



Unveiling relational values in agroecosystems through participatory video in a tropical agroforest frontier

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Abstract

Recognizing and incorporating the diverse values of nature into decision-making is critical for transformative change toward sustainability. This is particularly true for relational values involving reciprocity, care, and responsibility, especially in unsustainable production systems replacing rapidly diverse tropical forests. Our study reveals the diversity of relational values in agroecosystems through a creative Participatory Video (PV) process embedded within a long-term transdisciplinary project at the agroforestry frontier of southeastern Mexico. Informal chats and interviews were followed by a workshop to present the PV tools, storyboarding, filming, and video editing. The process concluded with a public screening at the community. The video content and interviews analysis revealed a great diversity of relational values of agroecosystems, such as individual and cultural identity, social cohesion, social responsibility, moral responsibility to non-humans, stewardship, self-determination, and some differences in narratives associated with intersectionality. PV allowed participants to express their deepest feelings, highlighting how relational values shape daily life in the community and nurturing self-determination to foster collective action. The diversity and prevalence of these values were striking, given that families arrived only 40 years ago, and the tropical forest is rapidly disappearing. Deep leverage points and shifts in sustainable management visions pave the way for transformative changes in the local food system and potential scaling to other similar communities.

Keywords Art-based methods · Transdisciplinary · Value pluralism · Global south

Abbreviations

PV	Participatory video
IPBES	Intergovernmental science-policy platform on biodiversity and ecosystem services

Introduction

People relate to nature differently based on their biophysical and social contexts, knowledge, emotions, experiences, and interpretations of their reality, which shapes their actions and relationships with nature (Tauro et al. 2018; IPBES 2022). Despite the diverse values of nature embedded in these relationships, decision-making often focuses on specific instrumental values (related to people's needs) and, occasionally, intrinsic values (related to the inherent value of nature) (Arias-Arévalo et al. 2017; Chan et al. 2018; Sheremata 2018; IPBES 2022; Himes et al. 2024). These values ultimately drive the biodiversity crisis or alternative pathways towards more just and sustainable futures. This current sustainability crisis is underpinned by the domination of a narrow set of instrumental market values associated with goods from nature and intrinsic values linked to colonial conservation approaches (Pascual et al. 2023; Vatn et al. 2024). Making visible the diversity of values in

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meaningful and inclusive ways is crucial for deconstructing dominant narratives that lead to unjust and unsustainable decisions and allow for shallow to deep transformative changes to occur (Termansen et al. 2023; Lenzi et al. 2023).

Plural valuation approaches that recognize the diversity of values lead to more equitable and sustainable decision-making (Jacobs et al. 2020; Zafra-Calvo et al. 2020; Pascual et al. 2023). Among these values, relational values are key to moving beyond dominant perspectives and narrowly framed nature-associated values. The “relational” turn in sustainability sciences (West et al. 2020) was triggered by Chan et al. (2016), who introduced the concept of relational values. These values go beyond the simple dichotomy between nature (intrinsic values) and people (instrumental values) to highlight the importance of the relationships between people and nature. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Value Assessment defines relational values as the “values of desirable, meaningful, and often reciprocal human relationships with nature, which are often specified as a particular landscape, place, species, etc., and among people through nature. In principle, non-substitutable” (IPBES 2022; Chap. 2:34), these relationships are deep, complex, and based on responsibility, ethics, and care, leading to a good life (Chan et al. 2016; Himes and Muraca 2018). Relational values have three core features: (a) they are not exclusively instrumental, (b) they derive from relationships, and (c) the natural entities involved are non-substitutable (Chan et al. 2016; Himes and Muraca 2018; Pratson et al. 2023; Gould et al. 2024). Moreover, these values are people-specific, rooted in intersectional characteristics such as gender, age, occupation, or land tenure, and shaped by individual experiences, proximity to nature, social relationships, and sociocultural contexts (Kenter et al. 2015; Chan et al. 2016; Tengö et al. 2017; Monroy-Sais et al. 2022; Pascual et al. 2023).

Relational values can contribute to the transformation towards sustainability, especially in the case of food systems, as some are linked with management decisions that promote biodiversity conservation in agroecosystems (Allen et al. 2018; Riechers et al. 2021). Farmers’ relational values, rooted in social responsibility and care for others, contribute to the well-being of future generations (Allen et al. 2018). These values also enhance agency, i.e., the ability to make decisions and influence actions in agroecosystems that allow for more sustainable paths (Chapman et al. 2019; Riechers et al. 2020). Relational values of agroecosystems (Allen et al. 2018; Riechers et al. 2020, 2021) are increasingly showing their role in supporting management, conservation programs (Chapman et al. 2019), soil health (Friedrichsen et al. 2021), and sustainability (Jones and Tobin 2018; Tobin 2023). However, not all relational values are sustainability-aligned; some are found in deforested areas used for cattle

ranching and pasture (Hoelle et al. 2022) or among farmers who maintain aesthetic farms with little natural vegetation (Chapman et al. 2019). Thus, the design of public policies, programs, regulations, and infrastructure should aim to cultivate and maintain relational values in a pro-environmental direction (Chapman and Deplazes-Zemp 2023).

Exploring relational values is particularly important for agroecosystems at the frontier, where large tracts in the planet’s tropical areas face alarming deforestation (Tilman et al. 2017; Kolb and Galicia 2018; Pendrill et al. 2022). Highly diverse ecosystems are being rapidly transformed into extensive livestock farming systems or monocultures such as palm oil or soybean (Kassa et al. 2017; Oakley and Bicknell 2022; Suarez and Gwozdz 2023). Nature is increasingly viewed as a mere supplier for market demands, diminishing the rich tapestry of interactions between humanity and the environment (Riechers et al. 2020). When both biological and value diversity are lost, feedback processes that exacerbate deterioration can occur (IPBES 2019; IPBES 2022).

The relational values held by local actors, such as smallholders in rural areas, are particularly relevant given that these stakeholders contribute to a significant proportion of the planet’s food production and are also the stewards of the world’s biodiversity (Díaz et al. 2019). Through their direct engagement with the land, they play a critical role in sustaining the livelihoods of local communities and in the preservation and nurturing of agrobiodiversity (Kull et al. 2013; FAO 2018; Ricciardi et al. 2018). Therefore, recognizing the relational values of these key actors in managing their agroecosystems is crucial as they are on the frontline of vulnerability to biodiversity loss and the erosion of biocultural heritage (Gliessman 1992; Altieri and Nicholls 2004; Toledo 2005; Toledo and Barrera-Bassols 2008; Sarandon et al. 2016). Many smallholders and local communities have unique knowledge and values that reflect their collective responsibility and care for agroecosystems, extending beyond anthropocentric concerns (Allen et al. 2018; Riechers et al. 2021). These values can motivate actions that prioritize the common good and the health of other life forms over economic productivity or individual well-being. They can also foster collective projects that trigger agency and autonomy, reflecting diverse knowledge in agrobiodiversity management decisions. However, these place-based values and practices are often overlooked in the design of public policies and conservation programs (Chapman et al. 2019). Recognizing these diverse values and views, encouraging active participation, and providing a platform for these voices to be heard can promote and strengthen the sustainable relationships and practices that smallholders already maintain (IPBES 2022).

The typology of relational values proposed by Chan et al. (2016) could be helpful as a starting point to explore the

relationships between people and agroecosystems. In the literature on relational values, there are variations to existing typologies (Riechers et al. 2021; Saito et al. 2021), typologies according to the study (Sheremata 2018; Kreitzman et al. 2022), or specific conceptual proposals (Chapman et al. 2019). However, more empirical evidence is needed to understand the framework better and illustrate typologies on the ground, including the context-specific nuances of value holders (Pascual et al. 2023; Pratson et al. 2023).

Our main goal was to reveal the diversity of relational values of agroecosystems through a creative Participatory Video (PV) process in Loma Bonita *ejido*, at the most critical agroforest frontiers of southeastern Mexico, as part of the long-term deep transformation of the local food systems. The case study is located in the Lacandon Forest, Chiapas; this region has high biodiversity and is rapidly changing due to the increase in monocultures and the creation of new population centers through recent colonization processes (Carabias et al. 2015; Berget et al. 2021). Our main question was: What relational values do the people of Loma Bonita unveil through PV? We also explored how these values vary according to the intersectional characteristics of the people and across the agroecosystems. We used an art-based participatory process from a decolonial approach.

This study is part of a long-running transdisciplinary project, *Cocina CoLaboratorio* (CoLaboratory Kitchen in Spanish), which aims to redirect food systems towards more just and sustainable routes. Collectives of local actors, participatory artists and designers, academics, and students come together around the kitchen, the farming plot, and the territory to exchange knowledge and experiment (Cocina Colaboratorio 2024). The fundamental premise is that encounters in these spaces and participatory artistic practices allow for more meaningful exchanges, engaging emotions and experiences and strengthening their participants' individual and collective agency (Kooi and Martínez-Balvanera 2021; Mesa-Jurado et al. 2024). Furthermore, creativity and non-verbal techniques, such as participatory videos or photos, make it possible to showcase the diversity of values and realities and influence decision-making processes toward more sustainable paths (Muhr 2020; Tauro et al. 2021; Gould 2023). Being embedded in a transdisciplinary project, the relationships of trust and previous knowledge of the participants benefit the motivations to get involved in the participatory process. At the same time, unveiling relational values can offer crucial insights into intricate, multi-faceted problems and lay the groundwork for transdisciplinary collaborations (Sheremata 2018).

This research allowed us to obtain an empirical, unique typology of relational values enriched with people's narratives derived from their personal and context-specific experiences related to their agroecosystems. We then discuss

how unveiling relational values through a participatory process contributes to the long-term transdisciplinary process towards a more sustainable local food system and the importance of considering the context-specific relational values of local actors in decision-making as an essential step towards sustainability transformation. We reflect on how the paper provides empirical evidence to illustrate the growing literature on relational values in sustainability sciences and the contribution of PV as an art-based participatory method. Finally, we consider how recognizing the relational values of local managers of agroforest frontiers can activate a deep leverage point that shifts dominant paradigms about the links between agriculture, biodiversity, and livelihoods to enable more caring, reciprocal, and responsible relationships that can lead to more just and sustainable food systems.

Participatory video: a creative tool that enables the democratic expression of voice diversity and values

The Participatory Video (PV) process consists of techniques that engage a given group or community in the shape and creation of their videos to communicate their visions, interests, and concerns (Lunch and Lunch 2006). Participatory Video gives local and marginalized groups a voice and contributes to political and social transformation (if applied with a critical and conscious intention) (Roberts and Lunch 2015). It is a tool that encourages the inclusion of local perspectives, where participants can express their narrative and how they wish to be seen and heard (Snyder et al. 2019). However, several researchers contest these assumptions, questioning its potential to disrupt power hierarchies during the research process or to solve practice tensions inherent to the methodology related to funding, timeframe, technical requirements and clashing researchers and communities' expectations, and several ethics concerns, among others (Chalfen et al. 2010; Milne 2016; Mistry et al. 2016; Shaw 2016; Walsh 2016). Nevertheless, the PV is a flexible tool that allows the process, time, and technical requirements to be adapted to the context in which it is implemented. In addition, to minimize power imbalances, the PV aims to promote a participatory, democratic process in which the participants author and lead the development of the film, and the researcher guides the participants, facilitating the maintenance of a collaborative process (Lunch and Lunch 2006). It also promotes collective and individual community reflection on their goals, priorities, or traditions (Berardi et al. 2014; Morales et al. 2021). Furthermore, this tool can help to reveal messages and nuances that would otherwise have gone unnoticed as they used more than words to express their emotions, thoughts, and experiences (Muhr 2020).

PV can be a valuable tool for exploring values as it can bring behaviors, feelings, or actions that may be silenced to

the surface by playing and acting with the camera. How an individual or a group chooses to narrate their story—determining the details to share or omit, the aspects to highlight or downplay, and the method of presentation—offers significant insight into their self-perception and prompts dialogue among community members (Berardi et al. 2014). The PV can be combined with other tools to understand better the relational values using multiple data types. For example, it can be used with interviews or other qualitative data such as observations, reflections, and discussions in participant dynamics (Muhr 2020; Eastwood et al. 2023). Visual arts and storytelling can inspire individuals to introspect and deeply relate to their daily surroundings and actions (Turner et al. 2023). This is crucial in bridging the gap between humans and nature, a gap that some fields (often rooted in Western scientific ecological, environmental, and conservation perspectives) still reinforce and thus exacerbate (Strand et al. 2022).

Methods

Case study

The *ejido* of Loma Bonita, adjacent to the Montes Azules Biosphere Reserve, still hosts enormous biodiversity (INEGI 2020). Since the 1970s, government programs have encouraged the migration of groups from different parts of the country and Guatemala (Carabias et al. 2015; Berget et al. 2021), the conversion of forest areas to agriculture and cattle ranching, and the establishment of monocultures (Cano-Castellanos 2014; Carabias et al. 2015; Pingarroni et al. 2022). Land tenure is the *ejido*, a semi-communal property granted mainly to men, created by the Mexican state following the Mexican Revolution (PA 2014). From the 1940s and especially the 1970s (Balvanera et al. 2021) the first settlers in the community came from the North of Chiapas. Their livelihoods had not been linked to tropical rainforests previously. In 1982, because of the civil war in Guatemala, Guatemalan refugees also settled in the community. In 2005, Loma Bonita was officially recognized as an *ejido*, which allowed farmers to access some government productive programs but not conservation programs such as Payment for Environmental Services, as the remnant primary rainforest is very fragmented (Berget et al. 2021).

Loma Bonita has around 300 inhabitants (INEGI 2020), of which 80 are *ejidatarios* who hold rights to individual plots of land within the *ejido* (RAN 2006). Not everyone has land tenure rights; only the *ejidatarios* can be part of the assembly and vote for community issues. Traditionally, mostly men have access to land. The rest of the inhabitants (no land property rights holders) have access to land for

cultivation by renting or borrowing from their relatives. The primary land use of about 1,700 hectares (RAN 2006) is cattle pasture, followed by primary and secondary forests and agriculture (Haperen 2019; Berget et al. 2021) (Fig. 1). The level of marginalization of the *ejido* is high, and the level of social lag is medium (SEDESOL 2015). Livestock and subsistence agriculture are the main economic activities (Berget et al. 2021).

The principal agroecosystems in the *ejido* are homegardens (called *solar* in this region), plots (*parcelas*), and pastures (*potreros*). Homegardens are the space around the house where families, mainly women, cultivate flowers, medicinal plants, fruit trees, and other edible plants, and breeding animals such as pigs, turkeys, and chickens (Bee 2014; Cano-Contreras 2015; Trevilla-Espinal et al. 2021). The size, spatial organization, and crops vary according to the objectives of the families who live there, the land acquired, and the environmental conditions (Mariaca 2012). The average size of these spaces in Loma Bonita is 25 × 25 m. Homegardens play an essential role in the experimentation and conservation of domesticated and wild seeds. They are considered biodiverse agroecosystems of ancient origin (González-Jácome 2007; Cano-Contreras 2015). The food produced is usually for the family's self-consumption, gifts to neighbors or family, and a small proportion for local or regional sales (Mariaca 2012). The plots are spaces dedicated to planting. Most plots are configured as a polyculture system called *milpa*, a traditional agricultural system primarily practiced in Mesoamerica, based on the cultivation of maize, beans, squash, chili, and several species of weeds. Other crops include cacao, coffee, rice, fruit trees, and timber trees such as mahogany or cedar (Zermeño-Hernández et al. 2016). Plots in Loma Bonita are usually 20 hectares in size and located on the outskirts of the settlement area. Plots with *milpa* tend to be on the banks of the Lacantun River, where the soil is most fertile. Also, in Loma Bonita, there are plots with pastures for livestock (paddocks), scattered trees, and, in some cases, fragments of rainforest area. Extensive cattle ranching is practiced (Berget et al. 2021); cattle are essential for the economic livelihood of some families and function as a savings system (Pingarroni et al. 2022). The men are mainly in charge of managing the plots and pastures.

The participatory video process

From April 2021 to March 2022, we facilitated a PV process with nine Loma Bonita inhabitants who participated in all stages and produced videos. In addition, 21 participants were interviewed and had informal conversations as part of the initial touchpoint of the PV process. Each person was free to decide at which stage of the process to join or

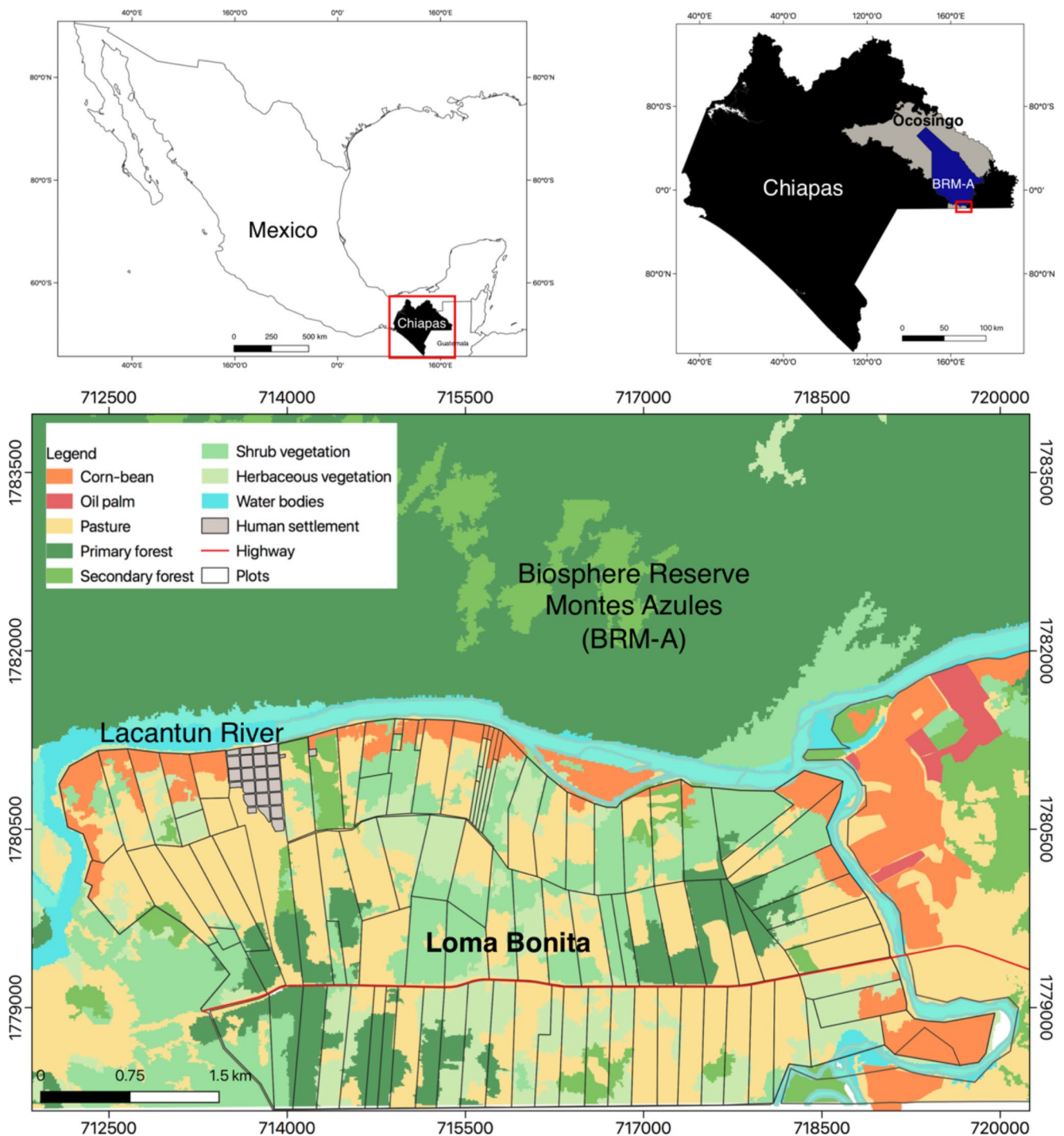


Fig. 1 Location of Loma Bonita and the distribution of plots and main land uses. Source: Elaborated by Aline Pingarroni with data obtained from Pingarroni et al. (2022)

conclude their participation. In this research, we adapted the PV process from Lunch and Lunch (2006) to the needs of the participants, time restrictions, funding, and limitations imposed by the SARS-COVID-19 pandemic. Before the fieldwork phase, the first author of this work received

training as a participatory video facilitator¹. The PV process was split into four stages with different involvement levels, number of participants, and multiple types of data co-constructed during the development of the research (Fig. 2).

¹ M.A. Mesa-Jurado and M. Pineda-Vázquez had training in this tool prior to this research.



Fig. 2 Participatory video process in Loma Bonita, and the co-produced multiple data types

We used participatory video (PV) from a decolonial approach, meaning that we explicitly aimed to address power relations between different types of knowledge and actors (Smith 2022) while creating spaces for transformative practices (Thambinathan and Kinsella 2021). In particular, we sought to dismantle discursive power dynamics that

privilege scientific knowledge over local knowledge and the framing power that influences how issues are understood (Arias-Arévalo et al. 2023). In Cocina Colaboratorio, rather than focusing on science as an end in itself or approaching the project through an extractive process, we were aware of the often hidden power relations between researchers

and local people and deliberately addressed these inequalities. This approach avoided imposing a particular way of thinking or doing things and allowed participants to express themselves on their own terms. Our focus remained on the needs of the local community, ensuring that our work contributed to their livelihoods and emphasizing the principles of care and reciprocity. The PV process created novel spaces not explicitly explored in the transdisciplinary project, further facilitating transformative processes.

Initial touchpoint

The initial touchpoint occurred during the Cocina Laboratorio fieldwork season in April 2021. This project has been collaborating with the residents of Loma Bonita since 2018, carrying out a wide range of activities and processes through arenas of exchange and experimentation around an agroecological communal plot, a living biocultural archive, and the kitchen, which is the central arena of this transdisciplinary project (Kooi and Martínez-Balvanera 2021; Cocina Laboratorio 2024). The kitchen is one of the most basic human spaces for exchange and daily experimentation and connects to the agrosystems through the natural ingredients cultivated there.

The first author was able to guide the participatory video process in collaboration with community members through the trust and networking that Cocina Laboratorio had built up over the years and its involvement in planned activities. During the initial phase, she explained the purpose of the research and invited individuals to attend introductory workshops on PV. Semi-structured interviews and informal conversations were conducted with 21 participants. The interviews occurred during parallel Cocina Laboratorio activities such as walks (mainly in homegardens (11) and plots (4)) and cooking sessions. Informed verbal consent was obtained regularly before each activity, and any recording or filming was also subject to consent. Interviews and informal talks were conducted throughout the PV process and lasted between 15 and 60 min. The study was conducted through visits to the participants' pastures, homegardens, plots, and the community agroecological plot managed by Cocina Laboratorio. The questions were designed to explore the participants' emotions, relationships, and feelings about agroecosystems. During the visits to the plots and pastures, they showed the diversity of crops they manage and explained daily activities. This led to informal conversations about the participants' relationship with agroecosystems. The visits and interviews were documented using field notes and recording when participants consented.

Introductory workshops

An initial workshop was held for those interested in participating. Eight women attended the introductory workshops, and six continued the process, forming two groups of three. The initial session included outlining the objectives, answering questions about the participatory video (PV), providing training on using the equipment, introducing different filming techniques, and collaboratively designing an informed consent activity tailored to the video production and screening process. We used icebreakers, exercises, and games developed by Lunch and Lunch (2006) to facilitate engagement. Separate sessions incorporating the above elements were also conducted with three male participants. Depending on each participant's schedule and availability, work sessions were conducted individually with each participant or group.

Storyboarding, filming/acting, and video editing

Subsequent activities focused on the technical aspects and core elements required to create a video. The exercise called "Margolis Flower" (Lunch and Lunch 2006) was implemented to select the theme and draft the script. It consisted of iterative rounds of questions where participants recorded the answers of their fellow participants with two or three words noted on cards. This exercise fosters active listening, allowing shy people to share their ideas in a few words with the rest of the participants, ensuring all voices are represented in the collective organization of the topics. These were later shared and collectively organized by themes and priority areas around the local agroecosystems. Both group and individual filming was then carried out according to each participant's schedule, ensuring they had different roles (such as directing, recording, or being recorded). Participants began the video editing phase after receiving training on the Filmora software.

Due to logistical and time-related restrictions, the participants, supported by the facilitator through WhatsApp, finished the editing process remotely. Additionally, one of the participants continued to create their film online. This stage has several iterative cycles; as the participants advanced in the filming or editing steps, they returned to the script to modify it or film other scenes to complete the emergent ideas.

By February 2022, seven films were co-produced (see Supplementary Material). The duration of each video ranges from two to 19 minutes. Three of the films focus on homegardens. The film "*Los Frutos*" (The Fruits) shows the variety of fruits, trees, and plants that can be grown in a homegarden. The participants of this film did not consent to public dissemination of their authorship or the film. The

other two videos, produced by siblings Lila (16 years old) and Suany (9 years old)², show the lessons they learned from their mother about home gardening and maintenance through “*Enseñanza Maternal*” (Maternal Teaching) and “*Que Vengan los Pájaros*” (Let the Birds Come), which shows how caring for the home garden and trees can lead to an increase in bird visits.

Four films were dedicated to the plots and pastures. Pascual (31 years old), a small farmer in “*Los frutos de nuestra tierra*” (The Fruits of Our Land), presents his daily work routine and the diverse crops he cultivates on his plot. In a separate film titled “*Parcela y Potrero*” (Plot and Pasture), Miguel (18 years old) provides an on-foot tour of his pasturelands, introduces his livestock animals, and explains some of his activities on the farm. The third film, “*Entre el Campo y la Escuela*” (Between the Field and the School), was made by Abimael (25 years old), in which he shares his experience as a primary school teacher and how it relates to his work in the field. In the final film, “*Platillos Saludables*” (Healthy Meals), Nelba (48 years old), a homemaker, gives step-by-step instructions on how to prepare vegan sausages and soy drinks grown by her partner in the plot.

Community screening

A community screening of the films was held in March 2022 and attended by 35 community members, five of whom were the authors of the videos, including adults (eight men and nine women) and children. During the screening, participants were asked for their thoughts and whether they identified with any of the testimonies or themes in the videos.

Analysis of the PV process and films.

To explore the relational values of agroecosystems held by Loma Bonita people through the PV process, we analyzed the following qualitative and mixed media data (Fig. 2):

- Researchers’ fieldnotes from informal conversations about the participants’ relationships with their agroecosystems during walks, homegardens visits, and other parallel activities such as cooking sessions and Cocina Colaboratorio workshops;
- Data collected from the PV workshop sessions (e.g., Margolis Flower exercise, storyboarding);
- Twenty-one semi-structured interviews with ten women and eleven men focused on the importance of agroecosystems to people and their relationships;
- The seven final films and montages;

- The recording from the community screening session.

We conducted a qualitative analysis, revealing the relational values expressed in the participants’ narratives about their relationships with agroecosystems and other individuals. We transcribed the videos and semi-structured interviews *verbatim*; then, we coded the information deductively using NVivo 11 software. We created a codebook following Chan et al.’s (2016) typology of relational value: *Cultural Identity, Social Cohesion, Social Responsibility, Moral Responsibility for Non-humans, Individual Identity, and Stewardship (Eudaimonic and Principle/Virtue)*. This categorization was iteratively modified based on the participants’ narratives and other relevant literature, adding one category and sub-categories of relational values. In this sense, we included an additional category called *self-determination* based on the Friedrichsen et al. (2021) codebook, related to farmers’ autonomy and its impact on soil health and Sheremata’s (2018) arguments about how relational values of the *Inuits* fostering the self-determination of indigenous people. In our analysis, we extended the term *stewardship eudaimonic* and *stewardship principle/virtue* to *stewardship*, following the subset of relational values considered by Allen et al. (2018). We used frequency as a proxy for the salience of recurring themes and patterns. While we described all the types of relational values in the synthesis table, we focused primarily on those more frequently mentioned values in the text.

Finally, at an exploratory level, we analyzed narratives associated with the intersectional characteristics of the participants and across the different local agroecosystems. We understood intersectionality as the various forms in which gender, age, occupation, land tenure, and family background interact and determine people’s experiences in ways that cannot be understood by only considering one of these identities (Crenshaw 1991). We recognize that intersectional traits are dynamic and that the following examples represent the specific and temporal contexts of the participants. Intersectionality allows us to explore the unique and multiple relationships between people and agroecosystems. To do so, we present examples of some participants to highlight how intersectional characteristics intercede with relational values and how these are expressed (Valentine 2007). The same exploration was used for agroecosystems, homegardens, plots, and pastures. It is worth noting that we did not conduct an in-depth, fully systematic analysis of narrative changes across intersectionality or agroecosystems, as it was beyond the scope of this research.

² In addition to the consent of minors to participate, maternal consent was obtained to allow their participation in the research and disseminate the video.

Results

Diversity of relational values of agroecosystems

We found a great diversity of relational values of agroecosystems in Loma Bonita, some of which, such as *self-determination*, have not yet been well studied in the literature. We found that these relational values could be empirically grouped into the importance of farmer pride, traditions, and heritage (*individual* and *cultural identity*) that reflects a strong connection with their land, the defense of rural lifestyle and agency in the management of their agroecosystems

(*self-determination*), *social cohesion* derived from relations with the family and the community and the multiple interactions with agroecosystems, and *social responsibility*, *moral responsibility to non-humans* and *stewardship* related to caring for the land as a way of caring for fellow humans (present and future) and non-humans, with a sense of good life and doing the right thing. We obtained an empirical, unique typology of relational values enriched with people's narratives derived from their personal and context-specific experiences related to their agroecosystems (Table 1). This typology included seven main categories of relational values and fifteen subcategories adapted to the context-specific

Table 1 Definitions and examples of relational values of agroecosystems revealed by participants. The coloured bars are proportional to the frequencies of mention of each category

RELATIONAL VALUE CATEGORY	DEFINITION	EXAMPLE QUOTE
CULTURAL IDENTITY	Refers to the importance given by the people to agroecosystem, for what they represent in terms of their local traditions, traditional knowledge and family heritage.	<u>Local traditions.</u> "This is where everything grows well [the plot] because all the people cultivate the same things, maize, beans, everything is the same as what all the people harvest" <u>Traditional Knowledge/ Family heritage.</u> "(It is the) inheritance that our parents, and our grandparents left us, it is what they taught us to do from a very young age, to work the land, to cultivate it [...] as a heritage for us".
SOCIAL COHESION	Refers to the agroecosystem as a bonding space where interpersonal relationships are configured and/or social ties are strengthened.	<u>Exchanges.</u> "Now the rue, the basil, all these plants, people consume them as medicine, and I like to share them, when I have them, then I share them". <u>Intergenerational work, family sharing.</u> "When he has asked me for advice, I tell him [it refers to another farmer]: Look, son, do it this way and try it, and it will work for you because it has given me results. That interaction is a big part of what agriculture is for me"
INDIVIDUAL IDENTITY	Refers to the importance people give to agroecosystem because they provide a sense of self and belonging.	<u>Sense of place.</u> "Talking about how she would feel if she did not have her home garden" "I would feel bad because let's say that this is our life, at least I personally do like my chickens, I do like my plants, and I don't know, I think I would feel sad if one day they were taken away". <u>Significant memories and past experiences.</u> "Here we have a little tree that we call marañon (cashew tree) [...] in the other plot where I was telling you that we used to play, we chose these trees because they are smaller, and here we used to play, we climbed on the trees, we swung, in short, we had a really good time".
SELF-DETERMINATION	Refers to the empowerment and autonomy individuals achieve through their interactions with agroecosystems. This value involves taking deliberate actions to shape their livelihoods and lifestyles (related to agency). It is reflected in the practices and knowledge needed to manage and care for agroecosystems.	<u>Decision and control of inputs to care of the land and oneself.</u> "Well, one works according to one's capacity, that is, no one is forcing you to do this or not, free will. Some people even say: I do want to work for two, three hours, then I rest for an hour, I take a nap, then I get up again, there is no one forcing me to do this or not. Well, it is an improvement, you have no boss. In other words, only one is one's own boss, but nevertheless one must make an effort, it does not mean that because I do not have a boss, I will not have the vision to be able to move towards the future". <u>Agroecosystem management in relation to their knowledge.</u> "In the field, I tell a lot of people that, in the field, you need to have a deep understanding of the plot, you have to know the place completely."
STEWARDSHIP	Refers to caring for agroecosystems as leading to a good life and includes doing what is the right thing to do.	<u>Principle or virtue of doing the right thing.</u> "The same thing helps the plant because since I've been here, I almost never burn garbage. It is rare for me to burn garbage, but most of the time I don't, because I am always picking up the garbage and putting it in the banana plant...". <u>Having a good life.</u> "The truth is that I like it when I go into my garden to clean it, pulling weeds, I enjoy being there [...] and being busy, a busy mind is a healthy mind [...] I think that what we do is healthy, taking care of the plants, taking care of our animals".
SOCIAL RESPONSIBILITY	Refers to the relationships with agroecosystems that generate in people a commitment to care for and support other people.	<u>Food care.</u> "We raise our own farm chickens, which are better than the ranch chickens" [...] "the ranch chickens are raised only on chemicals [...], but the ones here take three or four months to develop, but they are eating pure corn, dough or grass, and they are healthier than the ranch chickens, that is the difference." <u>Care through other practices.</u> [talking about sharing a plot with another member of the community] "since he has nowhere to plant, we gave him a little piece of land here".
MORAL RESPONSIBILITY FOR THE NON-HUMANS	Refers to the care of non-human nature, regardless of one's benefit.	<u>Taking care of the crops, of the land.</u> "There are trees, and the animals need shade and if we didn't have plots or if we had plots but there were no mountains, it would affect the water, the cornfields would dry up, the animals would dry up". <u>Taking care of other organisms that live in or come to the plot.</u> "We take care, we put almost no chemicals on it because there are plants that the animals eat and that contain some kind of medicine, so I tell my husband 'Don't fumigate', I tell him, 'It is better to remove the bush, but with a hoe, with a machete'..." <u>Care of breeding animals.</u> "They [my animals] really like to eat onions and onions... they are very healthy, but besides that they are also an anti-inflammatory, so I am always bringing them bush".

Note: The selected example quotes refer to a relational value category; however, the same quote can be articulated to multiple values.

relationships participants with the land and agroecosystems. *Social cohesion* was the most frequently registered, followed by *social responsibility*, *individual identity*, and *self-determination*. We found that this still unexplored *self-determination* relational value is manifested through the agency of small farmers in deciding how they care for their agroecosystems, which influences the care for the food that allows their families to subsist. Also, this relational value is attached to a sense of pride in being a farmer and freedom to choose their working times, inputs and seeds, and the active management of their agroecosystems.

The Participatory Video process, through the different stages, enabled the people of Loma Bonita to make visible the relevance of relational values in their daily lives. In particular, during the storyboarding and filming process, participants consciously verbalized what they wanted to emphasize about their relationships with agroecosystems: *“I think it would be to tell from the beginning, life as a child and the end of what I am doing now, or almost in between the field and the school”* [...] *“if we shoot at the top, we can shoot the calves and then go down to the maize harvest”*. Feelings and emotions about agroecosystems were raised through the process, with some locations evoking childhood memories and anecdotes. Although there was no formal quantitative or qualitative measurement of empowerment or proactivity, qualitative observations and participant narratives were gathered throughout the PV process. Increased empowerment and proactivity became evident through participants’ involvement in different activities. Some participants took the lead in filming, directing, and editing; others expressed their desire to continue making videos. Two participants created a second video titled “Let the Birds Come”. They also encouraged and supported the making of “Healthy Meals”. In this sense, another participant showed interest in learning more about camera operation to create videos for teaching at the community school. One participant shared how the PV process allowed him to highlight his achievements on the land, stating, *“Thank you for allowing us to share these videos, and hopefully, they will help develop what we want to do [continue to improve the plot with a government program and become more productive in a sustainable way].”*

The importance of relational values in their lives was also evident in the film “The Fruits of Our Land” where a young landless smallholder was moved to show what he has produced and achieved through his work and the support of his family who had lent him the land. His connection to the land reflected his *cultural identity* value, as the knowledge implemented on the land had been passed down through generations, evoking his late father and what he had taught him. He revealed the *social responsibility* value through his commitment to showcasing the produce he grew to feed his

family and community; moreover, his narrative links to the *moral responsibility to non-humans* by expressing his duty to care for the land and its biodiversity and describing how he implements some agroecological practices.

The community screening was well attended by community members who were not involved in the PV process. In a fun and relaxed atmosphere, attendees could express their feelings and how they felt represented by their peers; authors registered these observations. Even though it was held on a weekday and ended late at night, people, including older adults and children, stayed until the end of the screening. The attendees participated in the discussion, laughing, clapping, and sharing their experiences, illustrating the values revealed. *Self-determination*, *cultural identity*, *moral responsibility for non-humans*, and *stewardship* resonated with the audience. One man from the audience reacted with emotion and shared his feelings about working the land: *“There are people who grow up in the countryside and adapt to the city, and those of us who don’t, it is not for us [laughs], although we suffer, in a certain way we are happier [laughs], because we are free [laughs], because you are free, the truth is that in the countryside I feel a freedom, here in the countryside, in the city, just looking at them I feel like I am a prisoner...”* (*self-determination* and *stewardship/eudaimonic*). *Cultural identity* emerged and was strengthened by another participant that shared [about caring of the land]: *“well, the inheritance left to us by our parents, our grandparents. It is what they taught us to do from a very young age... to work the land, to cultivate it”*. Moreover, the usefulness of the PV process in their daily lives was highlighted by one of the filmmakers: *“It was helpful for a little bit of history, but if we look at it closely and analyze it, it lacked a little bit more detail, right? But as it was the first time, it was a... a very unforgettable experience because it was new for me”* (he wants to keep training and uses it in his daily life).

What are the differing narratives for relational values according to intersectional characteristics?

Relational values were stated through differing narratives according to intersectional characteristics of those who hold them, such as age, gender, occupation, land tenure, or family background. Here, we briefly illustrate how intersectional characteristics influence the expression of relational values. These unique characteristics shape specific experiences and narratives of relations values while revealing commonalities among individuals with similar personal and contextual traits. Regarding the narratives linked to *individual identity* relational values and how gender roles shape them, we provide these examples. A middle-aged housewife is a woman who cares for the homegarden where her house is located

and does not have land tenure rights. She emphasizes the importance of her work in caring for animals and planting in the agroecosystem, both for her identity and well-being, as illustrated by her quote: «*My little brother, who is there in the shop, says to me, 'What job do you have?' Why? I mean, taking care of the animals is a job*». Her role highlights the challenges women face in traditional agricultural settings, where their contributions are often undervalued and not recognized as legitimate work. A 31-year-old man who manages the family plot despite not owning land expresses great pride in his identity as a small farmer, derived from working the land: «*I am proud to show you the work that I am developing. Well, I feel very happy to have what I have so far, and I'm going to keep working hard*». This proactive expression of identity is linked to traditional masculine roles in agriculture, emphasizing achievement and hard work.

We also illustrate narratives related to how participants expressed *self-determination* relational value, where we observed differences based on the perception of what is particularly important to them and what they can or want to do. In this case, we found how age or being a caregiver can intersect with how this *self-determination* value is expressed. For a middle-aged housewife mother who cares for her homegarden and occasionally helps her husband in a rented plot, the relational value of *self-determination* is materialized in her agency to decide the seeds and consume the food she grows and provide for her family, not only as sustenance but also as a means of maintaining family health: «*In the plot, we sow our plants, and here we harvest them, we eat what we sow*» [*Why is it so important for you to eat what you sow yourself?*] *First, I know how I am growing them, what I put in, and what not to put in*». A teenage woman, the eldest daughter assigned the responsibility of housework and caring for the family homegarden expressed her enjoyment in participating in decision-making regarding this agroecosystem and is genuinely interested in its care. The relational value of *self-determination* is stated in her feeling of freedom and autonomy when deciding which plants and animals to care for, leading to a profound sense of pride and empowerment at her young age: «*Is what you are going to do, we have something of our own about what they can't tell us anything, we can sow whatever we want, and no one says anything [...], and so we can sow, harvest for ourselves*».

Relational values according to different agroecosystems

Identifying the relational values of a particular agroecosystem is complex as participants engage with multiple types simultaneously. Individuals have intricate relationships with the different agroecosystems to varying degrees. Homegardens

are usually the responsibility of one or two family members, mainly women, but as they are near or around the house and the gardens, they are part of everyone's daily living space. Men often manage agricultural plots, but many women contribute to planting, weeding, harvesting, and shelling maize or beans. Managing the pastures and cattle also involved the family, mainly the men, and frequently required outside labor (day laborers) for some heavy tasks. So, despite these differences, we only found slight differences in the frequency of mentions of relational values among the agroecosystems. In homegardens, the outstanding values were *social cohesion*, *individual identity*, and *social responsibility*; in the plots, *self-determination* and *social responsibility* stood out, whereas, in pastures, the most revealed values were *social cohesion* and *individual identity*. However, we observed somewhat different narratives regarding which agroecosystem participants were most connected (Table 2). Ethical treatment of animals (*moral responsibility for non-humans*) was emphasized across agroecosystems, focusing on farm animals in homegardens, wild animals, and non-living things in plots and pastures. *Social responsibility* in plots was demonstrated through community mutual support practices such as *cambio de manos* [exchanged labor], while in homegardens, it involves maintaining medicinal plants for the family and neighbors. Regarding the value of *social cohesion* in the pastures, relationships among the ranchers and external people, such as students and veterinarians, stood out. In the plots and homegardens, more emphasis was placed on connections with family or neighbors.

At the same time, it is worth noting that participants may refer to “the land” in a general sense but with a deep understanding that encompasses all forms of agroecosystems without distinction. They emphasize the relationship with the land—*my land* [plot, homegarden or pastures], *our land* [communal lands, territory]—is the farmer's *raison d'être*. This connection underscores the responsibility to care for, protect, and restore the nutrients extracted, ensuring the land is left to rest when needed. Some examples can illustrate this: “*We, as I tell you, are farmers. Obviously, where do you think a farmer comes from? Well, more than anything, from working the land*” or “*Well, you take care of your land, right? And at the same time, you're taking care of part of the environment to avoid polluting it too much, right?*”.

Discussion

Relational values and agroecosystems

The wide diversity of relational values revealed by the PV process contributes to the growing literature on this topic. Our findings expand on the current understanding of how

	HOMEGARDEN	PLOT	PASTURE
			
MORAL RESPONSIBILITY FOR NON-HUMAN	Emphasis on care for breeding animals		
	"that's why I can't have anything more in the homestead (of plants) because they (the chickens) are free, maybe if I were to enclose them, that's the only way I could, or if they were smaller" [-Would you like to enclose them or why do you want to leave them like that?] "because they are freer [...] I don't like to see the animals crowded together and more than that little pig needs freedom"	"only the bird (that arrives at the plot), eats the corn, starts to break it [...] Well, we can't fight it anymore, let it eat it"	"and then we clean it (the soil) with a machete, so that we don't use so much liquid, because if we use liquid all the time, we are also destroying the soil, the minerals it contains, right?"
SOCIAL RESPONSIBILITY	Emphasis on common and specific practices		
	"there are ladies who come, who need a plant for their baby, well, since I have one, I give them [...] I like to share whatever they need for their medicine"	"I'm going to tell him, I'll give you a hand these days, okay? first and then you give me a hand... That was the system we had in my family because we started sowing on May 3 and finished on May 10, we started with my grandfather and from there with my uncles and all of us and in the end we all finished (sowing)"	"when you are at home for two or three days you get bored, you want to go to the fields, you look at cattle in the pastures. Sometimes there are people, like your best friends, who (their cattle) get stuck, a cow gets stuck in the mud. They ask for help to get it out and we get it out, that's how we go [...] That's why I like to help people a lot"
SOCIAL COHESION	Emphasis is placed on community or external relations, with less focus on the family level		
	"the neighbors come to ask me to sell them some eggs and sometimes they look for the hens' eggs for another hen to hatch them, for when someone doesn't have them, or for example when I don't have eggs, I can go to my neighbor or the people I know here and we exchange them, the same thing happens with the plants, at least this one I just brought right now"	"since we are five brothers, each one of us has a little bit (of land), but we all have it together, for example here where I sow my corn, we all sow there together...together we work [...] exactly what we get we share the same"	"I like it best when we... manage, work with the cattle [...] because that's when we start joking around, and practically everyone II the members who have their animals (cattle) get together"

Table 2 Quote examples elicited by participants regarding the unveiled values for each agroecosystem. Source: Own elaboration.

farmers could establish deep connections with the agroecosystems that are intertwined with the instrumental values linked to the primary purpose of food production (Jones and Tobin 2018; Tobin 2023) and contribute to a lack of empirical studies in agroecosystems (Pratson et al. 2023). Through the lens of relational values, Loma Bonita residents were able to make explicit the relationships that are key to their lives; our findings confirm how these values are modulated by people's identities, histories, and lifestyles and support well-being, agency, ethics, responsibility, care, and connections to community, family, and land (Chan et al. 2016; Chapman et al. 2019). Our results suggest that some relational values describe unique and irreplaceable relationships (Himes and Muraca 2018); *they are foreground relationships, are*

not solely instrumental, and are non-substitutable (Gould 2023; Pratson et al. 2023). Several participants mentioned that they could not replace their agroecosystems because of their intricate relationship with them, as these systems are integral to their human flourishing and well-being. One farmer highlighted the importance of growing certain types of beans, even though he no longer consumes them, to preserve memories and family traditions, emphasizing the relational rather than the instrumental aspect. The PV process revealed how constant observation and a deep understanding of the rhythms and needs of a particular piece of land and its unique characteristics are put into practice to manage their agroecosystems and linked to such relational values (Chapman et al. 2019).

We found that *social cohesion* and *cultural* and *individual identity* were among the most mentioned relational values interconnected with other relational values, expanding on previous findings (Pratson et al. 2023). The importance of the pride of being a farmer, the traditions associated with this activity, and the heritage, though only established over a few generations since their arrival in this region, reflect a strong connection with their land. The pride of the community heritage and farmers' identity were frequently highlighted by participants during the PV process; this concurs with what Friedrichsen (2021) referred to as *dignity and pride for livelihood*. We considered the importance of memories and past experiences associated with agroecosystems as contributors to the sense of place commonly included as part of *individual identity* (Horlings 2015; Allen et al. 2018). *Social cohesion* was critical concerning on-farm responsibilities and activities, such as sharing resources and labor, strengthening community ties, and promoting a shared sense of purpose. In our study, participants mentioned exchanges of seeds, plants, fruits, and herbal remedies, along with the intergenerational exchange of practices and knowledge; farming fosters a sense of community and togetherness within the diverse spaces of the agroecosystem. This mutual support in farming and leisure activities strengthens social cohesion. These social relations are also critical in identity configuration, such as *cultural identity* rooted in local traditions, including food, traditional knowledge, and family heritage (Allen et al. 2018; Chapman et al. 2019). Our study confirms how *social cohesion* is particularly relevant in agriculture, which is seen as a fundamental link between people and nature (Allen et al. 2018). We found further support for how connections between farmers and the land extend to their relationships within the family and community and form the cornerstone of the societal fabric, primarily in communities highly dependent on subsistence agriculture (Chapman et al. 2019). Agriculture is more than just a livelihood in these communities: it is a cultural and social anchor (Berry 2015), fostering a sense of unity and collective identity.

The value of *self-determination*, which emphasizes autonomy, freedom, and control, was pivotal to farmers engaging with their agroecosystems. This value of *self-determination*, with many mentions as well, was deeply rooted in farmers' knowledge and way of life, as proposed by Friedrichsen et al. (2021) regarding soil. The narratives around this value underscore a sense of freedom that contrasts with urban life. Farmers value the control they have over what they produce and what they grow on their plots. This control is not only about agricultural production but is also closely linked to the health and well-being of their families. By choosing what to grow and how to grow it, farmers directly influence the quality and safety of the food they provide for their families.

This capacity of choice is consistent with Chapman's (2019) findings on the values of *active land management*, *application of parcel-specific knowledge*, and *community agency over the landscape*. Just as Chapman et al. (2019) highlight the importance of community participation and knowledge in managing landscapes, *self-determination* underlines the importance of farmers' knowledge and agency in shaping and maintaining their agroecosystems. Farmers cannot be seen as passive caretakers of the land; they are active agents who make informed decisions based on their extensive knowledge, experience, and community needs. Enhancing intrinsic motivation, especially in adverse contexts such as those faced by smallholder farmers whom the dominant development schemes have marginalized, is particularly important for individual well-being and as a trigger of collective action (Ryan and Deci 2000).

Social responsibility, *stewardship*, and *moral responsibility for non-humans* are also interdependent. As recently documented, our study aligns with other empirical research identifying characteristics akin to these values (Friedrichsen et al. 2021; Monroy-Sais et al. 2022; Tobin 2023). Preserving and sharing biodiversity with neighbors, family, and other communities, nurturing food production for family and caring for others through diverse practices like sharing land with those who do not have their own, contribute to the configuration of farmers-land, farmers-community and farmers-landscape relationships proposed by Chapman et al. (2019) which strongly resonate with the value of social responsibility (Allen et al. 2018). In turn, the *stewardship* values held by participants are influenced by how they sense their environment in a symbolic and meaningful dimension, potentially leading to what has been identified as an identity as *land stewards* (Allen et al. 2018). Several participants recognized the commitment to caring for the environment by carrying out certain practices and activities on their agroecosystems. The knowledge of natural cycles, the time the land needs to rest, and the care of the soil with fertilizers are reflected in their narratives. Our findings concur with previous studies highlighting attitudes of respect, care, and defense of other animals shown in other studies (Quinn and Halfacre 2014; Chapman et al. 2019). Values of *moral responsibility for non-humans* are also closely related to this virtue of stewardship. In addition, relational connections with nature are generated, where there is enjoyment in contemplating or knowing that certain organisms reach the plots and homegardens. These are complex relationships, full of sensitivity and empathy, seeking a harmonious state by trying to balance both parts (Chapman et al. 2019; Friedrichsen et al. 2021; Novo et al. 2024).

Narratives that unveil relational values

The analysis of the content of the PV and the conversations around them extended beyond examining statements that resembled values to facilitate individuals in expressing their values (Gould and Shultz 2021). We also considered people's language when discussing their customs, interpersonal relationships, and agroecosystem insights and how these conversations intersected with their value systems, following Chapman et al.'s (2019) methodology approach. As previously shown, this approach allowed us to explore how relational values are personal and situated (Tadaki et al. 2022; Chapman and Deplazes-Zemp 2023) and can be interpreted differently depending on contexts (Hoelle et al. 2022; Chapman and Deplazes-Zemp 2023) or among individuals of the same population (Monroy-Sais et al. 2022). This approach highlighted the differences between women and men in the perception of their work in agroecosystems. For example, some women participants emphasized that caring for homegardens and plots is invisible and not recognized as a real job. However, these contributions are part of their individual and cultural identity and relate to caring for the family and biodiversity. Recognition of their identity as farmers is necessary for women to benefit from programs or policies and may be related to inequalities in access to land (Radel 2011; Schreiber et al. 2023). Addressing who can use the land is necessary to contribute more equitably to managing and tackling agricultural problems (Chaplin-Kramer et al. 2023). Analysis of the narratives also allowed us further to understand the complex intertwining of different relational values. For example, participants did not distinguish between collective and individual approaches to care or protection. The values expressed by participants implied collective care, not just personal care or self-protection. Individual values include responsibility and care in a collective setting, either directly or indirectly, because of specific values rooted in nurturing relationships with others or considered in a family context. Family relationships were also beneficial because they act as a network of knowledge-sharing and emotional support, particularly for farmers new to farming activity (Scott and Richardson 2021; Schreiber et al. 2023). The relevance of these interactions and support among farmers may play a fundamental role in contexts of vulnerability and change (Liao et al. 2022). The narratives also revealed that agroecosystems are perceived as interconnected, and thus, in some cases, relational values are not specific to any of them but instead are woven across them, highlighting their interdependencies. In addition, these findings could imply that the dissection into specific agroecosystems like plots (*milpa*), pastures, or homegardens is a Western scientific construct that does not fully align with the ontology of the inhabitants of Loma Bonita. Instead,

they might refer to the land and territory fluidly, seeing its components not as separate entities but as a continuous, interconnected whole.

Relational values at the agroforest frontier

Unveiling the relational values of agroecosystems can be central to driving the transformation toward sustainability within agricultural landscapes. These values reflect the multifaceted connections between individuals, communities, and their territories, shaping interactions essential for sustainable transformation. The values revealed in our study are consistent with those found elsewhere that are aligned with more sustainable futures (IPBES 2022; Harmáčková et al. 2023; Pascual et al. 2023), with those that support a "good life" (Chan et al. 2020).

Surprisingly, the relational values revealed through PV were developed recently in a context of rapid colonization and deforestation beyond utilitarian and extractivist logic. Loma Bonita is located within a region where rapid deforestation and conversion to agricultural and pastureland have occurred in the past 30 years (Carabias et al. 2015; Balvanera et al. 2021; Berget et al. 2021). The relational values found in our study concur with those of commitment to responsibility and care within the community and among family members found elsewhere (Chapman et al. 2019; Santiago Vera et al. 2021; Tobin 2023). The inhabitants of Loma Bonita prioritize collective well-being over individualism, in concordance with global findings for areas in which people have been co-existing with nature for many generations (Harmáčková et al. 2023; Pascual et al. 2023).

Our findings underscore the importance of considering the relational values of those who inhabit and manage the land in designing public policies to address biodiversity loss and deforestation, especially for the highly diverse tropical forest. Despite the diversity and relevance of relational values found here, public policies for the Lacandon Forest (and elsewhere) have been built around the instrumental values of these forests and of the resulting pastures, as well as around the intrinsic values associated with the unique biodiversity harbored (Balvanera et al. 2021). The arrival of settlers into the Marques de Comillas region starting in the 1970s was aimed at fostering cattle production to meet global meat demands, while the creation of the Montes Azules Biosphere Reserve in the 1990s aimed at maintaining its unique biodiversity driven by national and global biodiversity conservation policies (Balvanera et al. 2021). Only recently, relational values tied with the land and the trees contributed to the scaffolding of the new governmental program *Sembrando Vida* (Sowing Life), which is only starting to be evaluated (Gómez-Rodríguez et al. 2023). More studies are needed to understand how these different value types can be

navigated and harnessed into policy design (Chapman et al. 2019; Pascual et al. 2023).

The agency of farmers and their families, clearly highlighted through their relational values, has yet to be considered in the design of public policies. Some have emphasized yields and their indirect positive benefits on the objective well-being of farmers, with mixed results (Rosset and Altieri 1997), leading to the imposition of technologies and inputs that are not consistent with small farmers needs and perceptions (Giraldo and Rosset 2018; Nyström et al. 2019). Our findings highlight how relational values support more sustainable management schemes based on seed conservation, reducing the use of inputs and attuning the management to the specific needs of each agroecosystem. The paramount role of farmers and their self-determination, deemed critical in our findings, is still to be explicitly incorporated into policies that promote, rather than ignore, their agency (Chapman et al. 2019). In addition, considering the farmers' agency could contribute to maintaining specific relational values that are important for the care of nature and the well-being of people (Chapman and Deplazes-Zemp 2023). Such approaches could build upon local knowledge to foster stewardship (Chapman et al. 2019) and communities' self-determination, as suggested by Sheremata (2018) concerning indigenous populations. Nurturing the local perspectives of these critical perspectives of these fundamental agents of change is consistent with recent work on inclusive decision-making processes toward more sustainable futures (Arias-Arévalo et al. 2023; Lenzi et al. 2023).

Participatory video, relational values, and long-term transdisciplinary transformation

Long-term, place-based transdisciplinary approaches may incorporate more equitable procedures that positively impact local communities. Over the six years that *Cocina Colaboratorio* has been active in the region, it has established a trustworthy and reputable network with community stakeholders, aiding research endeavors such as this one. Conducting collaborative research fostered a comfortable atmosphere and attentive engagement, reinforcing trust between individuals and enhancing robust and reciprocal learning relationships. Collaboration with local community members is crucial for strengthening long-term processes (Horlings 2015; Chaplin-Kramer et al. 2023). Such collaboration legitimizes local values and perspectives in academic and public policy spheres. These values and perspectives could be incorporated into horizontal participatory processes that foster more equitable, reciprocal, and non-extractive relationships (Hill et al. 2020; Marzi 2023).

Using PV enabled participants to articulate their values on their own terms. The participatory nature of the process

allowed us to minimize potential biases introduced by the researcher, carefully consider the internal dynamics of the community, and fully understand the language and the context. This approach allowed us to reduce the risks of extractivist and colonial approaches as much as possible. Given the strong power imbalances among stakeholders (Arias-Arévalo et al. 2023), allowing participants to be heard on their own terms is an essential step towards promoting fairness (Lele et al. 2023; Lenzi et al. 2023), independence, and empowerment (Hill et al. 2020). Such an approach was particularly relevant in the face of the neocolonial transformation of the region, migration phenomena, and land tenure difficulties and inequalities faced by the population of Loma Bonita participants (Cano-Castellanos 2014; Berget et al. 2021), where it becomes crucial to pay attention to the tools and methods employed.

Using PV allowed exploring dimensions of human experience that could not be unveiled only through interviews. Using the arts enables evoking emotions and experiences that connect with people's values (Muhr 2020). The long and iterative process of mapping, walking, storyboarding, filming, and editing allowed participants to connect their memories with the present territory and the complex dimensions of the relations between individuals and those with nature. The participation of youth and women was essential, as it contributed to a broader diversity of voices that have been called for. Our findings are consistent with those of Eastwood et al. (2023), who have suggested that PV can motivate young people to participate. Some people preferred PV to join in large workshops or interviews. Participants can select their own spaces, ways of doing, and choices, as previously explored (Lunch and Lunch 2006; Morales et al. 2021). Other arts-based approaches (Marquina et al. 2023) based on writing letters have also provided spaces for expressing themselves in confidence and privacy without feeling overlooked. Our results underscore previous calls for creative research methods that are more attractive and horizontal (Gould 2023; Marzi 2023).

The use of PV presented some unique challenges. The process is very time-consuming, especially during the learning phase of using the camera and editing the films, but also during the preparatory explorations and filming with each person or group. Daily commitments limited the time available to the community, but the flexible methodology allowed us to adapt. However, spending more time with the community could have enriched the collaborative process and potentially involved more people at different stages. To mitigate this challenge, we extended our activity calendar by returning to the community on a different date for the community screening and continuing the video editing online, as the participants did not have the necessary equipment or sufficiently developed skills. It would have

been preferable to conduct the video editing in person, as the participants could edit their videos themselves using the software. While in-person editing would have given participants more control, online editing - although hampered by poor connectivity - did not affect the data analysis, but it could have strengthened co-creation and independence in this aspect.

The PV process to unravel relational values fostered ongoing transformative change through the activities of *Cocina Colaboratorio*. It provided safe spaces for dialogue and reflection, enabling unheard voices to be screened in front of the community. This new form of expression increased participants' confidence and sense of belonging. Although these outcomes were not explicitly measured, participants demonstrated them through their actions, such as selecting video themes based on their personal experiences and priorities. Additionally, their desire to preserve and share the videos with family and neighbors further highlighted their engagement and commitment to the process. We concur with Marzi (2023) on the 'impact-in-process' of co-producing PV and its potential to contribute to social change and transformation. It also activates what Pascual et al. (2023) have identified as values-centered leverage points for navigating towards more just and sustainable futures. It made visible a wide diversity of values that had not been made explicit, brought in rarely heard voices, but also challenged dominant paradigms about what constitutes a good life and a desirable relation between people and nature by making visible reciprocal and responsible relationships that can lead towards more just and sustainable food systems. As such, this exercise is probably a potent booster of the long-term transformations emerging from our transdisciplinary process.

The ongoing transformation of the local food system fostered through this PV process is situated mainly in the specific community where the study was undertaken. Still, it can certainly be scaled deep and out (as defined by Moore et al. 2015). The ongoing changes profoundly transform the root interactions between people and nature in the case study and thus contribute to deep scaling. Also, the changes can scale out to other analogous communities, both in the surrounding region and other locations in the tropics, through inspiration or contagion (see Bennet et al. 2021). The videos are now shared through YouTube, and they have inspired the production of a guide for undertaking PV within a book recently published by the team; the collective shared experiences with large audiences that follow the project online. This paper can also inspire analogous collectives in other parts of the world.

Conclusion

Through a facilitated PV process, this study allowed participants to reveal strong relational values derived from their multiple and complex relationships with their agroecosystems. Identifying the relational values of local managers at the agroforest frontier provides unique examples/insights into the diversity of values and narratives that contribute to the care and well-being of people and nature. In essence, the practice of agriculture in these contexts is imbued with values that transcend mere food production. It embodies a deep-seated ethic of care, stewardship, and mutual support, essential for the survival and thriving of communities engaged in subsistence farming. Our findings emphasized that individuals' intersectional characteristics can shape different expressions of the same value. This allowed us to broaden the discussion about what individuals consider a priority and demonstrate the usefulness of exploring diverse value narratives to identify commonalities among different contexts or people. We found that slight differences between agroecosystem narratives are closely related to how individuals simultaneously relate to different agroecosystems and how important they are to their daily lives.

As we illustrated, recognizing place-based relational values can help better understand the depth of the connections and interweaving between individuals, the community, and different agroecosystems, which, it should be noted, do not respond solely to instrumental relations. Integrating relational values into the design of public programs and policies could result in a process that guarantees the agency of communities and contributes to biodiversity conservation, facilitating the sustainable transformation of food systems. The nuances in how individuals with different intersectional characteristics perceive and experience relational values will undoubtedly influence decision-making at the community level. However, it would be difficult to extrapolate the interplay of these values and power dynamics based on our work alone. Nevertheless, participatory decision-making models and inclusive governance structures can help reconcile these differences by ensuring that diverse voices are heard and valued. Flexible frameworks that evolve as individual and collective values shift over time can also contribute to more equitable and effective decision-making processes. Highlighting the mosaic of lived experiences within a small community like Loma Bonita invites further exploration of this diversity on a larger scale and in different contexts.

Using PV within a transdisciplinary approach shows the potential to integrate a greater diversity of voices more horizontally and to reveal less explicit values. Furthermore, in applying a decolonial approach to PV, we prioritized addressing power imbalances between scientific and local knowledge and fostering spaces for transformative practices

led by the participants themselves. Significantly, we avoided imposing a particular way of thinking or doing, ensuring that our work was non-extractive, respectful of local needs, and contributed meaningfully to community livelihoods through principles of care and reciprocity.

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References

- Allen, K.E., C.E. Quinn, C. English, and J.E. Quinn. 2018. Relational values in agroecosystem governance. *Current Opinion in Environmental Sustainability* 35: 108–115. <https://doi.org/10.1016/j.cosust.2018.10.026>.
- Altieri, M., and C. Nicholls. 2004. *Biodiversity and pest management in agroecosystems*, 2nd ed. Food Products Press.
- Arias-Arévalo, P., B. Martín-López, and E. Gómez-Baggethun. 2017. Exploring intrinsic, instrumental, and relational values for sustainable management of social-ecological systems. *Ecology and Society*. <https://doi.org/10.5751/ES-09812-220443>
- Arias-Arévalo, P., E. Lazos-Chavero, A. S. Monroy-Sais, S. H. Nelson, A. Pawlowska-Mainville, A. Vatn, M. Cantú-Fernández, R. Murali, B. Muraca, and U. Pascual. 2023. The role of power in leveraging the diverse values of nature for transformative change. *Current Opinion in Environmental Sustainability* 64: 101352. <https://doi.org/10.1016/j.cosust.2023.101352>
- Balvanera, P., H. Paz, F. Arreola-Villa, R. Bhaskar, F. Bongers, S. Cortés, E. Del Val, E. García-Frapolli, M. E. Gavito, C. E. González-Esquivel, M. Martínez-Ramos, A. Martínez-Yrizar, F. Mora, J. Naime, F. Pascual-Ramírez, N. Pérez-Cárdenas, O. A. Ugartechea-Salmerón, I. Siddique, I. Suazo-Ortuño, and S. M. Swinton. 2021. MINI REVIEW Social-ecological dynamics of tropical secondary forests. *Forest Ecology and Management*. <https://doi.org/10.1016/j.foreco.2021.119369>
- Bee, B. A. 2014. Si no comemos tortilla, no vivimos: women, climate change, and food security in central Mexico. *Agriculture and Human Values* 31: 607–620. <https://doi.org/10.1007/s10460-014-9503-9>
- Bennett, E. M., R. Biggs, G. D. Peterson, and L. J. Gordon. 2021. Patchwork Earth: navigating pathways to just, thriving, and sustainable futures. *One Earth* 4: 172–176. <https://doi.org/10.1016/j.oneear.2021.01.004>
- Berardi, A., E. Bignante, J. Mistry, M. Simpson, C. Tschirhart, C. Verwer, and G. de Ville. 2014. *How to find and share community owned solutions—A handbook*. London: The Open University.
- Berget, C., G. Verschoor, E. García-Frapolli, E. Mondragón-Vázquez, and F. Bongers. 2021. Landscapes on the move: Land-use change history in a Mexican agroforest frontier. *Land*. <https://doi.org/10.3390/land10101066>.
- Berry, W. 2015. *The unsettling of America: culture & agriculture*. Berkeley: Counterpoint.
- Cano-Castellanos, I. J. 2014. Entre sueños agrarios y discurso ecologista. Las encrucijadas contemporáneas de la colonización de la Selva Lacandona (Chiapas, México). *Entre Diversidades Revista de Ciencias Sociales y Humanidades* 1: 101–143. <https://doi.org/10.31644/ED.2.2014.a04>
- Cano-Contreras, E. J. 2015. Huertos familiares: un camino hacia la soberanía alimentaria. *Revista Pueblos y fronteras digital* 10: 70–91. <https://doi.org/10.22201/cimsur.18704115e.2015.20.33>
- Carabias, J., J. De la Maza, and R. Cadena. eds. 2015. *Conservación y desarrollo sustentable en la Selva Lacandona. Conservación y desarrollo sustentable en la Selva Lacandona. 25 años de actividades y experiencias*. Natura y ecosistemas mexicanos.
- Chalfen, R., L. Sherman, and M. Rich. 2010. VIA's visual voices: the awareness of a dedicated audience for voices in patient video narratives. *Visual Studies* 25: 201–209. <https://doi.org/10.1080/1472586X.2010.523271>
- Chan, K.M.A., P. Balvanera, K. Benessaiah, M. Chapman, S. Díaz, E. Gómez-Baggethun, R.K. Gould, N. Hannahs, K. Jax, S. Klain, G.W. Luck, B. Martín-López, B. Muraca, B. Norton, K. Ott, U. Pascual, T. Satterfield, M. Tadaki, J. Taggart, and N. Turner. 2016. Why protect nature rethinking values and the environment. *Proceedings of the National Academy of Sciences* 113: 1462–1465. <https://doi.org/10.1073/pnas.1525002113>.
- Chan, Kai M. A., R. K. Gould, and U. Pascual. 2018. Editorial overview: Relational values: what are they, and what's the fuss about? *Current Opinion in Environmental Sustainability* 35: A1–A7. <https://doi.org/10.1016/j.cosust.2018.11.003>
- Chan, K. M. A., D. R. Boyd, R. K. Gould, J. Jetzkowitz, J. Liu, B. Muraca, R. Naidoo, P. Olmsted, T. Satterfield, O. Selomane, G. G. Singh, R. Sumaila, H. T. Ngo, A. K. Boedhihartono, J. Agard, A. P. D. de Aguiar, D. Armenteras, L. Balint, C. Barrington-Leigh, W. W. L. Cheung, S. Díaz, J. Driscoll, K. Esler, H. Eyster, E. J. Gregor, S. Hashimoto, G. C. Hernández, T. Pedraza, M. Hickler, T. Kok, A. A. A. Lazarova, M. Mohamed, P. Murray-Hudson, I. O'Farrell, A. K. Palomo, Saysel, and R. Seppelt. 2020. Levers and leverage points for pathways to sustainability. *People and Nature* 2: 693–717. <https://doi.org/10.1002/pan3.10124>
- Chaplin-Kramer, R., R. A. Neugarten, D. Gonzalez-Jimenez, G. Ahmadi, T. D. Baird, N. Crane, E. Delgoulet, H. N. Eyster, A. Pawlowska-mainville, and J. Rulmal. 2023. Transformation for inclusive conservation: evidence on values, decisions, and impacts in protected areas. *Current Opinion in Environmental Sustainability* 64: 101347. <https://doi.org/10.1016/j.cosust.2023.101347>
- Chapman, M., and A. Deplazes-Zemp. 2023. I owe it to the animals': The bidirectionality of Swiss alpine farmers' relational values. *People and Nature* 5: 147–161. <https://doi.org/10.1002/pan3.10415>
- Chapman, M., T. Satter, and K. M. A. Chan. 2019. When value conflicts are barriers: Can relational values help explain farmer

- participation in conservation incentive programs? *Land Use Policy* 82: 464–475. <https://doi.org/10.1016/j.landusepol.2018.11.017>
- Cocina Colaboratorio. 2024. Cocina Colaboratorio Info. <https://colaboratorykitchen.com>. Accessed July 2023.
- Crenshaw, K. 1991. Mapping the Margins: Intersectionality, Identity Politics, and Violence against Women of Color. *Stanford Law Review* 43: 1241. <https://doi.org/10.2307/1229039>
- Díaz, S., J. Settele, E. S. Brondízio, H. T. Ngo, J. Agard, A. Arneeth, P. Balvanera, K. A. Brauman, S. H. M. Butchart, K. M. A. Chan, L. A. Garibaldi, K. Ichii, J. Liu, S. M. Subramanian, G. F. Midgley, P. Miloslavich, Z. Molnár, D. Obura, A. Pfaff, S. Polasky, A. Purvis, J. Razzaque, B. Reyers, R. R. Chowdhury, Y. J. Shin, I. Visseren-Hamakers, K. J. Willis, and C. N. Zayas. 2019. Pervasive human-driven decline of life on Earth points to the need for transformative change. *Science* 366: eaax3100. <https://doi.org/10.1126/science.aax3100>
- Eastwood, A., A. Juárez-Bourke, S. Herrett, and A. Hague. 2023. Connecting young people with greenspaces: The case for participatory video. *People and Nature* 5: 357–367. <https://doi.org/10.1016/pan3.10236>
- FAO. 2018. Biodiversidad para una Agricultura Sostenible. <http://www.fao.org/3/CA2227ES/ca2227es>. Accessed 1 August 2022.
- Friedrichsen, C. N., S. Hagen-Zakarison, J. D. Wulforst, and M. L. Friesen. 2021. Soil health and well-being: Redefining soil health based upon a plurality of values. *Soil Security* 2: 100004. <https://doi.org/10.1016/j.soisec.2021.100004>
- Giraldo, O. F., and P. M. Rosset. 2018. Agroecology as a territory in dispute: between institutionality and social movements. *The Journal of Peasant Studies* 45: 545–564. <https://doi.org/10.1080/03066150.2017.1353496>
- Gliessman, S. R. 1992. Agroecology in the tropics: Achieving a balance between land use and preservation. *Environmental Management* 16: 681–689. <https://doi.org/10.1007/BF02645658>
- Gómez-Rodríguez, G. A., J. Omar López-Martínez, J. Špirić, and P. A. Macario-Mendoza. 2023. Local Perceptions in the Implementation of the Sembrando Vida Program in Southern Mexico. *Human Ecology* 51: 379–395. <https://doi.org/10.1007/s10745-023-00436-7>
- González-Jácome, A. 2007. Agroecosistemas mexicanos: pasado y presente. *Itinerarios: revista de estudios lingüísticos, literarios, históricos y antropológicos*: 55–80.
- Gould, R. K. 2023. How creativity can help research on the multiple values of nature become more innovative and inclusive. *People and Nature* 5: 244–257. <https://doi.org/10.1002/pan3.10204>
- Gould, R. K., and P. W. Schultz. 2021. Challenges to understanding nonmaterial dimensions of human-nature connections, and how to address them. *Ecology and Society* 26: 14. <https://doi.org/10.5751/ES-12604-260314>
- Gould, R. K., B. Muraca, A. Himes, and D. Hackenburg. 2024. Biodiversity and Relational Values. In *Encyclopedia of Biodiversity*, 8–17. Elsevier.
- Haperen, L. V. 2019. Unravelling the role of Nature's Contributions to People for land use decisions by ejidatarios in the Lacandon rainforest, México. Master thesis, Wageningen University.
- Harmáčková, Z. V., Y. Yoshida, N. Sitas, L. Mannetti, A. M. Ritesh Kumar, M. Berbés-Blázquez, R. Collins, K. Eisenack, E. Guimarães, M. Heras, V. Nelson, A. Niamir, F. Ravera, I. Ruiz-Mallén, and P. O'Farrell. 2023. The role of values in future scenarios: what types of values underpin (un)sustainable and (un)just futures? *Current Opinion in Environmental Sustainability* 64: 101343. <https://doi.org/10.1016/j.cosust.2023.101343>
- Hill, R., F. J. Walsh, J. Davies, A. Sparrow, M. Mooney, R. M. Wise, and M. Tengö. 2020. Knowledge co-production for indigenous adaptation pathways: Transform post-colonial articulation complexes to empower local decision-making. *Global Environmental Change* 65: 102161. <https://doi.org/10.1016/j.gloenvcha.2020.102161>
- Himes, A., and B. Muraca. 2018. Relational values: The key to pluralistic valuation of ecosystem services. *Current Opinion in Environmental Sustainability* 35: 1–7. <https://doi.org/10.1016/j.cosust.2018.09.005>
- Himes, A., B. Muraca, C. B. Anderson, S. Athayde, T. Beery, M. Cantú-Fernández, D. González-Jiménez, R. K. Gould, A. P. Hejnowicz, J. Kenter, D. Lenzi, R. Murali, U. Pascual, C. Raymond, A. Ring, K. Russo, A. Samakov, S. Stålhammar, H. Thorén, and E. Zent. 2024. Why nature matters: A systematic review of intrinsic, instrumental, and relational values. *BioScience* 74: 25–43. <https://doi.org/10.1093/biosci/biad109>
- Hoelle, J., R. K. Gould, and A. Tauro. 2022. Beyond 'desirable' values: Expanding relational values research to reflect the diversity of human–nature relationships. *People and Nature* 00: 1–12. <https://doi.org/10.1002/pan3.10316>
- Horlings, L. G. 2015. The inner dimension of sustainability: personal and cultural values. *Current Opinion in Environmental Sustainability* 14: 163–169. <https://doi.org/10.1016/j.cosust.2015.06.006>
- INEGI. 2020. Censo de Población y Vivienda 2020. <https://www.inegi.org.mx/app/descarga/ficha.html?tit=325905%26ag=0%26f=csv>. Accessed 2 May 2022.
- IPBES. 2022. *Methodological assessment of the diverse values and valuation of nature of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. Edited by P. Balvanera, U. Pascual, M. Christie, B. Baptiste, and D. González-Jiménez. Bonn, Germany: IPBES secretariat.
- IPBES. 2019. *The global assessment report of the intergovernmental science-policy platform on biodiversity and ecosystem services*. Edited by Eduardo Sonnewend Brondízio, Josef Settele, Sandra Díaz, and Hien Thu Ngo. Bonn: IPBES secretariat.
- Jacobs, S., N. Zafra-Calvo, D. González-Jiménez, L. Guibrunet, K. Benessaiah, A. Berghöfer, J. Chaves-Chaparro, S. Díaz, E. Gómez-Baggethun, S. Lele, B. Martín-López, V. A. Masterson, J. Merçon, H. Moersberger, B. Muraca, A. Norström, P. O'Farrell, J. C. Ordóñez, A. H. Prieur-Richard, A. Rincón-Ruiz, N. Sitas, S. M. Subramanian, W. Tadesse, M. van Noordwijk, U. Pascual, and P. Balvanera. 2020. Use your power for good: Plural valuation of nature—The Oaxaca statement. *Global Sustainability* 3: 8. <https://doi.org/10.1017/sus.2020.2>
- Jones, K., and D. Tobin. 2018. Reciprocity, redistribution and relational values: organizing and motivating sustainable agriculture. *Current Opinion in Environmental Sustainability* 35: 69–74. <https://doi.org/10.1016/j.cosust.2018.11.001>
- Kassa, H., S. Dondeyne, J. Poesen, A. Frankl, and J. Nyssen. 2017. Transition from forest-based to cereal-based agricultural systems: A review of the drivers of land use change and degradation in Southwest Ethiopia. *Land Degradation & Development* 28: 431–449. <https://doi.org/10.1002/ldr.2575>
- Kenter, J. O., L. O'Brien, N. Hockley, N. Ravenscroft, I. Fazey, K. N. Irvine, M. S. Reed, M. Christie, E. Brady, R. Bryce, A. Church, N. Cooper, A. Davies, A. Evely, M. Everard, R. Fish, J. A. Fisher, N. Jobstvogt, C. Molloy, J. Orchard-Webb, S. Ranger, M. Ryan, V. Watson, and S. Williams. 2015. What are shared and social values of ecosystems? *Ecological Economics* 111: 86–99. <https://doi.org/10.1016/j.ecolecon.2015.01.006>
- Kolb, M., and L. Galicia. 2018. Scenarios and storylines: drivers of land use change in southern Mexico. *Environment Development and Sustainability* 20: 681–702. <https://doi.org/10.1007/s10668-016-9905-5>
- Kooi, A., and M. Martínez-Balvanera. 2021. Case study: climate action (SDG13) CoLaboratory Kitchen 1. In *Design for global challenges and goals. Design for Social Responsibility* 13, London New York: Routledge.
- Kreitzman, M., M. Chapman, K. O. Keeley, and K. M. A. Chan. 2022. Local knowledge and relational values of Midwestern woody

- perennial polyculture farmers can inform tree- crop policies. *Nature* 4: 180–200. <https://doi.org/10.1002/pan3.10275>
- Kull, C. A., S. M. Carrière, S. Moreau, H. R. Ramiarantsoa, C. Blanc-Pamard, and J. Tassin. 2013. Melting pots of biodiversity: Tropical smallholder farm landscapes as guarantors of sustainability. *Environment* 55: 6–16. <https://doi.org/10.1080/00139157.2013.765307>
- Lele, S., D. Del Bene, D. Avci, T. Roa-Avendaño, B. Roy, G. Sahu, M. Harris, and D. Moore. 2023. Values and knowledges in decision-making on environmentally disruptive infrastructure projects: insights from large dams and mines. *Current Opinion in Environmental Sustainability* 64: 101346. <https://doi.org/10.1016/j.cosust.2023.101346>
- Lenzi, D., P. Balvanera, P. Arias-Arévalo, U. Eser, L. Guibrunet, A. Martin, B. Muraca, and U. Pascual. 2023. Justice, sustainability, and the diverse values of nature: why they matter for biodiversity conservation. *Current Opinion in Environmental Sustainability* 64: 101353. <https://doi.org/10.1016/j.cosust.2023.101353>
- Liao, X., T. P. Lai Nguyen, and N. Sasaki. 2022. Use of the knowledge, attitude, and practice (KAP) model to examine sustainable agriculture in Thailand. *Regional Sustainability* 3: 41–52. <https://doi.org/10.1016/j.regsus.2022.03.005>
- Lunch, N., and C. Lunch. 2006. *Insights into participatory video: A handbook for the field by Nick and Chris Lunch*. InsightShare.
- Mariaca, R. ed. 2012. *El huerto familiar del sureste de México*. Secretaría de Recursos Naturales y Protección Ambiental del Estado de Tabasco/ECOSUR.
- Marquina, T., R. K. Gould, and D. Murdoch. 2023. Hey, tree. You are my friend': Assessing multiple values of nature through letters to trees. *People and Nature* 5: 415–430. <https://doi.org/10.1002/pan3.10334>
- Marzi, S. 2023. Co-producing impact-in-process with participatory audio-visual research. *Area* 55: 295–302. <https://doi.org/10.1111/area.12851>
- Mesa-Jurado, M. A., N. H. Roldán-Rueda., L. Pérez-Volkow, D. Hernández Muciño, P. Balvanera, M. Martínez-Balvanera, F. Arreola Villa, A. Cadena Roa, R. Domínguez Yescas, I. N. Flores Abreu, E. Guerrero, C. Heindorf, E. Hernández Martínez, R. Lombera, P. Miguel, G. A. Galván, L. Morales Valdelamar, Rentería, and X. Sánchez Chino. 2024. La cocina más allá de los fogones: Diálogos, transformaciones y aprendizajes colectivos desde Cocina Colaboratorio. In L. Hensler, D. Hernández-Hernández, D. Molina-Rosales, M.A. Mesa-Jurado, and J. Merçon (Coords.), *Investigación colaborativa desde la diversidad. Entretejiendo experiencias y reflexiones en la frontera sur de México* (pp. 213–230). El Colegio de la Frontera Sur and CopIt-arXives. <https://copitarxives.fisica.unam.mx/SC0010ES/SC0010ES.html>
- Milne, E. J. 2016. Critiquing participatory video: experiences from around the world. *Area* 48: 401–404. <https://doi.org/10.1111/area.12271>
- Mistry, J., E. Bignante, and A. Berardi. 2016. Why are we doing it? Exploring participant motivations within a participatory video project. *Area* 48: 412–418. <https://doi.org/10.1111/area.12105>
- Moore, M. L., D. Riddell, and D. Vocisano 2015. Scaling Out, Scaling Up, Scaling Deep: Strategies of Non-profits in Advancing Systemic Social Innovation. *The Journal of Corporate Citizenship* 58: 67–84. <http://www.jstor.org/stable/jcorpciti.58.67>
- Monroy-Sais, S., E. García-Frapolli, A. Casas, F. Mora, M. Skutsch, and P. R. W. Gerritsen. 2022. Relational values and management of plant resources in two communities in a highly biodiverse area in western Mexico. *Agriculture and Human Values* 39: 1231–1244. <https://doi.org/10.1007/s10460-022-10313-6>
- Morales, T., S. Muñiz, D. Montero, Sánchez, and J. M. Moreno-Domínguez. 2021. Autonomía y sostenibilidad en prácticas de vídeo participativo con comunidades indígenas. El caso de La Marabunta Filmadora. *Andamios, Revista de Investigación Social* 18: 397–422. <https://doi.org/10.29092/uacm.v18i47.882>
- Muhr, M. M. 2020. Beyond words—the potential of arts-based research on human-nature connectedness. *Ecosystems and People* 16: 249–257. <https://doi.org/10.1080/26395916.2020.1811379>
- Novo, P., and A. Byg, H., Scotch. 2024. Digging for nature: human-nature relations in the context of growing plants. *Ecosystems and People*. <https://doi.org/10.1080/26395916.2024.2358499>
- Nyström, M., J. B. Jouffray, A. V. Norström, B. Crona, P. Søgaard Jørgensen, S. R. Carpenter, Ö. Bodin, V. Galaz, and C. Folke. 2019. Anatomy and resilience of the global production ecosystem. *Nature* 575: 98–108. <https://doi.org/10.1038/s41586-019-1712-3>
- Oakley, J. L., and J. E. Bicknell. 2022. The impacts of tropical agriculture on biodiversity: A meta-analysis. *Journal of Applied Ecology* 59: 3072–3082. <https://doi.org/10.1111/1365-2664.14303>
- Pascual, U., P. Balvanera, C.B. Anderson, R. Chaplin-Kramer, M. Christie, D. González-Jiménez, A. Martin, C.M. Raymond, M. Termansen, A. Vatn, S. Athayde, B. Baptiste, D.N. Barton, S. Jacobs, E. Kelemen, R. Kumar, E. Lazos, T.H. Mwampamba, B. Nakangu, P. O'Farrell, S.M. Subramanian, M. van Noordwijk, S. Ahn, S. Amaruzaman, A.M. Amin, P. Arias-Arévalo, G. Arroyo-Robles, M. Cantú-Fernández, A.J. Castro, V. Contreras, A. De Vos, N. Dendoncker, S. Engel, U. Eser, D.P. Faith, A. Filyushkina, H. Ghazi, E. Gómez-Baggethun, R.K. Gould, L. Guibrunet, H. Gundimeda, T. Hahn, Z.V. Harmáčková, M. Hernández-Blanco, A.-I. Horcea-Milcu, M. Huambachano, N.L. Hummel Wicher, C. İskender Aydın, M. Islar, A.-K. Koessler, J.O. Kenter, M. Kosmus, H. Lee, B. Leimona, S. Lele, D. Lenzi, B. Lliso, L.M. Mannetti, J. Merçon, A.S. Monroy-Sais, N. Mukherjee, B. Muraca, R. Muradian, R. Murali, S.H. Nelson, G.R. Nemogá-Soto, J. Ngouhou-Poufoun, A. Niamir, E. Nuesiri, T.O. Nyumba, B. Özkaynak, I. Palomo, R. Pandit, A. Pawłowska-Mainville, L. Porter-Bolland, M. Quaas, J. Rode, R. Rozzi, S. Sachdeva, A. Samakov, M. Schaafsma, N. Sitas, P. Ungar, E. Yiu, Y. Yoshida, and E. Zent. 2023. Diverse values of nature for sustainability. *Nature*. <https://doi.org/10.1038/s41586-023-06406-9>
- Pendrill, F., T. A. Gardner, P. Meyfroidt, U. M. Persson, J. Adams, T. Azevedo, M. G. Bastos Lima, M. Baumann, P. G. Curtis, V. De Sy, R. Garrett, J. Godar, E. D. Goldman, M. C. Hansen, R. Heilmayr, M. Herold, T. Kuemmerle, M. J. Lathuillière, V. Ribeiro, A. Tyukavina, M. J. Weisse, and C. West. 2022. Disentangling the numbers behind agriculture-driven tropical deforestation. *Science*. <https://doi.org/10.1126/science.abm926>
- Pingarrón, A., A. J. Castro, M. Gambi, F. Bongers, M. Kolb, E. García-Frapolli, and P. Balvanera. 2022. Uncovering spatial patterns of ecosystem services and biodiversity through local communities' preferences and perceptions. *Ecosystem Services* 56: 101436. <https://doi.org/10.1016/j.ecoser.2022.101436>
- Pratson, D. F., N. Adams, and R. K. Gould. 2023. Relational values of nature in empirical research: A systematic review. *People and Nature*. <https://doi.org/10.1002/pan3.10512>
- Procuraduría, P. A. 2014. Agraria. *Ley Agraria y Glosario de Términos Jurídico-Agrarios 2014*. http://www.pa.gob.mx/pa/conoce/publicaciones/ley_glosario2014/glosario2014_25sep14_hq. Accessed 1 February 2022.
- Quinn, C. E., and A. C. Halfacre. 2014. Place Matters: An Investigation of Farmers' Attachment to Their Land. *Human Ecology Review*. <https://doi.org/10.22459/HER.20.02.2014.06>
- Radel, C. 2011. Becoming Farmers: Opening Spaces for Women's Resource Control in Calakmul, Mexico. *Latin American Research Review* 46: 29–54. <https://doi.org/10.1353/lar.2011.0023>
- RAN. 2006. Padrón e Historial de Núcleos Agrarios. <https://phina.ran.gob.mx>. Accessed 2 February 2022.
- Ricciardi, V., N. Ramankutty, Z. Mehrabi, L. Jarvis, and B. Chooklingo. 2018. How much of the world's food do smallholders

- produce? *Global Food Security* 17: 64–72. <https://doi.org/10.1016/j.gfs.2018.05.002>
- Riechers, M., Á. Balázs, L. Betz, T. S. Jiren, and J. Fischer. 2020. The erosion of relational values resulting from landscape simplification. *Landscape Ecology* 35: 2601–2612. <https://doi.org/10.1007/s10980-020-01012-w>
- Riechers, M., Á. Balázs, J. O. Engler, G. Shumi, and J. Fischer. 2021. Understanding relational values in cultural landscapes in Romania and Germany. *People and Nature* 3: 1036–1046. <https://doi.org/10.1002/pan3.10246>
- Roberts, T., and C. Lurch. 2015. Participatory video. In *The international encyclopedia of digital communication and society*, 1–6. Wiley.
- Rosset, P. M., and M. A. Altieri. 1997. Agroecology versus input substitution: A fundamental contradiction of sustainable agriculture. *Society & Natural Resources* 10: 283–295. <https://doi.org/10.1080/08941929709381027>
- Ryan, R. M., and E. L. Deci. 2000. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist* 55: 68–78. <https://doi.org/10.1037/0003-066X.55.1.68>
- Saito, T., S. Hashimoto, and M. Basu. 2021. Measuring relational values: do people in Greater Tokyo appreciate place-based nature and general nature differently? *Sustainability Science* 17: 837–848. <https://doi.org/10.1007/s11625-020-00898-4>
- Santiago Vera, T., P. M. Rosset, A. Saldívar, V. E. Moreno, Méndez, and B. G. Ferguson. 2021. La milpa: sistema de resiliencia campesina. Estudio de dos organizaciones campesinas en Chiapas. *Región y Sociedad* 33: e1432. <https://doi.org/10.22198/rys2021/33/1432>
- Sarandón, S. J., M. M. Bonicatto, and N. A. Gargoloff. 2016. Rol de la agrobiodiversidad para un manejo sustentable y resiliente de los agroecosistemas: importancia del componente cultural. *Cuaderno de la Biond* 1: 21–33.
- Schreiber, K., B. Soubry, C. Dove-McFalls, and G. K. MacDonald. 2023. Untangling the role of social relationships for overcoming challenges in local food systems: a case study of farmers in Québec, Canada. *Agriculture and Human Values* 40: 141–156. <https://doi.org/10.1007/s10460-022-10343-0>
- Scott, C., and R. Richardson. 2021. Farmer social connectedness and market access: A case study of personal networks among emerging farmers. *Journal of Agriculture Food Systems and Community Development* 10: 1–23. <https://doi.org/10.5304/jafscd.2021.102.024>
- SEDESOL. 2015. Catálogo de localidades Loma Bonita. <http://www.microrregiones.gob.mx/catloc/LocdeMun.aspx?tipo=clave%26campo=loc&ent=07%26mun=115> Accessed 2 February 2022.
- Shaw, J. 2016. Emergent ethics in participatory video: negotiating the inherent tensions as group processes evolve. *Area* 48: 419–426. <https://doi.org/10.1111/area.12167>
- Sheremata, M. 2018. Listening to relational values in the era of rapid environmental change in the Inuit Nunangat. *Current Opinion in Environmental Sustainability* 35: 75–81. <https://doi.org/10.1016/j.cosust.2018.10.017>
- Smith, L. T. 2022. *Decolonizing methodologies: research and indigenous peoples*. Third edition. London New York Oxford New Delhi Sydney: Bloomsbury Academic.
- Snyder, K. A., B. Cullen, and J. Braslow. 2019. Farmers as experts: Interpreting the hidden messages of participatory video across African contexts. *Area* 51: 779–787. <https://doi.org/10.1111/area.12538>
- Strand, M., N. Rivers, and B. Snow. 2022. Reimagining ocean stewardship: Arts-based methods to ‘hear’ and ‘see’ indigenous and local knowledge in ocean management. *Frontiers in Marine Science* 9: 886632. <https://doi.org/10.3389/fmars.2022.886632>
- Suarez, A., and W. Gwozdz. 2023. On the relation between monocultures and ecosystem services in the global south: A review. *Biological Conservation* 278: 109870. <https://doi.org/10.1016/j.bioccon.2022.109870>
- Tadaki, M., R. Holmes, J. Kitson, and K. McFarlane. 2022. Understanding divergent perspectives on introduced trout in Aotearoa: a relational values approach. *Kōtuitui: New Zealand Journal of Social Sciences Online* 17: 461–478. <https://doi.org/10.1080/1177083X.2021.2023198>
- Tauro, A., E. Gómez-Baggethun, E. García-Frapolli, E. Lazos Chavero, and P. Balvanera. 2018. Unraveling heterogeneity in the importance of ecosystem services: individual views of smallholders. *Ecology and Society* 23: art11. <https://doi.org/10.5751/ES-10457-230411>
- Tauro, A., P. Balvanera, and A. Hernandez. 2021. Valoración plural de la naturaleza: visibilizando relaciones intrincadas mediante foto entrevistas. In *Hacia una valoración Incluyente y plural de la Biodiversidad y los Servicios Ecosistémicos*, 98–130. Universidad Nacional de Colombia.
- Tengö, M., R. Hill, P. Malmer, C. M. Raymond, M. Spierenburg, F. Danielsen, T. Elmqvist, and C. Folke. 2017. Weaving knowledge systems in IPBES, CBD and beyond—lessons learned for sustainability. *Current Opinion in Environmental Sustainability* 26–27: 17–25. <https://doi.org/10.1016/j.cosust.2016.12.005>
- Termansen, M., S. Jacobs, R. Pandit, T. H. Mwampamba, N. Den-doncker, M. Schaafsma, V. Contreras, D. González-Jiménez, H. Gundimeda, H. Lee, A. Filyushkina, M. Huambachano, I. Palomo, and A. J. Castro. 2023. Five steps towards transformative valuation of nature. *Current Opinion in Environmental Sustainability* 64: 101344. <https://doi.org/10.1016/j.cosust.2023.101344>
- Thambinathan, V., and E.A. Kinsella. 2021. Decolonizing methodologies in qualitative research: Creating spaces for transformative praxis. *International Journal of Qualitative Methods* 20: 160940692110147. <https://doi.org/10.1177/16094069211014766>
- Tilman, D., M. Clark, D. R. Williams, K. Kimmel, S. Polasky, and C. Packer. 2017. Future threats to biodiversity and pathways to their prevention. *Nature* 546: 73–81. <https://doi.org/10.1038/nature22900>
- Tobin, D. 2023. Towards quantifying relational values: crop diversity and the relational and instrumental values of seed growers in Vermont. *Agriculture and Human Values* 40: 1137–1152. <https://doi.org/10.1007/s10460-022-10410-6>
- Toledo, V. 2005. La memoria tradicional: la importancia agroecológica de los saberes locales. *Leisa Revista de agroecología* 20: 16–19.
- Toledo, V., and N. Barrera-Bassols. 2008. *La Memoria Biocultural. La importancia ecológica de las sabidurías tradicionales*. Icaria editorial.
- Trevilla-Espinal, D. L., M. L. Soto-Pinto, H. Morales, and E. I. J. Estrada-Lugo. 2021. Feminist agroecology: analyzing power relationships in food systems. *Agroecology and Sustainable Food Systems* 45: 1029–1049. <https://doi.org/10.1080/21683565.2021.1888842>
- Turner, C., L. Salm, M. Spires, A. Laar, and M. Holdsworth. 2023. Capturing the moment: a snapshot review of contemporary food environment research featuring participatory photography methods. *Current Opinion in Environmental Sustainability* 65: 101364. <https://doi.org/10.1016/j.cosust.2023.101364>
- Valentine, G. 2007. Theorizing and researching intersectionality: A challenge for feminist geography. *The Professional Geographer* 59: 10–21. <https://doi.org/10.1111/j.1467-9272.2007.00587.x>
- Vatn, A., U. Pascual, R. Chaplin-Kramer, M. Termansen, P. Arias-Arévalo, P. Balvanera, S. Athayde, T. Hahn, and E. Lazos. 2024. Incorporating diverse values of nature in decision-making—theory and practice. *Phil Trans R Soc B* 379: 20220315. <https://doi.org/10.1098/rstb.2022.0315>

- Walsh, S. 2016. Critiquing the politics of participatory video and the dangerous romance of liberalism. *Area* 48: 405–411. <https://doi.org/10.1111/area.12104>
- West, S., L. J. Haider, S. Stålhammar, and S. Woroniecki. 2020. A relational turn for sustainability science? Relational thinking, leverage points and transformations. *Ecosystems and People* 16: 304–325. <https://doi.org/10.1080/26395916.2020.1814417>
- Zafra-Calvo, N., P. Balvanera, U. Pascual, J. Merçon, B. Martín-López, M. van Noordwijk, T. H. Mwampamba, S. Lele, C. I. Speranza, P. Arias-Arévalo, D. Cabroll, D. M. Cáceres, P. O'Farrell, S. M. Subramanian, S. Devy, S. Krishnan, R. Carmenta, L. Guibrunet, Y. Kraus-Elsin, H. Moersberger, J. Cariño, and S. Díaz. 2020. Plural valuation of nature for equity and sustainability: Insights from the Global South. *Global Environmental Change*. <https://doi.org/10.1016/j.gloenvcha.2020.102115>
- Zermeño-Hernández, I., A. Pingarroni, and M. Martínez-Ramos. 2016. Agricultural land-use diversity and forest regeneration potential in human-modified tropical landscapes. *Agriculture Ecosystems and Environment* 230: 210–220. <https://doi.org/10.1016/j.agee.2016.06.007>

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