

Review

Toward a Feminist Agroecology

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Abstract: Agroecology is gaining ground as a movement, science, and set of practices designed to advance a food systems transformation which subverts the patterns of farmer exploitation currently entrenched in dominant agricultural models. In order for agroecology to achieve its espoused twin aims of social and ecological wellbeing, women and other historically marginalized stakeholders must be empowered and centered as the movement's protagonists. The importance of gender and social considerations is not limited to patently social aspects of the agroecological agenda, but bears relevance in every dimension of agroecology. Yet, issues related to gender have commanded relatively little attention in the agroecological literature. In this paper, we review HLPE's 13 defining principles of agroecology through a feminist lens to demonstrate the ways in which human dimensions and power dynamics are interwoven in every principle. Through this analysis, we demonstrate that a feminist approach is instrumental to establish a socially just and ecologically sustainable agroecological transition.

Keywords: agroecology; feminism; gender; social equity; food sovereignty



Citation: Zaremba, H.; Elias, M.; Rietveld, A.; Bergamini, N. Toward a Feminist Agroecology. *Sustainability* **2021**, *13*, 11244. <https://doi.org/10.3390/su132011244>

Academic Editor: Robyn Alders

Received: 31 August 2021

Accepted: 5 October 2021

Published: 12 October 2021

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1. Introduction

Global food systems have extended dangerously past planetary boundaries and beyond a “safe and just operating space for humanity” [1]. The urgent, interrelated, and intensifying crises of global warming, biodiversity loss, and water and soil degradation are gravely imperiling the very agri-food systems that contribute to fueling these phenomena. Furthermore, the negative externalities of conventional, globalized agribusiness have exacerbated social inequalities and are disproportionately impacting the most vulnerable members of our societies [2].

Agroecology is gaining recognition as a potential solution to these interconnected global crises. Defined as a transformative agricultural and social movement, a scientific discipline, and a set of practices, agroecology rejects top-down technocratic approaches, and “challenges the power dynamics in the current exploitative and oppressive agri-food regime” [3–5]. The movement centers producers and food sovereignty, rather than productivity or profit, at the heart of the struggle for food security, in tandem with ecological and human health as the twin primary markers of food system success. Food sovereignty, an important concept in agroecology, refers to the right of food producers and consumers to define the way their food systems function, and to have access not only to sufficient food, but to food which is culturally appropriate and produced in an ecologically sustainable, non-exploitative manner. In this light, agroecology represents a new ‘social contract’ based on equity, justice, and solidarity among humans as well as a ‘natural contract’ between ourselves and the rest of the natural world [6].

To frame, define, and operationalize agroecology, the High Level Panel of Experts (HLPE) on food security and nutrition (which advises the UN Food and Agriculture Organization's (FAO) Committee on World Food Security) has proposed 13 agroecological principles [3]. These are organized around the three interrelated organizational principles of sustainable food systems (SFS): (1) improve resource efficiency; (2) strengthen resilience;

and (3) secure social equity/responsibility (Table 1). The largest number of agroecological principles relate to the third organization principle, and thus to socio-political issues. Yet, issues related to gender and other intersectional inequalities (i.e., those produced at the intersection of different axes of discrimination, such as gender, age, socio-economic status, caste, etc.) have commanded relatively little attention in the agroecological literature. This oversight has implications for how agroecology is understood and operationalized within agricultural development agendas, as the lack of emphasis on its political dimensions—and on gender as a critical social relation that (re)produces inequality—risks diluting the movement and reducing agroecology to a set of technocratic practices.

Table 1. HLPE's 13 principles of agroecology.

Improve resource efficiency	1. Recycling Preferentially use local renewable resources and close as far as possible resource cycles of nutrients and biomass.
	2. Input reduction Reduce or eliminate dependency on purchased inputs and increase self-sufficiency.
Strengthen resilience	3. Soil health Secure and enhance soil health and functioning for improved plant growth, particularly by managing organic matter and enhancing soil biological activity.
	4. Animal health Ensure animal health and welfare.
	5. Biodiversity Maintain and enhance diversity of species, functional diversity and genetic resources, and thereby maintain overall agroecosystem biodiversity in time and space at field, farm and landscape scales.
	6. Synergy Enhance positive ecological interaction, synergy, integration and complementarity among the elements of agroecosystems (animals, crops, trees, soil, and water).
	7. Economic diversification Diversify on-farm incomes by ensuring that small-scale farmers have greater financial independence and value addition opportunities while enabling them to respond to demand from consumers.
Secure social equity/responsibility	8. Co-creation of knowledge Enhance co-creation and horizontal sharing of knowledge including local and scientific innovation, especially through farmer-to-farmer exchange.
	9. Social values and diets Build food systems based on the culture, identity, tradition, social and gender equity of local communities. that provide healthy, diversified, seasonally and culturally appropriate diets.
	10. Fairness Support dignified and robust livelihoods for all actors engaged in food systems, especially small-scale food producers, based on fair trade, fair employment, and fair treatment of intellectual property rights.
	11. Connectivity Ensure proximity and confidence between producers and consumers through promotion of fair and short distribution networks and by re-embedding food systems into local economies.
	12. Land and natural resource governance Recognize and support the needs and interests of family farmers, smallholders, and peasant food producers as sustainable managers and guardians of natural and genetic resources.
	13. Participation Encourage social organization and greater participation in decision-making by food producers and consumers to support decentralized governance and local adaptive management of agricultural and food systems.

Source: HLPE [3] (p. 41, Table 5).

This paper aims to contribute to addressing this shortcoming by demonstrating the centrality of socio-political issues, with an emphasis on gender relations, in agroecology by: (a) highlighting the relevance of gender to the full set of agroecological principles; and (b) positing a feminist agroecology which reframes the approach to agroecology from one of individuated principles to that of a liberating and empowering worldview and agricultural system for all. We begin by demonstrating the promising alignment between feminism and agroecology as a movement, and argue that a feminist agroecology is necessary for a just and holistic food systems transformation. We then systematically examine each of the HLPE's 13 principles of agroecology [3] through a feminist perspective. We center our analysis on gender and the importance of building gender-just agroecological practices and policies, while recognizing the significance of other socio-political dimensions (e.g., age, caste, ethnicity) that intersect with gender in creating the complex power dynamics that embed agroecology. In so doing, we call attention to the importance of an intersectional, nuanced approach, and invite expansion on the analysis presented here through a more thoroughly intersectional lens. Finally, we underscore the importance of changing the narrative of agroecology from one of distinct ecological and social frameworks to one of intertwined, interconnected, and interdependent socio-ecological transformation(s) with women, Indigenous Peoples, and marginalized farmers centered as the movement's protagonists.

2. Toward a Feminist Agroecology

As noted above, agroecology as a movement differs from other, more piecemeal approaches to solving individual problems in the food industry by espousing a holistic, transformative approach to subvert top-down food regimes, centering the small-scale farmer as the driver, actor, and agent of this agricultural revolution. As such, the 'transformational' approach of the agroecological movement is paramount, as "agroecology from below seeks to transform the food system, while the institutional or corporate versions seek to 'conform' agroecology to the current industrial model and paint it a little green" [7] (p. 21). Gender equality is central to transformation. A feminist agroecology which values the equitable contributions of all stakeholders leads to a more creative, versatile, and successfully transformative movement. As Lopes and Jomalinis [8] (p. 17) write, women's disempowerment directly hinders agroecological imperatives, as "male dominance commonly manifests itself as an impediment to the advancement of agroecology transition by hindering women's free expression, their creative development and, finally, restricting their contribution to the productive unit".

As the HLPE principles [3] demonstrate, agroecology is not only about lowering agricultural inputs and increasing sustainability; it is about self-determination and reclaiming control of one's own food, land, and body—a right that has been stripped from the majority of producers by a productionist and profit-driven industrial agricultural paradigm. As agroecology inherently encompasses a normative commitment to redressing unequal power dynamics in the food system, agroecological approaches cannot be discussed without addressing the power (im)balances based on gender and other axes of marginalization that embed food systems and their actors and stakeholders [4]. Agroecology that lives up to its name centers food sovereignty as well as the more mainstream goal of food security, taking social relations based on gender, socioeconomic status, Indigenous identities, and their intersections into account.

Many scholars and activists have argued that agroecology's transformational and justice-oriented imperative make the movement and feminism a 'natural' pairing, as both question and challenge unequal power relations and entrenched systems [9]. In the words of Seibert et al. [4], "feminism in food crisis struggles finds its best representation in the agroecology and food sovereignty paradigm, applying the practices of solidarity by collective actions that challenge gender roles as well as paradigms of inequality, oppression and exploitation" [4] (p. 46). Furthermore, Milgroom [10] (no page number) highlights that agroecology, food sovereignty, and feminism are "intertwined emancipatory

movements and political projects that fight for autonomy, self-determination, egalitarianism, epistemic reconstitution and social justice.” As such, agroecological transitions and transformations are often recognized for their potential to support the empowerment of marginalized groups and individuals and reduce gender inequities in agricultural communities “if they are designed to address underlying power imbalances women face, such as norms, relationships and institutional structures that perpetuate discrimination and imbalance” [11] (p. 236). However, such transitions will not automatically advance social equality unless this outcome is targeted deliberately and methodically [7,8,12]. Toward this end, “agroecology as a science, practice and social movement needs to develop ways of knowing, knowledge, and practices informed by a feminist agroecology that challenges patriarchy and forms of structural violence against women in particular” [13] (p. 56).

While there are many definitions and many kinds of feminism, for the purposes of this paper feminism refers to a broad movement and lens which seeks to examine and uproot the underlying causes of inequality and disempowerment—not just for women but for all marginalized people—by challenging patriarchal and colonial power structures [4,5]. A feminist agroecology focuses on redressing unequal gender relations as well as other intersecting relations of marginalization such as race, class, caste, and ethnic identity. Rather than flattening women’s experience in food systems as one of unilateral victimhood and exploitation, or positioning women as environmental saviors, an intersectional analysis recognizes that their experiences are complex, dynamic, heterogenous, and shifting [14].

Taking a feminist approach to agroecological transformation also means understanding and addressing the myriad ways in which gender intersects with, influences, and is impacted by all aspects of food systems, as power relations underpin food systems in their entirety, not just their patently social dimensions. A review of the 13 agroecological principles [3] through a feminist lens, carried out in the following section, illuminates the centrality of gender relations and feminist-informed transformation throughout all agroecological undertakings. Agroecological pursuits which do not consider the complex and shifting ways that women and marginalized peoples will be uplifted or constrained by systems changes risk perpetuating or accentuating their marginalization. The following is an illustrative, rather than comprehensive, analysis of the relevance of gender in agroecology. This analysis serves as an invitation to formulate a more overtly feminist approach, whereby agroecology can achieve a more just systems transformation.

3. The 13 Agroecological Principles through a Feminist Lens

3.1. Improve Resource Efficiency

‘Improving resource efficiency’ is the operational principle of sustainable food systems that arches over the fewest number of agroecological principles (1. recycling, and 2. input reduction) [3]. It is also the least obviously connected with gender, despite important considerations of gender-differentiated experiences, constraints, and opportunities related to resource management, recycling, and input reduction. A feminist agroecology moves past questions of nutrients and biomass to question the factors and power configurations that have led women and men to adopt high-input farming practices, as well as the broader implications of closing resource loops and reducing external inputs. What agendas and interests at multiple scales drive a high-input agriculture? Who is able to make decisions about what renewable resources are adopted and how? Who decides which inputs and alternative technologies are desirable? Who has access to resources that allow a transition away from intensive external and agrichemical inputs without compromising production and food security? When a shift in resource use occurs, is labor increased? Whose labor? These questions ultimately boil down to power relations, which shape decision-making, the distribution of costs and benefits, and relations of production.

Principle 1. Recycling. “Preferentially use local renewable resources and close as far as possible resource cycles of nutrients and biomass” [3] (p. 41).

Principle 2. Input reduction. *“Reduce or eliminate dependency on purchased inputs and increase self-sufficiency” [3] (p. 41).*

Recycling is central to the concept of a circular economy, in which no external inputs are needed and no waste is created, as all resources are recycled in a closed loop. In several important ways, women in particular stand to benefit from closing this loop. In a treadmill system with high input costs, women and marginalized people are frequently shut out of markets due to barriers to entry and lack of access to extension and credit. The classic example of on-farm resource recycling is the idea of composting waste to use as fertilizer, thereby reducing waste as well as the application of external inputs. Yet, even compost can be difficult to access for marginalized farmers, as access to organic material cannot be assumed. Access to compost also depends on the intrahousehold allocation of resources; and can be reserved for the use of the (typically male) head of the household (e.g., [15]). Certain composting techniques, such as charcoal-making, also require levels of investment that lock out poor farmers [15]. Furthermore, diverting organic material to compost can incur considerable opportunity costs, as that material may be relied upon for other uses, such as the use of cow dung as biofuel for cooking fires [16]. As rural women are often responsible for acquiring fuelwood and making cooking fires, particularly throughout Africa and much of Asia [17], a diversion of resources used for this purpose will have gendered implications. All these considerations must weigh in an assessment of the costs and benefits of recycling, and input reduction or supplementation.

Because on the whole rural women already use fewer inputs than men due to limited access to extension services, credit, income, and technologies, agroecology has captured the interest of many women’s groups [18]. Yet, low-input farming can be more labor intensive and can increase drudgery, which has disproportionate impacts on women, who are tasked with time-consuming agricultural activities, such as manual weeding [19,20]. This is of particular concern as women already face longer workdays and a more severe time deficit than men in general, given their often-invisibilized household reproductive and care work [21]. Agroecology must therefore be informed by the feminist imperatives of making women’s work visible and valued and redistributing that work equitably across gender groups to avoid placing a disproportionate burden on women’s shoulders for the sake of agroecological transformation.

3.2. Strengthen Resilience

Agroecology as a movement re-situates ecological and human well-being as equal and mutually reinforcing pursuits, and centers social issues as key to making agroecological efforts resilient, adaptable, and sustainable over time. The operational principle of ‘strengthening resilience’ [3] arches over five principles, which could be further unpacked and sub-categorized as ecological (3. soil health, 4. animal health, and 5. biodiversity), socio-economic (7. economic diversification) and the nexus between the two (6. synergies).

The resilience of a food system does not just depend on the adaptability of its ecology, but also of its farmers. A feminist perspective examines and challenges the social and political scaffolding that upholds the systems that have historically compromised the ability of certain social groups, e.g., women and Indigenous Peoples, to achieve personal and communal resilience. Below, this lens is applied to each of HLPE’s [3] dimensions of agroecological resilience.

Principle 3. Soil health. *“Secure and enhance soil health and functioning for improved plant growth, particularly by managing organic matter and enhancing soil biological activity” [3] (p. 41).*

Gender equality and sustainable soil management (SSM) are linked in many ways. Women are essential participants in safeguarding and building soil health [22]. Some of the constraints preventing women from equitably participating in SSM include insecure land tenure, small size and low quality of plots allocated to women, inadequate NRM policy measures, exclusion from decision-making, insufficient or inadequate capital to access productive resources, lack of access to SSM knowledge and services, and competing

demands on time and labor [22]. Apart from issues around women's limited access to secure and favorable (fertile) lands and to resources such as compost, as outlined in the above section, women often lack power to influence decision-making about communal lands [16]. More generally, women's lack of representation and gender-based inequities in decision-making spaces mean that their knowledge, preferences, and priorities in the domain of soil management are given less voice and weight than men's.

This is not only disempowering, and therefore counterproductive for agroecology's twin goals of ecological and human wellbeing, but lack of representation and marginalization can also negatively impact soil health and restoration by excluding part of the available wisdom and experience around SSM. Knowledge around soil health and management is shaped by individuals' often socially prescribed relationship with the land, such that women and other marginalized groups can offer distinct insights and contribute to a more holistic understanding and practice of SSM than a focus on only elite men would [16,22]. What is more, gender-responsive soil management is not only beneficial for ecological health, but can also enhance women's well-being, as it can improve women's livelihoods through increased crop productivity, incomes, and other benefits such as health and food security [16]. Feminist agroecological approaches not only seek to redress women's disadvantaged status in terms of soil management, but dig deeper to examine and transform the systems of tenure and discrimination that lead to women's (typically insecure) allocation of often unhealthy lands and soils, which they have limited capacities to improve and incomplete authority to manage.

Principle 4. Animal health. *"Ensure animal health and welfare" [3] (p. 41).*

Animal husbandry involves a highly gendered division of labor in many contexts, leading to distinct experiences and knowledge bases among diverse groups of women and men (e.g., [23,24]). In many agricultural contexts around the world, certain types of animals are considered women's responsibility, while others are considered men's purview. Lopes Ferreira [25] and Rietveld [26], for example, find that chickens are considered women's responsibility whereas cattle are men's domain in Brazil and Uganda, respectively. In Nepal, richer farmers (predominantly men from higher castes) raise cattle while poor farmers (largely women and farmers from lower castes) raise 'micro-livestock', such as goats, pigs, and poultry [23]. In Bangladesh, Roess [27] similarly notes that women are responsible for caring for poultry, much the same way as they are responsible for caring for children, and animal health is seen as a feminized responsibility. In some cases, the close, socially-prescribed association between women and animal husbandry has linked women's health to animal health. For instance the use of antibiotics for animals has led to increased vulnerability to zoonotic diseases among women and children in Bangladesh [27].

Understanding the social relations and gender norms that mediate farmers' differentiated experience with, knowledge around, and priorities concerning animal care is essential to developing feminist and empowering agroecological policy. In the Nepal case study, for example, government policies at the state level neglected micro-livestock and thereby the marginalized farmers who depend on them for their livelihoods and wellbeing [23]. A feminist approach to animal welfare, which looks at the power dynamics that underpin the relationship between farmers and their livestock and livestock-related livelihoods, can help to mitigate or avoid negative impacts on women. These range from health risks to disproportionate and increased work burdens and drudgery.

Given the essential and central role of animals and animal health in agroecological systems that rely on livestock as part of a low-input system, and the gendered division of labor concerning animal care, women's work burden may increase in agroecological transitions that are not gender-responsive. Roess [27] (p. 5) observes that "women's work in animal husbandry is essential in agroecological transitions, both in terms of the quantity and variety of tasks performed (daily management of animals, and production of food for livestock and medicinal plants for treatment and prevention of diseases, among others) and/or in terms of the transformation and marketing of APs [animal products]". Yet, this

labor is often invisibilized and undervalued. It must be made visible and given its due weight if agroecology is to ensure animal health without compromising women's health and well-being. Similarly, the knowledge of women and marginalized peoples tends to be undervalued and underutilized. A feminist agroecology has the potential to unlock a far greater breadth of knowledge about animal care than conventional approaches which do not take all stakeholders' perspectives into account.

Principle 5. Biodiversity. *“Maintain and enhance diversity of species, functional diversity and genetic resources and thereby maintain overall agroecosystem biodiversity in time and space at field, farm and landscape scales” [3] (p. 41).*

Gender roles and power relations interact with biodiversity loss, as well as biodiversity conservation, in a few key ways [28]. Rural women tend to interact with different species toward different aims than men. Although gender roles are nuanced, highly contextual, and cannot be assumed [17], in many communities, particularly in Africa and Asia [28], women are seed keepers and foragers of wild plants, whereas men may have other responsibilities such as procuring wild meats [7]. In some communities, certain species are even taboo for women to plant (e.g., [29]). Because of such social rules and power structures, women and men, and diverse social groups and communities, value different crops and hold differentiated knowledge about biodiversity. Sidelining perspectives and knowledges of marginalized groups therefore undermines biodiversity goals while also underserving the groups that are dependent on undervalued species [30,31].

Enhanced gender equity has been found to support better biodiversity conservation [32]. In Nepal and India, for example, Agarwal [33] finds that biodiversity and other forest conservation outcomes (e.g., canopy cover and extent of degradation) improve overall when decision-making is carried out by forest user committees with gender parity rather than groups of mostly or exclusively men. The inclusion of women's particular and profound knowledge about usage, management, and conservation of diverse species — as well as women's frequently distinct needs and priorities to men's — in biodiversity initiatives creates a positive feedback loop as part of a more holistic and equitable agroecology program. In this feedback loop, giving weight to women's knowledge supports greater biodiversity, which in turn feeds back into the valuing of women's participation and leadership [34]. What's more, enhanced or restored biodiversity can relieve women's disproportionate labor burden by making households more self-sufficient [4]. A feminist approach that supports equity in biodiversity management can thus lead to a holistic systems transformation.

Principle 6. Synergy. *“Enhance positive ecological interaction, synergy, integration and complementarity among the elements of agroecosystems (animals, crops, trees, soil and water)” [3] (p. 41).*

While the standard understanding of synergy as an agroecological principle (outlined above by HLPE [3]) focuses solely on ecological elements, there is also enormous opportunity for synergies between social and ecological goals — as well as potential trade-offs or pitfalls if these are not intentionally avoided and mitigated. Lack of attention to a synergistic approach between social justice and environmental concerns in the HLPE's [3] foundational text is a prime example of how the agroecological literature still needs to grow and develop to give gender equity the attention it so urgently needs.

A feminist perspective rejects dichotomies that posit humans and nature as distinct entities, and critiques the ways patriarchy and colonialism doubly exploit the earth and women's bodies, in what Andrews et al. call the 'nexus of women-violence-nature' [35]. In the dominant global agrifood system, “both women and nature are exploited, 'othered', and made invisible” [35] (p. 8). While this power differential holds true around the world, women and marginalized peoples, far from being one-dimensionally victimized, are also at the forefront of pioneering alternative food networks such as the agroecological movement. The peasant political project embodied and organized by La Via Campesina, for example, seeks to reshape relations between human beings as well as between humans and nature, with a focus on horizontal and equitable relations based on community and communal-

ity [5]. Synergy is thus one of the 13 agroecological principles that most easily engages with the empowerment of women.

There are many opportunities for synergies and win-wins between social, ecological, and economic goals in agroecology. The implementation and success of agroecology ultimately hinges upon land-use decisions, which in turn are mediated by social dynamics across diverse social groups [36]. Gender-responsive and socially inclusive agroecology can have higher rates of success by bringing together more and diverse knowledges and skillsets and including voices which are often silenced or undervalued. The more diverse knowledge base which emerges from such an approach will better serve to address the wicked problems facing agri-food systems by boosting the capacities of marginalized people to contribute to and benefit from agroecological initiatives, while promoting the willingness or incentives of different groups to sustain agroecological measures over time.

Agroecology which advances and recognizes social aims as essential parts of a holistic movement can strengthen autonomy, sovereignty, and increase rights and control over resources and land-use decisions. These factors, in turn, are associated with inclusive and sustainable agricultural systems, while the opposite effects of top-down, patriarchal governance (e.g., elite capture, insecure tenure of land and resources, land-grabs, and even green-grabbing) tend to lead to unsustainable management practices (e.g., [37–40]).

Just as agroecology can create or enforce synergistic social, environmental, and economic aims, however, programs can also generate or fall prey to trade-offs among these dimensions. Agroecology which is not intentionally gender-responsive or feminist could, for example, place an undue burden on women to perform labor intensive low-input farming to serve the ‘greater good’ of combatting climate change, biodiversity loss, and land degradation.

Principle 7. Economic diversification. *“Diversify on-farm incomes by ensuring that small-scale farmers have greater financial independence and value addition opportunities while enabling them to respond to demand from consumers” [3] (p. 41).*

Worldwide, there is a considerable and persistent gender wealth gap [41]. While already contending with limited assets as compared to men, women in agriculture receive just a sliver of overall extension services and credit, greatly limiting their economic capacities and their overall access to economic diversification [21,42]. While women perform a vast array of roles in agricultural production, they “face a surprisingly consistent gender gap in access to productive assets, inputs and services”, leaving women with lower overall levels of productivity, less land and land access, and overall ability to achieve ‘broader economic and social goals’ [21] (p. 3). When given equitable access and opportunity, empirical studies show that women are just as efficient as men [21] (p. 4).

Agroecology, as a low-input form of agriculture that does not require the level of monetary expenditures needed for conventional high-input, predominantly monocropped agriculture, can help close this gender gap and contribute to a more equitable distribution of wealth and opportunity. In one example, Rosset et al. observe that adoption of agroecology, which diversified the crops grown and livestock raised by peasant families in Cuba, redistributed roles and responsibilities within households in a manner that directly challenged and transformed patriarchal structures in which men controlled all of the crops and therefore all of the family’s income [43]. In another example, a feminist agroecological program in Uruguay focused on local women’s priorities, which included economic diversification and family nutrition [34]. The program was successful in meeting women’s needs and desires, which had guided the process from the initial planning stages, and its successes were sustained over time.

In addition to ensuring that diverse economic opportunities are equitably distributed, there is a need to diversify the distribution of labor in households and communities, particularly care work and unpaid labor which is historically (and continuously) feminized and all too often made invisible [44]. This is a key point in the marriage and synergy between feminism and agroecology as a whole; as Lopes and Jomalinis [8] (p. 8) write,

“agroecology can be an instrument for empowering women, as long as women’s work is recognized and valued.” To put a finer point on this argument, agroecology, as a worker-led and socially reflexive model, has the potential to subvert the current top-down patriarchal structure of agriculture, which invisibilizes women’s work and neglects to monetize much of the essential agricultural and care work that women perform. Hence, “making visible the economic contribution of women would be fundamental to broaden the debate about the work and the androcentric character of economic discussions, including solidarity economy” [45] (p. 10).

3.3. Secure Social Equity/Responsibility

This overarching category is the most obviously and essentially connected with intersectional gender considerations and an overall feminist paradigm. It is also the largest category as outlined by HLPE [3], encompassing 6 out of the 13 total principles. While this would suggest that the leveling of power imbalances across social groups, including gender equity, is central to and inextricable from agroecology as a movement, science, and set of practices, gender is often relegated to a cursory passing mention in agroecology literature. Feminist agroecology addresses this oversight by centering social justice and asking questions about the distribution of costs and benefits from agroecology. While social equity dimensions such as ‘fairness’ may seem to be inherently informed by feminism, we outline below the ways in which a feminist agroecology takes a more transformational and probing approach to the already socially-informed HLPE principles [3].

Principle 8. Co-creation of knowledge. *“Enhance co-creation and horizontal sharing of knowledge including local and scientific innovation, especially through farmer-to-farmer exchange” [3] (p. 41).*

Recognizing farmers and consumers as the central actors of food systems and the primary, decentralized drivers of the agroecology movement brings together an incredibly diverse array of farming practices and culturally-specific knowledges. This is in direct contrast with conventional agriculture, which often takes a one-size-fits-all approach to farming that prioritizes Western scientific knowledge and technologies. The way that knowledge is created and (de)legitimized, and whose voice is included and heard (or silenced) in decision-making settings, are inherently feminist concerns.

The agroecological movement has arisen as a response to a dominant productionist worldview which centers Western scientific knowledge while marginalizing alternative knowledges and ways of knowing that contrast or challenge normalized agricultural paradigms. “Lack of holistic knowledge and a mechanistic worldview are at the root of the multiple crises humanity faces”, and agroecology posits that the way forward for sustainable food systems and agroecology necessarily involves pluralistic worldviews, even when these different knowledges clash or contradict each other [46,47]. Traditional and local agricultural systems, and the diverse knowledge that they embed, are essential for enhancing and preserving hallmarks of a healthy food system, including soil quality, biodiversity, ecologically friendly nutrient, pest, and water management, and resilience to climate change [48].

Agroecology is itself a form of knowledge and knowledge production that is marginalized and frequently silenced by conventional approaches and dominant agricultural narratives. Peasant and agroecological farmers therefore face a ‘double struggle for recognition’ [30], whereby their knowledge as marginalized peoples as well as participants in alternative or agroecological food systems places them outside the norm of accepted ‘conventional wisdom’. Valuing various and diverse farming approaches and knowledge bases can also increase buy-in into agroecological and conservationist initiatives, with stakeholders often citing wider recognition of their knowledge or identity as a key incentive for joining such initiatives [49]. While co-creation of knowledge and the inclusion of differing worldviews and approaches is core to agroecology, taking the step from nominal or piecemeal inclusion of differing knowledges (i.e., Indigenous worldviews and farming practices) to actual cognitive justice will not happen without continued directed efforts.

Cognitive justice is defined by Coolsaet [49] (p. 165) as “a concept originating in decolonial thought” which “encompasses not only the right of different practices to co-exist, but entails an active engagement across their knowledge-systems”. An ‘agroecology of knowledges’ which achieves cognitive justice is de-colonial and revalues and recognizes Indigenous and peasant knowledge as valid and not subordinate to Western scientific knowledge [30]. Likewise, it recognizes the legitimacy of women’s knowledge and experiences on equal footing with men’s, and brings this often invisibilized knowledge to light. More fundamentally, it recognizes women as farmers in their own right, and not only as helpers on their husband’s farm. In this regard, a feminist agroecology encourages the valued contribution of all genders in farmer-to-farmer exchanges.

Principle 9. Social values and diets. *“Build food systems based on the culture, identity, tradition, social and gender equity of local communities that provide healthy, diversified, seasonally and culturally appropriate diets”* [3] (p. 41).

While this principle directly names gender equity as one of its key elements, there is a need for a broader discussion of the ways in which the elements of diet and social equity interact, as well as a feminist examination of the underlying power structures and differentials which determine whose culture, priorities, and nutritional needs are valued and addressed in a heterogeneous community. As the disproportionate and often de facto care-takers and food-preparers in societies across the globe, women are predominately at the center of family nutrition. Despite this, women and girls often suffer the greatest health threat from malnutrition [50]. As such, gender equity and women’s empowerment find synergy with improved dietary diversity, nutrition, and overall wellbeing for all members of a community.

Efforts to target nutrition without taking a gender-responsive approach, however, can produce considerable trade-offs. A feminist approach that examines the broader causes and implications of social norms and values on nutrition, and the power structures which embed these, is essential for achieving increased nutrition security without perpetuating or worsening extant power differentials. In case studies in Mexico and Zambia, for example, Beuchelt and Badstue find significant trade-offs between nutrition- and climate-smart agriculture, which can place a disproportionate burden on women, especially in terms of increased labor and drudgery [50].

There is evidence that women’s increased ability to organize and assume leadership roles leads to improved food and nutrition outcomes for households and communities [51], and “households have better food security and dietary diversity if women can take decisions on the distribution of household resources and the nutrition of household members” [52] (p. 39). Indeed, a Uruguay case study found such a synergy between social and nutritional aims on the ground. The agroecological case study centered on family nutrition, one of the participating women’s greatest identified priorities, which in turn led to greater biodiversity, economic diversity, and women’s empowerment [34].

In the same vein, one of HLPE’s [3] four key dimensions to address gender in sustainable food systems (including agroecology) focuses on nutrition-sensitive agriculture that values nutrition over yield or marketability. In one example, a project in India revitalized minor millets, which are locally considered to be a women’s crop. While these millets are biodiverse, highly drought-tolerant, nutritious, comparatively water-efficient, require few inputs and can grow under marginal conditions, these crops “have largely been ignored by governments and research institutions, and total production has fallen in India to about one-quarter of what it was in 1950” [3] (p. 115). Moreover, the dynamic in which women hold valuable knowledge and play essential roles for enhancing local food and nutrition security but receive relatively little support is a common one. The participatory approach used in this project were rooted in cognitive justice, as “women’s perspectives and involvement were sought in terms of the additional labour-intensive processing that women undertook with millet, as well as women’s knowledge of key traits for millet in production, processing and cooking methods” [3] (p. 115). The project in question ad-

dressed women's empowerment at all levels of the local millet value chain, and ultimately improved local food security while also improving gender equity. This case illustrates the continuous thread of gender issues and the importance of a feminist approach throughout several of the agroecological principles, encompassing biodiversity (Principle 5), economic diversification (Principle 7), and the co-creation of knowledge (Principle 8).

Principle 10. Fairness. *“Support dignified and robust livelihoods for all actors engaged in food systems, especially small-scale food producers, based on fair trade, fair employment and fair treatment of intellectual property rights” [3] (p. 41).*

Women's empowerment and human rights for all marginalized peoples and genders are and should be a goal in and of themselves. However, under conventional, 'gender-blind' agricultural policy which is the standard today, unfairness, exploitation, and women's and peasants' subordination is the rule rather than the exception. In addition to being an important aim on its own, supporting women's empowerment and achieving gender equality are integral to successful and resilient agroecological endeavors and sustainable NRM as a whole [53]. As discussed in the section on synergies, gender equity and wellbeing for all stakeholders can both build upon and draw support from positive ecological outcomes in a positive feedback loop if properly planned for and maintained. In one example of agroecology and fairness supporting and sustaining each other, Rosset et al. observed that adoption of agroecology in Cuba had the power to transform gender relations within peasant families and challenge patriarchal structures [43]. Agroecological approaches provided a disruption to conventional practices in which men controlled the crops and the income, and diversified these responsibilities within the family, giving women more agency.

Feminism recognizes and challenges not only the extant inequities outlined in the HLPE definition of fairness [3], but the structural and systemic power differentials which underpin them. It recognizes that even within 'fairness' schemes like fair trade, gender inequity will continue to be a problem unless gender-responsive outcomes are targeted from the beginning and women and marginalized peoples are included in leadership roles and able to define the agenda, including what 'fairness' means to them [54]. Feminist agroecology is essential for holistic transformation that not only addresses individual circumstances of unfairness but their root causes. As Seibert et al. [4] (p. 45) write in their 'Without Feminism, There is No Agroecology' manifesto for the Committee on World Food Security, [feminist agroecology] is not about increasing women's options within the recognized economy, but rather about generating a new economy where productive and reproductive work is made visible and shared.

Principle 11. Connectivity. *“Ensure proximity and confidence between producers and consumers through promotion of fair and short distribution networks and by re-embedding food systems into local economies” [3] (p. 41).*

While it is widely acknowledged that connectivity, support networks, and collectivity are essential and integral to scaling agroecology up and out, the kind and quality of access that stakeholders have to different organizations and programs is highly gendered. For example in Malawi, Bezner Kerr et al. found that “agricultural knowledge sources were shaped by gender and other social inequalities, with women more reliant on informal networks than men” [55] (p. 238). In order for connectivity to be optimizable as well as socially equitable, it is therefore necessary that agroecological initiatives take a feminist approach to establish a nuanced understanding of on-the-ground gender roles and other social power differentials that shape the manner and extent to which different stakeholders are able to connect to their available resources and networks.

Supporting women's access to networks, economic connections, and opportunities for collective action is mutually beneficial to women and the overall agroecological process. Indeed, Action Aid's guide to scaling up and scaling out agroecology [56] includes supporting women's and peasant's organizations and movements as the first of its seven steps. Connectivity and collectivity enable the adoption and continued sustainability of agroecology. “Using inclusive social processes, 'peasant protagonism' and horizontal

farmer-to-farmer pedagogical methods—which emphasize participatory farmer-to-farmer exchange of knowledge, farmer field schools, cross-visits, field days, reflection, and collective sharing of knowledge and experiences—millions of Indigenous people, peasants and smallholder men and women farmers have successfully adopted agroecological practices” [56] (p. 12). In Brazil, Galvão Freire also found that social organization and connectivity were as important to women’s empowerment as to ecological aims and agroecological implementation, remarking that “collective learning among farmers has brought rural women out of their isolation and into positions of leadership” [57] (no page number). Through this connectivity and social networking, women were able to share, define, and determine their needs, priorities, and opportunities for agroecological experimentation and achievement. Hence, Freire argues that, “The success of the women’s movement lies in its link between experimentation with agroecology and reflection on inequalities” [57] (no page number).

Women-to-women and farmer-to-farmer networks have also allowed women to achieve a higher degree of economic diversification (thereby supporting agroecology Principle number 7). In Cuba, women were able to take control of their own profits and economic benefits, instead of a male head of household controlling the profits from women’s labor, as a direct result of farmer-to-farmer networks that brought gender issues to the forefront [43]. In addition to granting women access to the same networks, programs, organizations, markets, and other forms of agroecological connectivity that men are already disproportionately involved in, women-only spaces and networks “are of high importance for achieving gender equality, building solidarity, autonomy and strengthening women’s creative and collective work towards self-determination” [4] (p. 45). In Central America, Méndez et al. also observe success with cross-generational collaboration between youth organizations and women’s groups, which are a “particularly powerful approach for addressing gender inequality at the household and cooperative level, ultimately exposing alternative pathways towards agroecological transition” [58] (p. 15). In this way, feminist agroecology can support the empowerment of marginalized farmers at different scales by centering women and marginalized protagonists as the agents of change, and connecting them to pursue collective actions against top-down governance.

Principle 12. Land and natural resource governance. *“Women by and large lack secure land and resource tenure, which not only makes them vulnerable and locks them out of decision-making spaces, but also disincentivizes their buy-in to initiatives which do not seek to right this wrong” [3] (no page number).*

Land tenure is at the heart of many extenuating disadvantages for women and marginalized farmers. Women, in particular, lack secure land tenure on the whole, locking them out of land-use decision-making and granting them less access and rights to resources, including credit and income produced from the land that they cultivate. The UNESCO World Water Assessment Programme finds that “if women had the same access as men to productive resources—including land and water, they could increase yields on their farms by 20 to 30%, raising total agricultural output in these countries by 2.5 to 4%” [59] (no page number). In addition to shoring up agency and food sovereignty for women, gender-equitable land and resource governance would directly improve global food security, potentially reducing the number of hungry people worldwide by 12–17% [59] (no page number).

As they largely shoulder the responsibilities of providing a household’s meals, energy, and water, women in rural settings are extremely dependent on natural resources but frequently lack decision-making power concerning the management of those resources [60]. This can exacerbate women’s already unfair work burden, as they have to travel further distances and expend more time to access often scarce resources such as clean water and firewood [60,61]. Women’s lack of both formal and informal land and resource tenure can furthermore “force them into increasingly vulnerable situations and expose them to higher levels of physical and livelihood risk,” especially in areas experiencing conflict [60]. This

dimension will become increasingly relevant with the progression of climate change, which is expected to increase migration and geopolitical tensions. By the same token, gender equality and women's empowerment in natural resource management decision-making spaces holds great potential for peacebuilding [60].

The lack of control over land that many rural women experience contributes to their invisibility and low levels of self-identification as farmers in their own right. Moreover, because a large part of the agriculture and aquaculture work rural women do is not financially lucrative, it is invisibilized and not considered work. While women mend nets and help clean fish, for example, they themselves would not be considered fishers [62]. A feminist agroecology begins with recognizing women as farmers, fishers, natural resource managers, and more, and valuing the labor and knowledge they contribute to their agricultural enterprises. This requires challenging the social rules that devalue women's contributions, as a basis for strengthening their representation and participation in decision-making and their equitable access to benefits.

Principle 13. Participation. *“Encourage social organization and greater participation in decision-making by food producers and consumers to support decentralized governance and local adaptive management of agricultural and food systems” [3] (p. 41).*

While the HLPE definition of participation as the thirteenth and final principle of agroecology focuses on the participation of producers and consumers, participation should and can easily be expanded to encompass the equitable inclusion of all stakeholders, with particular attention to those who are generally sidelined and marginalized in decision-making processes. If the focus is simply on organizing producers and consumers, the representation of each of those stakeholder groups will almost certainly reflect, instead of challenging, the extant power dynamics on the ground in the decentralized structures in question. Including those who are marginalized within the groups of producers and consumers requires challenging the power differentials as part of a feminist approach. As the agroecological movement recognizes, historically sidelined stakeholders must be the protagonists if radical systems transformation is to be achieved [45,63].

Equitable participation must be a consideration starting from the earliest planning phases in order for a process to be more than nominally inclusive, and for it to achieve the kind of social and systems transformation that agroecology aims for [64] (p. 4). Equitable participation will not be achieved by simply inviting women and marginalized stakeholders, and attendance should not be conflated with participation. The concept of participation itself is deceptively complex. Inclusive and empowering participation not only grants all stakeholders a voice, but also gives those voices equal weight and influence [65]. Breaking down social barriers that prevent women and marginalized groups from active and empowering participation is a complex process that may require strengthening the confidence of, and leveling the playing field for, stakeholders who have never been involved in decision-making processes before. It will also require other accommodative measures, such as around languages and mediums used to facilitate communications, for example in local or unofficial languages or with visuals to account for illiterate participants.

In general, education is an essential component for equitable participation, and critical (and indeed, feminist) education which empowers women, builds capacity, and helps women be self-reflexive, develop a critical consciousness, and advocate for themselves is indispensable for a just agroecological transformation [7]. In Brazil's MST movement (Women Without Land), for example, gender-responsive agricultural education has helped transform inequitable power structures and ease the ongoing participation of women from future generations [66]. As Seibert et al. describe, the agroecological movement must make a more concerted effort to center women as protagonists of the movement, but also give them the “appropriate spaces to grow, lead, exchange, learn and earn in the framework of agroecology” [4] (p. 48).

4. Discussion and Conclusions

Using HLPE's 13 principles of agroecology [3] as a framework, we have shown the relevance, and indeed, centrality of gender as a tenet of the agroecological movement, science, and set of practices, and the need for a deeper restructuring of agroecology using a feminist lens. The importance of considering gender and other intersecting axes of marginalization is by no means limited to the more obviously social aspects of agroecology, but essential to the success of all facets of the movement. As many activists have argued, agroecology is inherently grounded in feminism by its very nature as a movement that seeks to transform existing systems that are based in patriarchal, exploitative, and top-down structures—systems which have brought the world to the brink of ecological collapse while exacerbating social inequities.

However, agroecology must be careful to embrace feminism as a holistic set of values. Agroecology as a fragmented set of practices has too often only nominally referenced social and ecological transformation while continuing to treat women and marginalized stakeholders as a footnote or a box to be checked. As Seibert et al. [4] (p. 48) eloquently state in their feminist agroecology manifesto: "It is necessary that agroecology imbibe the feminist perspective in its totality. Being a social movement and a set of practices that question social injustices (e.g., women's land rights, land grabbing, looting of territories, privatization of water and biodiversity), agroecology should acknowledge and openly discuss the inequalities to which women are subjected. There cannot be struggle for agroecology, agroecological practices and policies without the participation of women as central protagonists." The same goes for all stakeholders, including poor men, Indigenous groups, and landless communities, who have so often been sidelined by productionist, conventional food regimes that have prioritized profit over the common good.

There is a broad and pressing need to change the narrative of agroecology from one of twin, but distinct, ecological and social axes, to one of intertwined, interconnected, and interdependent socio-ecological transformation. This synergistic approach needs to evolve from merely paying lip service to social justice to enduring, holistic, and inclusive praxis.

While there is a pressing need to speed up progress toward both social and ecological goals, scaling up agroecology poses some critical risks to women and other marginalized people if this scaling is not done through a critical, nuanced, and feminist approach. As Álvarez Vispo and Romero-Niño found in agroecological projects in Spain and Colombia, scaling up agroecology can directly disempower women if the scaling is not deliberately feminist, as women tended to cede or be forced to cede decision-making power to men as soon as projects became lucrative, ultimately exacerbating gender-based inequities [67]. As large and influential organizations push for the scaling of agroecology (e.g., [68]) it is imperative that this scaling challenge rather than reinforce existing mass-scale agricultural norms and models, staying true to its transformational and decentralizing aims. It is also critical that women and marginalized actors assume decision-making power and leadership roles from the earliest stages of agroecological transformation. If their needs, priorities, perspectives, and knowledges are not considered with equal weight, and are not actively included from the very beginning stages of an agroecological endeavor, these actors who prop up the food system risk being locked out, as well as experiencing disproportionate labor burdens, marginalization, and food insecurity. By the same token, a feminist agroecology holds great hope and promise for creating a more impactful, resilient, and ultimately powerful and empowering movement.

Author Contributions: Conceptualization, H.Z., M.E., A.R. and N.B.; writing—original draft preparation, H.Z.; writing—review and editing, M.E., with inputs from A.R. and N.B. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Acknowledgments: The authors gratefully acknowledge the CGIAR Research Program on Forests, Trees and Agroforestry and the Trust Fund Donors for supporting this work, as well as Jennie Dey de Pryck for her time and thoughtful contributions.

Conflicts of Interest: The authors declare no conflict of interest.

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