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REVIEW AND SYNTHESIS

Disentangling gender and social difference for just and transformative biocultural approaches

Isabel Díaz-Reviriego[1] | Mario Torralba[2] | Beatriz Vizuete[3] | Stefan Ortiz-Przychodzka[1,4] | Jasmine Pearson[1,5] | Claudia Heindorf[6] | Aymara LLanque Zonta[1,7] | Elisa Oteros-Rozas[8,9]

[1]Social-Ecological Systems Institute (SESI), Faculty of Sustainability, Leuphana University of Lüneburg, Lüneburg, Germany; [2]Environmental Geography Group, Institute for Environmental Studies, VU University Amsterdam, Amsterdam, The Netherlands; [3]Social-Ecological Systems Laboratory, Department of Ecology, Faculty of Science, Autonomous University of Madrid, Madrid, Spain; [4]Grupo Economía, Ambiente y Alternativas al Desarrollo, Universidad Nacional de Colombia, Bogotá, Colombia; [5]School of Architecture and Built Environment, Faculty of Engineering, Queensland University of Technology (QUT), Brisbane, Queensland, Australia; [6]Department of Agricultural Economics and Rural Development, University of Göttingen, Göttingen, Germany; [7]Universidad Autónoma del Beni (UAB), Trinidad, Bolivia; [8]Departmento de Agronomía, Escuela Técnica Superior de Ingeniería Agronómica, Universidad de Sevilla, Sevilla, Spain and [9]FRACTAL Collective, Madrid, Spain

Correspondence
Isabel Díaz-Reviriego and Mario Torralba
Emails: diaz@leuphana.de; m.torralbaviorreta@vu.nl

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Abstract

1. Advancing research and practice that recognize diverse worldviews, knowledge systems, and value orientations is essential to enable transformative change towards sustainability. Biocultural approaches recognize the diverse ways in which people relate to nature, offering a potential pathway for sustainability transformations. However, recent scholarship on biocultural approaches to sustainability has highlighted that social aspects such as equity and justice have not been substantively addressed, whereby gender issues have been overlooked to a great extent.
2. Through qualitative content analysis, this review synthesizes the conceptualizations of gender and social difference within the literature on biocultural approaches to sustainability published in English and Spanish.
3. The biocultural literature predominantly focuses on describing knowledge and management practices, neglecting power and gender relations that affect access and control over resources, and how different axes of social difference matter across different social-ecological contexts. Overall, we found that gender considerations within the literature reviewed do not build upon feminist and gender theories.
4. Based on these findings, we provide insights into how more nuanced engagements, especially in relation to feminist theories and tools as intersectionality and decolonial perspectives, can allow for more just scholarly efforts to address biocultural relations.
5. Finally, we draw attention to responsible and engaged praxis towards promoting biocultural approaches that include the diverse perspectives of those who can contribute to transformative change, and which prevent the reinforcement of gender-based power relations.

Co-authorship ordered randomly determined with R. All the co-authors contributed equally to this manuscript.

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KEYWORDS
environmental justice, feminist approaches, indigenous and local knowledge, intersectionality, non-humans, power relations, women

1 | INTRODUCTION

Biocultural approaches are place-based and culturally grounded research perspectives that encompass values, knowledges, rights and needs, and that recognize the relationships between biophysical and social realms (Gavin et al., 2015; Sterling et al., 2017). Because they acknowledge such relationships, biocultural approaches are increasingly recognized as effective tools for addressing sustainability challenges. Fundamental to this trend is the recognition that addressing the complexity of sustainability issues requires a better understanding of peoples' diverse ways of relating to nature (Hanspach et al., 2020; Lukawiecki et al., 2022; Merçon et al., 2019). In this sense, the heterogeneity of human experiences with non-human entities of nature is often shaped by dynamic social norms and power relationships, such as gender and social difference, in a relational and co-emergent mode (Ahlborg & Nightingale, 2018; Nightingale, 2017).

This can have profound gendered implications for people's livelihoods and contributions to sustainability (Cruz-Torres & McElwee, 2012; Meinzen-Dick et al., 2014; Rocheleau et al., 2013), unequal distribution of impacts from environmental change or degradation (Kosanic et al., 2022; Malin & Ryder, 2018; Ravera et al., 2016) and in some cases, can even lead to gender-based violence (Le Tran et al., 2020; Menton et al., 2021; Tran & Hanacek, 2022). Understanding the drivers of inequality and differential well-being outcomes for humans and the non-human is at the core of just transformations to sustainability (Bennett et al., 2019; Martin et al., 2020; McGregor et al., 2020; Ulloa, 2017). Despite this, recent scholarship on biocultural approaches to sustainability have highlighted that issues related to social sustainability and justice have not been substantively taken into account (Hanspach et al., 2020), whereby gender issues are considerably overlooked (Díaz-Reviriego et al., 2024).

In this article, we aim to investigate how the literature on biocultural approaches has addressed gender and social differences. We address this by asking: what is made visible, what is made invisible and what are the implications? The biocultural perspective is becoming central to explore and better understand human–nature sustainability interactions (Bridgewater & Rotherham, 2019; Merçon et al., 2019). Biocultural approaches strive for inclusivity by incorporating diverse epistemologies and worldviews. We inquire about how this field is including—or failing to incorporate and reflect on—gender issues. Gender and social difference considerations are inextricably linked to just sustainability transformations that address the loss of biological and cultural diversities, and to the goals of the gender-responsive Kunming-Montreal Global Biodiversity Framework (Convention on Biological Diversity (CBD), 2022), including its articles on gender equality and gender-responsive participation in decision-making. We illustrate how overlooking the complex interlinkages between gender, social difference and biocultural relations may have serious consequences for how human–nature relationships are understood and therefore, how solutions to current systemic crises are framed in biocultural approaches scholarship. We are inspired by feminist theory and feminist political ecology in particular to illuminate potential ways in which biocultural approaches can be better attuned to provide the basis for just and transformative sustainability. Feminist political ecology offers theoretical approaches about the power relations associated with nature, culture, and economy, with a commitment to feminist epistemologies, methods, and values (Elmhirst, 2018: 1). Feminist political ecology emphasizes research and practice that empowers and promotes social and ecological transformation by inquiring forms of power that define inequality and differentiated access and control of resources through multiple axes of social difference such as gender, caste/ethnicity, age, class, among others (Clement et al., 2019; Nightingale, 2011). After describing our methodology, the following sections draw on feminist epistemologies to guide the narrative of the main findings on the coverage of gender in scholarly research in biocultural approaches to sustainability.

2 | METHODOLOGY AND ANALYTICAL STRATEGY

We based our analysis on the databases of two recent systematic reviews of academic articles on biocultural approaches published in English (Hanspach et al., 2020) and Spanish (Díaz-Reviriego et al., 2024). These two papers together give an account of the richness and diversity of biocultural approaches in the scientific literature. Although there is a much broader literature covering human–nature relationships (Montenegro Martínez, 2011; Pilgrim & Pretty, 2010), our review focuses specifically on the biocultural literature to provide an overview of how this emerging field is taking gender and social difference themes into consideration in relation to sustainability. From these two articles' database, we selected a subsample of those articles that considered gender. We updated the English database by searching Scopus on March 2022 with the search string: *TITLE-ABS-KEY* ((*"biocultural" OR "bio-cultural"*) *AND* (*"gender*" OR "women" OR "men" OR "non-binary"*)) *AND PUBYEAR > 2018 AND PUBYEAR < 2022*. Abstracts and titles were reviewed in the first step and after reading the full texts we included the publications that had a substantive engagement with gender (see Figure 1).

Our strategy for the analysis of the corpus was as follows. For each study in our database, we assessed whether the articles conceptualized gender based on specific literature, theoretical or conceptual frameworks, and identified the specific themes underlying gender perspectives. Figure 2 summarizes the themes that we explored.

We did a first close reading of the articles in which we coded for the above-mentioned themes. In a subsequent round of coding,

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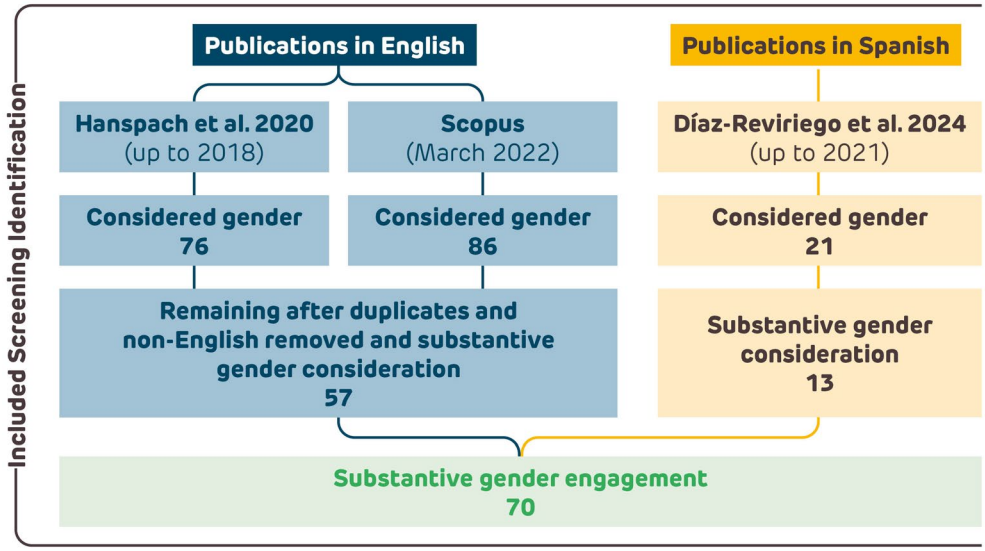

FIGURE 1 Identification and selection of academic publications for the review.

we re-read the articles to double-check the codes and developed a narrative result for each section. All co-authors worked as a team through regular online discussions and one hybrid workshop to ensure the analysis was guided by our collective expertise.

The positionalities, experiences, and relationships among our authorship team played an important role in the work we have done in this paper. We are early-to-middle career researchers from different corners of the world both from the Global South and North. Most of us began collaborating initially through a shared interest in biocultural approaches and social-ecological systems research through a gender lens. We are non-Indigenous people who have worked extensively in different forms and places, with Indigenous and local communities exploring matters of diversity, equity, inclusion, and participation in conservation, agroecology, and sustainability governance. Our place-based experiences have sparked our interest in how gender relations influence access to, use of, knowledge about, and values of nature, as well as in the transmission of ecological knowledge. We are particularly interested in the role that gender relations play in territorial and cultural struggles in the Global South. We are collectively committed to research and practices that foster social change towards sustainable and just futures. In this piece, we are inspired by feminist theory and epistemologies to help us unveil pathways for biocultural approaches that contribute to transformative change. More specifically, we strive to produce knowledge that can support addressing power dynamics within biocultural approaches to prevent the reinforcement of gender-based power relations and to achieve better sustainability outcomes.

3 | GENDER AND THE REPRESENTATION OF WOMEN IN BIOCULTURAL APPROACHES

We reviewed and synthesized 70 articles on biocultural approaches published in English and Spanish that had considered gender (see Supporting Information A for a list of all articles included). There is a gradient from articles that only include gender (sex) as a demographic variable in quantitative analysis, to those that conduct a more in-depth gender analysis.

The geographical distribution of case studies in the articles reviewed shows that studies were undertaken in countries with a relatively high to medium biocultural diversity rank, most of them in the global South (see Supporting Information B). Biocultural studies that considered gender and social difference have predominantly taken place in Mexico and India, most likely because of long-standing research that focuses on ethnobiology and biocultural thinking (see Burke et al., 2023).

3.1 | Conceptualization of gender and themes covered

For most studies, a binary approach was taken by only recognizing women and men and comparing results between them. However, there was an unequal distribution between genders of participants across several of these studies. Nine studies mostly considered men (e.g. Belayneh et al., 2020; da Silva et al., 2019; Fiol et al., 2017; Kassam, 2009), and seven mostly considered women (e.g. Manzanero-Medina et al., 2020; Singh, Bhardwaj, et al., 2021; Turner et al., 2019). Moreover, eight studies focused solely on women (e.g., Guzmán, 2016; Reyes-Carcaño et al., 2021; Singh et al., 2013), while only one study was restricted to men (Aziz et al., 2021). Regarding the studies with a focus on men, most papers mentioned the difficulty with recruiting women in the study due to patriarchal structures and related socio-cultural barriers (e.g. Aziz et al., 2021; Iniesta-Arandia et al., 2015). In contrast, bias towards women was mainly due to their role as key knowledge holders or experts on the related research topic (e.g., Curran et al., 2019; Lin et al., 2020; Marchant et al., 2020).

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Themes	Approach	Description
Conceptualization of gender	Inductive	Did the conceptualization of gender draw upon specific feminist literature, theoretical or conceptual frameworks?
Description of gender	Deductive	How was gender described in the papers? (gender = women; gender = binary (women and men); gender = otherwise).
Women portrayal	Inductive	How were women depicted within the narrative and objectives of the study?
Gendered domains	Inductive	What were the knowledge domains, practices, places or spaces that the papers focused on?
Axes of difference	Inductive	Which other axes of difference or social markers beyond gender were explored in the studies?
Intersectional complexity	Deductive McCall L (2005), Winker G & Degele N (2011)	We assessed whether the articles: **(a)** Focused on particular social groups at neglected points of intersection (e.g. indigenous women knowledge and practices). **(b)** Made a strategic use of categories to analyse relations of multiple inequalities between socially constructed groups, for example, comparing knowledge or practices of diverse groups of women (i.e. according to age, ethnicity, income) or diverse gender groups. **(c)** Deconstructed gender as an analytical category by focusing attention on the ways in which concepts, terms and categories are constructed.
Non-human acknowledgement	Inductive	Was the analysis of difference and power done beyond the human aspects?

FIGURE 2 Themes explored in the review.

Gendered knowledge was the most common theme among the studies, generally related to medicinal, handicraft, and ethnobotanical knowledge. Other studies explored knowledge related to wild species, fuel plants, building materials, cosmetics, and the spiritual use of nature. Across most of these studies, women were found to be knowledgeable, especially when it comes to domains related to gastronomy and cooking (e.g. Gutiérrez-García et al., 2020; Manzanero-Medina et al., 2020; Ugalde, 2016), farming (e.g. Alvarez et al., 2005; Castagnetti et al., 2021; Reyes-Carcaño et al., 2021) and medicinal and ethnobotanical knowledge more generally (e.g. Beltrán-Rodríguez et al., 2014; Chaves et al., 2019; Narváez-Elizondo et al., 2021). Women were often considered to be more knowledgeable than men. Yet, in some of these studies where women were more knowledgeable, men were still perceived to have 'specialized' knowledge whereas women were considered to have 'lay' (or non-specialized) knowledge (see Aston Philander et al., 2011). Women and men often have different yet complementary knowledge of species use. For example, in a study in the Sierra de Huautla Biosphere Reserve, Mexico, women mentioned significantly more ornamental and mystical-religious plants. In contrast, men mentioned significantly more plant species used for domestic purposes, such as building houses or fences, crafts, and farming wooden tools (Beltrán-Rodríguez et al., 2014). The uneven distribution of genders in sample size may have also skewed results across some studies. For example, Belayneh et al. (2020) found that men had more knowledge of medicinal uses, while women were knowledgeable about cosmetic uses. However, there were 37 men and only 10 women who participated in the study. Similarly, da Silva et al. (2019) set out to explore how the socio-economic profile of their study participants, 49 men versus seven women, influenced the richness of knowledge about ethnospecies, concluding that men had greater knowledge of the species than women had. Therefore, the sampling design may have skewed some of these studies to underestimate women's knowledge (Figure 3).

Gendered practices were another key theme among the studies, which included various agricultural practices, animal husbandry, food and culinary practices, hunting, and gardening. Women were more likely to be involved in food and culinary practices, animal husbandry, and gardening than men. Agricultural and hunting practices were relatively evenly distributed between genders. For

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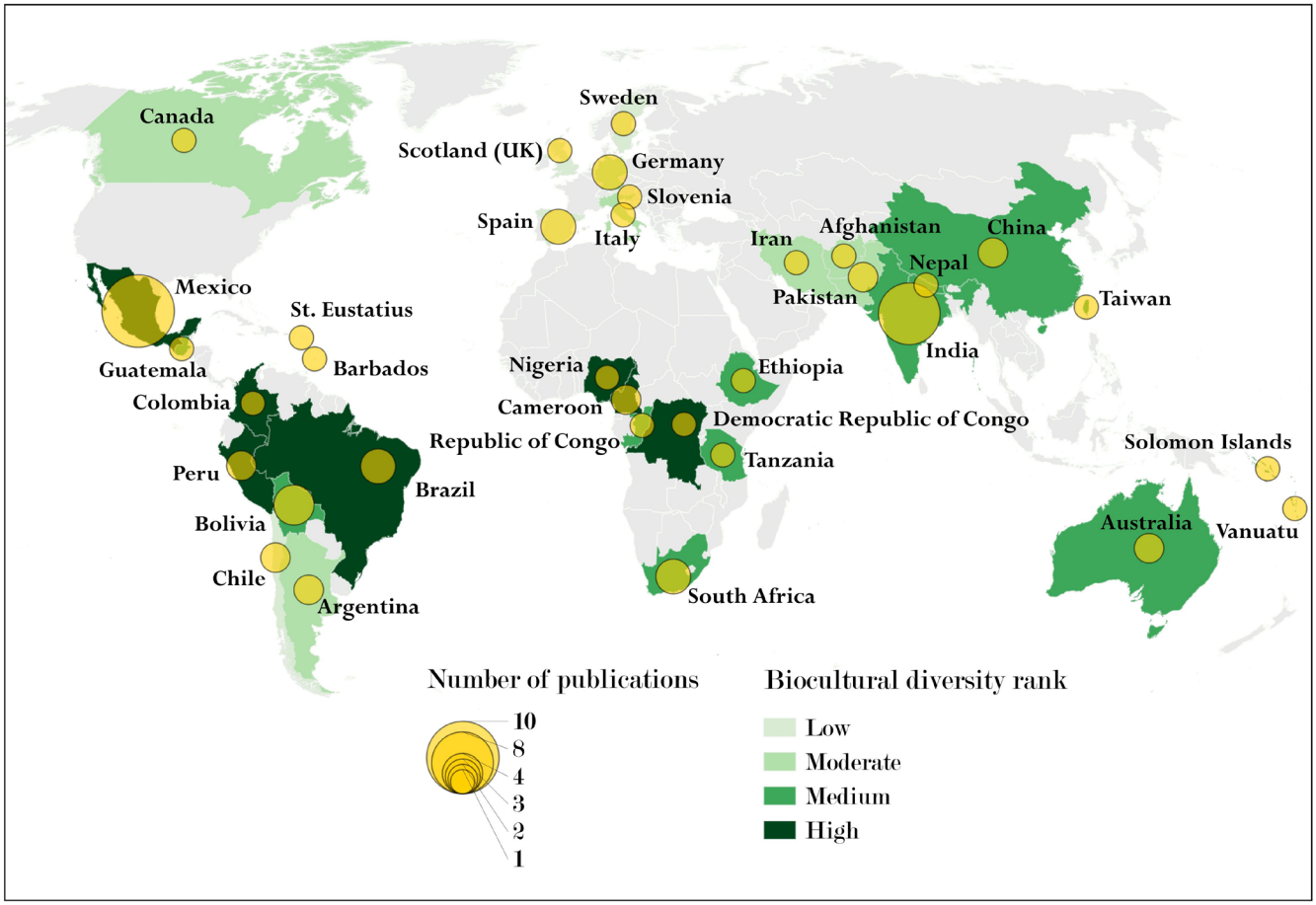

FIGURE 3 Geographical distribution of case study locations according to the biocultural diversity rank by country.

example, in Tunari National Park, Bolivia, communities indicated that "cultivated land becomes colder when plowed by the men, who are said to have 'cold hands,' and that fallow land becomes warmer when manure is spread by the livestock led by the women, who are said to have 'warm hands'" (Boillat et al., 2013). Conservation and management practices were also prevalent topics in the literature, including studies on both biodiversity and local varieties' conservation. Across these studies, women tended to have a stronger role in (agro)biodiversity conservation and management. Some of the practices mentioned are related to seed selection, exchange, offering, and other practices involving seeds which are important for agrobiodiversity conservation (e.g. Alvarez et al., 2005; Athayde & Silva-Lugo, 2018; Salas & Tillmann, 2021). In most of these studies, women played a key role in seed exchange networks and the offering of seeds during cultural practices. In Central Australia, Warlpiri and Anmatyerr women perform Yawulyu (traditional song, dance, and visual designs) about the journey of seed ancestors, identification of seeds, harvest, cleaning, and other practices that turn seeds into food (Curran et al., 2019). Other studies explored the gendered aspects of values and attitudes towards nature, access to nature, or regarding health, for example, in relation to food consumption and avoidance.

3.2 | Positionality and the construction of otherness

Positionality entails our worldviews, knowledge systems, beliefs, values, and social-demographic attributes, such as gender, class, dis/ability, education, race, and sexuality. Reflexivity involves identifying and accounting for the implications of one's position, as a researcher, in research processes (Ravera et al., 2023). Of the 70 articles reviewed, only five addressed the positionality of the author/s of the article. Of these papers, only a few provided details on the authors' reflexive approach (e.g. Bond & Gaoue, 2020; Iniesta-Arandia et al., 2015), by critically reflecting on the implications of their position in the research study and how they accounted for this along the research process. Briggs et al. (2019) provided the most detail in their study on place attachment and the sustainability of the biocultural diversity within the Q'eqchi' (Guatemalan Indigenous people).

Although about 60% of studies focused on Indigenous societies, these were conducted by scholars who do not express any identity or cultural link with these indigenous cultures. This implies a number of epistemological considerations. Postcolonial feminist scholars, in a critique to the modern universalism and Western centrism, call for the need to reflect on how the subjectivities of

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the researchers influence both the people they choose to study and the way they are perceived (Mohanty, 1984; Puwar, 2008). These power relations are most evident in studies that incorporate gender and the representation of "third world women" as a construction of the "other", where they have usually been portrayed as vulnerable, victims, or tradition-bound (Mohanty, 2004). It has been also argued that hegemonic approaches to gender might decontextualize women's practices and judge their ways of life based on normative white women's standards, misunderstood as universal (Sandoval, 2004). Similarly, literature on the links between women and the environment has highlighted a tendency to frame women either as victims, vulnerable to environmental degradation, or as powerful agents of change and environmental caretakers, sometimes neglecting more complex and multidimensional daily realities of resource use, power, and negotiation (Arora-Jonsson, 2011; Fernández-Giménez et al., 2022; Lowassa et al., 2012; O'Shaughnessy & Krogman, 2011; Ravera et al., 2016; Resurrección, 2013).

In biocultural scholarship, as we pointed out above, there is major emphasis on seeing women as knowledgeable when it comes to nature, especially taking care of it, without always considering more deeply the complexities of daily life power relations. Women are also depicted as playing an essential role in knowledge transmission and continuity (Athayde & Silva-Lugo, 2018; Iniesta-Arandia et al., 2015), as knowledge keepers and stewards (Marchant et al., 2020; Santos Tanús et al., 2019) or as knowledge refugia (Salas & Tillmann, 2021). In this sense, they are portrayed as custodians safeguarding biodiversity conservation (Boillat et al., 2013; Singh et al., 2012, 2015, 2020), communities, and family healthcare (Díaz-Reviriego et al., 2016; Singh, Singh, 2021).

In addition to portraying women as knowledgeable, some studies also address vulnerabilities. For example, a gender burden is sometimes described as driven by high workloads associated with women's responsibilities in productive, caring, and reproductive activities (Kassam, 2009; Díaz-Reviriego et al., 2016; Singh, Singh, 2021), and the implications on their health (Leatherman, 1998; Leatherman & Jernigan, 2014). Gendered vulnerability in biocultural approaches is mostly framed around changes in access to resources harvested by women (e.g. Ligtermoet, 2016), as well as the lack of recognition of women's rights to land ownership (Román Suárez et al., 2021).

Women are often also reported as key agents of change, responsible for leading collective actions from the margins for the conservation of biocultural heritage (Guzmán, 2016; Singh et al., 2013, 2015; Singh, Singh, 2021). For instance, Lin et al. (2020) show that women have been leading the movement on millet preservation in Taiwan, where women's ecological knowledge is linked to stories, songs, and rituals. Ojeda-Linares et al. (2020) also feature the importance of gendered knowledge of cactus species to the traditional brew of fermented beverages in Mexico. They state that "the renascence of local fermented beverages is made possible by the active role of women" (Ojeda-Linares et al., 2020: p. 10). Women from different generations were also reported to lead awareness-raising for the preservation of native maize farming (Rivera López et al., 2020). Other contributions point to the exclusion and undervaluation of women as sustainability and conservation agents (Bernis Carro, 2019; Singh et al., 2013).

4 | BEYOND GENDER

4.1 | Intersectional difference and power relations among humans

Intersectionality was first conceived to describe the interconnections and the interdependencies among race, gender, and class in Black women (Crenshaw, 1989), challenging the essentialized use of 'woman' as a unitary category (Hooks, 1981; Lorde, 1984). The contribution of Black feminism in conceptualizing the diversity within women and beyond relies on its focus on assemblages of differences. This has shaped the way feminist scholars deal with multiple structures of oppression at play through intersectionality as a tool, a method, and a way of thinking (Choo & Ferree, 2010; Lugones, 2016; McCall, 2005; Rodó-Zárate & Jorba, 2022; Winker & Degele, 2011). Feminist political ecology scholarship has also contributed to the understandings of power by unveiling the daily practices by which it is enacted and reproduced. It emphasizes the multidimensionality of subjectivities, where gender lies at the intersection of multiple social differences that produce inequities in environmental issues (Arora-Jonsson, 2014; Elmhirst, 2011; Lau, 2020; Mollett & Faria, 2013; Nightingale, 2011; Rocheleau et al., 2013). Power is therefore considered as relational, situational, and emergent, rather than fixed or held by individuals (Ahlborg & Nightingale, 2018; Svarstad et al., 2019).

Though biocultural literature dealing with gender has not yet explicitly incorporated these theories, some biocultural scholarship is sensitive to the diversity of lived experiences among women and men in different contexts. Beyond identity structures, such as race, class or gender, a broader range of social markers that may influence biocultural relations and people's knowledge, practices, and role in environmental governance have been explored. The biocultural literature has also addressed the neglect of women's voices by focusing on indigenous women's knowledge (Marchant et al., 2020). Ethnicity and age are two additional social factors that can be useful for centering views that are rarely heard, for example, by mapping place attachment as experienced by young Q'eqchi' Maya women of Guatemala (Briggs et al., 2019) or among elderly and young women from different groups in the Himalayas (Singh et al., 2010, 2013). Women's knowledge and use of plants for food across residential areas (from more remote or traditional vs. less remote or in transition; Singh et al., 2020) and from different economic sectors (Guzmán, 2016) has been also studied.

The knowledge and practices of diverse groups of women and men have also been compared by looking at age and gender simultaneously. Rivera López et al. (2020) explore the perception of challenges and strategies for the conservation of native maize in indigenous farming communities of Oaxaca, Mexico, across genders

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and generations. They conclude that understanding the heterogeneity of perspectives is important for identifying causes of agrobiodiversity decline and strategies for biocultural conservation of native maize. In a study with the Lhoba people in Tibet, the significance of the relationships between age and gender are also highlighted for the continuity and transmission of traditional ecological knowledge of medicinal and edible plants. The mastery of traditional knowledge increases with age and its transmission seems to be threatened by changes in lifestyles in younger generations (Yang et al., 2020). Finally, some studies show gendered differences in relation to water insecurity in migrant backgrounds in the Andes and diverse interactions with biodiversity in European urban parks (Hadley & Wutich, 2009; Palliwoda et al., 2017).

While biocultural approaches address diversity and differences within the categories of women and men, they fail to deconstruct and challenge normative binary gender categories. Context-specific gendered divisions of labor are generally described (e.g. Cocks et al., 2006; Ligtermoet, 2016; Reyes-Carcaño et al., 2021), though without considering the processes and systems of differentiation and domination. This could be improved by assessing the discourses and practices that make gender, and how the symbolic ideas of difference are produced and expressed through gender interactions that are material. Examples of nuanced approaches to gender that question normative ideals exist beyond the biocultural literature. O'Shaughnessy and Krogman (2011) explore the emergence and construction of masculinities and femininities in particular settings along the lines of the material and the discursive, which go beyond the dichotomization of gender and include contradictory and shifting gendered experiences in the context of extractive industries in the global North (US and Canada). The power of social and gender norms is explored by Lowassa et al. (2012) on the role of women behaviour in the maintenance and reinforcement of male hunting activities in Tanzania and Ethiopia. Nightingale (2011) also challenges ideas of difference that rely on fixed identities and emphasizes the importance of addressing social inequalities across gender, caste, and class in Nepal.

4.2 | Difference and power relations between humans and non-humans

Feminist research has advanced the understandings of humans and non-human relationships by including the latter in the analysis of intersecting power relations (Birke, 2012; Djoudi et al., 2022; Haraway, 1991; Hovorka, 2012; Kaijser & Kronsell, 2016; Méndez, 2018; Twine, 2010). These perspectives could enhance biocultural approaches not only by taking into account the multiplicity of human relationships with nature (Caillon et al., 2017; Coscieme et al., 2020; Droz et al., 2022; Ducarme et al., 2021) but also by helping to overcome human–nature dualism and dichotomies through relational approaches. For instance, the conceptualization of gender and intersectionality as assemblages of relations, practices, and interactions of humans (Luo women) and non-human elements (e.g. hybrid seeds, among others) in western Kenya has shown how difficult it is to essentialize gender categories and how differences among women are produced in relation to non-human elements in a specific social-ecological context (Kimanthi et al., 2022). Feminist geographies in Latin America have also highlighted the embodied human and non-human relationships that constitute many indigenous territorial practices (Berman-Arévalo & Valdivia, 2022; Ulloa, 2017). Concepts such as "body-territories" stress the multiple agencies that arise from decolonial ontologies and epistemologies reflecting gendered collective experiences in relation to non-humans (Ulloa, 2024). Dialogue with such non-dualistic understandings of human–nature relationships can provide opportunities for further exploring relational dimensions of biocultural diversity.

The reviewed literature does not show clear links to the relational approaches of feminist research. A few of the biocultural contributions analysed do signal alternative ways of relating to nature on the grounds of considering humans as part of nature in animistic and relational worldviews, and recognition of non-human agency (Boillat et al., 2013; Reyes-García & Fernández-Llamazares, 2019; Rozzi, 2012). Other articles highlighted human care and advocacy towards the non-human through religious beliefs and sacred sites for conservation (Baker et al., 2014; Kassam, 2009; Plieninger et al., 2020), and customary caring practices (Curran et al., 2019; Ligtermoet, 2016; Salas & Tillmann, 2021). Some examples further suggest ways through which relationships with non-human actors influence human values (Boillat et al., 2013; Borré, 1991; Plieninger et al., 2020) and practices such as agriculture (Briggs et al., 2019; Castagnetti et al., 2021; Mishra et al., 2013), hunting (Borré, 1991; Reyes-García & Fernández-Llamazares, 2019), and cooking (Santos Tanús et al., 2019). Most mentions of gender refer to descriptive differences between women and men in specific practices involving non-humans (Borré, 1991; Castagnetti et al., 2021; Plieninger et al., 2020). Others suggest deeper interrelations between women and non-humans. For example, Mishra et al. (2013) assess spiritual relationships and cultural rituals for the non-humans (crops) that shape women's and men's subjectivities expressed in place attachment and landrace conservation. Even though biocultural approaches make visible how humans and non-human worlds are intertwined from a gender perspective, the literature analysed did not elaborate on how these relationships may simultaneously produce differences within gender groups.

5 | DEEPENING INTERSECTIONAL AND DECOLONIAL PERSPECTIVES IN BIOCULTURAL APPROACHES

In light of these findings on gender and social difference in the biocultural literature, we argue that advancing intersectionality and engaging with feminist and decolonial theory would lead to more just and transformative biocultural approaches. In particular, it would support a better account of power dynamics (Malin & Ryder, 2018;

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Menton et al., 2020) in the understanding of human–nature relationships and contribute to decolonizing methodological approaches within biocultural scholarship.

This synthesis indicates that the gender considerations in biocultural approaches do not build upon feminist and gender theories. Improving theoretical foundations of the gender perspectives could help to avoid assumptions when describing gender roles, particularly challenging the romanticization of gendered responsibilities for care work, the binary perspective, and assumptions about women's roles in sustainability and biocultural relations. This can help transcend the persistent dichotomies that assume monolithic identities and stereotypes surrounding women and men in relation to nature. These assumptions may also explain the lack of attention to masculinities and the environment (see for example work by Paulson, 2016a, 2016b; Paulson & Boose, 2019; Paulson et al., 2022) and the deconstruction of gender categories in the literature assessed. There is long-standing critical literature that builds on the dynamic material aspects of gender relationships, their interplay with conceptions of femininities and masculinities (Agarwal, 2010; Harcourt & Nelson, 2015; Jewitt, 2019; Leach, 2007) and the impacts on social-ecological realms (Lowassa et al., 2012; Rocheleau et al., 2013). Biocultural approaches through a gender lens can be improved by drawing on feminist and gender theory literature in order for researchers to recognize, challenge, and move beyond their own assumptions and potential biases.

Advancing theoretical underpinnings of equity issues can support more critical reflections on how inequalities are influenced by broader power relations, social norms and symbolic representations, in both research ontologies and epistemologies, allowing for more contextualized and inclusive biocultural approaches (Nightingale, 2011; Spivak & Riach, 2020). Current biocultural literature gives special attention to Indigenous and local knowledge systems (Burke et al., 2023) and focuses heavily on describing knowledge and management practices, overlooking power and gender relations issues concerning access and control over resources. Understanding what social differences matter and in which ways is central to the recognition of collective and individual subjectivities and addressing people's concerns, needs, livelihoods, and values in relation to nature. As some evidence has shown, scaling down to explore gendered everyday practices (Berman-Arévalo & Ojeda, 2020) is vital to account for the specificity of human and non-human relationships that unfold in intimate places (such as kitchens, homegardens, agricultural fields). Berman-Arévalo and Ojeda (2020) and Berman-Arévalo and Valdivia (2022) show how quiet resistance and care can be utilized to contest power inequalities and the violence of agrarian extractivism in rural Colombia. Thus, care can be understood, not merely as descriptive categories of differentiation reaffirming the gender binaries, but as practices to maintain human–nature relationships under threat. Therefore, a more inclusive understanding of the diverse ways in which people value and interact with nature is still needed, particularly regarding Indigenous and local communities, and relationships between social roles and power structures (e.g. according to gender, ethnicity, race, colonial legacy). Improving how evolving and adapting values are expressed in research and practice is also key to just decision-making and mainstreaming diverse values into policy (IPBES, 2022).

We contend that by strengthening engagement with feminist decolonial perspectives, biocultural approaches could be more transformative by coproducing outcomes that interrogate gender relations and overcome gender-based power. Our results demonstrate that they generally lack critical conceptualizations of power and gender relations. This has epistemological implications in the way gender is understood by researchers in the indigenous contexts where studies take place, which can differ considerably from local perspectives (Lugones, 2010). Addressing diversity and different understandings of power relations would require analysing how oppressions based on gender, ethnicity/race, or social class are connected and articulated instead of compartmentalizing them as unidimensional (Cumes, 2009). For Cumes (2012), indigenous women experience a multifaceted domination and they challenge an oppressive and interconnected system from the margins. This positionality allows them to articulate alternative conceptualizations of power. From a decolonial perspective, there is a need to revisit the underlying reasons for the interpretation of gender and ethnicity that renders women only as vulnerable and that neglects the strengths of populations most affected by systemic oppression (Curiel, 2008; Miñoso, 2016, 2020). Decolonization of biocultural approaches can be promoted by pluralizing knowledge production and drawing upon the work of decolonial feminists, indigenous communitarian feminists (Cabnal, 2010; Davidson, 2022; Guzmán & Triana, 2019; Paredes, 2015), and decolonizing methodologies (Smith, 1999; Swiderska et al., 2022; Trisos et al., 2021) that address, transform and replace research methods that overlook local understandings and experiences of power relations when working with populations that have historically resisted extractive colonial legacies.

Indigenous communitarian and decolonial feminists have prioritized the body as the most important scale from which to derive information and reflections on the territories and the environment. One example of this pertains to extractive industries and the emotional attachments and corporeal experiences that emerged from these encounters in Latin America over the years (Ulloa, 2016; Zaragocín & Caretta, 2021). Bodily experiences not only show the violence exercised by agrarian extractivism on territories and bodies, but also the multiple strategies of women's organization in response to expropriation through collective struggles for the care of their territories (Tzul, 2014). These feminist, decolonial and action-oriented perspectives can support biocultural approaches that coproduce knowledge on people's emotions and embodied experiences with non-human aspects of nature. This can result in biocultural approaches that are more attuned to gendered contexts, fostering respect, recognition, and solidarity with those with whom we work (Todd, 2016; Toomey, 2016).

6 | CONCLUSION

While gender and other markers of social difference are widely acknowledged as shaping human–nature relationships, including the

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access to, use of, knowledge about, and values of nature, biocultural approaches have not addressed these issues with the depth they deserve. By synthesizing biocultural scholarship that has considered gender, this review shows that the literature predominantly focuses on describing (mostly women's) knowledge and management practices, neglecting the complexities of daily life power relations that affect access and control over resources, and how different axes of social difference matter across different social-ecological contexts.

Gender conceptualizations within the literature do not build upon gender and feminist theory, and have not explicitly incorporated intersectionality theories that challenge the essentialized representation of "woman" as a unitary category. We suggest that by engaging with intersectionality, biocultural research can support more just sustainability transformations that enhance the understandings of inequality and power relations entwinements (e.g. along the lines of gender, ethnicity, race, colonial legacy) while addressing the loss of biological and cultural diversities. Intersectional perspectives that include the non-human in the analysis of power can also provide opportunities to overcome human–nature dualism by further exploring relational dimensions of biocultural diversity and the diverse lived experiences across genders.

Cultivating a deeper, nuanced, and potentially transformative gender scholarship within biocultural approaches to sustainability requires more responsible and engaged praxis (Hird et al., 2023; Kuokkanen, 2010; Sultana, 2023; Turnhout et al., 2020). This entails critical reflexivity on behalf of researchers to gain more comprehensive insights into the lived experiences of research participants, and how they represent them.

AUTHOR CONTRIBUTIONS

Isabel Díaz-Reviriego conceived the idea of the study and led the writing of the manuscript. All authors contributed to the analysis of the data, interpretation of the results, and writing of the manuscript.

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CONFLICT OF INTEREST STATEMENT

Authors declare no competing interests.

DATA AVAILABILITY STATEMENT

This paper does not include any data.

ORCID

Mario Torralba https://orcid.org/0000-0001-9205-787X
Beatriz Vizuete https://orcid.org/0000-0002-0531-8777
Jasmine Pearson https://orcid.org/0000-0001-6341-1382
Claudia Heindorf https://orcid.org/0000-0002-2713-5250

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Supporting Information A. List of the 70 papers included in the review.

Supporting Information B. Method for calculating the BCD-index rank and case studies of reviewed literature country locations.

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