque* focuses on both the conservation of the many potato species (containing the highest in-situ biodiversity of potatoes in the world) and the heritage, traditions and knowledges of the people there (*Asociación* ANDES, 2022a; Madden, 2019). This research was conducted with the NGO *Asociación* ANDES, based in Cuzco, which collaborates with and provides technical assistance and funding for communities in the *Parque*, bridging Western and Indigenous knowledge systems for ecological solutions to climate change impacts (*Asociación* ANDES, 2022a; Madden, 2019). *Asociación* ANDES is also in the process of implementing a Pluriversity, which "aims to address contemporary and future global challenges through the incorporation of Indigenous ways of knowing and doing in agrobiodiversity and land use decision-making, policy, and practice" (*Asociación* ANDES, 2022b, online).

Bridging knowledge systems enables solutions to socio-ecological issues that currently threaten our earth. The goal of this capstone is to produce both a formal academic paper that will contribute to current literature, as well as a co-created resource for all people to utilize (not just those who can read in English/learn via formal papers). This research generates new tools that help illuminate creative, collaborative, equitable pathways to conservation and combatting

climate change in the Peruvian Andes. Additionally, since pluriversities and similar attempts under various names are not yet common, there are currently very few ways of evaluating best practices and of defining what successful knowledge co-creation means to those participating (Harvey et al., 2019). This paper reflects on these gaps in current literature and practice and, moreover, proposes resolutions to select shortcomings. The results of this paper support current literature while also adding new contributions, including important methods for knowledge exchange, perspectives of bridge actors, and varying understandings of what successful knowledge co-creation looks like outside of scholarly and Western definitions.

It is important to note that this research uses the term "Indigenous" to refer to Quechua knowledge systems. This is a term the community itself uses, along with "traditional". I recognize this term can be problematic, as it can homogenize very distinct groups and knowledge systems that have had unique experiences (Smith, 1999). When I use the term "Indigenous" it is with an ever-present awareness that this is not representative of all peoples who identify this way. I also use the word "Andean" and am referring primarily to the two communities I worked with. This is also used with the recognition that there are many different cultures, knowledge systems, and landscapes within the Andean region (Allen, 2019).

Background to the Issue and Case

This research explores many different concepts that must be contextualized in order to understand the results of this study. The background includes information on the history of the researcher, defining socio-ecological solutions, Quechua knowledge systems in the Peruvian Andes, interculturality, plurality, decolonizing knowledge, and bridging knowledge systems.

History of the Researcher

Often in theses such as this one, conceptual frameworks and backgrounds are based on research from top academics. While this paper will pull from prominent scholarly works, it also acknowledges lived experiences, cultural practices and generational knowledge: a combination of different ways of knowing.

Growing up, I saw the direct impacts of climate change on livelihoods in my own family. I was also taught from an early age to respect and acknowledge different ways of learning and understanding the world. Most of this came from my father: a proud snowplow driver who used to joke about moving our family to Buffalo, New York to guarantee snow since it was no longer predictable in Massachusetts as the years became warmer. He also used to joke about "graduating with the highest temperature in his class" and would repeatedly claim he was not "book smart". It is true – my father does not learn well from reading and sitting in classrooms, but he knows everything there was to know about trucks, and he can learn just about anything if he is working with his hands. My brothers also grew up with learning disabilities: one had trouble reading, and one was labeled by his school as having a severe math deficit. This label still follows him around. But he has incredible gifts of reading machines and troubleshooting and fixing their issues. I could never fix the sink or figure out an electrical problem, but I could read above my grade level and was doing high school math in elementary school. I grew up valuing different ways of learning and knowing.

In high school, I began to tutor students in a formal tutoring center. Some of my students were having trouble learning information for their standardized tests, but they all loved music. We formed a band, the Mathamusicians, and through music and movement all students were able to raise their scores. For the past ten years, I have lived and worked all over the world. I worked

for one year using music as a form of therapy and education at a school and home for persons with intellectual and developmental disabilities. Many of my colleagues there were pessimistic about music therapy. One student could not see, hear, or speak, and some colleagues asked me why I would try doing music therapy with him. They assumed hearing was the only way to experience music. This same student was the most excited about music class. A smile lit up his face every time he would bang a drum and feel the vibrations. He was healing and experiencing through music, just differently than I do, for example.

After this experience, I worked in rural Tanzania for two years in an organization that deeply values collaboration, relationship-building and knowledge co-creating. We were looking to find solutions to some of the major environmental challenges my partners, who worked in subsistence agriculture, were facing with climate change. I would consider the work to have been successful in many ways, but also know there was more we could have done to better co-create solutions. I plan to ask my former partners what they experienced, as well.

I also worked for three semesters as an IHP Fellow, facilitating community building sessions. In this role, my job was to facilitate affective learning, which IHP considers equally important to intellectual learning. While the students were receiving knowledge through classes and site visits, they were also learning through feeling, and my role was to bridge those modes of understanding. The sessions I led were often co-facilitated, and the student voices and participation were incredibly important. Co-creation was the goal.

My work in South Africa provided the foundations for my understanding of decolonization of knowledge through an educational program that centered marginalized narratives and placed great value in lived experiences. While there, I also studied Eco-Ubuntu, exploring the interconnectedness of all life. I became fascinated with the concept of *Buen Vivir*

when I spent time in an agro-food forest in the Atlantic Rainforest in Brazil. I was in a community that grounded themselves in reciprocity and symbiosis. My primary teacher saw himself as a steward of the land, with the plants and animals as his teachers. He spent 25 years reforesting the land and is a huge inspiration for me.

As part of my current graduate program, I met with Kichwa communities in Ecuador and heard first-hand about people's own cosmovisions and the impacts they have felt with *Buen Vivir* being written into Ecuador's constitution. All of these experiences and more have led to my fascination with and desire to advance Pluriversities and promote epistemic-diversity and the validation of ways of knowing and learning. My truth is not the only truth, but it is a truth, and I am continually growing and changing.

Defining Socio-Ecological Approaches

This paper specifically explores knowledge bridging in pursuit of socio-ecological solutions to current and expected climate changes. The term socio-ecological is intentionally utilized because this research takes a more holistic approach to combatting climate change and seeks to overcome the human-nature dichotomy of Western though. Socio-ecological typically encompasses environment-human connections, linking biophysical and social systems (Young et al., 2006). Pope et al. (2021) argue that the current dominant paradigms have "alienated the production of knowledge from its ontological foundations, becoming insufficient to perceive the systemicity and multi-dimensionality of current socio-ecological phenomena, interdependent in time and space, with their feedback loops, circular causality, globality, uncertainty, and complexity" (Pope et al., 2021, p. 2).

Quechua Knowledge Systems in Peruvian Andes

Quechua knowledge systems are integral to this research. The systems are far too complex to capture in words, particularly in a capstone like this, but this section explores some key aspects that will be discussed throughout the paper.

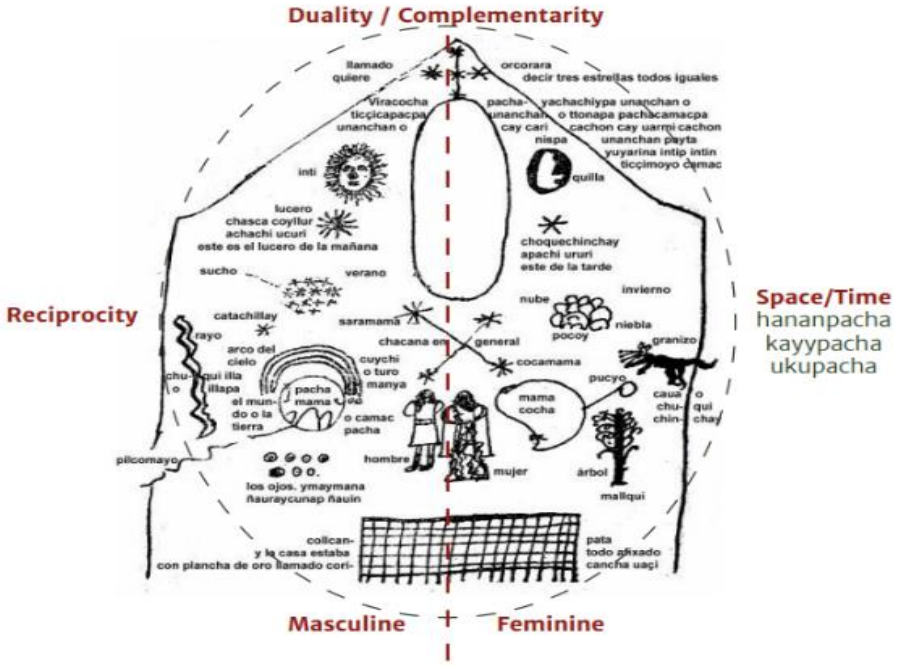
Sumak Kawsay

Many Quechua people in Peru are grounded in a cosmovision based on "good living" called *Sumak Kawsay*. Acknowledging my Western, non-Indigenous positionality, I will explain such concepts based on other researchers' explanations and descriptions from Quechua people in the *Parque*, with the caveat that these descriptions will inevitably be inadequate and cannot be thoroughly understood by the author nor properly translated to the reader. For the sake of context, however, limited descriptions and Quechua artistic depictions are included.

Cuestas-Caza (2018) describes *Sumak Kawsay* as an epistemology that "rests on critical and decolonial thinking, community thinking, reciprocity and solidarity, and aesthetic-symbolic relationality" (p. 55). This way of existing "includes other beings, animals, plants, minerals, stars, spirits and divinities and is governed by the principles of relationality, complementarity, correspondence, reciprocity and cyclicity (Cuestas-Caza, 2018, p. 56).

Figure 1

Santa Cruz Pachakuti – Quechua Cosmovision



Note: A conceptual graphic of "a drawing made by the chronicler Juan de Santa Cruz Pachakuti Yamqui Salcamaygua, based on an image made of gold, found on the altar of the Q'oricancha, or Temple of the Sun in Cuzco, in the early 17th century" (*Asociación* ANDES, 2019, p. 11).

Buen vivir is often conflated with *Sumak Kawsay,* though in reality the concept is a politicized version of "living well", losing some of its nuances for the sake of becoming more encompassing of multiple Indigenous cosmovisions (Cuestas-Caza, 2018). *Buen vivir*, by popular definition, "denotes, organizes and constructs a system of knowledge and living based on the communion of humans and nature and on the spatial-temporal-harmonious totality of existence" (Walsh, 2010, p. 18). Leading *Buen vivir* scholar Gudynas (2011) describes the concept as a different set of ethics that balance democracy, the environment and quality of life, basing development not on economic indicators, but on the wellbeing of humans within communities within broader ecosystems. *Buen vivir* is a complicated concept, perceived, defined and interpreted differently by different stakeholders and actors. Some Indigenous activists argue

that “living well increasingly depends on an ability to translate and move between different conceptions of Indigenous lands” (High, 2020, p. 302). It is important to note that, “when considering the Quechua knowledge system… the idea of a singular knowledge system can be misleading as there are six Quechua South American countries… with approximately ten million Quechua peoples” (Huaman, 2017, p. 15). Knowledge is context- and culture-specific, and Quechua systems cannot be considered homogenous or static (Huaman, 2017; Murove, 2018). In the *Parque*, *Sumak Kawsay* is represented by the interdependence of all elements in harmony and balance, including wisdom and unity across space and time (*Asociación* ANDES, 2019) (See Appendix C).

Ayllus

Sumak Kawsay has been described by farmers in the *Parque* as a way of being in community, in harmony and balance, with all of the *ayllus* (Sayre et al., 2017; *Asociación* ANDES, 2016). *Ayllu* is essentially community, individuals with shared principles in relation with spirits, animals, wildlife, crops, mountains, etc. (Argumedo & Wong, 2010). The *ayllus*, like most concepts in the Quechua cosmovision, are captured in three components*: auki, sallq’a* and *runa* (ANDES *Técnicos*, personal communication, June 22, 2022). *Runa ayllu* includes humans and domesticated animals and plants, in which the mental, physical and spiritual health of people is connected to all other *ayllus* (Sayre et al., 2017). *Auki ayllu* encompasses all sacred things, such as the *apus* or mountains and ancestors, which have tremendous importance (Sayre et al., 2017; *Asociación* ANDES, 2016). *Sallka ayllu* includes all wild things, including animals, non-domesticated plants, and landscapes (Sayre et al., 2017). *Ayni*, or the concept of reciprocity, is foundational and connects the *ayllus* (Sayre et al., 2017*). Pacha Mama* is the base of everything – the reason for community, for the *ayllus* (ANDES *Técnico*, personal communication, June 22, 2022).

Conceptions of Time

The way Quechua people conceive of time also looks differently than Western, more linear conceptions of time. Kimmerer (2013) emphasized the dominant historical representations of time as a line or a river moving in a single direction towards the ocean. She goes on to share an alternative, Indigenous understanding of time as a circle, or as the ocean itself (Kimmerer, 2013). Decolonial Indigenous scholar Smith (1999) highlighted the different orientations in time and space and different language systems that influence understandings of past and present in relation to land. Cuelenaere (2011) adds that ways of understanding time are often influenced by movement in space, in a more embodied sense. Quechua people, for example, hold time in relation to space with *Hanan, Kay, Urin Pacha* (see Figure 1) which relates time to the spaces of the worlds below, this world, and above (*Asociación* ANDES, 2019). This is a nonlinear, spiral-like conception (*Asociación* ANDES, 2019).

Interculturality and Plurality

The concepts of epistemology, plurality and interculturality are foundational to this research. "Epistemology" is often defined as a way of knowing the world (Jones 2002). Many scholars studying epistemologies debate whether knowledges are inextricably linked with social experiences and therefore deeply rooted in social systems (Cundill et al., 2005; Jones, 2002).

Interculturality and plurality stem from the understanding that knowledge is produced and experienced differently by people across the world. According to Walsh (2012), epistemic interculturality "enables…work towards the relating of knowledges within and from difference, a relating that requires an epistemic transformation in our very understanding of knowledge, philosophy and thought, and the continental rationalities that underlie this thinking" (p. 17). Interculturality is integral to Indigenous thinking and practices. Currently, the world operates on

colonial, Westernized knowledge systems that position Indigenous knowledges as "other" and attempt to situate them within the dominant systems (Walsh, 2012). This also applies to ecological approaches, in which scientific communities absorb and assimilate local knowledge into their own approaches to working with nature (Mistry & Berardi, 2016). Hall & Tandon (2017) take this a step further and talk about Western knowledge systems causing epistemicide, quashing and killing other knowledge systems. Thus, hegemonic systems promote adaptation and capacity building of Indigenous peoples in order to integrate them into the dominant economic, political and intellectual systems that separate humans from nature and have proven to be unsustainable (Gudynas, 2010; Cabello & Gilbertson, 2012).

The goal of interculturality, however, is not to make equivalent Indigenous and Western knowledge systems or attempt to jigsaw these ways of knowing into current dominant systems (Murove, 2018). Epistemic interculturality extends well beyond this, as "more than an ability to move between worlds or to function in a zone of contact or a border place of relation," and instead focuses on the "intercultural co-construction of diverse epistemologies and cosmologies, in which knowledge, as philosophy, is never complete but always 'in construction'" (Walsh, 2012, p. 17).

Some scholars argue that embracing plurality and interculturality in order to shift current hegemonic paradigms is essential on local, national and international scales (Walsh, 2011; Cabello & Gilbertson, 2012). For instance, when writing about forest management and REDD+ initiatives, Cabello & Gilbertson (2012) assert that "there is a crucial need within scholarly debates related to forests and lands to bridge Western knowledge to existing knowledges which have protected these forested lands for centuries" (p. 175). Collaboration and co-creation of forest management systems has proven to be a more successful approach to conservation and

ecological well-being (McKemey et al., 2021). Other researchers, like Buzinde et al. (2020), argue that "co-produced solutions are essential for sustainability outcomes, and they require effective boundary organizations capable of translating and coordinating across cultural paradigms" (p. 1). Walsh (2011) points-out the need for radical transformations on national scales in order to transition countries into plurinational states, reconstructing societies on the basis on interculturality.

Interculturality, according to Aman (2016), is a core component in Indigenous social movements in the Andean regions of Latin America, particularly in their struggles for recognition both publicly and politically and must be understood not as a Westernized interpretation of cultural sharing, but as creating inter-epistemic spaces.

In relation to interculturality, plurality and pluriversality are at the core of this research. Many scholars who write about plurality reference a famous quote by the Mexican Zapatistas:

> Many words are walked in the world. Many worlds are made. Many worlds make us. There are words and worlds that are lies and injustices. There are words and worlds that are truthful and true. In the world of the powerful there is room only for the big and their helpers. In the world we want, everybody fits. The world we want is a world in which many worlds fit (Ejército Zapatista de Liberación Nacional, 1996, online).

Leading scholars in plurality include Arturo Escobar, Marisol de la Cadena and Mario Blaser, all of whom connect their work to this phrase, "a world in which many worlds fit" (Escobar, 2018; Blaser & de la Cadena, 2018; Ejército Zapatista de Liberación Nacional, 1996). Escobar (2018) builds off this idea in his work and argues that the "Zapatista put it with stunning clarity" (p. xvi). Blaser & de la Cadena (2018) titled their popular book after this: *A World of Many Worlds*. To them, this is the very definition of a pluriverse: "heterogeneous worldings coming together as a political ecology of practices, negotiating their difficult being together in heterogeneity" (Blaser & de la Cadena, 2018, p. 4). It requires an acknowledgement of the

"uncommons", or shared yet different interests, needs and goals (Blaser & de la Cadena, 2018; Stengers, 2005). Escobar (2018) considers epistemic diversity to include distinctions stemming from colonial legacies, while pluriverses result from ontological difference. Savransky (2018) concretizes this, asserting that "relaying the Zapatistas' call to build 'a world where many worlds fit' involves reclaiming the pluriverse as a cosmological manifold that can host a multiplicity of alternative political practices and projects in its midst" (p. 126).

Similarly, according to Mignolo (2013), pluriversality does not imply cultural relativism. It is instead an "entanglement of several cosmologies connected today in a power differential," where "that power differential is the logic of coloniality covered up by the rhetorical narrative of modernity… a fiction that carries in it the seed of Western pretense to universality" (Mignolo, 2013, online). Others refer to plurality as embracing and allowing for the existence of a multitude of different realities (Savransky, 2021; Blaser & de la Cadena, 2018). Savransky (2021) delves more deeply into this idea, asserting that plurality is "not to solve but to learn to inhabit the problem of differences, of the one and the many, to feel this "and," in its viscosities and its openings, in its violences and its possibilities – pluralizing reality" (Savransky, 2021, p. 7). The concept of plurality will be expended upon in coming sections as foundational components of bridging knowledge systems and creating pluriversities.

Decolonizing Knowledge Systems

Pluriversality stems from decolonial theory, and in order for the world to shift and further embrace the concepts of interculturality and plurality, there must be a level of decolonizing of knowledge that takes place (Perry, 2020). Smith (1999) emphasizes that "for many Indigenous peoples the major agency for imposing this positional superiority over knowledge, language and culture was colonial education" (p. 64). Decolonial scholar Mbembe (2016) expresses the need

to decolonize education systems, shifting away from schools as businesses, as products purchased and sold, reduced to standardized tests and rote curricula with numerical, measurable standards. This greatly inhibits the transferal and exploration of knowledge. Wa Thiong'o (1981) writes that "education is a means of knowledge about ourselves.... After we have examined ourselves, we radiate outwards and discover peoples and worlds around us" (p.94). Essentially, people must explore and embrace their own knowledges before engaging with others, particularly hegemonic systems. Decolonizing must happen before exchanging. Scholars like Mignolo (2011) and Aman (2016) agree that delinking from Western colonial systems and their matrices of power are essential in order to imagine worlds where the earth (including humans) is no longer exploited.

This is not to imply that Indigenous knowledge systems are immutable. Scholars would be remiss to say Indigenous knowledges are not evolving or changing over time; an essentialist approach is dangerous (Smith, 1999). "Authenticity" does not imply stagnancy, and Indigenous knowledges deserve the same space to grow and shift and explore their complexities (Smith, 1999). This cannot solely be a privilege of the West, as it currently stands (Smith, 1999). Demaria & Kothari (2017) share "the dominant Western development model is a homogenizing construct, one that has usually been adopted by people across the world under material duress" (p. xvii). They argue instead for a post-development approach in which socio-ecological issues and transformations are viewed multi-dimensionally (Demaria & Kothari, 2017).

Bridging Knowledge Systems

Bridging knowledge systems is an important concept in this paper and has been written about both theoretically and practically. It is helpful to define the concept, discuss key actors and

their roles, outline pluriversities and methodologies for practicing knowledge co-creation, and acknowledge where this is currently happening in Peru.

What is it?

Knowledge co-creation is crucial for addressing complex global issues that stem from climate change, providing opportunities for collective imagination in the face of uncertainty and despair (Harvey et al., 2019; Savransky, 2021; Adger et al., 2011; Munda, 2002). The co-production of knowledge relies on the bridging of knowledge systems to reach across cultures and disciplines and create opportunities for collective learning and decision-making while challenging the very definition of knowledge in dominant, Western spheres (Harvey et al., 2019). Adger et al. (2011) suggest that said decision-making must recognize non-instrumental, non-market assessments and metrics, and must reflect communities and their identities.

According to Tengö et al. (2017) "bridging Indigenous and local knowledge systems with scientific knowledge systems is vital to enhance knowledge, practice, and ethics to move towards sustainability at multiple scales" (p. 17). Mistry & Berardi (2016) "suggest that any effort to solve real-world problems should first engage with those local communities that are most affected, beginning from the perspective of Indigenous knowledge and then seeking relevant scientific knowledge—not to validate Indigenous knowledge, but to expand the range of options for action" (p. 1275). With this approach, communities would be more likely to trust and integrate scientific knowledge while maintaining self-determination (Mistry & Berardi, 2016).

Many researchers use the term "bridging" to connect knowledge systems, but it is also important to include other ways of representing this concept. Tengö et al. (2017) use the metaphor of weaving to represent the integration or various knowledge systems, which implies the interconnectedness of systems that still maintain their own integrity. They lay out a format

(see Appendix E) of mobilizing knowledges, translating knowledges to be mutually comprehensible, negotiating and finding points of both similarity and agreement, synthesizing which involves integrating the systems, and finally, applying knowledge by using new hybrid systems for decision-making processes (Tengö et al., 2017). The ANDES *Yachay Kuychi* Pluriversity conceptualizes knowledge exchange and collaboration as a "rainbow of knowledges" (translation from *Yachay Kuychi*) (*Asociación* ANDES Staff Member, personal communication, June 28, 2022). Some researchers, like Cundill et al. (2005), prefer to use the metaphor of knowledge boats rather than bridges, highlighting that knowledge bases and starting points are often not fixed. These researchers utilize the case study of Peru to explore the scale and complexity of bridging knowledge systems through transdisciplinary approaches to conservation (Cundill et al., 2005).

When bridging knowledge systems, it is essential to recognize the uncommons, as Stengers (2005) articulated. There are some things that science truly cannot measure, some losses that people from the west cannot truly comprehend, as value holds different meaning for different people (Stengers, 2005). Blaser & de la Cadena (2018) use an example of a mountain in the Peruvian Andes, which is also considered to be a being. Destruction of this mountain was difficult for Western analysts to quantify or grasp, as it was not just the destruction of "nature" it was the destruction of a spirit (Blaser & de la Cadena, 2018). Blaser & de la Cadena (2018) share that "making public these kinds of other-than-humans is difficult for those who live with them; translating their destruction into a political issue is often impossible and even disempowering" (p. 2).

Funtowiczi & Ravetz (2003) discuss the bridging of knowledge systems as a form of Post-Normal Science (PNS). In their work, they assert that community participants are not

passively deferring to the words of "expert" scientists; peer communities play and active role in shaping research and contributing information. People are sharing their histories, knowledge of places, anecdotal evidence of climate change issues, their craft wisdom, etc. (Funtowiczi & Ravetz, 2003). They also assert that this peer engagement has been strengthened by the presence of the internet, with mutual education and collaboration across countries (Funtowiczi & Ravetz, 2003). Funtowiczi & Ravetz (2003) reinforce that "local people can imagine solutions and reformulate problems in ways that the accredited experts, with the best will in the world, do not find 'normal'" but "PNS provides a rationale whereby this traditional knowledge is utilized, harmonized, enhanced and validated anew" (p. 7). They push for solutions that "will no longer be rigid demonstration, but inclusive dialogue" (Funtowiczi & Ravetz, 2003, p. 7). Munda (2002) supports this, claiming that there must be an integration of both Western scientific methods and local knowledges/values in evaluating public policy.

Importance of Bridge Actors

In the process of knowledge co-creation, the people who come to the figurative table to exchange and co-create are essential. For the sake of this paper, we will refer to said people as bridge actors. Tengö et al. (2017) even refers to knowledge systems "as networks of actors connected by – formal and informal – social relationships that dynamically combine doing, learning, and knowing" (p. 19). Harvey et al. (2019) assert that the nature of the interactions between bridge actors is also important.

Some researchers refer to the act of sharing and entering into knowledge exchange spaces, particularly actors with experience in international and intercultural settings, as "brokering" (Tengö et al., 2017; Pohl et al., 2010). Pohl et al. (2010) outline two different approaches that bridge actors take when exchanging knowledge: 1. People act as brokers to

mediate spaces, and 2. the space is more free-form and permeable where boundaries are not well-defined. Escobar (1998) talks about the engagement of NGOs and actors in social movements who enter into these discussions, further transnationalizing conversations.

Some scholars assert that Indigenous communities that have familiarity with working with many different actors allow them to form strong eco-political alliances, international and other Indigenous allies (High, 2020). High (2020) writes about Waorani communities in Ecuador, and argue that "face-to-face relationships with environmentalists, whether involving technical training, paid work in environmental mapping, long-terms friendships, or shared family life, have allowed some Waorani to engage productively across different understandings of their territory and its conservation" (p. 306). Actors who actively and consistently navigate different knowledge systems are more equipped to move between worlds and connect with others.

Pluriversities and Methodologies – Putting Plurality into Practice

Many scholars argue for the need to shift from the Eurocentric university model to a pluriversity model (Aman, 2018; Escobar, 2018; Hall & Tandon, 2017). Leading thinkers have outlined proposals and designs for pluriversities that center around participatory and collaborative spaces, intended to be socially responsible, decolonial, and responsive to global social and ecological crises (Escobar, 2018; Neretti, 2022). Pluriversities currently exist primarily in theory. In practice, they become far more complicated.

Escobar's work (2018) is foundational, upon which many attempted pluriversities have designed their methodologies and goals (Neretti, 2022). Escobar (2018) acknowledges hegemonic epistemologies and ontologies and makes a case for reclaiming design that considers colonial histories and actively deconstructs their power imbalances. He asserts that when designing, one must consider the "dualist ontology of separation, control, and appropriation that

has progressively become dominant in patriarchal capitalist modernity, on the one hand, and inquiring into existing and potential rationalities and modes of being that emphasize the profound relationality and interconnectedness of all that is, on the other" (Escobar, 2018, p. 20). Escobar (2018) highlights two forms of transition thinking to relieve some of the social and ecological destructions taking place globally, including: design for transitions and design for autonomy of communities to defend their worlds and ways of being. Reshaping the world requires solutions based on collaboration and relationality, rooted in cultural and historical awareness (Escobar, 2018). Escobar (2018) reminds us that "it is, however, a Latin American contribution to the transnational conversation on design, that is, a contribution that stems from contemporary Latin American epistemic and political experiences and struggle" (Escobar, 2018).

While Escobar's works serve as foundational pieces for this research, I also pull from and build off other prominent scholars, activists, community leaders and practitioners. Savransky (2021) refers to an "experiment in harnessing the potential of design practices and traditions so as to precipitate environmental, epochal, and civilizational transitions into other-than-capitalist, ecological forms of togetherness" (p. 126). Savransky (2021) conceptualizes pluralism as "a pragmatics of the pluriverse: the always ongoing and unfinished task of remaining attentive to fugitive shatter zones, of intensifying what still happens and can still happen in divergent spaces of refuge where differences keep on proliferating… where they intimate the possibility of other worlds in this world" (p. 131). Mbembe (2016) views pluriversities as horizontal strategies that create space for dialogue between different epistemologies and traditions. He asserts that in order to decolonize educational systems, we must focus on "open critical cosmopolitan pluriversalism" which "involves the radical refounding of our ways of thinking and a transcendence of our disciplinary divisions" (Mbembe, 2016, p. 19).

Pete (2016) outlines 100 ways to indigenize and decolonize academia, spanning large-scale suggestions like reviewing UN documents to more localized approaches like co-creating and co-teaching university courses with Indigenous people. Smith (1999) shares concepts rooted in the Maori system for creating space for knowledge sharing and co-production, including:

> 1. Aroha ki te tangata (a respect for people). 2. Kanohi kitea (the seen face, that is present yourself to people face to face). 3. Titiro, whakarongo ... korero (look, listen ... speak). 4. Manaaki ki te tangata (share and host people, be generous). 5. Kia tupato (be cautious). 6. Kaua e takahia te mana o te tangata (do not trample over the mana of people). 7. kaua e mahaki (don't flaunt your knowledge) (p.120).

Hall & Tandon (2017) also offer important questions to guide co-productive dialogues, which primarily center around critical self-reflections and exploring one's own identity first. The ultimate question they ask is: "How do we become a part of creating the new architecture of knowledge that allows co-construction of knowledge between intellectuals in academia and intellectuals located in community settings?" (Hall & Tandon, 2017, p. 17).

Many organizations are attempting to begin to integrate the voices of non-dominant participants. The Fork to Farm Dialogues, for example, is at the forefront of connecting farmers and policymakers (Nourish Scotland, 2021). Their primary focus is on relationship-building between the two sets of actors in order to enhance conversations that influence policies (Nourish Scotland, 2021). At COP26 in Glasgow, they were able to unite farmers from diverse backgrounds and UN policymakers to discuss climate policies, taking a decolonial approach (Nourish Scotland, 2021). Their website includes toolkits and extensive resources on how to hold space for knowledge co-creation across seemingly drastically different backgrounds (Nourish Scotland, 2021).

Okun & Jones (2000) write about the pillars of white supremacy culture and offer antidotes in response. They intentionally write in all lowercase letters and format the paper

differently than formal academic articles. The pillars they explore are perfectionism, sense of urgency, defensiveness, quantity over quality, worship of the written word, only one right way, paternalism, either/or thinking, power hoarding, fear of open conflict, individualism, "I am the only one", progress is bigger/more, objectivity, and right to comfort (Okun & Jones, 2000). Oftentimes, organizations uphold and reproduce white supremacy culture without being aware of it, making it almost impossible for other cultures to express their standards, and Okun & Jones (2000) created this list to highlight this issue and offer solutions.

Cēsis Pluriversity International Summer School (2022) is a school in Latvia that is attempting to create a pluriversity, founded on relational, decolonial pillars that exist in "a multicultural and liminal learning landscape" (online). The school does not have an address and utilizes the entire city as a school. The program seeks to address current global crises, including climate change, through processes of de-re-construction, or unlearning and relearning (Cēsis Pluriversity International Summer School, 2022). The creators believe universities will eventually become obsolete and want to transform higher education into an "environment of knowledge and landscape of care" – a "complex web and relationships of already existing formal education spaces, creative and artistic plainairs, education research conferences, philosophical symposiums, gardens as classrooms and summer schools with the transformative potential to turn public space into a new kind of interconnected learning environment" (Cēsis Pluriversity International Summer School, 2022, online). Since pluriversities and similar attempts under various names are not common, there are currently few known ways of evaluating their success.

Knowledge Co-creation for Climate Resilience in Peru

Knowledge co-production and the creation of pluriversities are also happening in Peru. Researchers, such as Huaman (2017) and Mathez (2018), have studied knowledge-bridging in

the Peruvian Andes, particularly with regards to e Indigenous Rights Education (IRE). IRE takes into consideration the colonial legacies and the Westernized education systems that dominate in Peru and bolster Indigenous ways of knowing and transferring knowledge (Huaman, 2017). Mathez (2018) emphasizes many agricultural projects in the Peruvian Andes where knowledge co-creation is happening and argues that education must coincide with peoples' realities. Mathez (2018) asserts that social learning tools and continued integration of Indigenous knowledges into formal academia are important steps for Peru.

SIFOR (Smallholder Innovation for Resilience: Strengthening Innovation Systems for Food Security in the Face of Climate Change) is a multi-country project that created a qualitative baselines in places like the *Parque* in Peru that addresses the use of different knowledge systems in creating biocultural innovations (*Asociación* ANDES, 2016). The project specifically focuses on biocultural innovations and not just traditional knowledge (TK) to emphasize the "interaction among the components of biocultural heritage, including TK, biodiversity, landscapes, cultural and spiritual values and customary laws (endogenous innovations), and between traditional knowledge and science (collaborative innovations)" (*Asociación* ANDES, 2016, p. 10).

This work is being done in partnership with ANDES. ANDES deeply values knowledge co-creation for biocultural innovations, and has launched the *Yachay Kuychi* Pluriversity, which takes a decolonial, transformative approach to tackling prominent ecological issues in the surrounding Andean communities (*Asociación* ANDES, 2019). The methods "based on the understandings of multiple literacies and participatory curriculum development support the integration of diverse but complementary knowledge systems, allowing traditional knowledge and modern science and technology to come together in the search for solutions to complex global problems" (*Asociación* ANDES, 2019, p. 29). The Pluriversity is building off of

everything ANDES has already been doing for years (*Asociación* ANDES Staff Member, personal communication, June 28, 2022). Argumendo & Wong (2010) share a goal of the *Parque* to establish alternative, more inclusive models for development and conservation. The Pluriversity is a space to create mechanisms "for a rights-based approach to participatory research and development, which enables synergies between science and traditional knowledge for creating more sustainable and just ways into the future" (Sayre et al., 2017, p. 104). Participants and facilitators include people from local Quechua communities, Indigenous peoples around the world, researchers and scientists from Peru and globally, who have goals to bridge and systematize knowledge systems and influence policy to support conservation and Indigenous rights (Sayre et al., 2017; *Asociación* ANDES, 2019).

Some of the ways ANDES is actively bridging systems include (all from *Asociación* ANDES, 2019):

- Farmer Field Schools (FSS) – space for farmers and scientists to collaborate on research and learning; "are intended to facilitate Participatory Plant Breeding (PPB) activities, which can lead to the development of seed varieties suited to local conditions and preferences and resistant to extreme and changing climate conditions. PPB can also increase the diversity of seeds that farmers have access to, thereby increasing resilience in the face of climate change" (p. 24)
- Participatory action research – led by communities on an array of topics like climate change, nutrition, traditional agriculture, etc.
- Internships and volunteering, often with international participation

Some of the tools and methods ANDES uses for knowledge exchange include (all from *Asociación* ANDES, 2019):

- Conceptual Graphics
- Workshops and materials (ie. agendas, logistical components, maps, etc.)
- Information Sheets (for FFS, biological cycle of crops, plagues and pests, indicators, etc.)
- Audio-visual materials

Additionally, language is an important consideration for ANDES, and most workshops are held in Quechua so all community members can fully express themselves in their preferred

language (Sayre et al., 2017). ANDES also uses the Khipu system, a prehispanic method for systematizing and storing information (Argumedo & Wong, 2010). The *Parque* has created Local Biocultural Databases using this system, which allows communities to collect and register Indigenous knowledge based on their own traditional systems (Argumedo & Wong, 2010). The Khipu "is a tool that can be used to conserve, promote and protect local knowledge, thus becoming useful in facing political, social and technological challenges that are all too common in this era of globalization" (Argumedo & Wong, 2010, p. 88).

Research Questions

- What are strong methods for bridging knowledge systems in the Peruvian Andes?
- What are the current methods being employed to bridge Indigenous and Western knowledge systems at *Parque de la Papa*? What are the benefits and the challenges of those methods?
- Who are the bridge actors in this process, and what actions do they take to effectuate change in knowledge co-production at *Parque de la Papa*?
- How do we measure successful knowledge co-creation? What does it mean to truly co-produce knowledge?
- Can knowledge co-production and bridging Indigenous and Western knowledge systems create socio-ecological solutions for environmental protection and livelihood resilience in the face of climate change?

Methods

Anthropologist Behar (1997) writes "nothing is stranger than this business of humans observing other humans in order to write about them" (p. 5). Smith (1999) shares an Indigenous perspective that "the term 'research' is inextricably linked to European imperialism and

colonialism" (p. 1). In typical Western discourse, Indigenous communities are presented as the Other, which infiltrates every aspect of educational institutions, from the vocabulary and imagery used, to the articles produced (Said, 1978; Smith, 1999). Smith (1999) does assert, however, that some researchers have developed mutually beneficial projects with Indigenous peoples.

I have actively worked to employ and co-create methods that breakdown these imperialistic, colonial approaches, though I also want to acknowledge that given the time-constraints, parameters of this capstone, and my own socialization, I was not able to fully decolonize my methodology. My research itself focuses on new pathways to engage the world and come to meaningful understandings, both theoretically and practically. I have engaged in a mixed-method approach that incorporates both Western and decolonial methods.

While it is common to engage in "participant-observation" methods, I have chosen to take a slightly different approach to learning while experiencing. Recognizing that not all knowledge is transferred or experienced in language or verbal interactions, nor is data collected in a vacuum, I chose to engage in "wit(h)nessing" as my primary research method. This method was a result of Ettinger's (2006) work and is utilized and written about by Boscacci (2018), who suggests that all encounters are exchanges. It essentially implies that there is no independent subjectivity, and that with every "I" there is a "non-I" and therefore, a relationship. Thus, "we cannot remove ourselves from our world in order to examine it" (Wilson, 2020, p. 14).

Both scholars problematized the concept of witness, and alternatively "propose wit(h)nessing as a waymaker that enriches and extends the work of witnessing by embracing the teachings of affect and more-than-visual sensing and mattering in our humanimal encounters" (Boscacci, 2018, p. 343). Wit(h)nessing thus "becomes a modality of being present in whole-bodied attunement and attention in encountering" (Boscacci, 2018, p. 345-346). I am a present,

sensory being who cannot and should not detach my experiences from my research. Affect plays an important role in research experiences, which "pertains to the forces and intensities of encounters and to the passages of these energies as becomings of thinking, making, doing, and undoing in research-practice" (Boscacci, 2018, p. 344).

With this as a preface, I chose to participate in a homestay with one of the *técnicos* for ANDES in the *Parque* as my primary wit(h)nessing experience. I shadowed him for three days to understand his day-to-day activities. I was able to participate in six sessions he led with students and tourists, twice in Quechua, twice in Spanish, and twice with an English translator. These sessions took place primarily in Pampallacta, a community that has a potato museum and a seedbank. It is comprised of three rooms and an outdoor space, with visual aids, traditional tools, an agricultural calendar, and many varieties of potatoes. I was also able to walk/hike long distances with him while we discussed the landscape, cosmovisions and life experiences. On my last day in the *Parque*, we hiked 2.5 hours to his *chakra* (farm)[1] where we met with the *técnico* group to harvest a small transect of potatoes with the group's agronomist. During this homestay, I took extensive notes in a field notebook. I typically divided my pages into two sides: one for observations and information being shared, and one for my responses and feelings in each moment.

Additionally, I have chosen to find an alternative to focus groups as an interview method, which also tends to isolate and elevate the researcher. Instead, I co-designed a reflection session with 23 people in ANDES (including staff from Canada, Cuzco, the *Parque*, and the USA, as well as *técnicos* and community members from Lares and the *Parque*). This session was based on equitable exchange with a reflective core component: a meta session intentionally designed to

[1] *Chakra* is loosely translated to farm, but is more complex, implying a space and system of reciprocity and mutuality, rooted in Sumak Kawsay (Coq-Huelva et al., 2017; Heredia-R et al., 2020; Grillo Fernandez, 1998).

promote knowledge co-creation about knowledge co-creation. This session was intended to feed into the co-creation of a Pluriversty toolkit on biocultural education in the Peruvian Andes. I was part of the co-creation process, and those experiences (specifically the reflection session) have informed my research, as well. The agenda for the session (see Appendix B) included a round of introductions, a session led by external facilitators (not utilized in this research), a break for restrooms and refreshments, a group dialogue/story-telling with photos on a giant television screen from their past experiences working with international groups (in Peru and in other countries), an active game where participants received photos of animals and were asked to act out their animals to find their groups, small group discussions anywhere in the vicinity, a share out session in the larger group, lunch, and a synthesis at the end. The session was delayed because the outside facilitators ran an hour over their time, which caused us to shorten some of the sections of the session. During this session, most participants were speaking in Quechua. I sat with two colleagues who are fluent in Quechua who translated to Spanish in real-time for me.

Additionally, I utilized auto-ethnography, with a reflection on myself as a bridge actor and my experiences working with all of my colleagues in ANDES. I looked at the role I play and how I am/can become a stronger bridge actor. Co-production of knowledge requires adequate reflection, so this reflexivity in my work helps to shed more light on the co-production process. My process also intentionally included my emotional journey. Behar (1997) wrote about the importance of vulnerability in research, as vulnerability begets vulnerability. I am a human, processing and sensing, and I have had valuable emotional responses to my research that I believe enhance my findings.

This project also included open-ended, semi-structured interviews (the most "Western" method employed in this research). I conducted six interviews in total. Each lasted between 40

minutes to an hour. These interviews included people who are on ANDES' staff and/or identify as leaders in spaces that require bridging knowledge systems, some from within the *Parque* de la Papa community, and some NGO workers with non-Indigenous heritage. I tailored my interview questions based on each interviewee (See Appendix A). Specifically, I interviewed:

- Interviewee 1: A *técnico* from the *Parque* whose first language is Quechua and is fluent in Spanish; has been working with ANDES for many years and gives presentations in the *Parque* museum for students and tourists. Interview took place in the *Parque*.
- Interviewee 2: An agronomist whose first language is Spanish, but her family is Quechua and she taught herself Quechua as an adult; leads farmer field school trainings; leads agricultural research; spends significant time in the *Parque*. Interview took place via video call.
- Interviewees 3 and 4: Two ANDES employees who both speak Quechua as their first language and grew up in the *Parque*; both now live/spend significant time outside of the *Parque* and are fluent in Spanish; both work with interns and staff from other countries/cultures; both do administrative work for the organization. Each interview took place in-person, outdoors. Interview with Interviewee 3 took place at his home. Interview with Interviewee 4 took place in a small park in Cuzco.
- Interviewee 5: An ANDES employee from a city in Peru whose first language is Spanish; does not speak Quechua and is not from a Quechua family; works often in the *Parque* and has strong relationships there; does many different jobs and tasks for ANDES. Interview took place via video call.

- Interviewee 6: An ANDES employee from outside of Peru (USA) – first language is English; fluent in Spanish and has a working knowledge of Quechua. Interview took place in-person in a quiet, small café.

With consent of interviewees (in an accessible and understandable consent process based on individual needs), interviews were recorded. All interviews were coded for confidentiality, as well as stored in an encrypted personal external drive for protection of data.

Ethical Considerations

There are many ethical components to consider in this research. Consent has been an important part of this research process. I created an extensive consent form that I then translated into Spanish (and then had native Spanish-speaking colleagues read it to ensure it was clear). Taking literacy and writing abilities into consideration, I always offered to read the consent form and receive a verbal response. Almost all participants opted to verbally respond. I also gained consent to audio-record the interviews.

I did not need to hire a translator for my interviews, as all were able to be conducted in Spanish or English, and my Spanish is strong enough to hold these types of conversation. Any points of uncertainty were marked, and I worked with my Spanish teacher (having received consent from participants) to ensure clarity of what was shared. During the reflection session, some information was translated from Quechua to Spanish by group members who speak both languages. Consent for the reflection session and parts of my wit(h)nessing experience were translated from Spanish to Quechua by colleagues who speak both languages. They offered to translate, as they typically take on this role within all ANDES sessions and the reflection session was part of ANDES' work (a key workshop to inform the Pluriversity toolkit).

It is also essential to address my identity as a white-identifying, US American woman who holds a different worldview from many of the people I interacted with. Additionally, there are deep colonial legacies throughout South America and within Peru that must be acknowledged. I have been hyper-aware of power-dynamics throughout the duration of this study, and actively seeking out "mirrors" to ensure I have not been causing harm or reproducing power imbalances. My biases and worldview inevitably impacted my research and have been things that I have consistently reflected on and questioned. Smith (1999) assert "it is surely difficult to discuss research methodology and Indigenous peoples together, in the same breath, without having an analysis of imperialism, without understanding the complex ways in which the pursuit of knowledge is deeply embedded in the multiple layers of imperial and colonial practices" (p. 2). These were things I thought of in relation to my work and identity constantly.

Findings

The findings of the paper are broken down based on each research method. The following section outlines results of wit(h)nessing, auto-ethnography, interviews, and reflection sessions.

Wit(h)nessing

I was able to spend three full days in the *Parque* living with a homestay family and shadowing a *técnico*. These experiences were meta for me, as data collection happened via what was being shared, but also via how it was being shared. I reflected quite a bit on the ways that we were sharing information. This section is broken down into four sub-sections: workshops, an informal interview; walking and talking; and vulnerable exchange.

Workshops

I took part in six different workshop sessions. All followed a similar format: start session with traditional songs and sometimes dances to welcome guests; orient groups by showing them

a 3D map of the *Parque*; share about the *Ayllu* system using a poster graphic; share about the governance structure of the *Parque* using a poster chart; share about potato cultivation using a large circular agricultural calendar; move into another room to share about potato varieties, cultivation, the three elevations of growing, and climate change in the *Parque*; and finish with a workshop on weaving and using natural dyes, with an opportunity to buy woven products (See Figures 2, 3, 4 and 5).

During the workshops, the symbolism and graphics were a combination of Western and Indigenous systems (see Figures 2, 3 and 4). I was able to participate in two student sessions in Quechua (one of which was partially translated to me in Spanish), one large student group in Spanish, one small group in Spanish, and two medium-sized tourist groups in English (translated from Quechua). I participated in the two tourist groups last, after having seen the presentation four times. The translation to English included many embellishments. The guides who were translating from Quechua to English were adding new information that I had not heard in the previous sessions. They would often cut the presenter off to tell him they had already shared that information earlier in the day, or to start translating early in anticipation of what would be said. The tourist groups also received Papa Sours (like Pisco Sours but made from potatoes in the *Parque*). The presenter was smiling much more than he had with the students. The workshop was then followed by a presentation on weaving and dying fabrics naturally in the *Parque* (something the student groups did not experience). Pieces of fabric and fibers were passed around so the tourists could feel the differences between sheep, llama, alpaca and baby alpaca. People seemed to respond well to this additional tactile component. The tourists had an opportunity to purchase items following the presentation. While there was not much knowledge exchange happening, there certainly was a transference of knowledge and learning happening.

Finally, a photographer showed up to Pampallacta, later than anticipated causing my host and me to wait for him for almost an hour. He expressed that he exclusively wanted to hear about potatoes and did not want to learn about the *Ayllu* system, governance in the *Parque*, or anything else. My host nodded in agreement, and then proceeded to give the entire presentation. To him, all of the components are inextricably linked and crucial to teaching about potato cultivation. The photographer seemed a bit antsy. He did not make it clear why he was there or interested in potatoes until I asked him. He then let us know that he is taking photos for a large United States image company who are now in pursuit of photos of native potatoes in their various stages. The photographer admitted to having no knowledge of potatoes. He then took pictures of one of the community members holding potatoes. My host asked to have his picture take, as well; the photographer ignored him. After he left, my host inquired as to why the man did not want to take his photo. I was at a loss for words. The experience felt extractive and disrespectful.

Figure 2

Combined Knowledge Systems in the Parque *Museum Room*

Note: This image displays the museum in Pampallacta in the *Parque* where student and tourist groups learn about the *Parque*. There are clear Western influences in the governance and organization chart, as well as the Venn diagram. There is an informational sign on the wall in English. There are also Quechua influences with the various traditional tools on the walls and an agricultural calendar in a circular shape

divided into months and seasons with tools, soils and plants representing potato cultivation and transitions. There is a 3D model of the *Parque*: a strong visual for all. Photo credit: Ciavattone, 2022.

Figure 3

Mixed Methods Presenting the Ayllu *System and* Parque *Governance*

Note: This is a close-up image of the picture above. The sign on the left shows a very clear example of a Western organizational chart. The sign on the right uses images rather than words to represent the Quechua concepts of the *Ayllu* system, while also including a Western-style Venn diagram. My homestay host (and presenter in the museum) shared that these signs were products of group discussions and formatted/printed by ANDES. Photo credit: Ciavattone, 2022.

Figure 4

Parque *Potato Display*

Note: Photo credit: Ciavattone, 2022.

Textiles and weaving are another means for communication in the *Parque* and amongst Quechua people. The patterns and designs seem to represent their cosmovision. Most of the animal scarves, for example, also had human figures woven in, placing humans on a level with animals. Typically, they had men and women shapes, representing the *yanatin* or duality (a different form of duality and promotes equal responsibility and requires harmony and balance). The designs also include representations of *Pacha Mama*, rivers in the area, and important pathways. My homestay family gifted me a bracelet that they shared represents a *camino* or pathway. Interestingly, some of my best moments of knowledge exchange during my stay in the *Parque* occurred during walks along the pathways. I shared with them that I had a tattoo on my foot in Swahili: "*Kutembea ni dawa*" or "To walk is medicine." This prompted a conversation around the importance of walking for overall health and connectedness, as well as the importance of being with others and in the landscape. Textiles are another way of experiencing and expressing knowledge in the *Parque*.

Figure 5

Textiles from the Parque

Note: This scarf was woven by one of my homestay hosts. Her family herds alpaca, and she uses their fiber to create textiles. All of the dyes are natural, and the images woven into the scarf represent their worldview. Photo credit: Ciavattone, 2022.

Informal Interview

I conducted an interview with my homestay host/presenter in the museum (Interviewee 1) while sitting in one of the museum rooms waiting for a new tour group to arrive. This was not a pre-planned interview, and therefore took a more informal structure. I did jot down questions to ask throughout the day as they popped up during the workshops.

During this interview, I asked questions about how science interacts with traditional knowledge in the *Parque*, how science adds to his work (if it does), and if there are benefits to working with ANDES. Interviewee 1 responded after a bit of thought to each question. He shared that he has learned the importance of integrating both traditional and scientific knowledge. He considered scientific additions to his traditional practices useful. He shared that ANDES offers great support with workshops, particularly in providing organizational tactics. Their support aids in the conservation of potatoes. He shared that his traditional knowledge is important and useful, but he lacks the ability to organize well. He emphasized the importance of formal education but shared that he does not have a formal education. We had a discussion about valuing different ways of knowing, and he expressed that in his community children start learning from five years old to sow seeds, and they learn through observing and doing. He also talked about the different tools they use, the irrigation systems they have built, and the interchanging of foods they use to promote food security.

Methodologically, I also learned that this type of interview does not seem to be the most effective way to exchange knowledge. We were both a bit awkward and acknowledged that Spanish was neither of our first language, so we both stumbled a bit for words without any

visuals or props to aid in our explanations. The interview felt stiff. There were also moments when I was asking Interviewee 1 about *Sumak Kawsay* and his cosmovision to which he would respond with similar statements that he used in the workshops but added that much of it cannot be explained in words, especially in Spanish; so much cannot be translated from the heart.

Pathway to Learning: Walking and Talking

Figure 6

Walking and Sharing

Note: This is a photo of a *Parque* resident as we were walking through the mountains together. Photo credit: Ciavattone, 2022.

After the difficult interview and another workshop, we embarked on a two-hour walk back to his town. This experience proved far more conducive for knowledge exchange. The embodied, phenomenological aspects of the walk seemed to allow for more sharing as we were experiencing sensations and sights that we could discuss. The landscape itself was humbling. I was feeling a sense of awe and wonder as we walked. The mountains were stunning to me, and to my host they hold deep spiritual meaning. He mentioned the *Apus* (mountains) multiple times on our walk and spoke about them with great reverence. My host was sharing about *indicadores* as we passed them. He showed me *roka*, a flower that blooms when it is time to sow potatoes. I shared about my own *indicadores* from Massachusetts. I talked about how the leaves on trees

turn over when it is about to rain. My host lit up. He said he understood me, and I understood him. I wrote in my recap notes that it was much easier to walk and talk, as there were many visuals and feelings to spark conversation, and things to point to when words were failing. We talked quite a bit, but also shared steps in silence. My host mentioned that this two-hour walk was one he did often. We both commented on how much we like to walk, how it is good for health, and for the mind. I referenced that tattoo I have on my foot: "To walk in medicine". He agreed with the phrase. We walked on, talking about customs and cultures in the *Parque* and the US and Tanzania. Cuelenaere (2011) writes extensively about the phenomenological aspects of walking and movement as a means for making of the world, which certainly relates to this experience and will be addressed more thoroughly in the Discussion section.

Vulnerable Exchange

On my last day in the *Parque*, I was unwell. We hiked two and a half hours uphill and over two small mountains. I wanted to be as present as possible. My host offered to arrange a car for me, but I knew how much sharing can happen while walking, and also knew that he typically does not have the option to take a car, so I wanted to have an experience that would be more similar to reality (even if it meant feeling stomach pain on the walk). As we hiked, we met a woman who was herding alpaca and sheep. I was able to learn about her practice while sharing my own experiences having herded alpaca in Ecuador. The three of us made "*tsk*" noises to move the animals along. We went slowly to acclimate and stopped for a bit to chew coca leaves to help prevent altitude sickness. My host was eager to share thoughts as we walked; I was feeling unwell and having some difficulty engaging as we got further along in our hike.

When we arrived and I finally sat down, the pain was unbearable, and I began to keel over and tear up. My host was incredibly kind and supportive. He jumped into action and went to

collect salvia for me to crush in my hand (the fragrance soothing me), and then boiled some to make tea to help my stomach. As I drank tea, we sat by the *wathiya* earth oven that my host was cooking potatoes in and discussed *Sumak Kawsay* a bit more with the mountains as a backdrop. He again reiterated that the concept cannot be fully captured in words. We talked about the interconnectedness of all life, a belief that we both share but in different ways. We sat in silence for a bit. I could feel the breeze on my skin, and the tea was starting to soothe my stomach. I was vulnerable, in pain and at peace all at the same time. We both acknowledged that we were feeling a lot. At one point, I asked if what we were doing, sitting and breathing and feeling, was part of *Sumak Kawsay*. My host nodded yes. We thanked *Pacha Mama* together for this moment. A bird flew overhead, and my host shared that when that particular bird sings, it is an *indicadore* that rain is going to come. I shared about geese flying south as an *indicadore* that winter is coming in the northeast of the USA, and robins signify spring.

I asked about the traditional oven he built. How did he know how to make it? He talked about learning from "the grandparents" or learning through ancestral knowledge. He learned as a child by watching older people make them. He said even his grandson who is three years old is already learning how to support the process of *wathiya*.

When I was starting to feel better, we cut and collected some grass for guinea pig food. My host was shocked that I was able to do the work, and he seemed pleased to be sharing a physical task together. Soon the rest of the *técnicos* arrived with another intern from the USA and our agronomist coming from Cuzco. They were evaluating transects. I was too unwell to take part, but I learned that they were analyzing the potatoes for plagues and sickness.

While being sick did detract a bit from my ability to focus, my vulnerability seemed to humanize the situation. It necessitated trust. I was being taken care of, and this fostered more

dialogue and more moments of shared awe. Me choosing to hike with him, and him taking care of me when I was unwell allowed us to be more open to human and land connections.

Auto-Ethnography

While I have already integrated many of my personal responses and feelings throughout the wit(h)nessing section of this paper, there are a few other reflections that are useful to share. As a bridge actor myself, someone who is exchanging and co-creating knowledge outside of my home country and in a different language other than my first language, I have been reflecting often on strong methods (and challenges) in knowledge co-creation.

Ultimately, I have found language-barriers to be both challenges and opportunities for myself. Speaking Spanish particularly with my colleagues whose first language is Quechua has been helpful because we are all speaking in a language that is not our native language. For me, this feels like we share the struggle and therefore I experience less pressure. I feel safer making mistakes and stumbling through the language knowing that at times, they do the same. Language has also been a challenge, though. Most of our work is in Quechua, so I usually sit by a translator listening to Quechua translated to Spanish and take my notes in English. There are so many layers, and information certainly gets lost in the process. It is also challenging at times to ask the exact questions I want to ask because I do not know how to word them well, or do not know how to make my questions more relatable or culturally specific. Sometimes words just cannot capture intention. When conducting interviews in Spanish, without any visual aids, and sometimes online with videos turned off for better connection, it was challenging for me to understand and convey meaning. Thankfully I recorded the interviews and was able to pay more attention and translate while listening at a later time. Speaking, listening and thinking in Spanish for extended periods of time can also be exhausting for someone who is still in a language-learning phase. I found

myself getting increasingly more tired throughout each conversation. I also had moments, particularly in large groups, where I felt shy and intimidated to ask questions. One-on-one felt much easier than in front of groups where I did not know most people. I had to muster up confidence to speak (and typically went over the question multiple times in my head before saying it out loud). Two of the workshops were translated into English, and I noted that it felt a bit comforting hearing English, as "my brain did not have to work so hard."

During some of the presentations I had a headache from the altitude and likely dehydration. I was not able to focus well as it got worse. I was trying to be polite but wrote in my notes that at moments I was zoning out and feeling unwell. This was a hindrance to my learning and ability to engage and exchange. A positive to feeling ill, however, was that I also felt very held and taken care of by my colleagues. For me, this fostered a sense of trust. My colleagues constantly checked in on me and asked how my head was. They made tea and supported me.

I also found that I learned well by doing. I helped remove potatoes from the *wathiya* oven, harvested potatoes and cut grass for guinea pig food, all of which helped me remember and understand the processes. I found music to be a powerful tool for exchange and expression. I had to introduce myself to all of my colleagues and chose to do so with a song. I wrote original lyrics and played my ukulele, and my colleagues commented on how they enjoyed it. For me, music is a profound way of communicating. I also experienced music in the *Parque*. Each workshop started with traditional songs and dances as a welcome. My host also played videos of Quechua concerts and celebrations during our dinners, commenting on the dance styles, the clothing, and translating the lyrics to Spanish for me. It was a great way to bond.

Finally, I reflected quite a bit on participating in sessions in which there was no common language. The first workshop I attended was in Quechua. While there was a bit of Spanish

infused, it was primarily Quechua. I found myself paying extra attention to and being grateful for all of the visual aids being used. I clung onto every Spanish word I heard. I kept reminding myself that this workshop was not intended for me. It was intended for a group of high school students from Urubamba who all speak Quechua. Another person who was in that *Parque* that day who is from the USA but also speaks Spanish chose to leave the session as soon as he realized it would primarily be in Quechua. I chose to stay. I could understand quite a bit of what was being shared based on gestures, the agricultural calendar being presented and the signs. I reflected on other ways of knowing, through visual aids and feelings.

Interviews

The interviews are discussed through the following lenses: ways of knowing, bridge actors, bridging knowledge systems for climate change, and defining successful knowledge co-creation.

Ways of Knowing

The interview participants shared various ways in which they learn and know. Interviewees 3 and 4 from the *Parque* both shared that they learn by doing. Interviewee 3 talked about learning from *abuelos,* or grandparents and ancestors, transmitting knowledge through generations. He also learns day by day from his family and from *Pacha Mama*. He has seen climate change firsthand and talked with his grandparents about their experiences, giving him more information to contrast with the present. He noted irregular rain and hot sun that is hard to work in. Both Interviewees 3 and 4 said now that they are working with ANDES, they are learning more technological things like how to use a laptop. Interviewee 4 made a point to say he does not have an academic background. Interviewees 2, 5 and 6 all learned through formal schooling and university, but all also shared that they now learn differently and learn from

working with Quechua farmers in the *Parque* and Lares. Interviewee 2, who is an agronomist with a formal academic background, said she knows there are things that cannot be explained by science. Interviewee 5 learned from his parents, as well, both of whom have formal educations.

Bridge Actors – Working with People from Other Cultures

All participants mentioned learning a great deal from their work with ANDES and working with people from different cultures. Almost all had positive experiences working across cultures and countries. Interviewee 3 said working with people from outside of the *Parque*, particularly from other countries, allows him to see the achievements of the work they are doing. He said people respond well to learning about the *Parque* and enjoy the music and flowers they give when people first arrive. He believes it is easy to work with people from other countries. Interviewee 5 also likes working with people from other countries, and said they have other knowledges, information and realities. He likes to learn about their realities and said they can support ANDES' work with action. Interviewee 3 discussed working with other Andean communities during the pandemic, and how useful those exchanges were. While there are similarities between communities and most speak Quechua, he expressed that there are also many differences in knowledges, tools and customs. Different places have different types of expertise, and those exchanges are important.

Interviewee 6 is from the United States but has been living and working in Peru for three years. She mentioned that it can be complicated to figure out her space and where it is "okay to be" as an outsider from the communities and the country. She often thinks of what it means for her to truly be a partner in her work, and where her place is as a white, US American woman. Sometimes there are events where it is supposed to seem like there is no NGO presence and other times she has been in situations where people only address her, so she believes there needs

to be a balance. She also mentioned some cultural work environment differences that she has had to adjust to. In the USA, for example, there is a large emphasis on individual growth and professional development, often with staff trainings and development sessions. Peruvian work culture is not like this. She appreciates this in some ways, as there are not superfluous session taking up her time, but she does see value in acquiring skills in trainings designed for staff. She shared that learning seems to be more trial and error in Peru.

For Interviewee 5, being a bridge actor is derived from his desire and excitement to teach people (particularly people who are excited to learn), as well as his equal desire to learn from others. He likes the points of exchange and likes when people engage with interest and motivation to learn. He is not from the communities and said he has learned a lot from people in the *Parque* and Lares through his work with ANDES. Interviewee 2, an agronomist with a scientific foundation for her knowledge, has deep respect for Indigenous knowledge systems. She learned Quechua to communicate in the communities. She leads many of the FFS trainings, and her approach is very collaborative and inclusive. She made a comment that many people discredit the farmers that she works with, as many do not have formal educations, do not speak Spanish, or cannot read. She then said people may not be going to libraries, but they have libraries in their heads and did not need formal schooling to be knowledgeable. She respects her colleagues and their knowledges.

Not all of the responses about working across cultures were positive, however. Interviewee 4 expressed frustrations, having had negative experiences with short-term interns and researchers from other countries. He discussed how people come from outside to learn and do research but do not return information, or respond on whatsapp, or or continue to interact with people from the communities after they leave. This worries him. He did say that his work with

international colleagues in ANDES has been good and respectful, but outside researchers and interns often do not coordinate well, and many come in without sharing what they are doing or why they are there. They just start asking questions. He said all interns should leave something with ANDES and must have better organization and coordination. He also asked me how I will share my information back, and I told him I plan to co-create the Pluriversity Toolkit, will translate this paper to Spanish and make it available to the communities/ANDES, and will present my findings verbally to anyone who wants to hear them. He approved of this plan.

Bridging Knowledge Systems for Climate Change Adaptation and Mitigation

The interviews revealed where knowledge co-creation is happening, ways in which ANDES has been successful in creating opportunities for knowledge exchange, and challenges they have faced.

Where is it happening?

Knowledge co-creation is happening in many forms and spaces in the *Parque*, particularly with bridging scientific and Indigenous approaches to potato cultivation and adapting to climate change. Interviewee 4 said it is imperative for academic and traditional knowledge to be balanced. He thinks research helps, but local *indicadores* are invaluable. He has noticed increasing issues with plagues and frost unpredictability. There has always been climate change as long as he can remember, but now it is much stronger: wild animals are disappearing, the springs are drying up, there is more wind, it is colder, and the sun is stronger. He said everyone must adapt and mitigate. For example, communities have had to change sowing times to adapt to climate changes.

All participants expressed the deep value in Indigenous systems, and the importance of respecting them. Both Interviewees from the *Parque*, 3 and 4, expressed that it is imperative to

maintain Indigenous ways of doing in their work. Interviewee 3 talked about how his community continues their ancestral practices. He used an example of *moraya*, a freeze-dried potato, that should not be harvested after the sun comes out, or it will not have a good flavor. He and Interviewee 2 both talked about the cycles of the moon and how they influence potato cultivation. During the full moon, seeds cannot be sown. During the new moon, there is typically a good amount of frost. Interviewee 2 who is not from the *Parque* still talked about the importance of following the agricultural calendar and *indicadores*. She leads all of her FFS trainings in the *chakras*, and the plants are the teachers. Everyone learns from being in the landscape itself. She will typically ask everyone what sicknesses they are seeing in their farms leading up to the training, and then observe together in the plots during the trainings.

Indigenous knowledge is at the core of the work being done in the *Parque*, and scientific tools and interventions complement this work. Interviewee 4 claimed that before he worked with ANDES, he did not use scientific approaches to farming. Now there is useful research being done in transect plots. Interviewee 3 said he does not use much science in his work in his *chakra*, but he did echo Interviewee 4's sentiment that research is helpful. He also said it is useful to help identify different kinds of insects and being able to monitor temperatures to predict frost. Interviewee 2 discussed the importance of researching to look for resilient potatoes that can resist hail, knowing biological cycles of animals/insects, using science to identify plagues and damage in plants, capturing or trapping insects like weevils, using calcium and fertilizers on crops, and promoting seed diversity to enhance food security. She also said it helps to have banners and materials that provide useful information. To identify plagues, everyone gives their input, and they form a diagnosis together.

Interviewee 6 talked about the holistic approach to knowledge co-creation that happens in ANDES. The work is very team oriented, and the whole team is needed. She talked about ANDES being an organization that is empathetic to different ways of knowing and understanding. Prior to working with ANDES, she had not thought of knowledge co-production. ANDES is bringing together strengths from different systems, which is important in combatting climate change. These co-creative processes lead to the most innovative solutions. I intentionally ended all my interviews asking the participants if they had any questions for me. I wanted to leave space for potential exchange and dialogue. Interviewee's 3, 4 and 5 all asked me questions which turned each of the interviews into more of a conversation.

ANDES Successes

All interviewees agree that ANDES is a good space for knowledge exchange. Both Interviewees from the *Parque*, 3 and 4, said they believe there is space for their own cosmovisions in all their work. Interviewee 3 feels like his knowledge is valued in ANDES. He said he is able to continue to work on his *chakra* while also working in other fields like tourism. Due to the presence of ANDES, the *Parque* has more visitors and more research. He is growing while also continuing and maintaining his own customs. He said with his current work, he can stay deeply connected to his roots while also now engaging in other work and research around climate change, and the combination helps the communities figure out how to adapt. Interviewee 4 also shared that he has learned a lot from ANDES, having been able to travel internationally, and while he is not living in luxury in Cuzco, he and his family are comfortable in their lives.

Interviewee 2 has deep respect for the knowledge systems of her colleagues in the *Parque* and does not try to change them. She believes that respect for all knowledges in ANDES makes people feel more relaxed and leads to better capacity building. People express their needs and ask

for the types of trainings they want (like on dealing with plagues, for example). Interviewee 5 also expressed this as a success, and said the work is strengthening identities, knowledge, customs and language. He added that ANDES is flexible and there is a lot of room for development in the organization, which cannot be found in many other organizations. He also believes the international interconnectedness is a strength of ANDES. Interviewee 6 asserted that ANDES is not a very top-down organization, and most community-level decisions are made collectively. Larger decisions on a global scale (like funding) do not always include participation from everyone in the organization, though she added this would likely not be the best use of resources.

Interviewee 6 also reflected that, while she is bilingual in Spanish and English, Quechua is a challenge for her (discussed further below), but one of the advantage of ANDES is that it is very relational, and reciprocity it important. She often translates to English for visitors, and her colleagues in the *Parque* and Lares will translate Quechua to Spanish for her if necessary.

Challenges to Knowledge Co-Production

Language was by far the most prominent challenge that was addressed in all interviews. Interviewee 2 is a native Spanish speaker but learned Quechua in part to enhance her work in the *Parque* and Lares. She said around 80% of the women she works with only speak Quechua, though many of the men can speak Spanish. Interviewee 5's first language is Spanish, and he does not know much Quechua. He admitted it is more difficult for him to work in Lares, as less Spanish is spoken, but he understands some and feels comfortable asking his colleagues who speak both to translate for him. Interviewee 6 elaborated is working in three languages: English, Spanish and Quechua. She does see English (her first language) as an advantage in the NGO

world, as it helps with external communications, but cautioned that it can be exclusive or uncomfortable when it is dominating a space.

Interviewee 3, whose native language is Quechua but also speaks Spanish comfortably, thought language was an opportunity as he enjoys working in and learning Spanish, but he found tourists who do not speak Spanish (particularly those who only speak English) to be hard to connect with. He referenced using technology to communicate but did not find it to be ideal. Interviewee 4 also speaks both Quechua and Spanish and is often asked to translate. He does this willingly but did say it is hard to translate and to work constantly in Spanish, and it requires him to put in an effort.

Other challenges that popped up included accountability, particularly of external partners, researchers and organizations who can become extractive when they do not share back their work with communities. The transience of those people can also be a challenge.

Defining Successful Knowledge Co-Creation

All interviewees described successful knowledge co-creation slightly differently. Interviewee 2, as an agronomist, believes this entails putting methods from FFS trainings into practice. As mentioned above, she has a deep respect for traditional knowledge systems. She also thinks a training is successful when participants then go to their own farms and apply what they have learned from her and from their group. Interviewees 3 and 4 both agree that successful co-production also requires maintaining their own knowledges and ways of doing. Interviewee 3 expressed that there are some organizations that dominate, and Indigenous people are no longer free to continue their own practices. With ANDES, however, Quechua knowledge systems are respected. He ultimately believes success comes in combining and respecting all systems, ideas and input. Interviewee 3 also added that success comes with respecting *Pacha Mama*.

Interviewee 5 agreed that success comes in more holistic solutions. He believes scientific knowledge is valid, but not complete. Interviewee 6 discussed success in terms of personal, emotional transformation. To her, successful knowledge co-creation includes bringing "strengths from different knowledge systems into conversation with each other and figuring out how those different strengths can fill gaps, especially in terms of climate change." She acknowledged that there are tremendous strengths in Indigenous knowledge systems, though they are not as fast to adapt to the rapidly changing climate, and the most innovative solutions come from co-creation efforts. She expressed that there does need to be more work done to identify what it looks like methodologically to successfully co-create knowledge. This is still unclear, though she shared that visual representations of knowledge help, and community members respond well to that. She has found that, for example, her partners from the communities will generate knowledge, and her additions from a Western lens will be data analysis and visualization, and together it provides new tools. Successful knowledge exchange should reveal something about one's own knowledge to oneself. She also thinks it should challenge and reframe who gets to be experts, and said ANDES is doing well with this. She shared that is difficult to fully escape colonial contexts, but that success empowers all people and encourages local expertise (something ANDES works hard to do).

Group Reflection Session

The reflection session took place on July 8th, 2022 (see Appendix B for detailed agenda). I co-designed this session with my supervisor who has extensive experience working with the communities in both Lares and the *Parque*. She also has a strong background in inclusive, participatory education. The session was designed to generate information for the Pluriversity Toolkit that ANDES is working to create. By reflecting on former knowledge exchange sessions

in Peru and internationally, participants shared what works and what does not when attempting to share ideas across cultures and worldviews. They then came up with suggestions for how to best exchange knowledge. Essentially, there were four categories they explored: logistical needs; methods; language; and impacts.

We started the session by presenting photos on a large television screen. These photos were of their past experiences hosting international groups in Peru, followed by photos of their experiences in other countries, including Bhutan, China, Ethiopia, Mexico, and the USA. Everyone was outside in the open air, some choosing to sit in the shade on chairs, others choosing to sit on the ground in the sun. Everyone had just had snacks and tea. The session started at 11:45am (it started later than expected as a result of a different session running later than anticipated). The session was a bit slow to begin, with people observing the pictures. Once a few shared, many people had stories and perspectives to add.

Some of the stories that were shared touched on learning about new cultures while visiting other countries. Many people talked about food (ie. spicier in Mexico, less flavorful/healthy in the USA). They were also discussing customs around food, such as eating with their hands in Ethiopia. They discussed some of the climate change related issues they talked about in other countries and touched on how the USA has more monoculture as opposed to the crop diversity in Peru, for example. They also discussed the differences in maize in Mexico versus Lares, and the different ways of cultivating it in China. They connected through crops. They fondly remembered museum visits, hiking mountains in different countries, and trying tequila with a worm in it. There were many smiles as people shared.

At the end of the session, the group had space to share concluding thoughts. Many shared that they typically are not confident participating in knowledge exchange, as they do not have

formal educational backgrounds. As Interviewees 1, 2 and 4 mentioned, many people from the *Parque* and Lares communities did not receive much formal education. Women, in particular, have not attended high school. Since formal, Westernized education is dominant, their knowledges are often discredited. During the concluding session, a few women started saying "I do not have formal training" almost like an apology. My supervisor said we should not apologize, and instead encouraged them to be proud of what they do know and shared about multiple literacies. She reinforced the value in Indigenous ways of knowing. She shared that, while she is university-educated and can read papers, for example, she cannot read the stars or the land the way others can. All of these ways of knowing and reading are important. Many participants mentioned that in ANDES, as part of international exchanges, technical trainings and workshops like the one we held that day, they feel like their knowledges are respected and valued, and they feel comfortable sharing in those spaces.

Table 1

Knowledge Exchange Chart

Logistics	Methods	Language	Impacts	Additional
Organization: Agenda Norms and agreements Invitations Recognize participants (experts, area or association, schools, etc) – logos on materials **Welcome:** Something flashy – exhibitions – show culture and customs (song, dance, music) Important to do in	Headphones for translation Hire an interpreter from the place the session is being held in Notebooks for taking notes during sessions Need a space that is well ventilated Need to identify groups and identify transportation	Often discrimination around non-dominant languages Being able to speak in native language is important – for example, use Quechua in *Parque* because it is the primary language spoken Language is a challenge – often miscommunication, things get lost in	Participants should leave workshops with tangible, practical knowledge and skills To have broader impact, participants should become teachers – teaching others helps them to remember and share Everyone changes personally (change own way of	Timing is important, as are breaks for rest Feeling valued and respected is very important – knowledge exchange is best in space when all worldviews are accepted and all knowledge is considered valid

landscape/scenery -for example, if talking about water, be near water Give information to participants **Food:** How much do we need? Have preparation plan Pride in food Buffets are good This is important – participants need to be nourished **Summit:** Arrive prepared Materials prepared Adequate plans Weather considerations – is it sunny or rainy? What do we need for this? **Accommodation:** Bathrooms Sanitary and clean spaces Showers if necessary (with hot water) Access for all Nice and well-cared for space	Give tote bags for carrying materials to and from sessions Use photographs and videos of scenery – help to jog memory Active activities like the animal/photo activity to split into groups Group work Have an ambulance nearby for safety	translation, or words have different meanings in different cultures Translation is often not 100% of what is being shared/ sometimes conform to what participants want to hear Strategies to help: Use videos/photos Performances Dramatizations Have more direct translations (ie Quechua to English)	thinking or learn), but also should share with families and communities to impact more people Ripple effects by sharing	

Note: This chart was adapted from posters that were generated by the participants in the workshops discussing best conditions for knowledge exchange and co-creation.

Additionally, from facilitating this session, my supervisor and I reflected and did a meta-analysis of what worked and what did not during this knowledge-exchange workshop. We noticed that participants seemed far more engaged and responsive when sharing collectively in the larger group, while telling stories of their past experiences in unstructured settings with

photographic stimuli. Once broken into smaller groups, there seemed to be a bit more confusion and less fluid sharing. When offered butcher paper, all groups opted to take it and organized their thoughts on paper to prepare to present back to the broader group. It is a commonly used method in FFSs, so it is comfortable for everyone to use. All of the papers were written in Spanish but presented in Quechua, as Quechua was not a written language for many years, and in schools people learned to write in Spanish. Due to ANDES' long-standing relationships, people seemed to (and expressed) feeling comfortable sharing in the session. People requested to watch videos about their communities. There was more informal sharing during lunch. Once the session ended people lingered to talk more, and were excited for follow-up steps with more formalized, centralized information for hosting effective sessions. Participants expressed looking forward to another workshop the following week.

In a follow-up session one week after this reflection session, the group added to this list, emphasizing the importance of dance, music and visual representations of knowledge. They discussed communicating through their traditional clothing, for example. They also talked about and displayed the utility of using tools and props like the agricultural calendar to share knowledge. This session began with my supervisor asking everyone to draw something they felt confident teaching. I drew musical instruments, for example, while my colleagues shared teaching about the *ayllu* system, weaving, harvesting potatoes, cultivating maize, fixing and riding bicycles, cooking, and others. This activity was designed to show everyone that they are all experts and teachers in their own ways.

Discussion

As anthropogenic activity continues to exacerbate climate change, people across the globe are searching for solutions. Many argue that knowledge co-production is crucial and is the

best way to move forward and engage with climate-related challenges. This research sought to explore methods and successes in bridging Indigenous and Western knowledge systems in the Peruvian Andes through five primary inquiries: What are ideal, strong methods for knowledge co-creation? What are the current methods being employed in the *Parque* and what are their benefits and challenges? Who are the bridge actors in this process, and what actions do they take to effectuate change via knowledge co-production? What does it mean to truly co-produce knowledge? Is bridging actually possible and effective in the face of climate change?

Strong Method for Bridging Knowledge Systems in the Peruvian Andes

Based on the results of this paper, strong methods for bridging knowledge systems essentially come down to six main components: vulnerability/trust/respect, embodied knowledge exchange, logistics, language, tools/visuals, and integrating various ways of learning. This section also includes the successes and challenges of methods employed by ANDES.

Vulnerability, Trust and Respect

Anthropologist Behar (1997) discusses vulnerability as a valid and important way to convey research, and this study found that it is also a way to promote and create an environment for knowledge exchange. Jones & Okun (2000) challenge people who are working across cultures to embrace discomfort as the foundation for growth and learning. This discomfort can come in the knowledge that is being exchanged, and also in the way it is being exchanged (Jones & Okun, 2000). My experiences walking and sharing and while I was sick while staying with my homestay align with these theories. In my self-reflection, I talked about a positive to feeling ill: that I also felt very held and taken care of by my colleagues. For me, this fostered a sense of trust. My colleagues were constantly checking in on me which allowed me to open up more.

Respect is also a key element for knowledge co-creation. Tengö et al. (2017) claim relationship building, trust and respect are essential, and this concept permeated every section of the findings. We saw this very clearly in the reflection session when many women shared that they typically do not feel comfortable sharing their knowledge, as it is not a result of formal education, but they do feel encouraged and safe sharing in ANDES sessions. They attributed this to the respect the organization has for their knowledge system. This is also reflected in the interviews, in which interviewees share that they feel there is space for their cosmovisions in their work with ANDES. Jones & Okun (2000) caution that "when working with communities from a different culture than yours or your organization's, be clear that you have some learning to do about the communities' ways of doing; never assume that you or your organization know what's best for the community in isolation from meaningful relationships with that community" (p. 4). All interviewees shared how much they have learned from their colleagues from different cultures, and how open they were to learning new ways of knowing. Interviewee 6 reflected on how ANDES is not a top-down organization.

Another way to show respect and acknowledge power dynamics, according to Mistry & Berardi (2016), is to situate exchanges primarily in Indigenous or local systems and adding scientific knowledge only where needed in. This would also promote more trust in the scientific methods when they are not dominating but instead complementing (Mistry & Berardi, 2016). This then promotes equitability and acceptance of distinct and valid epistemologies (Mistry & Berardi, 2016). The importance of situating exchanges primarily in Indigenous systems is evident in all of the interviews, and particularly with Interviewee 2. She comes from a science background and plans and executes the FFS sessions, yet she builds her trainings from traditional knowledge first. She follows the agricultural calendar, respects *indicadores* and works to

maintain full participation and collaboration in the trainings. Interviewees 3 and 4, both from the *Parque*, also addressed the importance of working from their own traditional knowledge first and foremost and using science to complement or support their work. They both agreed that co-creation is important, and science is useful as long as it is not taking over.

Embodied Knowledge Exchange

Cuelenaere (2011) writes about walking and communicating, which "involves physical displacement, knowledge of the world, and the endurance of the body" (p. 126). To phenomenologists, she writes, "motion and speech produce space" (p. 136). She also asserts that "walkers like speakers infuse space with meaning" (Cuelenaere, 2011, p. 126). She claims that studying the activity of walking should include analysis of the moving body in relation to landscapes/terrains (Cuelenaere, 2011). Conducting research or exchanging knowledge in the landscape was referenced in the reflection session (see Table 1). Interviewee 2 echoed this and said FFS take place in the *chakras*; the plants themselves become the teachers and the backdrop to exchanging knowledge and co-creating solutions.

Perry (2020) writes that "discourses and frameworks of affect and relationality infuse literacies with the power to support the complex sensemaking and decision making that increasingly impact our world" (p. 306). Some people make sense of motion, and "this awareness and consciousness of motion reflects the interplay between the speakers' field of action (relative to which objects are grasped and relative to which the walker understands his motion) and his/her linguistic resources" (Cuelenaere, 2011, p. 129). For researchers like de Certeau (1984) "speech and walking, rather than a house, a wall, a city or a building, constitute dimensions of social organization and therefore also define and elaborate the contours of the places where people live and speak… motion itself grounds speech" (Cuelenaere, 2011, p. 128).

As written in the Findings: Walking and Sharing section, my experience walking hours with my host proved far more conducive for knowledge exchange than sit-down interviews. The embodied, phenomenological aspects of the walk seemed to allow for more sharing as we were experiencing sensations and sights that we could discuss. The mountains were stunning to me, and to my host, they hold deep spiritual meaning. My host was sharing about *indicadores* as we passed them. I shared about my own *indicadores* from Massachusetts. We had moments of understanding each other on a different level. I wrote in my recap notes that it was much easier to walk and talk, as there were many visuals and feelings to spark conversation, and things to point to when words were failing. We even talked about the act of walking itself. This is also a method that ANDES has been utilizing; the organization facilitates walking workshops, recognizing the value in movement while exchanging (*Asociación* ANDES, 2016). Cuelenaere (2011) also discusses walking as a way that a person suffers the world, implying the pain and vulnerability that comes with walking great distances, which relates to the above section.

Aside from walking, other embodied ways of knowing and experiencing include things like music and dance. As I wrote in my self-reflection, I found music to be a powerful tool for exchange and expression. Each workshop in Pampallacta also started with traditional songs and dances as a welcome. During my homestay, my host also played videos of Quechua concerts and celebrations during our dinners, commenting on the dance styles, the clothing, and translating the lyrics to Spanish for me. It was a great way to bond. During the reflection session, the group mentioned songs, dances and dramatics/acting as helpful ways to share knowledge.

Logistics

Logistics, while seemingly straightforward, are considered to be important for creating settings for strong knowledge bridging. As seen in the reflection session (see Table 1), logistics

created the longest column. From organizing, welcoming, preparing food and materials, and having accommodation or a clean space for people to convene, and having medical services available if necessary, logistics are essential. It is important for people to feel safe, comfortable, nourished, and respected. As Interviewee 4 expressed, disorganization of researchers or facilitators can lead to frustration and confusion for those being interviewed, which can sour their experiences working across countries and cultures. Organization is important.

Language

The issue and importance of language also showed up in every session, interview, and self-reflection. Harvey et al. (2019) note that all of their studies find language and time constraints to be challenges. Interestingly, so did the participants in this study, including myself. Both of these issues were brought up in the reflection session. Some mentioned, and I saw firsthand in the session that ran overtime, that time-constraints can inhibit knowledge exchange and space to fully work through concepts and ideas. Jones and Okun (2000) list sense of urgency as a pillar of white supremacy culture, and while this is worth acknowledging, it was also frustrating for participants from all backgrounds when the sessions were cut short.

One group dedicated their small group discussion to language and listed issues surrounding language as well as potential solutions. They discussed how non-dominant languages can face discrimination and shared that it is important for people to be able to speak in their native languages, particularly if they are in their own region. Language can also result in miscommunications and cultural misinterpretations. Things easily get lost in translation. One suggestion was to have more direct translations (ie. Quechua to English). I saw many of those same challenges first-hand in my own research: the struggles with someone translating Quechua into Spanish for me, and then me translating Spanish into English in my head and my notes. At

times I was lost in my interviews and needed to replay them to better understand what was being discussed.

In the reflection session, the language group also shared that translation is often not 100% of what is being shared, and sometimes translators embellish or conform to what they think participants want to hear. I saw this during the workshops I attended in Pampallacta, as well. Having watched the presentation six times, with the English versions as my last two, I saw how the translator was sharing different information, cutting off the presenter, sharing before the presenter was going to share and embellishing.

All interviewees noted language as a challenge while working with ANDES and across cultures. Interviewee 6, however, shared that a helpful solution to this has been the strong emphasis on reciprocity and relationship-building in ANDES. She, for example, will translate Spanish to English in the *Parque* and Lares, and her Quechua/Spanish speaking colleagues like Interviewee 4 will translate from Quechua to Spanish for her. Other helpful potential solutions to reconcile language barriers are to have headphone translators, to have performances and dramatizations, and to use videos and photos to help explain and facilitate.

Tools and Visuals

Pete (2016) urges facilitators to consider artistic, non-dominant, story-telling and visual modes of generating understanding. As noted previously, this was one of the group's recommendations for remedying language barriers. It was also a successful and useful way to engage our group in the reflection session, as people were recalling their experiences working with people from and in other countries. With the images in front of them, they were eager to share. They even requested we play videos of their experiences during lunch to spark more story-telling.

The visuals and tools used in the workshops in Pampallacta are essential. The agricultural calendar is powerful, and the 3D map, posters and tools on the walls all help bring the presentation to life. The weaving presentation with the different wools and fibers, and the demonstrations combined with the stories the scarves and tapestries themselves tell are very powerful. In the follow-up to the reflection session, the group mentioned the importance of wearing their traditional clothing, as well. This is another strong visual that communicates and stimulates interest and connection.

I reflected quite a bit on participating in sessions in which there was no common language. As noted in the Findings section, the first workshop I attended was in Quechua. I found myself paying extra attention to and being grateful for all of the visual aids being used. I could understand quite a bit of what was being shared based on gestures, the agricultural calendar being presented, and the signs. I reflected on other ways of knowing, through visual aids and feelings.

Learning by Doing, Feeling and Thinking

It is important in knowledge co-creation to embrace differences collectively and ensure that no knowledge or way of knowing is canceling another (Blaser & de la Cadena, 2018; Verran, 2002). ANDES is already employing methods to engage, validate and facilitate learning through various ways of knowing. They are currently using Quechua terms to incorporate more holistic learning, with principles of *Yachay* (thinking/intellect), *Ruway* (doing/activity) and *Munay* (heart/feeling) (*Asociación* ANDES, 2019). The use of three principles also aligns with Quechua systems that typically work in threes. All three of these were integral components to this research.

Ruway showed up many times throughout this study. In my homestay, I was told children learn by doing. My homestay host's grandson, for example, is already learning to make *wathiya* at age three. My host shared that that was also how he learned to make *wathiya,* as well. Many interviewees also referenced learning by doing. My host expressed that in his community children start learning from five years old to sow seeds, and they learn through observing and practicing. I also found that I learned well by doing. I helped remove potatoes from the *wathiya* oven, harvested potatoes and cut grass for guinea pig food, all of which helped me remember and understand the processes.

Munay was also prominently mentioned or felt throughout my research. There were moments when I was asking Interviewee 1 about *Sumak Kawsay* and his cosmovision to which he would share that much of it cannot be explained in words, especially in Spanish. So much cannot be translated from the heart. From my self-reflection, I explained that I learned best while walking and talking and reflected on sitting and beholding. My host and I walked and sat in silence at times, both feeling similarly deeply in very different ways. It cannot be explained, but it is a very valid way of understanding the world.

Literacy is also an important concept to be considered. Perry (2020) discusses the exploration of literacies that engage affective learning and understanding, while emphasizing global literacy plurality. Perry (2020) also acknowledges that many of these literacies are overpowered by dominant literacies and models of education. As seen in the reflection session, my supervisor at ANDES actively encourages the appreciation of different literacies. She commented on how people can read landscapes and stars, while other can read books, and all are valid. The drawing activity in the follow-up session emphasized everyone's strengths and abilities. Interviewee 2, similarly, talked about how Quechua communities in the *Parque* and

Lares may not have books to read, but they have libraries in their heads, implying that they have great and extensive knowledge and other forms of reading the world. These assertions help create spaces where the Indigenous participants feel validated and respected and can more freely share (as they mentioned in the reflection session).

Design matters. To decrease harm to vulnerable communities involved in co-creation processes "requires close attention to design and delivery of knowledge-sharing processes that are equitable and empowering" (Tengö et al., 2017, p. 19). Jones & Okun (2000) discuss the importance of this designing while considering various ways in which people share information, with special attention to what needs to be written or what can be captured and shared via different mediums. Intentional design is something ANDES prioritizes, engaging many different ways of producing and synthesizing data. As Interviewee 6 mentioned, for example, new visual tools will typically be created as a result of knowledge sharing sessions.

Finally, ancestral learning and different conceptions of time much be acknowledged. Pete (2016) emphasizes the importance of elders and knowledge keepers in traditional systems, and how this must be considered in exchange spaces. Generational learning is deeply ingrained in Quechua communities (ANDES Staff, Personal Communication, June 28, 2022). The *abuelos* and ancestors were brought up many times during my homestay. They were also referenced in interviews, as well. Knowing across time and space must be respected and valued.

Role and Actions of Bridge Actors

Tengö et al. (2017) refer to actors involved in knowledge co-creation quite a bit, and view knowledge systems as networks of these actors connected by social relationships in which they are knowing, doing, and learning together. The effective engagement of said actors is essential for successful knowledge sharing (Tengö et al., 2017). Pohl et al., (2010) refers to these

actors either as brokers to mediate space or as moving through free-form spaces that do not have defined boundaries. All participants in the interviews and the reflection session, including myself, would be considered bridge actors. Many mentioned being open and excited to learn about different cultures and customs. Some, like Interviewee 5, are also motivated by teaching, and like to share information with people who are passionate about learning. All bridge actors have learned new ways of being and have adapted and integrated a bit of that new knowledge into their lives (while still maintaining the integrity of their typical ways of knowing).

Interviewee 6 from the USA mentioned that it can be complicated to figure out her space in her work in Peru. I have felt similarly and have reflected on my positionality and presence here. I believe it is crucial for actors like myself to constantly be aware of power dynamics, ways in which I have internalized those dynamics, colonial influences, and how I can unlearn to relearn (as Cēsis Pluriversity International Summer School encourage) and remain open and respectful. I am constantly trying to navigate where and when I can and should occupy spaces, as a facilitator and as a participant.

As the interviews show, not all of the responses about working across cultures were positive. Interviewee 4 expressed frustrations, having had negative experiences with short-term interns and researchers from other countries. These exchanges can be extractive and one-sided, and he believes bridge actors should be responsible to one another and share what they are doing and later what they have learned. This requires organization and transparency, which could be facilitated by key bridge actors in the ANDES staff who are coordinating interns and researchers. There must be clearer purposes and research objectives for interns, as well as an emphasis on/more effort in relationship building. Accountability is crucial. I, myself, as an intern and a bridge actor, plan to co-create the Pluriversity Toolkit, will translate this paper to Spanish and

make it available to the communities/ANDES, and will present my findings verbally to anyone who wants to hear them.

Successful Knowledge Co-Creation

Successful knowledge co-creation can be defined in various ways. Harvey et al. (2019) focus more on tangible, usable knowledge as successful co-creation, often implying collectively-owned physical or knowledge-related products. Interviewee 2 seemed to align with this idea, and believes FFS workshops, for example, are successful when people then apply the lessons they have learned in their own *chakras*. Other tangible outcomes in the *Parque* can be seen in crop yield successes that have resulted from biocultural innovations, through combining knowledge systems to come up with creative ideas and technologies that ultimately improve production and food security (*Asociación* ANDES, 2016).

During the reflection session, all participants agreed that a huge takeaway from knowledge exchange is personal growth and change. To amplify that success would include then allowing those learnings to ripple out to their families and communities. When people learn, they must then teach and share, and that creates wider impacts. Interviewee 6 also discussed success in terms of personal, emotional transformation. She shared that successful knowledge exchange should reveal something about one's own knowledge to oneself. She also thinks it should challenge and reframe who gets to be experts in order to empower all people and encourages local expertise. This could be seen in the follow-up to the reflection session in the drawing activity that showed everyone's strengths, reinforcing all expertises and empowering all group members.

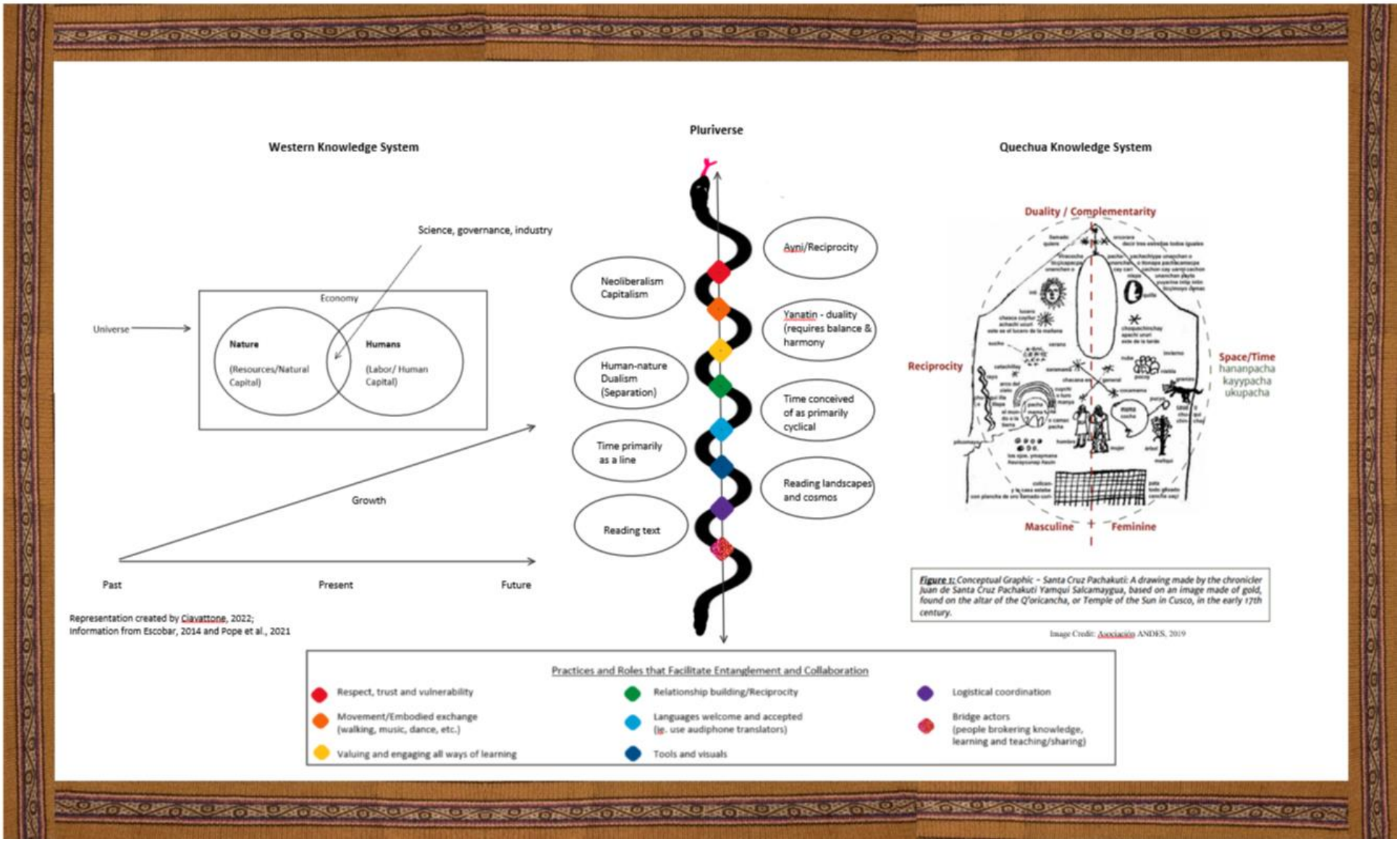
Tengö et al. (2017) believe Indigenous governance models can provide solid foundations for successful knowledge co-creation practices, and Funtowiczi & Ravetz (2003) believe

Indigenous systems should bridge with scientific systems when climate change damage may be irreversible, and no single system is successful in turning things around. Most interviewees agreed that science should be complementary, and that there are things like plagues and drastic temperature changes in which scientific methods support Indigenous processes for successful interventions. ANDES is certainly operating in this manner, for the most part, though the organization is continuing to work to decolonize (as Interviewee 6 mentioned).

Harvey et al. (2019) lay out two approaches to knowledge co-production (see Appendix D), including brokered, mediated approaches that contain more structure, and "agora" approaches which are more free-form and unstructured. Both approaches are successful in their own ways, but according to Harvey et al. (2019), brokered approaches are more prevalent and less disruptive. ANDES workshops and FFS seem to follow more of a brokered approach. As has been noted many times, logistics and organization are important for the group, so this brokered approach seems like it provides more success overall.

Figure 7

Knowledge Co-creation Graphic to Model and Advance the Entanglement of Different Worldviews and Practices



Note: This image was drawn by the author and adapted from a conversation with her advisor, Dr. Alex Alvarez. It represents spaces in which knowledge co-creation happens. The left displays a simplified Western knowledge system. The right is the same graphic from Figure 1, representing a Quechua knowledge system. This is a heuristic, contemporary model. It is not intended to be all-encompassing, and the author recognizes that this will evolve over time. The middle section represents a pluriverse. It takes the form of a snake, or *amaru*, a snake-like creature of Incan mythology, which is thought capable of transgressing boundaries and moving through celestial and terrestrial worlds (Urton, 1981). The snake is seen in many cultures to represent knowledge, the collapse of dichotomies and moving through worlds, as it can navigate land water (Urton, 1981). The motion of the snake is not static, which also represents movement and transformation. Some scholars refer to the *amaru* as a rainbow serpent (Urton, 1981). The rainbow serpent is symbolic in many cultures and countries and is seen as uniting all life and is representative of transformation (Taçon et al., 1996). The rainbow is also significant in this figure, as it is the Cuzco flag, and this research is situated in Cuzco. The colorful diamonds on the snake represent the methods and spaces that make true exchange possible: the bridges. In its full form, the snake and points represent the "uncommons". The bulges on each side represent the knowledges that occupy space in the pluriverse, but that cannot be fully understood by everyone involved (those from different knowledge systems). The border was taken from the author's scarf (see Figure 5) and like strings being woven, represent knowledge co-creation and the interplay different systems. In Quechua weaving, the symbol on the scarf represents a *camino*, or pathway, which is significant to this research as walking is an important method for knowledge exchange. It surrounds the entire graphic to symbolize the importance of holding all ways of being at once and weaving them together, with similar goals and sometimes different approaches/understandings.

Conclusions and Recommendations

As the climate continues to change rapidly, strong, creative, holistic interventions and solutions are desperately needed. It is clear that neoliberal and solely science-based, Western solutions are not the answer, but they still can contribute to possible solutions. In order to truly effectuate change, solutions must include all voices and systems of knowledge. A pluralistic approach to knowledge co-creation is essential. We can see this happening in *Parque de la Papa* in the Peruvian Andes.

This research found that knowledge co-production and bridging Indigenous and Western knowledge systems can indeed create socio-ecological solutions for environmental protection and livelihood resilience in the face of climate change. This research specifically outlines concreate and important methods to foster successful knowledge co-creation. Additionally, it complicates the idea of what success entails in knowledge exchange and bridging. While tangible innovations are important to many in knowledge co-creation processes, others define success

differently. Successful knowledge bridging ultimately centers non-dominant systems and complements them with Western knowledges, creates concrete, tangible outcomes and innovations, creates personal changes for individuals involved and ripples out beyond co-creative processes. This research also emphasizes the significance of bridge actors and their integral roles in facilitating knowledge-bridging, which has not yet been extensively explored in current literature. The results indicate that bridge actors broker spaces for co-creation, have an openness to learning and changing, and share their new knowledges with others in their homes and communities.

The findings also indicate that best methods for knowledge co-creation engage respect, vulnerability and trust, emphasize embodied knowledge exchange, pay attention to logistics, navigate complexities that arise from language differences, utilize tools and visuals, and validate multiple literacies/engage various ways of learning. Many of these methods are already being impactfully employed in the *Parque*. Mixed methods for this research proved to be very effective. Being fully present and wit(h)nessing is a useful strategy for collecting data, as it is both observant in introspective. Complementing this with interviews and an intentionally designed, collaborative reflection session provided opportunities for analyses and meta-analyses of co-creative processes.

There were certainly limitations to this research. This written format of presenting this knowledge itself is limiting and is deeply rooted in Western formal academic methods. For research that is attempting to decolonize knowledge creation, this format seems a bit hypocritical. That being said, it is a requirement for graduation, and can also be a useful tool for those who learn through reading academic papers. Also given the short timeframe, it would have been difficult to find a workaround or radically alter the presentation of this information (as

noted in methods, however, the findings of this research will also be shared in other forms to be more accessible to all). In retrospect, I also would not have made my research anonymous. In my Western perspective, I prioritize anonymity to protect identity, but this project is co-creative, and in the future, I would give the option to have names attached to contributions. The IRB process is designed to protect participants, but I do think in this case, my IRB proposal and approach also led to the inability to share names in this collaborative process.

This research could and should explore many different ideas that I had neither time nor space to dig into. Future research should look more closely at neoliberal frameworks and how, on a global scale and policy level, they can be altered or dismantled in order to create room for different epistemological and ontological ideas. It would be interesting to compare this research, done on an organizational/community level, with the Indigenous knowledge inclusion attempts that are happening on a policy level in Bolivia and Ecuador. I would also like to think more about the various layers of an organization like ANDES which works with communities using a decolonial approach, yet still exists in Western NGO spheres. It would be helpful to compare this research with other organizations that claim to be doing similar work, as well as those who unapologetically take top-down development approaches. It would be interesting to look at these outcomes in comparison with other countries, thinking about proximities to colonial pasts and how that may impact knowledge systems and climate change approaches. Finally, in the future this research would transition to using different terminologies and metaphors, likely using "weaving" instead of "bridging" as it implies more of an integrated and closely linked form of knowledge co-production. Terminology aside, as climate change continues to imperil our earth, we must embrace plurality and find innovative, co-creative socio-ecological solutions to these threats.

References

Adger, W. N., Barnett, J., Chapin III, F. S., & Ellemor, H. (2011). This must be the place: underrepresentation of identity and meaning in climate change decision-making. Global Environmental Politics, 11(2), 1-25.

Allen, C. J. (2019). Righting imbalance: Striving for well-being in the Andes. *Science, Religion and Culture*, *6*(1), 6-14.

Altamirano, T. (2014). *Refugiados ambientales: cambio climático y migración forzada*. Fondo Editorial de la PUCP.

Aman, R. (2016). En Route from University to Pluriversity via Interculturality. *Decolonizing the Westernized University: Interventions in Philosophy of Education from Within and Without*, *95*.

Asociación ANDES. (2016). Resilient farming systems in times of uncertainty: Biocultural innovations in the Potato Park, Peru. *SIFOR quantitative baseline study. IIED, London*. http://pubs.iied.org/pdfs/14663IIED.pdf

Asociación ANDES. (2019). Yachay Kuychi Toolkit II. Biocultural Education: Andean Cosmovision as Conceptual Framework. ANDES. 4+II+Biocultural+Education+Andean+Cosmovision+as+Conceptual+Framework.pdf (amazonaws.com)

Asociación ANDES. (2022a). *Potato Park*. Andes.org.pe. Retrieved April 5, 2022, from https://andes.org.pe/

Asociación ANDES. (2022b). *Yachay Kuychi*. Andes.org.pe. Retrieved April 5, 2022, from https://andes.org.pe/

Argumedo, A., & Wong, B. Y. L. (2010). The ayllu system of the Potato Park (Peru). *Sustainable use of biological di-versity in socio-ecological production landscapes*, (52), 84.

Behar, R. (1997). *The vulnerable observer: Anthropology that breaks your heart*. beacon press.

Blaser, M., & De la Cadena, M. (Eds.). (2018). *A world of many worlds*. Duke University Press.

Boscacci, L. (2018). Wit (h) nessing. *Environmental humanities*, *10*(1), 343-347.

Buzinde, C. N., Manuel-Navarrete, D., & Swanson, T. (2020). Co-producing sustainable solutions in Indigenous communities through scientific tourism. *Journal of Sustainable Tourism*, *28*(9), 1255-1271.

Cabello, J., & Gilbertson, T. (2012). A colonial mechanism to enclose lands: A critical review of two REDD+-focused special issues. *Ephemera: Theory & Politics in Organization*, *12*.

Carey, M. (2014). Glaciares, cambio climático y desastres naturales. *Ciencia y sociedad en el Perú*.

Cēsis Pluriversity International Summer School. (2022). *Summer School 2022*. Summer school 2022. Retrieved June 28, 2022, from https://www.pluriversity.eu/

Coq-Huelva, D., Higuchi, A., Alfalla-Luque, R., Burgos-Morán, R., & Arias-Gutiérrez, R. (2017). Co-evolution and bio-social construction: The Kichwa agroforestry systems (chakras) in the Ecuadorian Amazonia. *Sustainability*, *9*(10), 1920.

Cuelenaere, L. (2011). Aymara forms of walking: a linguistic anthropological reflection on the relation between language and motion. *Language Sciences*, *33*(1), 126-137.

Cuestas-Caza, J. (2018). *Sumak Kawsay* is not buen vivir. *Alternautas*, *5*(1).

Cundill, G. N., Fabricius, C., & Marti, N. (2005). Foghorns to the future: using knowledge and transdisciplinarity to navigate complex systems. *Ecology and Society*, *10*(2).

De Certeau, M. (1984). The Practice of Everyday Life. 1984. *Trans. Steven Rendall. Berkeley: U of California P*.

Demaria, F., & Kothari, A. (2017). The Post-Development Dictionary agenda: paths to the pluriverse. *Third World Quarterly*, *38*(12), 2588-2599.

Ejército Zapatista de Liberación Nacional. (1996). "Cuarta Declaración de la Selva Lacandona" [Fourth declaration of the Lacandón jungle]. http://enlacezapatista .ezln.org.mx/1996/01/01/cuarta-declaracion-de-la-selva-lacandona/.

Escobar, A. (2018). Designs for the Pluriverse. In *Designs for the Pluriverse*. Duke University Press.

Escobar, A. (2014). Sentipensar con la tierra. *Nuevas lecturas sobre desarrollo, territorio y diferencia. Medellín: Ediciones UNAULA*, *4*.

Escobar, A. (1998). Whose knowledge, whose nature? Biodiversity, conservation, and the political ecology of social movements. *Journal of political ecology*, *5*(1), 53-82.

Ettinger, B. (2006). *The matrixial borderspace* (Vol. 28). U of Minnesota Press.

Funtowicz, S., & Ravetz, J. (2018). Post-normal science. In *Companion to environmental studies* (pp. 443-447). Routledge.

Grillo Fernández, E. (1998). Development or cultural affirmation in the Andes?. *The spirit of regeneration: Andean culture confronting Western notions of development*, 124-145.

Gudynas, E. (2011). Buen Vivir: today's tomorrow. *Development*, *54*(4), 441-447.

Hall, B. L., & Tandon, R. (2017). Decolonization of knowledge, epistemicide, participatory research and higher education.

Harvey, B., Cochrane, L., & Van Epp, M. (2019). Charting knowledge co-production pathways in climate and development. *Environmental Policy and Governance*, *29*(2), 107-117.

Heredia-R, M., Torres, B., Cayambe, J., Ramos, N., Luna, M., & Diaz-Ambrona, C. G. (2020). Sustainability assessment of Smallholder agroforestry Indigenous farming in the Amazon: a case study of Ecuadorian Kichwas. *Agronomy*, *10*(12), 1973.

High, C. (2020). "Our Land Is Not for Sale!" Contesting Oil and Translating Environmental Politics in Amazonian Ecuador. *The Journal of Latin American and Caribbean Anthropology*, *25*(2), 301-323.

Höök, M., & Tang, X. (2013). Depletion of fossil fuels and anthropogenic climate change—A review. *Energy policy*, *52*, 797-809.

Huaman, E. S. (2017). Indigenous Rights Education (IRE): Indigenous knowledge systems and transformative human rights in the Peruvian Andes. *International Journal of Human Rights Education*, *1*(1), 5.

Jones, S. (2002). Social constructionism and the environment: through the quagmire. *Global Environmental Change*, *12*(4), 247-251.

Kimmerer, R. W. (2013). *Braiding sweetgrass: Indigenous wisdom, scientific knowledge and the teachings of plants*. Milkweed Editions.

Kopnina, H. (2016). The victims of unsustainability: a challenge to sustainable development goals. *International Journal of Sustainable Development & World Ecology*, *23*(2), 113-121.

Madden, C. (2019). Criar y Dejarse Criar: Trans-Situ Crop Conservation and Indigenous Landscape Management through a Network of Global Food Neighborhoods.

Mathez, S. L. (2018). Schools as Seeds: Bridging knowledge systems in the Peruvian Andes.

McKemey, M. B., Ens, E. J., Hunter, J. T., Ridges, M., Costello, O., & Reid, N. C. (2021). Co-producing a fire and seasons calendar to support renewed Indigenous cultural fire management. *Austral Ecology*, *46*(7), 1011-1029.

Mbembe, J. A. (2016). Decolonizing the university: New directions. *Arts and Humanities in Higher Education*, *15*(1), 29-45.

Mignolo, W. (2011). *The darker side of Western modernity: Global futures, decolonial options*.

Duke University Press.

Mignolo, W. (2013, October 20). On Pluriversality. Retrieved July 11, 2022, from http://waltermignolo.com/on-pluriversality/.

Mistry, J., & Berardi, A. (2016).Bridging Indigenous and scientific knowledge. *Science*, 352(6291), 1274-1275.

Moore, J. W. (2015). *Capitalism in the web of life*. London: Verso.

Munda, G. (2002). Social multi-criteria evaluation (SMCE): methodological foundations and operational consecuences. Barcelona: Universitat Autónoma de Barcelona. 26 p. *Manuscript submitted to European Journal of Operational Research*.

Murove, M. F. (2018). Indigenous knowledge systems discourse and inclusionality: An Afro-centric quest for recognition in a globalised world. *Journal for the Study of Religion*, *31*(1), 159-176.

Neretti, S. P. (2021). *Designing the pluriversity*. DesigningThePluriversity. Retrieved July 11, 2022, from https://designingpluriversity.org/

Nourish Scotland. (2021). *Home: Fork to farm dialogues*. Fork to Farm Dialogues. Retrieved June 20, 2022, from https://www.fork2farmdialogues.org/

Okun, T., & Jones, K. (2000). White supremacy culture. *Dismantling racism: A workbook for social change groups, Durham, NC: Change Work. Retrieved from http://www. dismantlingracism. org/Dismantling_Racism/liNKs_files/whitesupcul09. pdf*.

Perez, C., Nicklin, C., Dangles, O., Vanek, S., Sherwood, S. G., Halloy, S., ... & Forbes, G. A. (2010). Climate change in the high Andes: Implications and adaptation strategies for small-scale farmers. *The International Journal of Environmental, Cultural, Economic and Social Sustainability*, *6*, 71-88.

Perry, M. (2021). Pluriversal literacies: Affect and relationality in vulnerable times. *Reading Research Quarterly*, *56*(2), 293-309.

Pete, S. (2016). 100 Ways: Indigenizing & decolonizing academic programs. *aboriginal policy studies*, *6*(1).

Pohl, C., Rist, S., Zimmermann, A., Fry, P., Gurung, G. S., Schneider, F., ... & Wiesmann, U. (2010). Researchers' roles in knowledge co-production: experience from sustainability research in Kenya, Switzerland, Bolivia and Nepal. *Science and public policy*, *37*(4), 267-281.

Pope, K., Bonatti, M., & Sieber, S. (2021). The what, who and how of socio-ecological justice:

tailoring a new justice model for earth system law. *Earth System Governance*, *10*, 100124.

Said, E. (1978), Orientalism, *Vintage Books*, London.

Savransky, M. (2021). Around the day in eighty worlds. In *Around the Day in Eighty Worlds*. Duke University Press.

Sayre, M., Stenner, T., & Argumedo, A. (2017). You can't grow potatoes in the sky: Building resilience in the face of climate change in the Potato Park of Cuzco, Peru. *Culture, Agriculture, Food and Environment*, *39*(2), 100-108.

SENAMHI and PACC Peru (2012), 'Caracterización climática de las regiones Apurimac y Cuzco', PACC Serie de investigación regional 1, Servicio Nacional de Meteorología, PACCPERU, Lima, www.paccperu.org. pe/publicaciones/pdf/40.pdf

Smith, L. T. (1999). *Decolonizing methodologies: Research and Indigenous peoples*. Zed Books, Ltd.

Stengers, I. (2005). Introductory notes on an ecology of practices. *Cultural studies review*, *11*(1), 183-196.

Taçon, P. S., Wilson, M., & Chippindale, C. (1996). Birth of the Rainbow Serpent in Arnhem Land rock art and oral history. *Archaeology in Oceania*, *31*(3), 103-124.

Taylor, L. S., Quincey, D. J., Smith, M. W., Potter, E. R., Castro, J., & Fyffe, C. L. (2022). Multi-Decadal Glacier Area and Mass Balance Change in the Southern Peruvian Andes. Front. *Earth Sci*, *10*, 863933.

Tengö, M., Hill, R., Malmer, P., Raymond, C. M., Spierenburg, M., Danielsen, F., ... & Folke, C. (2017). Weaving knowledge systems in IPBES, CBD and beyond—lessons learned for sustainability. *Current Opinion in Environmental Sustainability*, *26*, 17-25.

Urton, G. (1981). Animals and astronomy in the Quechua universe. *Proceedings of the American Philosophical Society*, *125*(2), 110-127.

Verran, H. (2002). A postcolonial moment in science studies: alternative firing regimes of environmental scientists and aboriginal landowners. *Social Studies of Science*, *32*(5-6), 729-762.

Wa Thiong'o, N. (1981). *Decolonising the mind: The politics of language in African literature*. East African Publishers.

Walsh, C. (2010). Development as Buen Vivir: Institutional arrangements and (de) colonial entanglements. *Development*, *53*(1), 15-21.

Walsh, C. (2011). Afro and Indigenous life-visions in/and politics. (De) colonial perspectives in Bolivia and Ecuador. *Bolivian studies journal*, *18*, 49-69.

Walsh, C. (2012). "Other" knowledges, "other" critiques: Reflections on the politics and practices of philosophy and decoloniality in the" other" America. *Transmodernity*, *1*(3), 11-27.

Wanner, T. (2015). The new 'passive revolution' of the green economy and growth discourse: Maintaining the 'sustainable development' of neoliberal capitalism. New Political Economy, 20(1), 21-41.

Wilson, S. (2020). *Research is ceremony: Indigenous research methods*. Fernwood publishing.

Young, O. R., Berkhout, F., Gallopin, G. C., Janssen, M. A., Ostrom, E., & Van der Leeuw, S. (2006). The globalization of socio-ecological systems: an agenda for scientific research. *Global environmental change*, *16*(3), 304-316.

Appendix

Appendix A – Interview Questions

(A) Agronomist - first language is Spanish, but her family is Quechua and she taught herself Quechua as an adult; leads farmer field school trainings; leads agricultural research; spends significant time in the *Parque* (*English*):

1. Can you please describe your job at ANDES?
2. Where are you from/what is your background?
    a. When, how and why did you start working at ANDES?
3. How did you learn what you know?
    a. How do you think that influences how you work with or teach other people?
4. What is "climate change" to you?
5. How do you decide what to teach in farmer field schools?
6. What Indigenous knowledge is used in cultivation in the Park?
    a. What are the strengths of Indigenous knowledge systems in addressing issues related to climate change in the Park?
    b. What have you learned while working in the park?
7. Where are there needs for solutions to climate change related issues that do not come from traditional Indigenous knowledge? (Like plagues, etc.)
    a. What is the role of scientific intervention in agriculture in the Park?
8. How are you teaching or facilitating agricultural trainings? What are your methods?
    a. Discussion? Who leads? How do you prepare for it? Are there set questions?
    b. Do you have any resources that you use that you could share with me?
    c. What language are you primarily working in?
    d. How are you translating local concepts and/or merging them with scientific knowledge and processes?
9. How do you know if the training has worked?
    a. What are techniques, lessons or tools people are using after the sessions?
10. Do you have any questions for me?

(A) Agronomist (*Spanish*):

1. ¿Por favor, puede describir su trabajo en ANDES?
2. ¿De dónde eres/cuál es tu formación?
    a. ¿Cuándo, cómo y por qué empezaste a trabajar en ANDES?
3. ¿Cómo aprendiste lo que sabes?
    a. ¿Cómo crees que influye en la forma en que trabajas o enseñas a otras personas?
4. ¿Qué es el "cambio climático" para ti?
5. ¿Cómo decide qué enseñar en las escuelas de campo para agricultores?
6. ¿Qué conocimientos indígenas se utilizan en el cultivo en el *Parque*?
    a. ¿Cuáles son las fortalezas de los sistemas de conocimiento indígena para abordar los problemas relacionados con el cambio climático en el *Parque*?
    b. ¿Qué has aprendido mientras trabajabas en el *Parque*?

7. ¿Dónde hay necesidades de soluciones a los problemas relacionados con el cambio climático que no provienen de los conocimientos tradicionales indígenas? Como invasiones de plagas, etc.
    a. ¿Cuál es el rol de la intervención científica en la agricultura en el *Parque*?
8. ¿Cómo está enseñando o facilitando las capacitaciones agrícolas? ¿Cuáles son sus métodos?
    a. ¿Tienen discusiones? ¿Quién dirige las sesiones? ¿Cómo te preparas para las sesiones? ¿Hay preguntas establecidas?
    b. ¿Tienes algún recurso que utilices que puedas compartir conmigo?
    c. ¿En qué idioma estás trabajando principalmente?
    d. ¿Cómo está traduciendo conceptos locales y/o fusionándolos con el conocimiento y los procesos científicos?
9. ¿Cómo saber si la formación ha funcionado?
    a. ¿Cuáles son las técnicas, lecciones o herramientas que las personas están usando después de las sesiones?
10. ¿Tienes alguna pregunta para mí?

(B) Two ANDES employees - both speak Quechua as first language and grew up in *Parque*; both now live/spend significant time outside of the *Parque* and are fairly fluent in Spanish; both work with interns and staff from other countries/cultures; both do administrative work for the organization (*English*):

1. Can you please describe your job at ANDES?
2. Where are you from/what is your background?
    a. When, how and why did you start working at ANDES?
3. How did you learn what you know?
    a. How do you think that influences how you work with or teach other people?
4. What is "climate change" to you?
5. What is your community's process of decision-making?
    a. In what ways is this similar (or not) to ANDES's processes of decision-making?
6. What skills or knowledge have you learned through your work with ANDES?
    a. Has working with ANDES changed you? If so, how?
7. Do you feel like there is space for your cosmovision in your work with ANDES?
8. What does knowledge co-production mean to you?
    a. What does successful work in ANDES look like?
9. What has your experience been like working with tourists, interns or colleagues from other countries? From different areas/backgrounds in Peru?
10. What language do you conduct most of your work in?
    a. Do you find this to be a challenge? An opportunity?
11. Do you have any questions for me?

(B) Two ANDES employees from *Parque* (*Spanish*):

1. ¿Por favor, puede describir su trabajo en ANDES?
2. ¿De dónde eres/cuál es tu formación?
    a. ¿Cuándo, cómo y por qué empezaste a trabajar en ANDES?
3. ¿Cómo aprendiste lo que sabes?
    a. ¿Cómo crees que influye en la forma en que trabajas o enseñas a otras personas?

4. ¿Qué es el "cambio climático" para ti?
5. ¿Cuál es el proceso de toma de decisiones de su comunidad?
    a. ¿De qué manera es esto similar (o no) a los procesos de toma de decisiones de andes?
6. ¿Qué habilidades o conocimientos has aprendido a través de tu trabajo con ANDES?
    a. ¿Te ha cambiado trabajar con ANDES? Si es así, ¿cómo?
7. ¿Sientes que hay espacio para tu cosmovisión en tu trabajo con ANDES?
8. ¿Qué significa para ti la coproducción de conocimiento?
    a. ¿Cómo es el trabajo exitoso en andes?
9. ¿Cómo ha sido tu experiencia trabajando con turistas, pasantes o colegas de otros países? ¿De diferentes áreas/orígenes en Perú?
10. ¿En qué idioma realizas la mayor parte de tu trabajo?
    a. ¿Te parece un desafío? ¿Una oportunidad?
11. ¿Tienes alguna pregunta para mí?

(C) ANDES employee from Cuzco – first language is Spanish; does not speak Quechua and is not from a Quechua family; works often in the Park and has strong relationships there; does many different jobs and tasks for ANDES (*English*):

1. Can you please describe your job at ANDES?
2. Where are you from/what is your background?
    a. When, how and why did you start working at ANDES?
3. How did you learn what you know?
    a. How do you think that influences how you work with or teach other people?
4. What is "climate change" to you?
5. What skills or knowledge have you learned through your work with ANDES?
    a. Has working with ANDES changed you? If so, how?
6. Do you feel like there is space for your voice and working style in your work with ANDES?
7. What does knowledge co-production mean to you?
    a. What does successful work in ANDES look like?
8. What has your experience been like working with tourists, interns or colleagues from other countries? From different areas/backgrounds in Peru?
9. What language do you conduct most of your work in?
    a. Do you find this to be a challenge? An opportunity?
10. Do you have any questions for me?

(C) ANDES employee from Cuzco (*Spanish*):

1. ¿Por favor, puede describir su trabajo en ANDES?
2. ¿De dónde eres/cuál es tu formación?
    a. ¿Cuándo, cómo y por qué empezaste a trabajar en ANDES?
3. ¿Cómo aprendiste lo que sabes?
    a. ¿Cómo crees que influye en la forma en que trabajas o enseñas a otras personas?
4. ¿Qué es el "cambio climático" para ti?
5. ¿Qué habilidades o conocimientos has aprendido a través de tu trabajo con ANDES?
    a. ¿Te ha cambiado trabajar con ANDES? Si es así, ¿cómo?
6. ¿Sientes que hay espacio para tu voz y estilo de trabajo en tu trabajo con ANDES?

7. ¿Qué significa para ti la coproducción de conocimiento?
    a. ¿Cómo es el trabajo exitoso en andes?
8. ¿Cómo ha sido tu experiencia trabajando con turistas, pasantes o colegas de otros países? ¿De diferentes áreas/orígenes en Perú?
9. ¿En qué idioma realizas la mayor parte de tu trabajo?
    a. ¿Te parece un desafío? ¿Una oportunidad?
10. ¿Tienes alguna pregunta para mí?

(D) One ANDES employees from outside of Peru – first language in English; fluent in Spanish and has working knowledge of Quechua (*English*):

1. Can you please describe your job at ANDES?
2. Where are you from/what is your background?
    a. When, how and why did you start working at ANDES?
3. How did you learn what you know?
    a. How do you think that influences how you work with or teach other people?
4. What is "climate change" to you?
5. What is your typical process of decision-making in an organization?
    a. In what ways is this similar (or not) to ANDES's processes of decision-making?
6. What skills or knowledge have you learned through your work with ANDES?
    a. Has working with ANDES changed you? If so, how?
7. What does knowledge co-production mean to you?
    a. What does successful knowledge co-production look like?
8. What has your experience been like working in a culture/cultures that you did not grow up in?
9. What language do you conduct most of your work in?
    a. Do you find this to be a challenge? An opportunity?
10. Do you have any questions for me?

Appendix B – Agenda for Reflection Session (English and Spanish)

Agenda for Reflection Session (*English*)

Asociación ANDES

Knowledge Exchange Workshop Agenda (English)
Office in Huaran
July 8th, 2022
9:00am – 3:00pm

KEY:
Black = activity overview/schedule
Red = materials needed/actions to take
Blue = what to say/explanation of activity
Green = roles (who is doing what)

8:30am – prepare tea and coffee
9:00am – Arrivals (tea, coffee, cups, sugar, use the bathroom)
9:30-9:50am – Introductions
Please say you name, where you are from and your favorite

9:50am-11am – Quinoa Games

(external facilitator will manage this game)

11am-11:15am – Presente brevemente la sesión de intercambio de conocimientos: reciba preguntas para pensar

11:15am – 11:30am - Take a break (tea, coffee, cups, sugar, use the bathroom)

Questions: What is knowledge exchange? When have you experienced knowledge exchange?

11:30am-11:45am – Start Session: Introduce themes, instructions, divide into groups

Today we are discussing knowledge exchange and want to think about times when you have worked with people from different countries, cultures, backgrounds. When have you worked with people who speak a different language than you? When have you worked in groups with people from other communities? What helped you to share ideas? What made it difficult to share ideas?

There are many components involved in creating spaces for sharing ideas and creating solutions to collective global problems (like climate change).

Today we are going to divide into four groups to discuss four main components of knowledge co-production:

- Logistical:
  - What do you need for people to feel comfortable exchanging ideas? For example: food, temperature, access bathrooms, medical team
- Methodological:
  - Setting? Are you moving? Are you outdoors? What senses are you engaging? Does it help to see pictures?
- Language:
  - Why is it important? Different meaning? Different worldviews?
- Impacts:
  - Do we actually change the world with these workshops? How do we create more impacts beyond a single exchange?

(bring out photos from their experience – printed or on computer)

Please look at these images form some of your past international knowledge exchange experiences to reflect on all 4 categories. You will have time in your groups to discuss particular elements of your experiences.

Where were you? Who were you with? Think of some of your memories from those experiences

Now, each person is going to get a picture of an animal. Please do not show this picture to your *compañeros*. Your picture represents the group you are in. Without using words, you need to find your group. You can make the noises of that animal. You can act like that animal. Or if you prefer, you can draw the animal to show your *compañeros*.

(Have animal pictures printed and cut ahead of time – hand out to people)

(have small paper and markers available)

Please find each other, and then wait for further instructions:

(everyone finds their groups)

(have printed papers with questions for each group on it)

Raise your hand if you are the birds or group one. You all are the logistics group (hand them a paper with the questions they are supposed to think about and read the questions out loud to emphasize)
Raise your hand if you are the trout or group two. You all are the methodology group (hand them a paper with the questions they are supposed to think about and read the questions out loud to emphasize)
Raise your hand if you are the llama or group three. You all are the language group (hand them a paper with the questions they are supposed to think about and read the questions out loud to emphasize)
Raise your hand if you are the puma or group four. You all are the impacts group (hand them a paper with the questions they are supposed to think about and read the questions out loud to emphasize)

Specific Questions for Each Group:

- Logistical:
  - What do you need for people to feel comfortable exchanging ideas? For example: food, temperature, access bathrooms, medical team
- Methodological:
  - Setting? Are you moving? Are you outdoors? What senses are you engaging? Does it help to see pictures?
- Language:
  - Why is it important? Different meaning? Different worldviews?
- Impacts:
  - Do we actually change the world with these workshops? How do we create more impacts beyond a single exchange?

11:45am-12:30pm – Discuss in groups

You will have 45 minutes, until 12:30pm, to meet with your group. Feel free to go anywhere with your group. You can use big paper and markers, notebooks, you can sit or walk. Your group can decide how you want to discuss your theme.
(have butcher paper, markers, notebooks, photos and workbooks available for people to use)
When you come back to the big group, you will share what you discussed with everyone.
How will they share back with the group? – pictures, words? Chart paper? White board?

12:30pm-1:00 pm – Share-out with the entire group

Why did you choose to sit in the shade? Choose to walk? Etc.
Share responses to group questions (8 minutes max, including questions and comments from others)

1:00pm-2:00pm – Lunch

(someone will arrive with lunch – **group 1** to get silverware; **group 2** helps set up chairs and tables; **group 3** gets cups for everyone for drinks; **group 4** helps clean after)

2:00pm-3:00pm – Discuss recommendations, action and concrete conclusions

Now that we have had some time to think about our experiences with knowledge exchange, we want to come up with some concrete recommendations for future sessions where we will be discussing our problems and creating solutions together. You no longer have to think only about your group's topic – you can add to any section.

What are the logistic, methods, language and follow up we want to see in the future?
How can we best represent and save this knowledge for future events?
Document key recommendations for each theme
White board – draw what knowledge exchange looks like – draw space and things needed in that space, walking or sitting – everyone can contribute something to the image
Have sheets with each topic and an extra for things that might not fit in 4 categories
Everyone can add to each topic
Next meeting: July 15 in Potato Park

3:00pm – Clean-up and Leave

Agenda for Reflection Session (*Spanish*)

Taller de Intercambio de Conocimientos Agenda (Espanol)

Oficina en Huaran
8 de julio de 2022
9:00am – 3:00pm

CLAVE:
Negro = resumen/horario de la actividad
Rojo = materiales necesarios/acciones
Azul = qué decir/explicación de la actividad
Verde = roles (quién está haciendo qué)

8:30am – prepare tea and coffee
9:00am – Llegada (té, café, tizas, azucar, usar el baño)
9:30-9:50 am – Presentaciones
Por favor, diga su nombre, de donde eres, y su papa favorita
9:50 am-11am – Juego del Quinoa
(Facilitador externo gestionará este juego)
11am-11:15am – Presente brevemente la sesión de intercambio preguntas para pensar
11:15 – 11:30 tomar un descanso (té, café, tizas, azucar, usar el baño)
Preguntas: ¿Qué es el intercambio de conocimientos? ¿Cuándo has experimentado el intercambio de conocimientos?
11:30am-11:45am – Iniciar sesión: introducir temas, instrucciones, dividir en grupos
Hoy estamos discutiendo el intercambio de conocimientos y queremos pensar en los momentos en que has trabajado con personas de diferentes países, culturas, orígenes. ¿Cuándo has trabajado con personas que hablan un idioma diferente al tuyo? ¿Cuándo has trabajado en grupos con personas de otras comunidades? ¿Qué te ayudó a compartir ideas? ¿Qué hizo que fuera difícil compartir ideas?
Hay muchos componentes involucrados en la creación de espacios para compartir ideas y crear soluciones a problemas globales colectivos (como el cambio climático).
Hoy vamos a dividirnos en cuatro grupos para discutir cuatro componentes principales de la coproducción de conocimiento:

- Logística:

- ¿Qué necesitas para que las personas se sientan cómodas intercambiando ideas? Por ejemplo: comida, temperatura, baños de acceso, equipo médico

- Metodológico:
  - o ¿Configuración? ¿Te estás mudando? ¿Estás al aire libre? ¿Qué sentidos estás involucrando? ¿Ayuda ver imágenes?
- Idioma:
  - ¿Por qué es importante? ¿Significado diferente? ¿Diferentes visiones del mundo?
- Impactos:
  - ¿Realmente cambiamos el mundo con estos talleres? ¿Cómo creamos más impactos más allá de un solo intercambio?

(sacar fotos de su experiencia, impresas o en la computadora)

Por favor, mire estas imágenes de algunas de sus experiencias pasadas de intercambio de conocimiento internacional para reflexionar sobre las 4 categorías. Tendrá tiempo en sus grupos para discutir elementos particulares de sus experiencias.
¿Dónde estabas? ¿Con quién estabas? Piensa en algunos de tus recuerdos de esas experiencias
Ahora, cada persona va a obtener una imagen de un animal. Por favor, no muestre esta foto a sus *compañeros*. Tu imagen representa el grupo en el que te encuentras. Sin usar palabras, necesitas encontrar a tu grupo. Puedes hacer los ruidos de ese animal. Puedes actuar como ese animal. O si lo prefieres, puedes dibujar al animal para mostrar a tus *compañeros.*
(Imprima y corte imágenes de animales con anticipación – dígaselas a las personas)
(Tienen papel pequeño y marcadores disponibles)
Por favor, encuéntrese y luego espere más instrucciones:
(todos encuentran sus grupos)
(tener documentos impresos con preguntas para cada grupo en él)
Levanta la mano si eres el pájaro o el grupo uno. Todos ustedes son el grupo logístico (entrégueles un papel con las preguntas en las que se supone que deben pensar y lea las preguntas en voz alta para enfatizar)
Levanta la mano si eres la trucha o el grupo dos. Todos ustedes son el grupo de metodología (entrégueles un papel con las preguntas en las que se supone que deben pensar y lea las preguntas en voz alta para enfatizar)
Levanta la mano si eres la llama o el grupo tres. Todos ustedes son el grupo lingüístico (entrégueles un papel con las preguntas en las que se supone que deben pensar y lea las preguntas en voz alta para enfatizar)
Levanta la mano si eres el puma o el grupo cuatro. Todos ustedes son el grupo de impactos (entrégueles un papel con las preguntas en las que se supone que deben pensar y lea las preguntas en voz alta para enfatizar)

Preguntas específicas para cada grupo:

- Logística:
  - ¿Qué necesitas para que las personas se sientan cómodas intercambiando ideas? Por ejemplo: comida, temperatura, baños de acceso, equipo médico
- Metodológico:

- ¿Configuración? ¿Te estás mudando? ¿Estás al aire libre? ¿Qué sentidos estás involucrando? ¿Ayuda ver imágenes?

- Idioma:
  - ¿Por qué es importante? ¿Significado diferente? ¿Diferentes visiones del mundo?
- Impactos:
  - ¿Realmente cambiamos el mundo con estos talleres? ¿Cómo creamos más impactos más allá de un solo intercambio?

11:45am-12:30pm – Discutir en grupos

Tendrán 45 minutos, hasta las 12:30 pm, para reunirse con su grupo. Siéntase libre de ir a cualquier parte con su grupo. Puede usar papel grande y marcadores, cuadernos, puede sentarse o caminar. Tu grupo puede decidir cómo quieres discutir tu tema. (tener papel de carnicero, marcadores, cuadernos, fotos y libros de trabajo disponibles para que las personas los usen)

Cuando regresen al grupo grande, compartirán lo que discutieron con todos.

12:30pm-1:00 pm – Compartir con todo el grupo

¿Por qué elegiste sentarte a la sombra? ¿Eliges caminar? Etc.

Compartir respuestas a preguntas grupales (8 minutes max, including questions and comments from others)

1:00pm-2:00pm – Almuerzo

(alguien llegará con el almuerzo – grupo 1 para conseguir cubiertos; el grupo 2 ayuda a colocar sillas y mesas; el grupo 3 recibe tazas para todos para las bebidas; el grupo 4 ayuda a limpiar después)

2:00pm-3:00pm – Discutir recomendaciones, acciones y conclusiones concretas

Ahora que hemos tenido algo de tiempo para pensar en nuestras experiencias con el intercambio de conocimientos, queremos llegar a algunas recomendaciones concretas para futuras sesiones en las que discutiremos nuestros problemas y crearemos soluciones juntos. Ya no tiene que pensar solo en el tema de su grupo, puede agregar a cualquier sección.

¿Cuáles son la logística, los métodos, el idioma y el seguimiento que queremos ver en el futuro? ¿Cómo podemos representar y guardar mejor este conocimiento para eventos futuros?

Documentar recomendaciones clave para cada tema

Pizarra blanca – dibujar cómo se ve el intercambio de conocimientos – dibujar el espacio y las cosas necesarias en ese espacio, caminando o sentado – todos pueden contribuir algo a la imagen

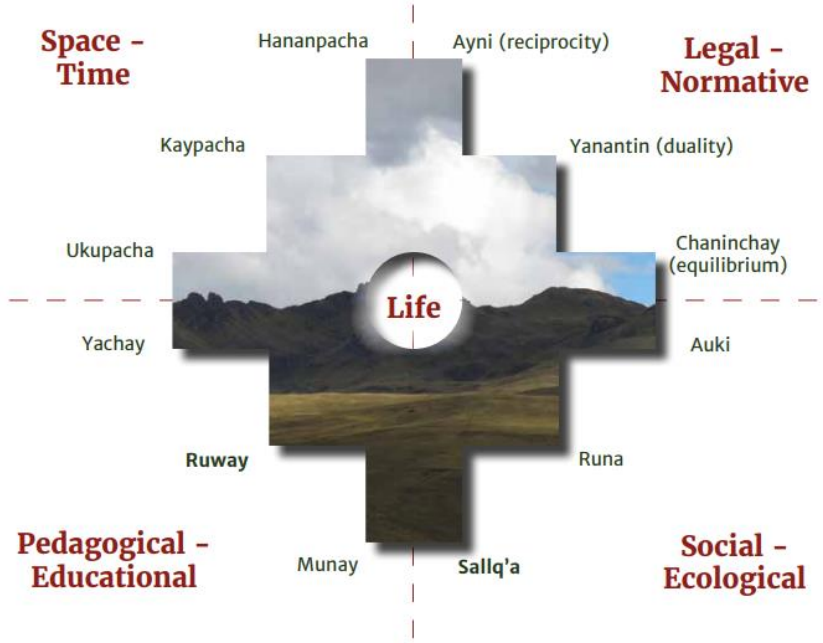
Tenga hojas con cada tema y un extra para cosas que podrían no encajar en 4 categorías

Todos pueden agregar a cada tema

Próxima reunión: 15 de julio en Potato Park

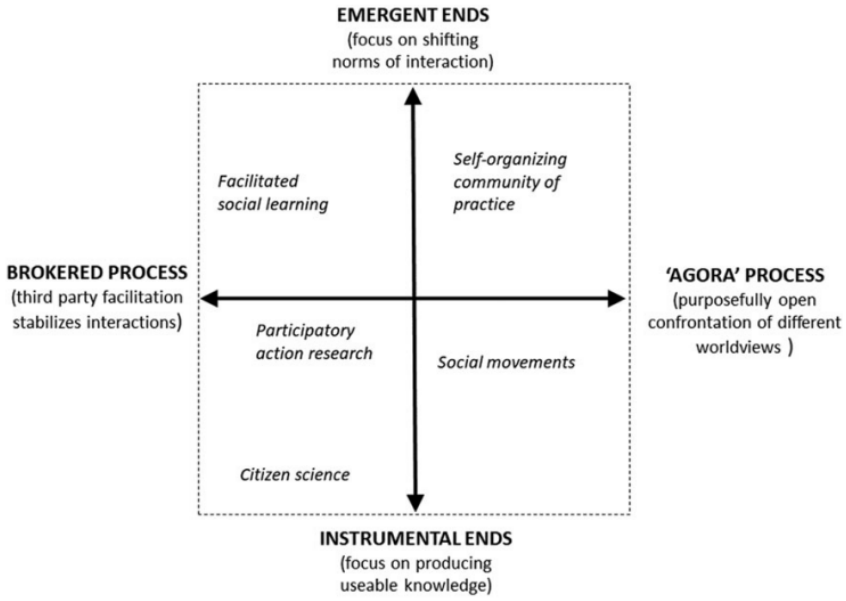
3:00pm – Limpiar y salir

Appendix C – Quechua Knowledge System in Form of Chakana



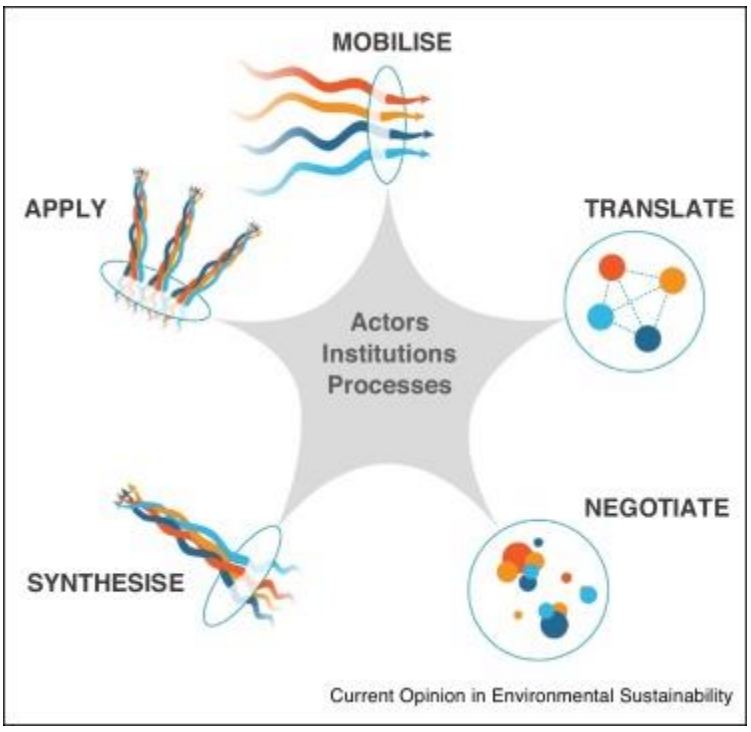
The Chakana (southern cross) was "adapted to integrate considerations of spacetime, legal-normative, socio-ecological, and pedagogical-educational in ANDES' curriculum for biocultural education" (*Asociación* ANDES, 2016, p. 13).

Appendix D – Brokered vs. Agora Processes



(Harvey et al, 2019)

Appendix E – Weaving Knowledge Systems



(Tengö et al., 2017)