Knowledge on agroecology disseminated by the FAO: Assessment from a human-nature relationship perspective

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Abstract

This study assesses the knowledge on agroecology disseminated by the Food and Agriculture Organisation (FAO) through its Agroecology Knowledge Hub (AKH), from a human-nature relationship perspective. It focuses on the knowledge contained in scientific articles published between 2014 and 2023. Using a theoretical framework based on the concept of human-nature relationship and a methodology rooted in content analysis techniques, the study seeks to answer the following research question: What knowledge on agroecology that contributes to the reconnection between humans and nature has the FAO disseminated during the period 2014-2023? To this end, the study: (1) depicts the main trends and geopolitical distribution of the knowledge disseminated through the AKH during the specified period, (2) reveals the human-nature relationship perspectives embodied in this knowledge, and (3) delves into the state of this knowledge. The findings suggest that the knowledge disseminated through the FAO's AKH does not fully contribute to the reconnection between humans and nature within the agricultural realm. The discrepancy may be attributed to patterns of coloniality of knowledge, the preference for disseminating knowledge rooted in positivist/post-positivist foundations and in an extractivist logic and a mechanistic view of nature, and the potential perpetuation of the Western worldview in the production of knowledge. The study concludes by urging the FAO to take ethical responsibility for its knowledge dissemination, and recommends that knowledge producers challenge prevailing theoretical frameworks and epistemological positions guiding the generation of knowledge on agroecology.

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INTRODUCTION

The socio-environmental issues associated with conventional agriculture, characterised as being capital-intensive, large-scale, and highly mechanised (Knorr and Watkins, 1984), have epistemological roots. They emerge from ontological and epistemological criteria that establish an essential division and differentiation between humans and nature. Moreover, these criteria establish a foundation for knowledge that is detached from the social and natural bases underlying the cognitive process, giving rise to an extractive logic and mechanistic view of nature. This in turn leads to a destructive relationship between humans and nature within the agricultural realm (Domptail et al., 2021; Losada et al., 2023).

Several alternatives have been proposed to overcome these socio-environmental issues, such as climate-smart agriculture, sustainable intensification of agriculture, and organic agriculture, among others (Bernard and Lux, 2017). However, they fail to address the root problem of conventional agriculture, which can be understood as the disconnection between humans and nature (Nieto et al., 2013; Souza, 2018).

Agroecology, on the other hand, an initiative proposed from the global South as a response to the environmental, economic and social problems caused by conventional agriculture (Gómez et al., 2015; Guzmán et al., 2000), claims to be fundamentally different (Domptail et al., 2021; Leff, 2002). Based on alternative rationalities and perceptions of nature, it stems from ontological and epistemological criteria that reshape the relationship between humans and nature, to reconnect them (Aparecida et al., 2020; Domptail et al., 2023; Guzmán et al., 2000; Leff, 2002; Nieto et al., 2013; Souza, 2018). Agroecology is therefore a viable alternative to address the socio-environmental issues associated with conventional agriculture, as it tackles the root problem by reconnecting humans and nature within the agricultural realm.

Furthermore, agroecology transcends traditional scientific boundaries by incorporating non-scientific knowledge, which includes technical and spiritual wisdom passed down through generations by people engaged in agriculture (Fernández et al., 2021; Losada et al., 2023; Ruiz-Rosado, 2006). Unlike conventional science, which often disregards non-scientific knowledge, agroecology draws on this wisdom to strengthen its epistemological foundation and restore the connection between humans and nature in agriculture (Berman, 1987; Losada et al., 2023; Nieto et al., 2013).

Although agroecology emerged as a discipline in the 1970s, it did not achieve international prominence on the international agenda until 2014, primarily owing to the international forums organised by the Food and Agriculture Organisation (FAO) (Gómez et al., 2015; Gómez et al., 2013; Wezel and Soldat, 2009). This increased visibility prompted the FAO to establish the Agroecology Knowledge Hub (AKH) which disseminates, inter alia, knowledge from scientific articles produced worldwide to support the development of agroecology (FAO, 2023).

Debates on the misinterpretation and co-optation of agroecology, including its use for greenwashing and perpetuating conventional agriculture (Alonso-Frajedas et al., 2020; Giraldo and Rosset, 2016; Nyéléni, 2015), have nevertheless raised questions about whether the knowledge disseminated through the FAO's AKH truly supports agroecology's purpose of reconnecting humans and nature within the agricultural realm. Additionally, there are concerns that the guiding concepts and values behind knowledge production might legitimise political agendas that exacerbate problems like socio-environmental issues caused by conventional agriculture (Eschenhagen, 2022). It is therefore crucial to assess the knowledge disseminated through the AKH; specifically, from a human-nature relationship perspective.

In view of this context, this article addresses the following research question: What knowledge on agroecology that contributes to the reconnection between humans and nature has the FAO disseminated during the period 2014-2023? To answer this question, three specific objectives are outlined: (1) to depict the main

trends and geopolitical distribution of the knowledge on agroecology disseminated through the AKH during the specified period; (2) to reveal the human-nature relationship perspectives embodied in this knowledge; and (3) to delve into the state of this knowledge, determining its meaning for the reconnection between humans and nature and the discipline of agroecology.

STATE OF THE ART[1]

Multiple studies have aimed to examine, comprehend, define and classify human-nature relationships (Barbour, 1980; De Groot, 1992; Eversberg et al., 2022, among others), leading to a variety of interpretations. Many of these interpretations rely on limited and simplistic criteria, such as the positionality of humans and nature, and the nature of their bond (Flint et al., 2013). Other interpretations, while grounded in philosophical bases, power dynamics and material foundations, remain highly complex and challenging to operationalise (Eschenhagen, 2017). In contrast, some interpretations, such as Muradian and Pascual's (2018), incorporate ontological aspects and rely on comprehensive and operational criteria, including interests and practices, among others.

When studying agroecology and the human-nature relationship together, some studies have problematised these concepts (da Silva et al., 2020; Domptail et al., 2023; Garcia-Polo et al., 2021; Giagnocavo et al., 2022; Sivini and Vitale, 2023; Steinhäuser, 2020; Tifni, 2023; Vieira et al., 2016). Nevertheless, the assessment of the state of knowledge on agroecology from a human-nature relationship perspective remains an under-researched topic within these studies.

While numerous studies in the field of agroecology have focused on content analysis, only a small portion of them have examined the knowledge on agroecology contained in scientific articles (Fernández et al., 2021; Gallardo et al., 2018; Gallardo et al., 2019; Gazzano et al., 2022; Pinzón et al., 2023). This indicates that research endeavours aimed at assessing the knowledge on agroecology through content analysis techniques are relatively few and far between.

None of these studies employs the concept of the human-nature relationship as a theoretical framework to assess the knowledge on agroecology that contributes to reconnecting humans and nature. They moreover focus exclusively on the knowledge contained in scientific articles disseminated through academic databases and agroecology congresses, suggesting that the knowledge disseminated by the FAO through its AKH has yet to be assessed. It is worth noting that while some studies (Loconto and Fouilleux, 2019) have explored FAO initiatives, they have not examined the knowledge on agroecology contained in scientific articles. Additionally, the studies in question lack a temporal framework, indicating that research focused on specific periods is relatively uncommon in the academic literature.

Based on the above, there is a clear lack of studies assessing knowledge on agroecology from a human-nature relationship perspective, despite academic efforts to develop suitable frameworks to conduct such studies. Additionally, no comprehensive content analysis has been conducted on the scientific articles disseminated through the FAO's AKH, particularly one that uses the concept of human-nature relationship as a theoretical framework (to assess the contribution of the knowledge on agroecology to reconnecting humans and nature within the agricultural realm) and focuses on the period 2014-2023 (when agroecology gained prominence on the international agenda). Therefore, this article significantly contributes to addressing this critical knowledge gap.

[1] This section is grounded in a thorough search in the Web of Science and Google Scholar databases. The search aimed to find studies exploring human-nature relationships in agroecology, and efforts to assess knowledge on agroecology through content analysis.

THEORETICAL FRAMEWORK

Human-nature relationship: definition, types and grammar

Muradian and Pascual (2018) define human-nature relationships as the general ideas or structures that shape the perceptions and behaviours of humans towards nature, influenced by cognitive processes configured by a complex arrangement of social conventions inherent to particular social groups and periods. They note that the relationship between humans and nature is often viewed as a dichotomy between intrinsic and instrumental values – a perspective that does not resonate with many laypeople.

Muradian and Pascual (2018) also suggest that decision-making involves considering the properties of human-nature relationships (preferences, principles and virtues) rather than the inherent worth or instrumental benefits of nature. To address this, the same authors propose seven types of elementary and discrete human-nature relationship, each with its own grammar: Detachment, Domination, Devotion, Stewardship, Wardship, Ritualised exchange, and Utilisation.

The Detachment relationship is characterised by an indifference towards nature, since non-human entities are perceived as irrelevant. This attitude may stem from ignorance or lack of experience. In contrast, the Domination relationship reflects a sense of human entitlement over nature, coupled with a fear of it. This relationship is marked by a confrontational perspective, viewing nature as an obstacle to progress.

The Devotion relationship, on the other hand, portrays nature as possessing agency and divine attributes that transcend human capabilities. This dynamic is rooted in religious rituals and taboos that shape the foundational social conventions of human-nature interactions. The Stewardship relationship presents a different view, where nature lacks inherent agency, yet humans see themselves as integral to and reliant upon it. This interdependency fosters a sense of responsibility expressed through nature-centric management principles and self-imposed behavioural constraints.

The Wardship relationship shares similarities with Stewardship but emphasises a preference for untouched or pristine states of nature. It advocates for protecting natural spaces by isolating them from human activities or managing species for non-utilitarian purposes, acknowledging their intrinsic rights. The Ritualised Exchange relationship involves humans attributing agency to nature and engaging in exchanges governed by ritualised codes of equality, balance, and reciprocity, rather than proportionality and ratios. These exchanges aim to maintain cosmic harmony and compensate nature for its vitality shared with humans.

Finally, the Utilisation relationship is based on a utilitarian rationale for appropriating nature's goods and services through extraction and consumption. Nature is commodified for exploitative and conservationist purposes, highlighting instrumental values and a clear human-nature distinction. This utilitarian perspective underscores the exploitation and commodification of nature's resources.

As mentioned above, each human-nature relationship has its own grammar, which refers to the social conventions, rules, and norms that determine how and when humans relate to nature (Muradian and Pascual, 2018). The grammar is composed of five basic dimensions that characterise different domains of human-nature relationships: ontology, goal orientation, emotional drivers, practices, and main mode of interaction, and are governed by specific sets of social conventions (Muradian and Pascual, 2018).

Muradian and Pascual (2018) argue that Ontology refers to the cognitive framework defining the boundaries between self and otherness. It involves the degree of differentiation between humans and nature, whether nature (non-human entities) is considered to have agency, and how nature is positioned in relation to humans. For this article, this dimension can be interpreted as the position or limits established by the researcher (author of the scientific article) between humans (including himself/herself) and nature. Goal Orientation

encompasses the overall goals guiding human decision-making processes and evaluative criteria. In this study, it translates to the general purpose, preference, or perception regarding nature that motivates or guides the researcher throughout the research development. Emotional Drivers involve the emotions and state of mind influencing behaviour and decisions, as opposed to purely rational thinking. In this work, this dimension refers to the emotions or state of mind toward nature that the researcher is influenced by or intends to promote through the research. Practices pertain to formalised social conventions setting normative boundaries, especially concerning responsibilities and rights. In this article, they can be understood as the actions and conventions toward nature that the researcher encourages or suggests, based on their findings. Main mode of interaction relates to how the relationship is operationalised or made practical. For this study, it involves potential ways to operationalise the relationship between humans and nature, based on the researcher's arguments or findings. Table I shows the seven human-nature relationships and their particular grammar.

In summary, each of the seven types of human-nature relationship is characterised by specific assumptions within each dimension of the grammar. Consequently, the seven relationships proposed by Muradian and Pascual (2018) are discrete. Additionally, these relationships are elementary. According to the same authors, these relationships can be identified across cultures because they encompass key cognitive structures that underlie human-nature relations.

Table I. ***Types of human-nature relationship and their grammar***

	Ontology						
Human-nature relationship	**Human-nature distinction**	**Nature with agency[2]**	**Position of nature vis-à-vis humans**	**Goal orientation**	**Emotional drivers**	**Practices**	**Main mode of interaction**
Detachment	Yes	No	Nature as inexistent	Nature perceived as not important	Indifference	Lack of formalised practices	Isolation
Domination	Yes	No	Hierarchical relation: nature as subordinated	Preference for human dominance over nature Nature seen as a threat	Fear	Rules and norms based on human entitlement (for appropriation or annihilation of nature) and superiority	Destruction
Devotion	No	Yes	Hierarchical relationship: Nature as a deity	Preference for circumstances believed to be favourable to deities Nature seen as sacred	Pursuit of transcendence Duty	Sacredness leading to religious practices, including rituals and taboos	Worship

[2] Agency here refers to the attribution of conscious intentionality and social agency to non-human entities, implying that they can define the position of humans and influence or shape their actions (Roldan Muradian and Unai Pascual, 2024, personal communication).

	Ontology						
Human-nature relationship	**Human-nature distinction**	**Nature with agency[2]**	**Position of nature vis-à-vis humans**	**Goal orientation**	**Emotional drivers**	**Practices**	**Main mode of interaction**
Stewardship	No	No	Humans as part of nature	Preference for human restraint to respect nature Nature seen as a system that includes humans	Sense of belonging Identity Care	Rules and norms concerning nature-centred management and self-imposed behavioural limits	Integration of livelihoods with nature
Wardship	Yes	No	Nature as a distinct entity with intrinsic rights[3]	Preference for pristine spaces or conditions Nature perceived as a distinct entity that needs to be protected	Appreciation of beauty Care Tranquillity	Rules and norms that prioritise the preservation of pristine spaces or conditions and emphasise biocentrism	Conservation of natural landscapes Benevolent patronage
Ritualised exchange	No	Yes	Nature as equal	Preference for equality Nature seen as an interactive agent	Duty	Rules and norms grounded in a sense of partnership	Collaboration Pursuit of equilibrium
Utilisation	Yes	No	Nature as a distinct entity with no intrinsic rights	Preference for maximising benefit-cost ratios Nature seen as a provider of resources and services	Needs satisfaction Hedonic pleasure	Rules and norms grounded in rational calculation and market orientation	Utilisation (for exploitation or conservation) Maximising profits

Source: Adapted from Muradian and Pascual (2018)

[3] Rights of nature refers to the inherent entitlements attributed to non-human entities, irrespective of their instrumental value to humans (Roldan Muradian and Unai Pascual, 2024, personal communication). In this regard, nature with rights is reflected when human actions refrain from prioritizing human needs or (economic) interests over the inherent rights of non-human entities.

Knowledge on agroecology for reconnecting humans and nature

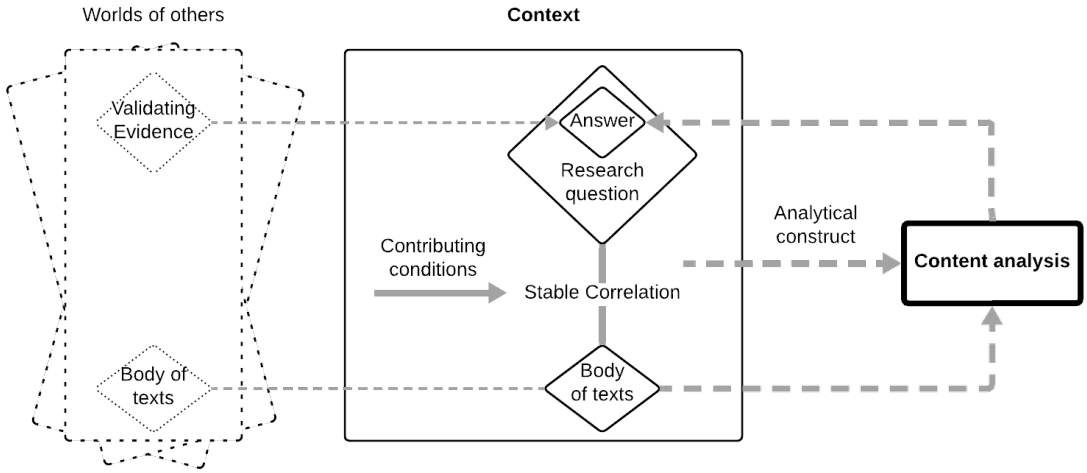
Knowledge is generated from theories grounded in epistemologies entailing particular norms and values tied to specific interests, as noted by Eschenhagen (2017, 2022). Additionally, Muradian and Pascual (2018) argue that these norms and values emanate from various cognitive frameworks that shape the relationships between humans and nature. Accordingly, given that the main purpose of agroecology is to reconnect humans and nature within the agricultural realm, the knowledge produced in this field can be associated with particular human-nature relationships. Knowledge that genuinely contributes to agroecology's purpose would thus be linked to human-nature relationships emphasising interdependence or unity between humans and nature.

According to the typology proposed by Muradian and Pascual (2018), the relationships indicating integration or connection between humans and nature include *Devotion*, *Stewardship* and *Ritualised Exchange*. Therefore, this article posits that knowledge on agroecology should inherently stem from research that integrates assumptions or fundamentals pertinent to the grammar of these three human-nature relationships within its constituent elements, including the research problem, theoretical framework, methodology, and findings.

Content analysis framework for assessing knowledge on agroecology

Content analysis is a research technique used to derive valid inferences from texts within their context, and involves six conceptual components: body of texts, research question, context, analytical construct, inferences, and validation of evidence (Krippendorff, 2019). Figure 1 shows the content analysis framework and its component interrelationships.

Figure 1. Content analysis framework



Source: Adapted from Krippendorff (2019)

According to Krippendorff (2019), the *body of texts* refers to the data available for analysis. In this article, it consists of scientific articles disseminated through the FAO's AKH. The *research question* guides content analysis, determining which texts to read and why. It is outlined in the Introduction section. The *context* is the conceptual environment used to interpret the body of texts and relate it to the research question. It includes: (1) the network of stable correlations connecting the texts to possible answers to the research question, and (2) the contributing conditions affecting the network of stable correlations predictably. In this research, the human-nature relationship framework proposed by Muradian & Pascual (2018) serves as the context, with the seven types of human-nature relationship as the network of stable correlations, and the five dimensions that characterise human-nature relationships symbolising the contributing conditions. The *analytical construct* operationalises the context to generate inferences from the body of texts. It operates as testable mini-theories of the context, verified through coded text features and involving conditional 'if-then' statements. In this article, the analytical construct is represented by Table 1. *Inferences* are premises that address the research

question and represent the content analysis outcome. They are primarily abductive inferences, which involve bridging the gap between descriptive accounts of texts and what they mean or refer to. Content analysis can also generate inductive inferences, which draw general conclusions from specific observations. In this study, abductive inferences determine whether the knowledge in the FAO's AKH articles contributes to reconnect humans and nature within the agricultural realm, while inductive inferences reveal trends and geopolitical distribution of this knowledge, and explore its state. Lastly, *Validation* of evidence involves confirming the content analysis outcomes. In this article, validation is achieved comparing findings within the study or with other studies.

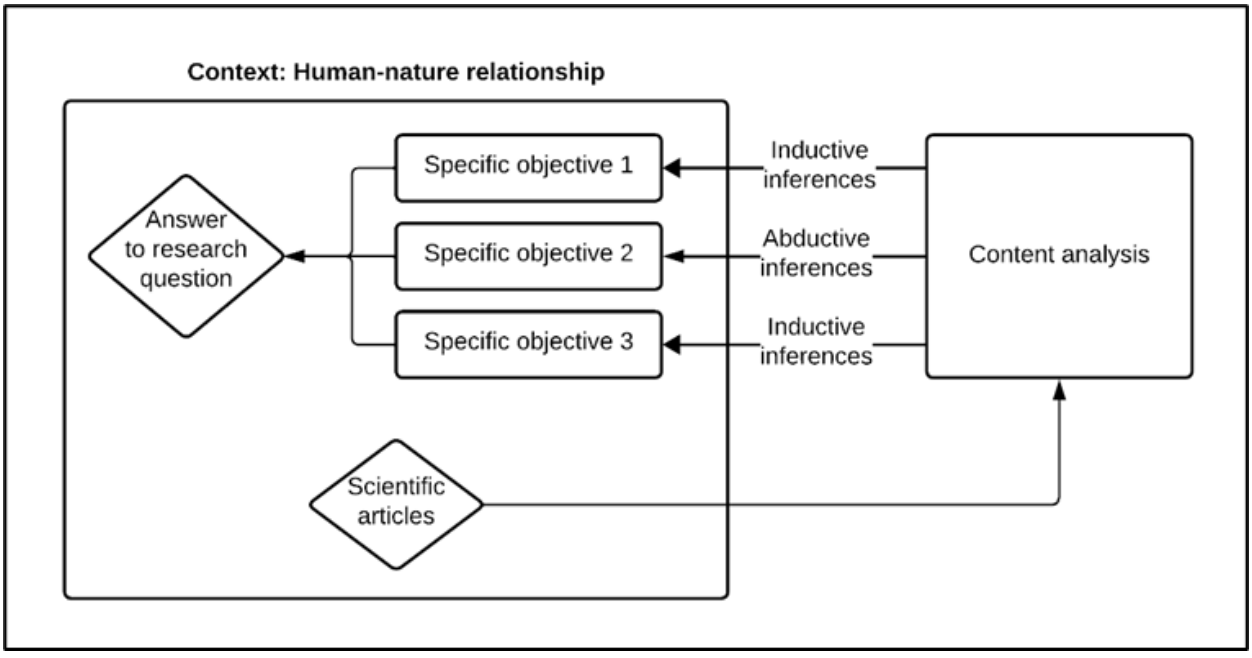
Considering this, content analysis is suitable for assessing the knowledge disseminated by the FAO's AKH. It also verifies whether this knowledge helps reconnect humans and nature in agriculture.

METHODOLOGY

Structure of the study

The structure of the study is simple but sound and effective. The study starts with a research question and three specific objectives, and aims to address them based on the examination of scientific articles. This examination is conducted through a content analysis, assessing the scientific articles within a context determined by the relationship between humans and nature. Content analysis is a suitable method to assess the knowledge on agroecology disseminated by the FAO's AKH, since it aims at revealing the non-explicit meanings or narratives of a text, produced in a specific context (Bernete, 2013). Figure II illustrates the structure of the study.

Figure II. Structure of the study



Source: Own elaboration

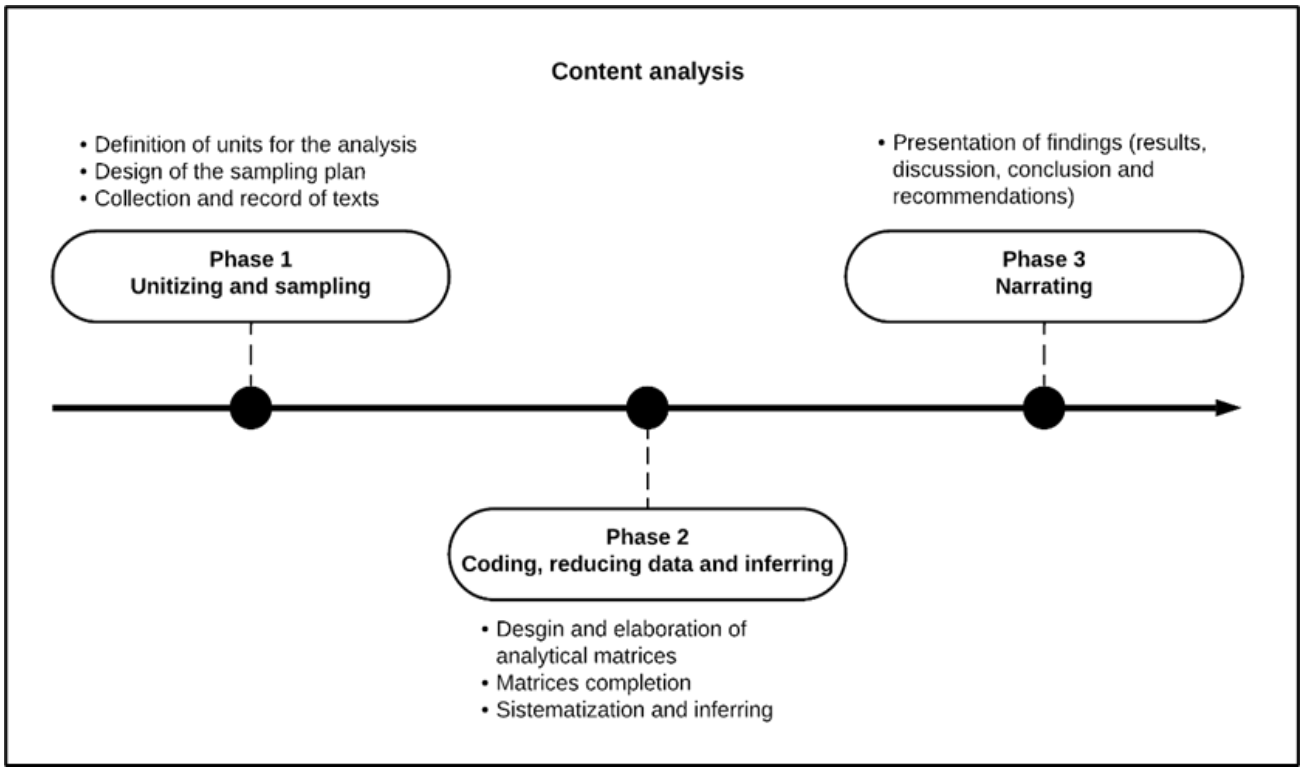
As shown in Figure II, the specific objectives that contribute to answering the research question are met through inferences derived from the content analysis. This study leverages both abductive and inductive inferences, with inductive inferences supporting objectives 1 and 3, and abductive inferences supporting objective 2.

Phases of the study

Although there are various ways to conduct a content analysis, this research adopts Krippendorff's (2019)

method for its simplicity, clarity, robustness, replicability, and academic recognition. The method consists of six steps: unitising, sampling, coding, reducing data, inferring, and narrating. However, in this research these steps have been consolidated into three phases. Figure III outlines these phases and the processes associated with each of them.

Figure III. Phases of the study



Source: Own elaboration

Phase 1: Unitising and sampling

This phase started by defining the units for the analysis, namely the sampling unit, coding unit and context unit. The scientific articles served as the sampling units, with quotations (pieces of writing taken from scientific articles) as the coding units, and the sections of the article from which quotations were taken as the context units.

Later, the sampling plan was designed. This encompasses defining the source and criteria for collecting sampling units. In this study, the FAO's AKH was the source, with criteria focused on publication year (2014-2023), language (English and Spanish), and download availability. The collection of scientific articles was straightforward, as the agroecology knowledge hub's search functionalities allowed filtering by document type, with 'journal article' selected for this filter. Only downloadable articles with valid links and no access restrictions were included, as the study targeted content accessible to regular users. No keyword filters were necessary since the FAO's AKH exclusively disseminates agroecology-related documents.

After outlining the sampling plan, scientific articles were collected using the FAO's AKH search features, which allowed for easy refinement to focus solely on scientific articles. The collection took place from 5 to 31 December 2023. All collected scientific articles were logged in an Excel sheet, documenting key details such as title, journal, publication year, and references, serving as the bibliographic record for the research.

Phase 2: Coding, reducing data and inferring

This phase involved three sub-processes. The first sub-process focused on the design and elaboration of three analytical matrices, namely matrix of trends and geopolitical distribution, matrix of human-nature relationship

and matrix of state of knowledge. The first matrix, related to specific objective 1, was elaborated using eight categories of analysis drawn from Gómez et al. (2013), with which overarching patterns of knowledge on agroecology can be examined. The second matrix, corresponding to specific objective 2, was elaborated using six categories of analysis drawn from Muradian and Pascual (2018), whose work was explained in the theoretical framework (see Table 1). The third matrix, addressing specific objective 3, was elaborated using eight categories of analysis drawn from Roca-Servat and Carmona (2020), with which key research elements for assessing knowledge in development-related fields such as agroecology can be identified. Appendix A provides a detailed description of each matrix's categories. These matrices were created using Microsoft Excel, as specialised text analysis software did not meet the study's needs for streamlined analysis.

The second sub-process involved completing the three analytical matrices by extracting and allocating quotations from scientific articles under appropriate categories, supplemented with data from SCImago[4]. It is relevant to mention that part of the third matrix, particularly the epistemological position category, required the application of Guba and Lincoln's (1998, 2002) fundamentals to properly characterise the quotations. Appendix B details these fundamentals.

The third subprocess centred on systematisation and inference, involving the reduction and analysis of quotations accumulated in the three analytical matrices. Each matrix was independently analysed to generate abductive inferences from the human-nature relationship matrix, and inductive inferences from the trends and geopolitical distribution matrix and the state of knowledge matrix. These inferences were supported by graphics depicting trends over time and proportions. Before analysing the matrices, an introductory analysis of the bibliographic record was conducted, describing the characteristics of the sample obtained in Phase 1.

It is worth mentioning that the individual analyses from the three matrices were compared to uncover connections between them, despite their distinct natures. Findings from one matrix were triangulated with those from the others to validate the content analysis outcomes. Additionally, these results were compared and contrasted with existing literature and arguments from other authors.

Phase 3: Narrating

The final phase focused on presenting the study findings, which included detailing the results and their discussion. This was followed by formulating the conclusions and recommendations based on insights from the previous phase. The subsequent three sections of this article provide a detailed account of these outcomes.

RESULTS

Sample composition

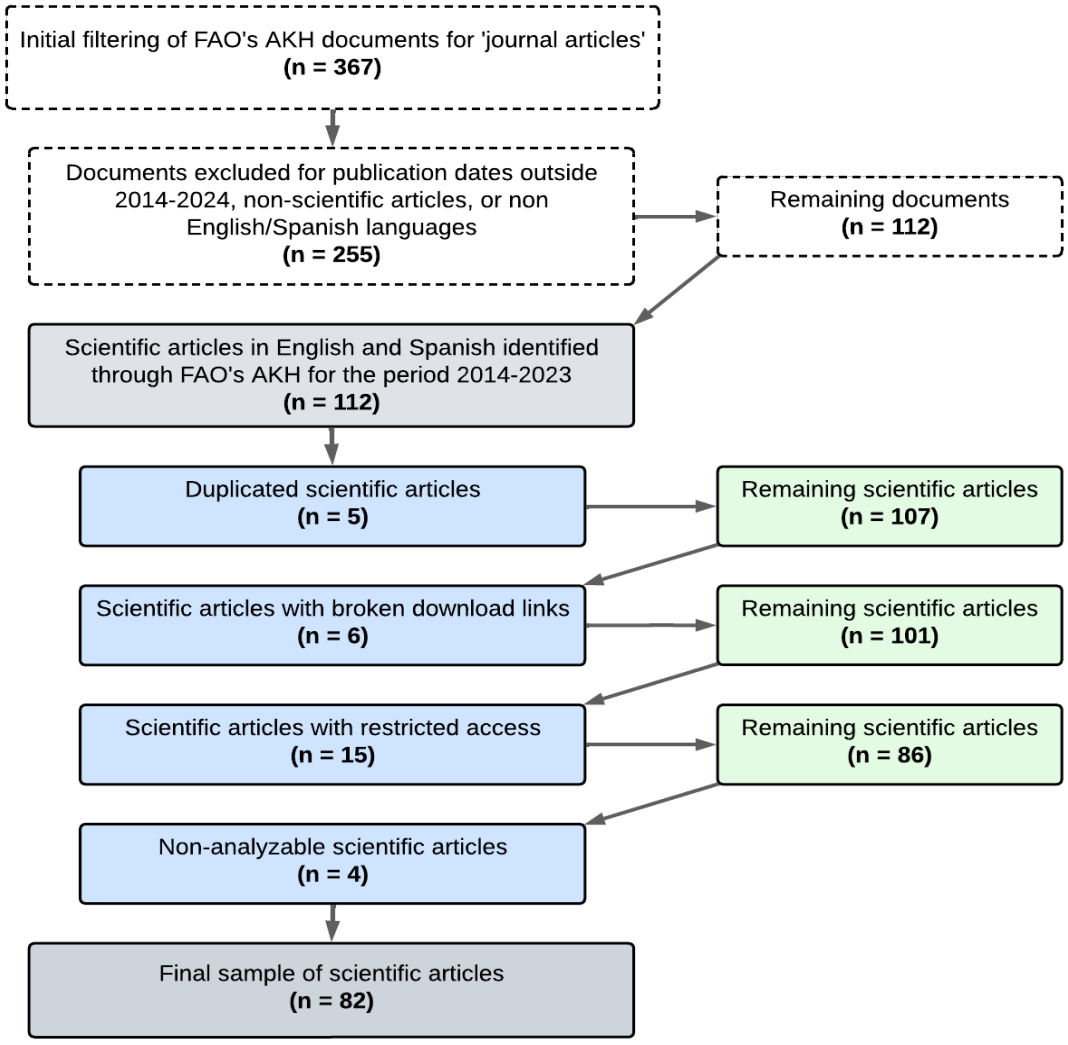
Initially, a quick filtering of the FAO's AKH documents was conducted by document type to display only those classified as 'journal article', resulting in a total of 367 documents. Of these, 255 were excluded because their publication dates fell outside the analysis period of 2014–2023, or because they were not scientific articles, or they were scientific articles published in languages other than English or Spanish. This process resulted in a sample of 112 scientific articles published in English and Spanish between 2014 and 2023.

This set of 112 articles was then further refined. Five duplicates were excluded, leaving 107 unique articles. Of these, 21 could not be included due to download constraints—6 with broken links and 15 behind paywalls—leaving 86 articles. An additional four articles were excluded because they lacked content related to human-nature relationships, focusing instead on descriptions of participatory research initiatives and agroecology courses without foundational ideas on agroecology, agriculture, or nature. The final sample consisted of 82 articles. Figure IV illustrates this sampling process. The complete list of these 82 articles is provided in the

[4] SCImago was used to obtain additional information missing from the articles to complete the matrix of trends and geopolitical distribution, such as the field and country of the journal.

bibliographic record in Appendix C. Similarly, Appendix D contains the completed analytical matrices.

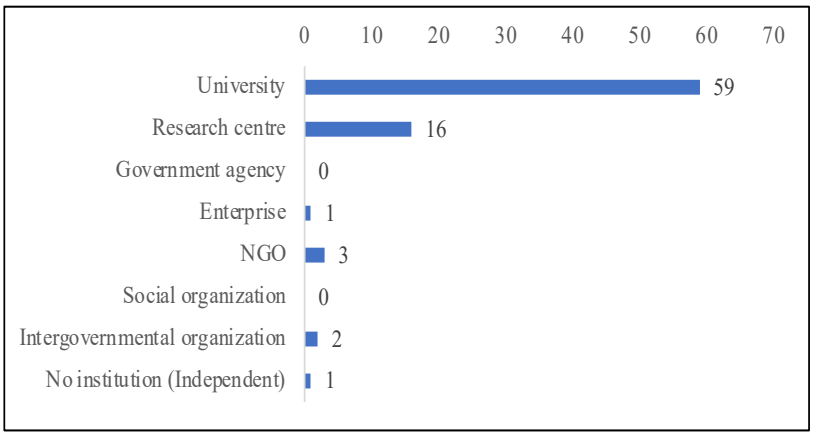
Figure IV. Sampling process



Source: Own elaboration

Trends and geopolitical distribution of the knowledge on agroecology disseminated by the FAO

Figure V. Number of scientific articles produced per type of institution



Source: Own elaboration

The knowledge on agroecology disseminated through the FAO's AKH comes from a variety of institutions, including universities, research centres, enterprises, non-governmental organisations (NGOs), and intergovernmental organisations, along with independent individuals, as shown in Figure V. Universities are the leading contributors, producing the majority of scientific articles, while government agencies and social organisations are not primary producers of agroecology knowledge.

Figure VI. ***Collaboration between different types of institution in the generation of knowledge on agroecology***

Source: Own elaboration

Regarding the collaboration patterns between institutions in the development of knowledge on agroecology, 75 of the 82 articles involved multiple authors. Among these, 31 featured authors from the same type of institution, while 44 included authors from different types of institution. Remarkably, only universities collaborated with social organisations—specifically farmer organisations—as seen in just one article. These organisations are not social movements. Figure VI illustrates these collaboration patterns.

Shifting to a geopolitical perspective, of the 75 multi-authored articles previously mentioned, 42 involve the collaboration of authors affiliated with different countries to generate knowledge on agroecology. Among these, 25 articles show collaboration between authors (and institutions) from the global North and South,[5] 16 involve collaboration between authors only from the global North, and one article features collaboration between authors from the global South.

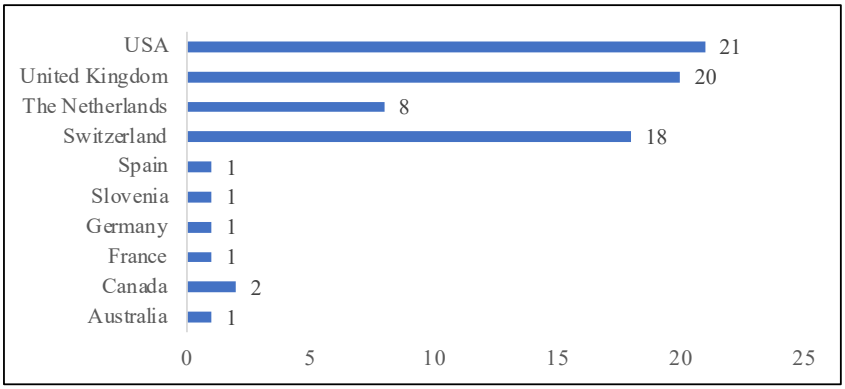
Regarding the role of countries (and regions) in generating knowledge on agroecology, 79% of all the analysed articles involved studying countries, or countries conducting studies, from the global North. These included Australia, Canada, France, Germany, Italy, Portugal, Spain, Sweden, Switzerland, the Netherlands, the United Kingdom, and the United States of America. In contrast, only 21% of the analysed articles involved studying countries from the global South. These included China, Colombia, India, Japan, Kenya, Mexico, Peru, and Uganda. This indicates that the distribution of studying countries is asymmetric: Europe and North America are predominantly represented, while Latin America, Asia, and Africa have less representation.

Similarly, there is an asymmetry in the distribution of studied countries, or countries under study. Specifically, 30% of all the analysed articles involve studied countries from the global South, including those from Latin America, Africa and Asia, while 21% involve studied countries from the global North, which includes European and North American countries. Due to its extensive nature, the detailed list of countries within each region is not included in this document. Furthermore, 10% of the analysed articles involve studied countries from both the global regions simultaneously, and 39% do not specify a studied country or region.

Concerning the publication patterns of the knowledge on agroecology, the study reveals a significant asymmetry: 74 out of the 82 analysed articles were published in journals from global North countries, while only eight were from global South journals. This suggests that the majority of knowledge on agroecology is disseminated through journals based in the global North. Specifically, ten countries are predominant in these publications,

[5] In this research, the terms global South and global North align with de Sousa and Meneses (2014). The global South refers to countries subjected to European colonialism (except Australia and New Zealand) and less economically developed, while the global North includes Europe and North America. These terms are used metaphorically, not just geographically.

*Figure VII. **Distribution of scientific articles among journals from global North countries***



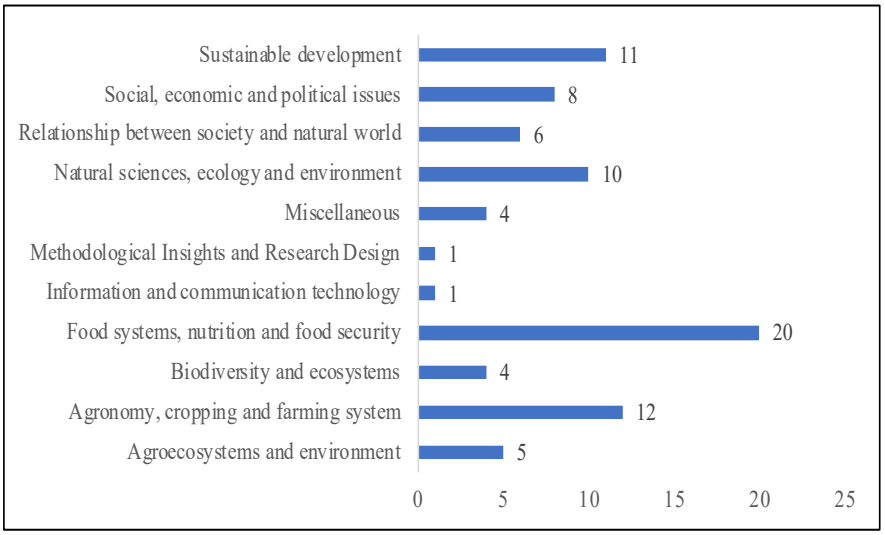
Source: Own elaboration

as shown in Figure VII. Notably, the United States of America, the United Kingdom, and Switzerland are the leading publishers, underscoring North America and Europe as the predominant publishers of this knowledge.

When it comes to language, the study reveals a clear predominance of English in publications, with 77 of the 82 analysed articles published in English and only 5 in Spanish. This disparity highlights the asymmetry in language usage for disseminating knowledge on agroecology.

Finally, regarding the topic of the journals that disseminate knowledge on agroecology, journals focused on food systems, nutrition, and food security are the primary outlets. Journals on agronomy, cropping, and farming systems are also preferred venues for disseminating this knowledge. In contrast, journals addressing topics such as social, economic, and political issues, societal-natural world relationships, and biodiversity and ecosystems are less favoured options for publication. Figure VIII illustrates these preferences.

*Figure VIII. **Distribution of scientific articles by journal topic***



Source: Own elaboration

Based on the aforementioned observations, it becomes apparent that universities are the primary generators of knowledge on agroecology disseminated through the FAO's AKH, collaborating extensively with various institutions and social organisations. Notable collaboration exists between authors and institutions from both the global North and South. However, global South countries are mainly studied rather than studying countries, whereas global North countries are dominant as both studying and publishing countries. This dominance of global North countries in publishing may explain the predominance of English in disseminating knowledge on agroecology. Additionally, journals focused on food systems, nutrition, and food security are the preferred venues for publishing this knowledge.

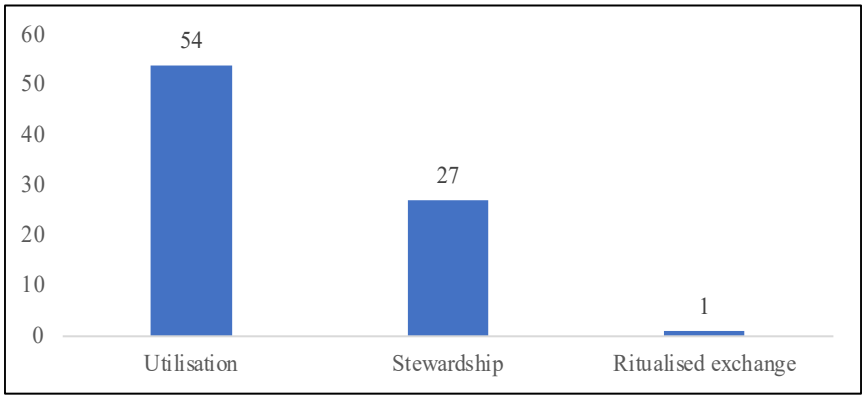
Human-nature relationship perspectives embodied in the knowledge on agroecology disseminated by the FAO

The knowledge disseminated through the FAO's AKH has been generated based on assumptions or fundamentals of three out of the seven human-nature relationship types proposed by Muradian and Pascual (2018), as shown in Figure IX. Specifically, the knowledge on agroecology contained in 54 articles is rooted in assumptions and fundamentals related to the Utilisation relationship type. Additionally, the knowledge contained in 27 articles is based on premises related to the Stewardship relationship type, while the knowledge of only one article aligns with the Ritualised exchange relationship type. From these observations, Utilisation and Stewardship are

the predominant relationship types shaping knowledge on agroecology, with Utilisation being more prevalent. No articles cover more than one relationship type.

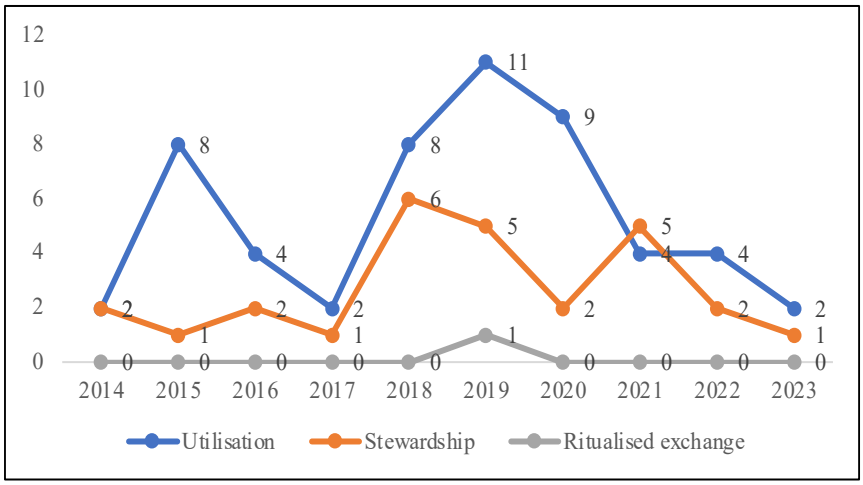
Shifting to a temporal perspective, Figure X illustrates the evolution of the knowledge on agroecology associated with Utilisation, Stewardship, and Ritualised exchange relationships. The figure reveals no clear trends in the evolution of knowledge associated with the Utilisation and Stewardship relationship types. However, it shows that the number of articles containing knowledge aligned with the Utilisation relationship practically surpasses those aligned with the Stewardship relationship across the period 2014-2023. Additionally, the figure reveals that the evolution of knowledge associated with the Ritualized exchange type of relationship is practically null throughout the same period.

Figure IX. ***Distribution of scientific articles by type of human-nature relationship embodied in them***



Source: Own elaboration

Figure X. Evolution of the knowledge on agroecology by type of human-nature relationship: Utilisation, Stewardship and Ritualised exchange



Source: Own elaboration

Based on these observations, Utilisation emerges as the hegemonic human-nature relationship shaping most of the knowledge disseminated through the FAO's AKH. While the Stewardship relationship type also plays a role, it does not match the prominence of Utilisation. This insight provides an initial view into the possible implications of the knowledge on agroecology for fostering a reconnection between humans and nature within the agricultural realm; however, this topic will be explored further on. Additionally, it is worth noting that the Utilisation relationship type maintained its prevalence throughout the 2014-2023 period, reflecting its enduring influence over time.

State of the knowledge on agroecology disseminated by the FAO

Knowledge on agroecology associated with the Utilisation relationship type

Most of the knowledge associated with the Utilisation relationship type has been developed without a clear definition of agroecology, indicating that some authors may not have a firm understanding of its meaning. A minority of this knowledge has been generated based on a conception of agroecology as a strategy leveraging ecological processes for socio-environmental benefits, or as a pathway guided by the operation of ecological (natural) systems for sustainable agri-food systems. Additionally, some knowledge has emerged treating agroecology as a contested concept with multiple definitions due to differing schools of thought.

Regarding the objectives guiding the generation of this knowledge, there is a primary focus on improving benefits to human health, nutrition, food security, and the environment, stemming from agricultural practices.

Other objectives focus on determining economic and environmental factors affecting agrochemical use, assessing alternative farming systems for increasing yields and ecosystem services provision, and exploring principles and challenges for resilient, productive and sustainable agri-food systems. Additionally, albeit to a lesser extent, there are objectives related to improving soil management to increase benefits from ecosystem services, elucidating economic and financial aspects of agroecological initiatives and products, characterising agroecosystems to determine yields, benefits and risks, and developing tools for measuring sustainability and productivity within agroecosystems.

In terms of theoretical frameworks, most of the knowledge in question lacks explicit theoretical foundations, possibly reflecting a view among some authors that theoretical explanations are unnecessary or that reality is understood only through their implicit theoretical assumptions. To a lesser extent, some of the knowledge has been generated with frameworks encompassing criteria and indexes for measuring, estimating and analysing the productivity and sustainability of agroecological practices, natural resources, and food security. Furthermore, concepts to explore the potential of agrochemical inputs and ecosystem services for yield and profit enhancement have been employed as theoretical frameworks. Other concepts, such as ecological intensification and the labour power of nature, have been employed to integrate approaches and practices for designing sustainable food production systems.

Most of the data employed to generate the knowledge aligned with the Utilisation relationship type is quantitative, with few contributions from mixed and qualitative data. However, a substantial portion of this knowledge has been developed without specifying the type of data used.

In the case of methods of data collection, the knowledge on agroecology has primarily been generated through interviews, surveys, focus groups, workshops, farm visits, and participant observations, which engage diverse actors and incorporate gender perspectives and agricultural seasons. Bibliographic compilation is also a common method, involving the collection of academic documents from databases such as Web of Science, Scopus, PubMed, Scielo, and Agricola, as well as technical documents from databases managed by governmental and non-governmental entities. Additionally, methods such as cloud data downloading and field measurements, such as sampling and assessing agricultural outputs, are used to collect data. However, a significant portion of the knowledge has been generated without specifying the methods of data collection employed.

Regarding the methods of data analysis, the knowledge on agroecology has primarily been generated using statistical analysis, including both descriptive statistics to characterise variables like yield and pesticide loads, and inferential statistics to compare the effects of different agricultural practices in yield and pesticide application. Bibliographic reviews are also commonly used as a method to analyse data. Other methods, though less prevalent, include economic and mathematical analysis (from basic data estimation to complex modelling), comparative analysis to assess agroecological interventions, and (bio)chemical analysis to measure substance concentrations and identify pest species. A significant portion of this knowledge has been developed without specifying the methods of data analysis employed.

Concerning the main findings, the knowledge associated with the Utilisation relationship type has significantly advanced understanding and inventorying of various agricultural practices and their impacts. It has primarily identified practices that enhance economic sustainability by improving yields, productivity, resource efficiency, income and profits, while also promoting food security and sustainable agriculture through the protection of ecosystem functions and the reduction of greenhouse gas emissions. Additionally, this knowledge has contributed to reducing agroecosystems' reliance on external inputs by utilising natural resources and ecosystem services. It has also highlighted factors affecting human health, including the adverse effects of pesticides, and the challenges of financial support for agroecology development. This knowledge has notably been instrumental in proposing elements such as theories, methods, and tools, to design strategies supporting transitions towards sustainable agri-food systems, fostering innovation and enhancing farmers' capacities.

In terms of epistemological position, the knowledge in question has predominantly been generated by adopting fundamentals from the Positivism / Post-positivism paradigm. This means that most authors of scientific articles conceive reality as external and apprehensible, consider the research object as independent of themselves, and favour experimentation, variable manipulation, hypothesis testing, and quantitative methods for comprehending the world.

Knowledge on agroecology associated with the Stewardship relationship type

Most of the knowledge associated with the Stewardship relationship type has been developed with a political understanding of agroecology, viewing it as a counter-hegemonic construction and reaction challenging the dominant corporate agri-food regime and advocating for socially just, economically fair, and ecologically resilient models, often linked to food sovereignty. Additionally, agroecology is recognised as polysemic, shaped by diverse values and worldviews, and is also understood as the ecology of food systems, applying ecological principles to mimic natural ecosystems in agriculture. To a lesser extent, this knowledge has been framed around the concept of agroecology as endogenous rural development, emphasising the use of social and ecological local resources to foster rural development. Only a small portion of this knowledge has been produced without a clear definition of agroecology, indicating some ambiguity among authors.

Regarding the objectives guiding the generation of this knowledge, there is a primary focus on proposing and examining theoretical and practical elements for discussing and navigating agroecological transitions. Additionally, significant objectives include identifying socio-political factors shaping agroecology and evaluating determinants crucial for scaling it up. To a lesser degree, some objectives aim to explore agroecology's capacity to reshape relationships between societies and ecosystems and propose new participatory research methodologies.

In terms of theoretical frameworks, most of the knowledge in question has been developed employing frameworks to explore interactions, reconfigurations, and tensions between factors that influence agroecological transitions. Frameworks such as the multilevel perspective and material and immaterial territories have been used, along with concepts to validate the legitimacy of non-scientific actors and knowledge. Additionally, frameworks for understanding the conceptualisation and reconfiguration of realities in agriculture, such as discourse, ontology, knowledge co-production and socio-ecological systems, have been employed. While less common, some knowledge has emerged from frameworks offering unconventional and disruptive conceptualisations of agri-food systems such as food sovereignty and zero-budget natural farming. Additionally, various frameworks defining various dimensions of agriculture have also been utilised.

Most of the data employed to generate knowledge aligned with the Stewardship relationship type is qualitative and mixed, with limited use of quantitative data. Additionally, some of this knowledge has been developed without specifying the type of data used.

In the case of methods of data collection, the knowledge on agroecology in question has primarily been generated through interviews, surveys, focus groups, workshops, farm visits, participant observations, and participation in meetings, engaging a wide array of stakeholders, including farmers, academia, government, NGOs, indigenous communities, and the private sector, while also considering gender perspectives. Bibliographic compilation is another prevalent method, gathering academic documents from databases such as Scopus and Web of Science, AGRIS and ERIC. Additional methods include cloud data downloading and participatory photography. However, a significant portion of the knowledge has been generated without specifying the methods of data collection employed.

Regarding the methods of data analysis, the knowledge on agroecology has primarily been generated using narrative and discourse analysis, along with bibliographic review. Content analysis, often combined

with statistical analysis for triangulation, has also been employed as a method of data analysis, along with sociocultural-historical analysis, visual analysis (thematic collage), and comparisons against indicators and criteria. However, a significant portion of this knowledge has been developed without specifying the methods of data analysis used.

Concerning the main findings, the knowledge associated with the Stewardship relationship type reveals a clear trend among peasants and family farmers: they are moving away from capitalist and neoliberal agri-food models, and favouring cooperative over competitive models, as well as local consumption and production practices that respect local diets, customs, and nature. This knowledge also contributes to identifying key socio-political determinants for scaling up agroecology as a life project, and emphasises the importance of valuing diverse knowledge systems for its development. Additionally, it explores the risks of agroecology's co-optation by dominant agri-food regimes, proposes alternative agri-food systems and regimes, and traces the evolution of agroecology's conceptualisation over time.

In terms of epistemological position, the knowledge in question has predominantly been generated by adopting fundamentals from the Critical Theory paradigm. This means that most authors of scientific articles conceive reality as shaped by social, political, economic, cultural, gender, and ethnic factors, see the researcher and research object as interactively linked with research outcomes mediated by values, and favour dialogic, dialectical, and participatory methodologies aimed at emancipation and socially significant results. Furthermore, a small portion of this knowledge has been shaped by the assumptions from the Constructivism paradigm, where authors of scientific articles view reality as apprehensible in the form of multiple mental constructs which are socially and experientially constructed, assume that knowledge is a human construction and never free of values, and prefer hermeneutic techniques for interpreting these constructs. Very few authors have used the positivism/post-positivism paradigm in generating this knowledge.

Knowledge on agroecology associated with the Ritualised exchange relationship type

Only one of the 82 articles analysed refers to knowledge on agroecology related to the Ritualised exchange relationship type. There is consequently insufficient data to provide a comprehensive analysis compared to the Utilisation and Stewardship relationship types. More details about the scarcity of this knowledge, and its implications, are provided in the next section.

DISCUSSION

Starting with the general characteristics of the knowledge on agroecology disseminated through the FAO's AKH, this study highlights the limited availability of such knowledge. A significant disparity exists between the 112 articles identified in the AKH spanning 2014-2023, and the substantially larger numbers of articles available in Web of Science (4426 articles) and Scopus (4692 articles) for the same period.[6] Furthermore, access is restricted to just 82 of the 112 articles.

In terms of the trends and geopolitical distribution of knowledge on agroecology, universities are the leading generators of such knowledge and collaborate with a broad range of institutions. They are the only type of institution documented to collaborate with social organisations, but this was observed in just one article where a university partnered with a farmer organisation. This suggests that the FAO's AKH may not fully embrace the transdisciplinary nature of agroecology, as emphasised by Fernández et al. (2021) and Ruiz-Rosado (2006).

Furthermore, findings show that collaboration among global South authors is rare, and was documented in only one article. This is noteworthy because, as agroecology is a global South proposal (Guzmán et al., 2000),

[6] This information was obtained from a Web of Science and Scopus search using the keyword 'agroecology' for the period 2014-2023, conducted on 26 February 2024, at 11:00 a.m.

one would expect more collaboration among authors from the South in the production of the knowledge disseminated through the AKH.

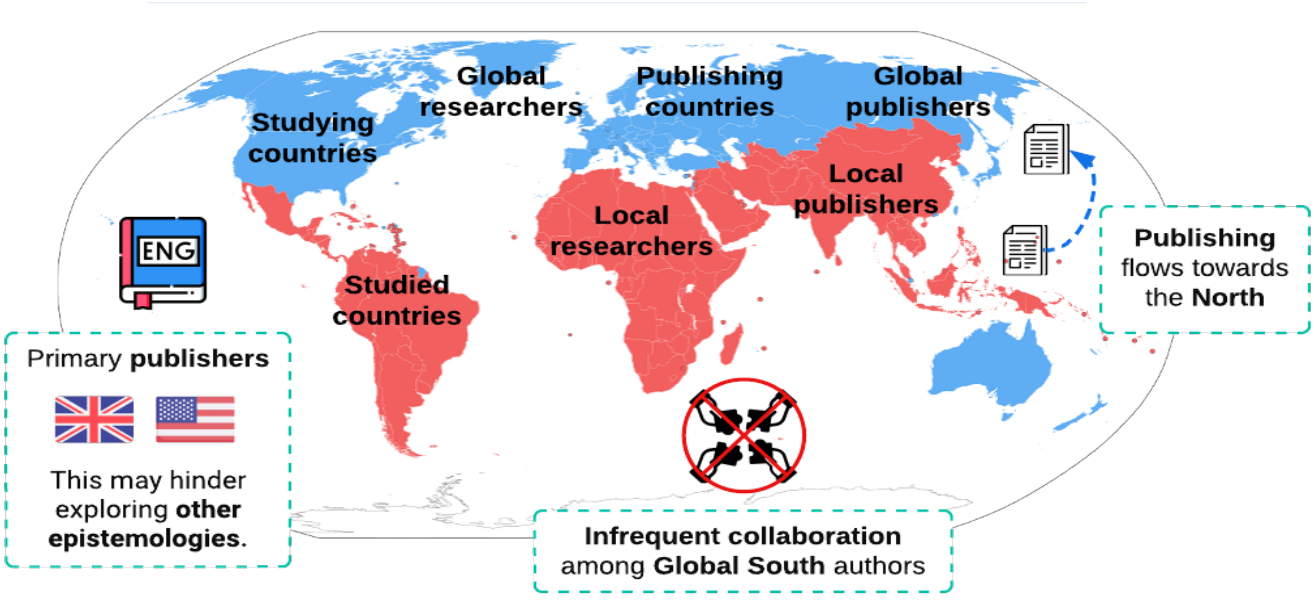
This study also highlights the roles of global North and global South countries in the production of knowledge on agroecology. Typically, global North countries often act as studying countries, whereas global South countries primarily serve as studied countries. global North countries tend moreover to investigate both global North and global South regions, while global South countries focus on their own regions. This phenomenon aligns with Gómez et al. (2013), who found global North countries to be global researchers and global South countries to be local researchers.

Additionally, global North countries dominate the publishing landscape, disseminating knowledge from both regions (acting as global publishers), whereas global South countries mainly publish regional knowledge (acting as local publishers). This pattern highlights a trend of publishing flowing towards the North, consistent with Gómez et al. (2013).

The study also reveals that English is predominant in the knowledge disseminated through the FAO's AKH, reflecting the influence of English-speaking publishers and primarily those in the United States and the United Kingdom. The predominance of English found in this study may be biased, as it only examined articles published in English and Spanish. Nevertheless, Gómez et al. (2013) identified a similar trend in their study, which included a broader range of languages. Ortiz (2009) argues, moreover, that English holds hegemonic status in fields dealing with social facts, such as agroecology. If this dominance of English reflects the entire knowledge base of the AKH, it could limit the exploration of other epistemologies, as unique meanings, representations and perspectives in other languages may not be fully captured in English, according to Lugo (2019).

Additionally, the findings show that academic journals on food systems, nutrition, and food security are now the main outlets for publishing knowledge on agroecology. This marks a shift from a decade ago when Gómez et al. (2013) found no agroecology publications in these journals. Figure XI summarises the key ideas discussed up to this point.

*Figure XI. **Trends and geopolitical distribution of knowledge on agroecology***



Source: Own elaboration

In the case of the human-nature relationship assumptions embodied in the knowledge on agroecology, this study reveals alignment with the Utilisation, Stewardship, and Ritualised exchange relationship types,

with the first two predominantly shaping the knowledge. This indicates that knowledge on agroecology is produced based on assumptions that emphasise a clear human-nature distinction with a utilitarian rationale, supporting the commodification and exploitation of nature (Utilisation). Additionally, it reflects assumptions of interdependency and human responsibility towards nature (Stewardship). To a lesser extent, it also embodies assumptions that acknowledge the absence of a clear human-nature distinction, viewing both as active agents in cosmic harmony through reciprocal exchanges (Ritualised exchange).

Although the knowledge on agroecology is primarily shaped by the Utilisation and Stewardship relationship types, about two-thirds is based on Utilisation assumptions. This suggests a prevailing view of humans and nature as distinct entities, with nature seen as a source of extractable and consumable goods for human welfare or progress. Therefore, the knowledge disseminated through the FAO's AKH does not fully align with agroecology's purpose of reconnecting humans and nature within the agricultural realm.

The incompatibility between this knowledge and agroecology's purpose may be partly explained by the remarks made so far. The dominant role of global North nations as both studying and publishing countries, along with limited collaboration from global South authors, may be perpetuating the Western worldview that has shaped agriculture over the last decades. This worldview often maintains a division between humans and nature, as noted by Domptail et al. (2021) and Losada et al. (2023), and supports an extractivist logic and mechanistic view of nature, according to Berman (1987). Additionally, the reluctance of the FAO's AKH to embrace agroecology's transdisciplinary nature and its preference for disseminating knowledge in English might be hindering the inclusion of knowledge generated from alternative epistemologies that emphasise the interconnectedness and interdependence between humans and nature, as Lugo (2019) argues.

Complementary to earlier observations, the identified asymmetries in the knowledge disseminated through the AKH suggest a pattern of coloniality of knowledge. This implies the existence of practices maintaining systems of thought that portray certain social groups as inferior based on race and geopolitical background (Gómez et al., 2013). Thus, the dominance of the global North and English as the main source and official language of (valid) knowledge may be marginalising knowledge from other regions and languages – a notion supported by de Sousa and Meneses (2014) and Gómez et al. (2013).

Additionally, given that universities are the primary sources of knowledge disseminated through the AKH, and that much of this knowledge does not facilitate the reconnection between humans and nature, Fazey et al. (2020) may be correct in their assessment. They argue that universities are failing humanity by not stimulating the societal changes needed to tackle contemporary challenges. This also raises concerns about universities' effectiveness in addressing critical socio-environmental issues, such as those stemming from conventional agriculture, which Gil (2012) identifies as a core aspect of their role.

Regarding the state of knowledge on agroecology, particularly that aligned with the Utilisation relationship type, it is noteworthy that most of this knowledge is produced without a clear definition of agroecology. When defined, agroecology is often framed within an extractivist and mechanistic view of nature, treating it as a commodity or replicable efficient machine, similar to conventional agriculture. This aligns with what Cerdan et al. (2019) describe as 'weak agroecology', which denotes greenwashed conventional agriculture. It is consistent with the objectives guiding the development of such knowledge, which focus on utilising nature to meet human needs and enhancing the efficiency and productivity of agri-food systems, often adopting only minimal social and environmental constraints. Theoretical frameworks supporting this knowledge also adhere to this logic. However, their frequent omission may suggest that the extractivist and mechanistic view of nature is deeply embedded in the authors' cognitive frameworks, as Eschenhagen (2017) argues, leading them to accept this perspective without question.

Methodologically, the knowledge on agroecology aligned with the Utilisation relationship type heavily prioritises

quantification. Although data collection methods may not always involve measuring instruments, they are primarily geared toward quantification, as evidenced by statistical analysis as the predominant method of data analysis, and the reliance on quantitative data. This focus probably stems from the need for measurements to assess benefits, impacts, and resource use — key concerns in this type of knowledge. The prevalence of quantification in this knowledge is unsurprising, as quantification is essential for 'utilising' nature. As Polo and Piñeiro (2019) argue, quantification reduces the world to measurable, lifeless objects, turning nature into inert commodities, distinct from and exploitable by humans.

It is worth noting that some authors classify organic agriculture, climate-smart agriculture, and sustainable intensification under agroecology. However, this contradicts scholars such as Domptail et al. (2021), Nieto et al. (2013), and Souza (2018), who argue that these practices still adhere to an extractivist logic and mechanistic view of nature, distinguishing them from (true) agroecology. This suggests a possible misinterpretation of agroecology's core fundamentals or even a risk of its co-optation, as warned by Alonso-Frajedas et al. (2020), Giraldo and Rosset (2016), and Nyéléni (2015).

Concerning the state of knowledge on agroecology associated with the Stewardship relationship type, it is noteworthy that this knowledge uses definitions of agroecology that diverge from conventional agriculture. These definitions challenge corporate agri-food systems, recognise diverse worldviews, and support principles of endogenous development, aligning with the 'strong agroecology' of Cerdan et al. (2019) and Leff (2002). This is consistent with the objectives guiding the development of this knowledge, which focus on facilitating transitions, validating non-scientific knowledge, and scaling up agroecology to reshape human-nature relationships. The theoretical frameworks used also reflect this perspective, addressing tensions and reconfigurations in agriculture and developing alternative agricultural models.

Methodologically, the knowledge on agroecology aligned with the Stewardship relationship type utilises data collection methods similar to those of the Utilisation type but not focused on quantification. Instead, these methods, along with pertinent methods of data analysis (narrative and discourse analysis, bibliographic review, content analysis, and sociocultural-historical analysis) aim to understand the sociopolitical processes in agriculture and agroecology and their impact on the representation of realities and transitions in these fields. This approach, which predominantly relies on qualitative and mixed data, stems from a desire to comprehend the drivers of agroecological transitions and the socio-political factors affecting the human-nature relationship.

The state of knowledge on agroecology associated with the Ritualised exchange relationship type remains unclear due to the limited corpus available for analysis. Despite this limitation, an examination of the predominant epistemological positions—positivism/post-positivism, critical theory, and constructivism—shows that positivism/post-positivism is the most prevalent. This is consistent with Pozzoli's (2007) view of its historical dominance. This epistemological position views reality as objective, external and governed by natural laws, and assumes a clear subject-object (or human-nature) distinction (Guba and Lincoln, 1998, 2002) reflecting a mechanistic view of nature. This perspective contrasts with the assumptions needed to understand the interconnection and interdependence of humans and nature, as seen in the knowledge associated with the Ritualised exchange relationship type. Critical theory and constructivism, which are more aligned with these assumptions, are less prevalent, and knowledge related to the Ritualised exchange relationship type is therefore scarce. These observations also elucidate why Stewardship-type knowledge, although present, is less prominent compared to Utilisation-type knowledge in the FAO's AKH.

From the above, the discrepancy between the purpose of agroecology—reconnecting humans and nature within the agricultural realm—and the knowledge disseminated through the FAO's AKH can be partially attributed to the prevailing state of this knowledge. As noted, it largely aligns with an extractivist logic and mechanistic view of nature, reflecting a clear separation between humans and nature. This tendency is further reinforced by the hegemony of positivism/post-positivism in knowledge production, driven by the predominance of global North countries in knowledge generation, which share certain affinity for this

epistemological position rooted in the Western world. Although there is some knowledge within the AKH that challenges this perspective, it constitutes only one-third of the total knowledge disseminated, which is insufficient to reduce the noted discrepancy.

In this context, the FAO must take proactive measures to effectively advocate and promote agroecology. Similarly, the generators of knowledge on agroecology, particularly those affiliated with universities, need to revise their research approaches to more effectively contribute to agroecology's purpose of reconnecting humans and nature in agriculture.

CONCLUSION

The study reveals that the knowledge disseminated through the FAO's AKH does not fully support agroecology's purpose of reconnecting humans and nature within the agricultural realm. This discrepancy may be linked to observable patterns of coloniality of knowledge observed in the dissemination of knowledge, as well as to the notable inclination towards disseminating knowledge rooted in positivist/post-positivist foundations and in an extractivist logic and a mechanistic view of nature.

Similarly, the study suggests that the Western worldview underlying conventional agriculture may persist in the knowledge disseminated through the FAO's AKH. This is alarming because agroecology should be based on fundamentals distinct from those of conventional agriculture, which emphasises a disconnection between humans and nature. Combined with the identified risk of co-optation of agroecology, this highlights the need for vigilance in how knowledge on agroecology is produced and disseminated.

These observations underscore the need for the FAO to take ethical responsibility in its knowledge dissemination if it aims to align with agroecology's purpose. The knowledge it disseminates may influence the configuration of agricultural territories and potentially shape the human-nature relationship within agriculture, with far-reaching implications for life and human welfare (Eschenhagen, 2022). This responsibility is even more critical considering that the FAO's AKH could become a leading source of knowledge on agroecology, given FAO's global reputation as an advocate for agroecology and its commitment to providing access to up-to-date knowledge on this field. Furthermore, these findings underscore the need to challenge the prevailing theoretical frameworks and epistemological positions guiding the generation of knowledge on agroecology, and to explore their contrasts with alternative perspectives, to facilitate more responsible decision-making (Eschenhagen, 2022). This would not only deter knowledge generators, such as universities, from 'just doing homework' but also encourage them to adopt more critical and discerning approaches to knowledge production.

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APPENDIX A: Categories of analysis of each analytical matrix

Table A.1. *Categories of analysis corresponding to the matrix of trends and geopolitical distribution*

N°	Category	Description
1	Type of institution affiliated with the lead author	It indicates whether the institution affiliated with the lead author is a university[1], research centre[2], government agency, enterprise, non-governmental organization (NGO), intergovernmental organization, or social organization.
2	Type of institution affiliated with the co-author(s)	It indicates whether the institution affiliated with the co-author(s) is a university, research centre, government agency, enterprise, non-governmental organization (NGO), intergovernmental organization or social organization.
3	Country of affiliation of the lead author	It refers to the country of the institution affiliated with the lead author. It represents the studying country (the country that conducts the study).
4	Country of affiliation of the co-author(s)	It refers to the country of the institution affiliated with the co-author(s).
5	Study area	It refers to the country, or region (in the case of studies with a regional approach), on which the scientific article is focused. It represents the studied country or studied region.
6	Field of the journal	It refers to the study field of interest of the journal.
7	Country of the journal	It refers to the country to which the journal, where the scientific article is published, belongs.
8	Language	It is the language in which the scientific article was written.

Source: Own elaboration.

[1] Including other high-education institutions.
[2] Certain universities have research centres under their jurisdiction. However, research centres here denote independent institutions that generate knowledge through research.

Table A.2. *Categories of analysis corresponding to the matrix of human-nature relationship.*

Nº	Category		Values
1	Ontology	Clear human-nature distinction	☐ Yes ☐ No
		Nature with agency	☐ Yes ☐ No
		Position of nature vis-à-vis humans	☐ Nature as inexistent ☐ Nature as subordinated ☐ Nature as a deity ☐ Humans as part of nature ☐ Nature as a distinct entity with intrinsic rights ☐ Nature as equal ☐ Nature as a distinct entity with no intrinsic rights
2	Goal Orientation		☐ Nature perceived as not important ☐ Preference for human dominance over nature ☐ Nature seen as a threat ☐ Preference for circumstances believed to be favourable to deities ☐ Nature seen as sacred ☐ Preference for human restraint to respect nature. ☐ Nature seen as a system that includes humans ☐ Preference for pristine spaces or conditions ☐ Nature perceived as a distinct entity that needs to be protected ☐ Preference for equality ☐ Nature seen as an interactive agent ☐ Preference for maximizing benefit-cost ratios ☐ Nature seen as a provider of resources and services
3	Emotional drivers		☐ Indifference ☐ Fear ☐ Pursuit of transcendence ☐ Duty ☐ Sense of belonging ☐ Identity ☐ Care ☐ Appreciation of beauty ☐ Tranquillity ☐ Needs satisfaction ☐ Hedonic pleasure
4	Practices		☐ Lack of formalized practices ☐ Rules and norms based on human entitlement (for appropriation or annihilation of nature) and superiority ☐ Sacredness leading to religious practices, including rituals and taboos ☐ Rules and norms concerning nature-centered management and self-imposed behavioral limits ☐ Rules and norms that prioritize the preservation of pristine spaces or conditions and emphasize biocentrism ☐ Rules and norms grounded in a sense of partnership ☐ Rules and norms grounded in rational calculation and market orientation

N°	Category	Values
5	Main mode of interaction	☐ Isolation ☐ Destruction ☐ Worship ☐ Integration of livelihoods with nature ☐ Conservation of natural landscapes ☐ Benevolent patronage ☐ Collaboration ☐ Pursuit of equilibrium ☐ Utilization (for exploitation or conservation) ☐ Maximizing profits
6	Human-nature relationship	☐ Detachment ☐ Domination ☐ Devotion ☐ Stewardship ☐ Wardship ☐ Ritualized exchange ☐ Utilization

Source: Own elaboration.

Table A.3. *Categories of analysis corresponding to the matrix of state of knowledge.*

N°	Category	Description
1	Definition of agroecology	It refers to the definition of agroecology adopted in the scientific article.
2	Objective	It refers to the goals or objectives that the research published in the scientific article seeks to achieve.
3	Theoretical framework	It refers to the corpus of concepts that adopted to propose, explain and address the reality (or research problem) that contextualizes the scientific article.
4	Type of data	It refers to the type of data or information required to develop the research published in the scientific article. This data or information can be of three types: qualitative, quantitative, and mixed (when the author works with both qualitative and quantitative data).
5	Methods of data collection	It refers to the procedures or instruments employed to collect the information required to produce knowledge on agroecology.
6	Methods of analysis	It refers to the procedures employed to systematize and analyze the information collected to produce knowledge on agroecology.
7	Main findings	It pertains to the results and contributions of the scientific article within the field of agroecology.
8	Epistemological position	It refers to the basic belief system or worldview that guides the researcher during the development of the research.

Source: Own elaboration.

APPENDIX B: Fundamentals to characterize the quotations corresponding to the category of analysis 'epistemological position'

The following Table outlines the fundamentals employed in identifying and characterizing quotations for the category 'epistemological position'. This table, adapted from Catalán and Jarillo (2010), synthesizes the fundamentals of Guba and Lincoln (1998, 2002) related to epistemological positions.

Table B.1. *Fundamentals to characterize quotations corresponding to the category 'epistemological position'*

Paradigm (Epistemological position)	Assumptions		
	Ontological assumption	**Epistemological assumption**	**Methodological assumption**
Positivism	There is an external, real, and apprehensible objective reality driven by immutable natural laws and mechanisms.	The researcher and the object of research are two autonomous entities: the researcher studies the object without influencing it or being influenced by it. Knowledge is value-free and independent to the social context in which it is produced.	Experimentation, variable manipulation, hypothesis verification, and quantitative techniques are the best way to discover the world.
Post-positivism	Reality is apprehensible, albeit imperfectly and only probabilistically.	Results are considered probably true, always subject to falsification.	Experimental methodology and variable manipulation are of significant importance.
Critical theory	Reality shaped by social, political, cultural, economic, ethnic, and gender factors.	The researcher and the researched object are interactively linked, so research outcomes are mediated by values.	Methodology is dialogic and dialectical, aiming for emancipation and promoting participatory methods. It seeks to direct research towards socially significant ends.
Constructivism	Reality is apprehensible in the form of multiple, intangible mental constructs, socially and experientially constructed, of a local and specific nature, dependent in form and content on individuals or groups.	The relationship between the researcher and the researched object is transactional and subjectivist; hence knowledge is a human construction and never free from values.	Through hermeneutic techniques, individual constructions are interpreted, extracted, and refined through the interaction between and amidst the researcher and their respondents.

Source: Adapted from Catalán and Jarillo (2010).

It is pertinent to indicate that while completing the matrix of state of knowledge, the epistemological positions of positivism and post-positivism were treated as a unified class. This was due to the considerable similarity in their fundamental assumptions (Catalán and Jarillo, 2010).

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APPENDIX C: Bibliographic record

Table C.1. *List of 82 scientific articles analyzed*

Nº	Title	Journal	Year of publication	Reference (APA)
1	Food systems in depressed and contested agro-territories: Participatory Rural Appraisal in Odemira, Portugal	*Frontiers in Sustainable Food Systems*	2023	Horstink, L., Schwemmlein, K., & Encarnação, M.F. (2023). Food systems in depressed and contested agro-territories: Participatory Rural Appraisal in Odemira, Portugal. Frontiers in Sustainable Food Systems, 6, 1-24.
2	Friend or Foe? The Role of Animal-Source Foods in Healthy and Environmentally Sustainable Diets	*The Journal of Nutrition*	2023	Beal, T., Gardner, C.D., Herrero, M., Iannotti, L.L., Merbold, L. Nordhagen, S., & Mottet, A. (2023). Friend or Foe? The Role of Animal-Source Foods in Healthy and Environmentally Sustainable Diets. The Journal of Nutrition, 153(2), 409-425.
3	Assessing impact of agroecological interventions in Niger through remotely sensed changes in vegetation	*Scientific Reports*	2023	Mishra, V., Limaye, A.S., Doehnert, F., Policastro, R., Hassan, D., Ndiaye, M.T.Y., Van Abel, N., Johnson, K. Grange, J., Coffey, K., & Rashid, A. (2023). Assessing impact of agroecological interventions in Niger through remotely sensed changes in vegetation. Scientific Reports, 13(360), 1-12.
4	Ample room for reducing agrochemical inputs without productivity loss: The case of vegetable production in Uruguay	*Science of the Total Environment*	2022	Scarlato, M., Dogliotti, S., Bianchi, F.J.J.A., & Rossing, W.A.H. (2022). Ample room for reducing agrochemical inputs without productivity loss: The case of vegetable production in Uruguay. Science of the Total Environment, 810, 1-11.
5	Impact of Zero Budget Natural Farming on Crop Yields in Andhra Pradesh, SE India	*Sustainability*	2022	Duddigan, S., Collins, C.D., Hussain, Z., Osbahr, H., Shaw, L.J., Sinclair, F., Sizmur, T., Thallam, V., & Winowiecki, L.A. (2022). Impact of Zero Budget Natural Farming on Crop Yields in Andhra Pradesh, SE India. Sustainability, 14(3), 1-13.
6	The Role of Actor Networks in Enabling Agroecological Innovation: Lessons from Laos	*Sustainability*	2022	Castella, J.C., Lestrelin, G., Phimmasone, S., Tran Quoc, H., & Lienhard, P. (2022). The Role of Actor Networks in Enabling Agroecological Innovation: Lessons from Laos. Sustainability, 14(6), 1-18.
7	Global analysis of yield benefits and risks from integrating trees with rice and implications for agroforestry research in Africa	*Field Crops Research*	2022	Rodenburg, J., Mollee, E., Coe, R., & Sinclair, F. (2022). Global analysis of yield benefits and risks from integrating trees with rice and implications for agroforestry research in Africa. Field Crops Research, 281, 1-18.
8	Pollinator Deficits, Food Consumption, and Consequences for Human Health: A Modeling Study	*Environmental Health Perspectives*	2022	Smith, M.R., Mueller, N.D., Springmann, M., Sulser, T., Garibaldi, L.A., Gerber, J., Wiebe, K., & Myers, S.S. (2022). Pollinator Deficits, Food Consumption, and Consequences for Human Health: A Modeling Study. Environmental Health Perspectives, 130(12), 1-12.
9	Agroecology and Sustainable Smallholder Agriculture: An Exploratory Analysis with Some Tentative Indications from the Recent Experience of 'Natural Farming in Andhra Pradesh'	*IASSI Quarterly: Contributions to Indian Social Science*	2022	Reddy, D.N. (2022). Agroecology and Sustainable Smallholder Agriculture: An Exploratory Analysis with Some Tentative Indications from the Recent Experience of 'Natural Farming in Andhra Pradesh'. IASSI Quarterly: Contributions to Indian Social Science, 41(3), 234-271.

N°	Title	Journal	Year of publication	Reference (APA)
10	Thematic Collages in Participatory Photography: A Process for Understanding the Adoption of Zero Budget Natural Farming in India	*International Journal of Qualitative Methods*	2021	Walker, G., Osbahr, H., & Cardey, S. (2021). Thematic Collages in Participatory Photography: A Process for Understanding the Adoption of Zero Budget Natural Farming in India. International Journal of Qualitative Methods, 20, 1-13.
11	"The Innovation Imperative": The Struggle Over Agroecology in the International Food Policy Arena	*Frontiers in Sustainable Food Systems*	2021	Anderson, C.R., & Maughan, C. (2021). "The Innovation Imperative": The Struggle Over Agroecology in the International Food Policy Arena. Frontiers in Sustainable Food Systems, 5, 1-15.
12	A Nutrition-Sensitive Agroecology Intervention in Rural Tanzania Increases Children's Dietary Diversity and Household Food Security But Does Not Change Child Anthropometry: Results from a Cluster-Randomized Trial	*The Journal of Nutrition*	2021	Santoso, M.V., Bezner Kerr, R.N, Kassim, N., Martin, H., Mtinda, E., Njau, P., Mtei, K., Hoddinott, J., & Young, S.L. (2021). A Nutrition-Sensitive Agroecology Intervention in Rural Tanzania Increases Children's Dietary Diversity and Household Food Security But Does Not Change Child Anthropometry: Results from a Cluster-Randomized Trial. The Journal of Nutrition, 151(7), 2010-2021.
13	Bottom-Up Transformation of Agriculture and Food Systems	*Sustainability*	2021	Sandhu, H. (2021). Bottom-Up Transformation of Agriculture and Food Systems. Sustainability, 13(4), 1-13.
14	Pesticides and Soil Invertebrates: A Hazard Assessment	*Frontiers in Environmental Science*	2021	Gunstone, T., Cornelisse, T., Klein, K., Dubey, A., & Donley, N. (2021). Pesticides and Soil Invertebrates: A Hazard Assessment. Frontiers in Environmental Science, 9, 1-21.
15	Food forests: Their services and sustainability	*Journal of Agriculture, Food Systems, and Community Development*	2021	Albrecht, S., & Wiek, A. (2021). Food forests: Their services and sustainability. Journal of Agriculture, Food Systems, and Community Development, 10(3), 91-105.
16	Amplifying Agroecological Farmer Lighthouses in Contested Territories: Navigating Historical Conditions and Forming New Clusters in Japan	*Frontiers in Sustainable Food Systems*	2021	McGreevy, S.R., Tamura, N., Kobayashi, M., Zollet, S., Hitaka, K., Nicholls, C.I., & Altieri, M.A. (2021). Amplifying Agroecological Farmer Lighthouses in Contested Territories: Navigating Historical Conditions and Forming New Clusters in Japan. Frontiers in Sustainable Food Systems, 5, 1-18.
17	The political economy of agroecology	*The Journal of Peasant Studies*	2021	van der Ploeg, J.D. (2021). The political economy of agroecology. The Journal of Peasant Studies, 48(2), 274-297.
18	Can agroecology improve food security and nutrition? A review	*Global Food Security*	2021	Bezner Kerr, R., Madsen, S., Stüber, M., Liebert, J., Enloe, S., Borghino, N., Parros, P., Munyao Mutyambai, D., Prudhon, M., & Wezel, A. (2021). Can agroecology improve food security and nutrition? A review. Global Food Security, 29, 1-12.
19	Nicaragua's agroecological transition: Transformation or reconfiguration of the agri-food regime?	*Agroecology and Sustainable Food Systems*	2020	Schiller, K., Godek, W., Klerkx, L., & Poortvliet, P.M. (2020). Nicaragua's agroecological transition: Transformation or reconfiguration of the agri-food regime?. Agroecology and Sustainable Food Systems, 44(5), 611-628.

N°	Title	Journal	Year of publication	Reference (APA)
20	Potential of multi-species livestock farming to improve the sustainability of livestock farms: A review	*Agricultural Systems*	2020	Martin, G., Barth, K., Benoit, M., Brock, C., Destruel, M., Dumont, B., Grillot, M., Hübner, S., Magne, M.A., Moerman, M., Mosnier, C., Parsons, D., Ronchi, B., Schanz, L., Steinmetz, L., Werne, S., Winckler, C., & Primi, R. (2020). Potential of multi-species livestock farming to improve the sustainability of livestock farms: A review. Agricultural Systems, 181, 1-12.
21	The prefigurative power of urban political agroecology: rethinking the urbanisms of agroecological transitions for food system transformation	*Agroecology and Sustainable Food Systems*	2020	Tornaghi, C., & Dehaene, M. (2020). The prefigurative power of urban political agroecology: rethinking the urbanisms of agroecological transitions for food system transformation. Agroecology and Sustainable Food Systems, 44(5), 594-610.
22	The 10 Elements of Agroecology: enabling transitions towards sustainable agriculture and food systems through visual narratives	*Ecosystems and People*	2020	Barrios, E., Gemmill-Herren, B., Bicksler, A., Siliprandi, E., Brathwaite, R., Moller, S., Batello, C., & Tittonell, P. (2020). The 10 Elements of Agroecology: enabling transitions towards sustainable agriculture and food systems through visual narratives. Ecosystems and People, 16(1), 230-247.
23	Agroecological principles and elements and their implications for transitioning to sustainable food systems. A review	*Agronomy for Sustainable Development*	2020	Wezel, A., Gemmill Herren, B., Bezner Kerr, R., Barrios, E., Rodrigues Gonçalves, A.L., & Sinclair, F. (2020). Agroecological principles and elements and their implications for transitioning to sustainable food systems. A review. Agronomy for Sustainable Development, 40(40), 1-13.
24	Assessing Transitions to Sustainable Agricultural and Food Systems: A Tool for Agroecology Performance Evaluation (TAPE)	*Frontiers in Sustainable Food Systems*	2020	Mottet, A., Bicksler, A., Lucantoni, D., De Rosa, F., Scherf, B., Scopel, E., López-Ridaura, S., Gemmil-Herren, B., Bezner Kerr, R., Sourisseau, J.M., Petersen, P., Chotte, J.L., Loconto, A., & Tittonell, P. (2020). Assessing Transitions to Sustainable Agricultural and Food Systems: A Tool for Agroecology Performance Evaluation (TAPE). Frontiers in Sustainable Food Systems, 4, 1-21.
25	Towards redesign at scale through zero budget natural farming in Andhra Pradesh, India	*International Journal of Agricultural Sustainability*	2020	Pervez Bharucha, Z., Bermejo Mitjans, S., & Pretty, J. (2020). Towards redesign at scale through zero budget natural farming in Andhra Pradesh, India. International Journal of Agricultural Sustainability, 18(1), 1-20.
26	Beyond Sustainability in Food Systems: Perspectives from Agroecology and Social Innovation	*Sustainability*	2020	Marchetti, L., Cattivelli, V., Cocozza, C., Salbitano, F., & Marchetti, M. (2020). Beyond Sustainability in Food Systems: Perspectives from Agroecology and Social Innovation. Sustainability, 12(18), 1-24.
27	Agricultural diversification promotes multiple ecosystem services without compromising yield	*Science Advances*	2020	Tamburini, G., Bommarco, R., Cherico Wanger, T., Kremen, C., van der Heijden, M.G.A., Liebman, M., & Hallin, S. (2020). Agricultural diversification promotes multiple ecosystem services without compromising yield. Science Advances, 6(45), 1-8.
28	Ecological intensification and diversification approaches to maintain biodiversity, ecosystem services and food production in a changing world	*Emerging Topics in Life Sciences*	2020	Kremen, C. (2020). Ecological intensification and diversification approaches to maintain biodiversity, ecosystem services and food production in a changing world. Emerging Topics in Life Sciences, 4(2), 229-240.

N°	Title	Journal	Year of publication	Reference (APA)
29	Assessing agro-ecological practices using a combination of three sustainability assessment tools	*Journal of Sustainable and Organic Agriculture*	2020	Landert, J., Pfeifer, C., Carolus, J., Schwarz, G., Albanito, F., Muller, A., Smith, P., Sanders, J., Schader, C., Vanni, F., Prazan, J., Baumgart, L., Blockeel, J., Weisshaidinger, R., Bartel-Kratochvil, R., Hollaus, A., Mayer, A., Hrabalová, A., Helin, J., Aakkula, J., Svels, K., Guisepelli, E., Smyrniotopoulou, A., Vlahos, G., Iordanidis, Y., Szilágyi, A., Podmaniczky, L., Balázs, K., Galioto, F., Longhitano, D., Rossignolo, L., Povellato, A., Z□l□ns, A., das Jegelevi□ius, G., Fr□□il□, M., Iragui Yoldi, U., Astrain Massa, C., Bienzobas Adrián, J., Resare Sahlin, K., Röös, E., Frick, R., Bircher, R., Aalders, I., Irvine, K.N., Kyle, C., & Miller, D. (2020). Assessing agro-ecological practices using a combination of three sustainability assessment tools. Journal of Sustainable and Organic Agriculture, 70(2), 129-144.
30	The impact of long-term organic farming on soil-derived greenhouse gas emissions	*Scientific Reports*	2019	Skinner, C., Gattinger, A., Krauss, M., Krause, H.M., Mayer, J., van der Heijden, M.G.A., & Mäder, P. (2019). The impact of long-term organic farming on soil-derived greenhouse gas emissions. Scientific Reports, 9, 1-10.
31	Applying the Aboveground-Belowground Interaction Concept in Agriculture: Spatio-Temporal Scales Matter	*Frontiers in Ecology and Evolution*	2019	Veen, G.F., Jasper Wubs, E.R., Bardgett, R.D., Barrios, E., Bradford, M.A., Carvalho, S., De Deyn, G.B., de Vries, F.T., Giller, K.E., Kleijn, D., Landis, D.A., Rossing, W.A.H., Schrama, M., Six, J., Struik, P.C., van Gils, S., Wiskerke, J.S.C., van der Putten, W.H., & Vet, L.E.M. (2019). Applying the Aboveground-Belowground Interaction Concept in Agriculture: Spatio-Temporal Scales Matter. Frontiers in Ecology and Evolution, 7, 1-12.
32	An assessment of acute insecticide toxicity loading (AITL) of chemical pesticides used on agricultural land in the United States	*PLoS ONE*	2019	DiBartolomeis, M., Kegley, S., Mineau, P., Radford, R., & Klein, K. (2019). An assessment of acute insecticide toxicity loading (AITL) of chemical pesticides used on agricultural land in the United States. PLoS ONE, 14(8), 1-27.
33	Ecological illiteracy can deepen farmers' pesticide dependency	*Environmental Research Letters*	2019	Wyckhuys, K.A.G., Heong, K.L., Sanchez-Bayo, F., Bianchi, F.J.J.A., Lundgren, J.G., & Bentley, J.W. (2019). Ecological illiteracy can deepen farmers' pesticide dependency. Environmental Research Letters, 14(9), 1-12.
34	Agroecology and La Via Campesina I. The symbolic and material construction of agroecology through the dispositive of "peasant-to-peasant" processes	*Agroecology and Sustainable Food Systems*	2019	Val, V., Rosset, P.M., Zamora Lomelí, C., Giraldo, O.F., Rocheleau, D. (2019). Agroecology and La Via Campesina I. The symbolic and material construction of agroecology through the dispositive of "peasant-to-peasant" processes. Agroecology and Sustainable Food Systems, 43(7-8), 872-894.
35	The economic potential of agroecology: Empirical evidence from Europe	*Journal of Rural Studies*	2019	van der Ploeg, J.D., Barjolle, D., Bruil, J., Brunori, G., Costa Madureira, L.M., Dessein, J., Drąg, Z., Fink-Kessler, A., Gasselin, P., Gonzalez de Molina, M., Gorlach, K., Jürgens, K., Kinsella, J., Kirwan, J., Knickel, K., Lucas, V., Marsden, T., Maye, D., Migliorini, P., Milone, P., Noe, E., Nowak, P., Parrott, N., Peeters, A., Rossi, A., Schermer, M., Ventura, F., Visser, M., & Wezel, A. (2019). The economic potential of agroecology: Empirical evidence from Europe. Journal of Rural Studies, 71, 46-61.

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36	From Transition to Domains of Transformation: Getting to Sustainable and Just Food Systems through Agroecology	*Sustainability*	2019	Anderson, C.R., Bruil, J., Chappell, M.J., Kiss, C., & Pimbert, M.P. (2019). From Transition to Domains of Transformation: Getting to Sustainable and Just Food Systems through Agroecology. Sustainability, 11(19), 1-28.
37	Do field-level practices of Cambodian farmers prompt a pesticide lock-in?	*Field Crops Research*	2019	Flor, R.J., Maat, H., Hadi, B.A.R., Kumar, V., Castilla, N. (2019). Do field-level practices of Cambodian farmers prompt a pesticide lock-in?. Field Crops Research, 235, 68-78.
38	Structuring Markets for Resilient Farming Systems	*Agronomy for Sustainable Development*	2019	Valencia, V., Wittman, H., & Blesh, J. (2019). Structuring Markets for Resilient Farming Systems. Agronomy for Sustainable Development, 39(25), 1-14.
39	Ecosystem hero and villain: Native frog consumes rice pests, while the invasive cane toad feasts on beneficial arthropods	*Agriculture, Ecosystems and Environment*	2019	Shuman-Goodier, M.E., Diaz, M.I., Liberty Almazan, M., Singleton, G.R., Hadi, B.A.R., & Propper, C.R. (2019). Ecosystem hero and villain: Native frog consumes rice pests, while the invasive cane toad feasts on beneficial arthropods. Agriculture, Ecosystems and Environment, 279, 100-108.
40	Bases agroecológicas para la adaptación de la agricultura al cambio climático	*Cuadernos de Investigación UNED*	2019	Nicholls, C.I., & Altieri, M.A. (2019). Bases agroecológicas para la adaptación de la agricultura al cambio climático. Cuadernos de Investigación UNED, 11(1), 55-61.
41	Defining agroecology: Exploring the circulation of knowledge in FAO's Global Dialogue	*The International Journal of Sociology of Agriculture and Food*	2019	Loconto, A., & Fouilleux, E. (2019). Defining agroecology: Exploring the circulation of knowledge in FAO's Global Dialogue. The International Journal of Sociology of Agriculture and Food, 25(2), 116-137.
42	Transitioning to Sustainable Agriculture Requires Growing and Sustaining an Ecologically Skilled Workforce	*Frontiers in Sustainable Food Systems*	2019	Carlisle, L., Montenegro de Wit, M., DeLonge, M.S., Iles, A., Calo, A., Getz, C., Ory, J., Munden-Dixon, K., Galt, R., Melone, B., Knox, R., & Press, D. (2019). Transitioning to Sustainable Agriculture Requires Growing and Sustaining an Ecologically Skilled Workforce. Frontiers in Sustainable Food Systems, 3, 1-8.
43	Peasant balances and agroecological scaling in Puerto Rican coffee farming	*Agroecology and Sustainable Food Systems*	2019	McCune, N., Perfecto, I., Avilés-Vázquez, K., Vázquez-Negrón, J., & Vandermeer, J. (2019). Peasant balances and agroecological scaling in Puerto Rican coffee farming. Agroecology and Sustainable Food Systems, 43(7-8), 810-826.
44	Shifting from farming to tending the earth: A discussion paper	*Journal of Organics*	2019	Hes, D., & Rose, N. (2019). Shifting from farming to tending the earth: A discussion paper. Journal of Organics, 6(1), 3-21.
45	Agroecology as a Practice-Based Tool for Peacebuilding in Fragile Environments? Three Stories from Rural Zimbabwe	*Sustainability*	2019	McAllister, G., & Wright, J. (2019). Agroecology as a Practice-Based Tool for Peacebuilding in Fragile Environments? Three Stories from Rural Zimbabwe. Sustainability, 11(3), 1-21.
46	The Contribution of Agro-ecology as a Solution to Hunger in the World: A Review	*Asian Journal of Agricultural Extension, Economics & Sociology*	2019	Adidja, M.W., Mwine, J., Majaliwa, J.G.M., & Ssekandi, J. (2019). The Contribution of Agro-ecology as a Solution to Hunger in the World: A Review. Asian Journal of Agricultural Extension, Economics & Sociology, 33(2), 1-22.

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47	Challenges and Action Points to Amplify Agroecology in Europe	*Sustainability*	2018	Wezel, A., Goris, M., Bruil, J., Félix, G.F., Peeters, A., Bàrberi, P., Bellon, S., & Migliorini, P. (2018). Challenges and Action Points to Amplify Agroecology in Europe. Sustainability, 10(5), 1-12.
48	Contribution of trees to the conservation of biodiversity and ecosystem services in agricultural landscapes	*International Journal of Biodiversity Science, Ecosystem Services & Management*	2018	Barrios, E., Valencia, V., Jonsson, M., Brauman, A., Hairiah, K., Mortimer, P.E., & Okubo, S. (2018). Contribution of trees to the conservation of biodiversity and ecosystem services in agricultural landscapes. International Journal of Biodiversity Science, Ecosystem Services & Management, 14(1), 1-16.
49	Agroecological transitions: What can sustainability transition frameworks teach us? An ontological and empirical analysis	*Ecology and Society*	2018	Ollivier, G., Magda, D., Mazé, A., Plumecocq, G., & Lamine, C. (2018). Agroecological transitions: What can sustainability transition frameworks teach us? An ontological and empirical analysis. Ecology and Society, 23(2), 1-18.
50	Food Sovereignty and the regeneration of terraced landscapes	*Annals for Istrian and Mediterranean Studies - Series Historia et Sociologia*	2018	Pimbert, M. (2018). Food Sovereignty and the regeneration of terraced landscapes. Annals for Istrian and Mediterranean Studies - Series Historia et Sociologia, 28(4), 779-794.
51	The Contribution of Traditional Agroecological Knowledge as a Digital Commons to Agroecological Transitions: The Case of the Conect-E Platform	*Sustainability*	2018	Calvet-Mir, L., Benyei, P., Aceituno-Mata, L., Pardo-de-Santayana, M., López-García, D., Carrascosa-García, M., Perdomo-Molina, A., & Reyes-García, V. (2018). The Contribution of Traditional Agroecological Knowledge as a Digital Commons to Agroecological Transitions: The Case of the Conect-E Platform. Sustainability, 10(9), 1-14.
52	Urban Agroecology: designing biodiverse, productive and resilient city farms	*Agro Sur*	2018	Altieri, M.A., & Nicholls, C.I. (2018). Urban Agroecology: designing biodiverse, productive and resilient city farms. Agro Sur, 46(2), 49-60.
53	Food systems for sustainable development: proposals for a profound four-part transformation	*Agronomy for Sustainable Development*	2018	Caron, P., Ferrero y de Loma-Osorio, G., Nabarro, D., Hainzelin, E., Guillou, M., Andersen, I., Arnold, T., Astralaga, M., Beukeboom, M., Bickersteth, S., Bwalya, M., Caballero, P., Campbell, B.M., Divine, N., Fan, S., Frick, M., Friis, A., Gallagher, M., Halkin, J.P., Hanson, C., Lasbennes, F., Ribera, T., Rockstrom, J., Schuepbach, M., Steer, A., Tutwiler, A., & Verburg, G. (2018). Food systems for sustainable development: proposals for a profound four-part transformation. Agronomy for Sustainable Development, 38(41), 1-12.
54	Knowledge politics in participatory climate change adaptation research on agroecology in Malawi	*Renewable Agriculture and Food Systems*	2018	Bezner Kerr, R., Nyantakyi-Frimpong, H., Dakishoni, L., Lupafya, E., Shumba, L., Luginaah, I., & Snapp, S.S. (2018). Knowledge politics in participatory climate change adaptation research on agroecology in Malawi. Renewable Agriculture and Food Systems, 33(3), 238-251.
55	Absent Agroecology Aid: On UK Agricultural Development Assistance Since 2010	*Sustainability*	2018	Pimbert, M.P., & Moeller, N.I. (2018). Absent Agroecology Aid: On UK Agricultural Development Assistance Since 2010. Sustainability, 10(2), 1-10.

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56	Quality farmer training videos to support South–South learning	*CSI Transactions on ICT*	2018	Van Mele, P., Okry, F., Wanvoeke, J., Barres, N.F., Malone, P., Rodgers, J., Rahman, E., & Salahuddin, A. (2018). Quality farmer training videos to support South–South learning. CSI Transactions on ICT, 6(3-4), 245-255.
57	'We go back to the land': processes of re-peasantisation in Araponga, Brazil	*The Journal of Peasant Studies*	2018	van den Berg, L., Hebinck, P., & Roep, D. (2018). 'We go back to the land': processes of re-peasantisation in Araponga, Brazil. The Journal of Peasant Studies, 45(3), 653-675.
58	Development of the Concept of Agroecology in Europe: A Review	*Sustainability*	2018	Gallardo-López, F., Hernández-Chontal, M.A., Cisneros-Saguilán, P., & Linares-Gabriel, A. (2018). Development of the Concept of Agroecology in Europe: A Review. Sustainability, 10(4), 1-23.
59	Agroecology, local food systems and their markets	*HAL*	2018	Loconto, A.M., Jimenez, A., Vandecandelaere, E., & Tartanac, F. (2018). Agroecology, local food systems and their markets. HAL, 25(2), 13-42.
60	Farmers' knowledge of soil quality indicators along a land degradation gradient in Rwanda	*Geoderma Regional*	2018	Kuria, A.W., Barrios, E., Pagella, T., Muthuri, C.W., Mukuralinda, A., & Sinclair, F.L. (2018). Farmers' knowledge of soil quality indicators along a land degradation gradient in Rwanda. Geoderma Regional, 15, 1-14.
61	The way forward: An agroecological perspective for Climate-Smart Agriculture	*Agriculture, Ecosystems and Environment*	2017	Saj, S., Torquebiau, E., Hainzelin, E., Pages, J., & Maraux, F. (2017). The way forward: An agroecological perspective for Climate-Smart Agriculture. Agriculture, Ecosystems and Environment, 250, 20-24.
62	The Long Road: Rural Youth, Farming and Agroecological Formación in Central America	*Mind, Culture, and Activity*	2017	McCune, N., Rosset, P.M., Cruz Salazar, T., Morales, H., & Saldívar Moreno, A. (2017). The Long Road: Rural Youth, Farming and Agroecological Formación in Central America. Mind, Culture, and Activity, 24(3), 183-198.
63	Agroecology accounting: biodiversity and sustainable livelihoods from the margins	*Accounting, Auditing & Accountability Journal*	2017	Lanka, S.V., Khadaroo, I., & Böhm, S. (2017). Agroecology accounting: biodiversity and sustainable livelihoods from the margins. Accounting, Auditing & Accountability Journal, 30(7), 1592-1613.
64	Investing in the transition to sustainable agriculture	*Environmental Science & Policy*	2016	DeLonge, M.S., Miles, A., & Carlisle, L. (2016). Investing in the transition to sustainable agriculture. Environmental Science & Policy, 55, 266-273.
65	Toward thick legitimacy: Creating a web of legitimacy for agroecology	*Elementa: Science of the Anthropocene*	2016	Montenegro de Wit, M., & Iles, A. (2016). Toward thick legitimacy: Creating a web of legitimacy for agroecology. Elementa: Science of the Anthropocene, 4, 1-24.
66	Agroecology: Principles for the Conversion and Redesign of Farming Systems	*Journal of Ecosystem and Ecography*	2016	Nicholls, C.I., Altieri, M.A., & Vazquez, L. (2016). Agroecology: Principles for the Conversion and Redesign of Farming Systems. Journal of Ecosystem and Ecography, 5(1), 1-8.
67	Agroecology: A Global Paradigm to Challenge Mainstream Industrial Agriculture	*Horticulturae*	2016	Valenzuela, H. (2016). Agroecology: A Global Paradigm to Challenge Mainstream Industrial Agriculture. Horticulturae , 2(2), 1-11.

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68	Agroecología, territorio, recampesinización y movimientos sociales	*Estudios Sociales*	2016	Rosset, P.M., & Martínez Torres, M.E. (2016). Agroecología, territorio, recampesinización y movimientos sociales. Estudios Sociales, 25(47), 275-299.
69	Trees in agricultural landscapes enhance provision of ecosystem services in Sub-Saharan Africa	*International Journal of Biodiversity Science, Ecosystem Services & Management*	2016	Kuyah, S., Öborn, I., Jonsson, M., Dahlin, A.S., Barrios, E., Muthuri, C., Malmer, A., Nyaga, J., Magaju, C., Namirembe, S., Nyberg, Y., & Sinclair, F.L. (2016). Trees in agricultural landscapes enhance provision of ecosystem services in Sub-Saharan Africa. International Journal of Biodiversity Science, Ecosystem Services & Management, 12(4), 255-273.
70	Caracterización de nueve agroecosistemas de café de la cuenca del río Porce, Colombia, con un enfoque agroecológico	*IDESIA Revista de Agricultura en Zonas Áridas*	2015	Machado, M.M., Nicholls, C., Márquez, S.M., & Turbay, S. (2015). Caracterización de nueve agroecosistemas de café de la cuenca del río Porce, Colombia, con un enfoque agroecológico. IDESIA Revista de Agricultura en Zonas Áridas, 33(1), 69-83.
71	Sustentabilidad de los sistemas de cultivo con yuca (Manihot esculenta Crantz) en la subcuenca de Santa Teresa, Cusco	*Ecología Aplicada*	2015	Meza, Y., & Julca Otiniano, A. (2015). Sustentabilidad de los sistemas de cultivo con yuca (Manihot esculenta Crantz) en la subcuenca de Santa Teresa, Cusco. Ecología Aplicada, 14(1), 55-63.
72	Agroecology and the design of climate change-resilient farming systems	*Agronomy for Sustainable Development*	2015	Altieri, M.A., Nicholls, C.I., Henao, A., & Lana, M.A. (2015). Agroecology and the design of climate change-resilient farming systems. Agronomy for Sustainable Development, 35, 869-890.
73	Incorporating Agroecology Into Organic Research–An Ongoing Challenge	*Sustainable Agriculture Research*	2015	Niggli, U. (2015). Incorporating Agroecology Into Organic Research–An Ongoing Challenge. Sustainable Agriculture Research, 4(3), 149-157.
74	Agroecological engineering	*Agronomy for Sustainable Development*	2015	Lescourret, F., Dutoit, T., Rey, F., Côte, F., Hamelin, M., & Lichtfouse, E. (2015). Agroecological engineering. Agronomy for Sustainable Development, 35, 1191-1198.
75	Agroecological management of cucurbit-infesting fruit fly: a review	*Agronomy for Sustainable Development*	2015	Deguine, J.P., Atiama-Nurbel, T., Aubertot, J.N., Augusseau, X., Atiama, M., Jacquot, M., & Reynaud, B. (2015). Agroecological management of cucurbit-infesting fruit fly: a review. Agronomy for Sustainable Development, 35, 937-965.
76	Analysis of ecosystem services trade-offs to design agroecosystems with perennial crops	*Agronomy for Sustainable Development*	2015	Rapidel, B., Ripoche, A., Allinne, C., Metay, A., Deheuvels, O., Lamanda, N., Blazy, J.M., Valdés-Gómez, H., & Gary, C. (2015). Analysis of ecosystem services trade-offs to design agroecosystems with perennial crops. Agronomy for Sustainable Development, 35, 1373-1390.
77	Evaluación de los servicios ecosistémicos de un socio-ecosistema singular a través de la historia: "La Huerta de Murcia"	*Ecosistemas*	2015	Gutiérrez, P., Suárez, M.L., & Vidal-Abarca, M.R. (2015). Evaluación de los servicios ecosistémicos de un socio-ecosistema singular a través de la historia: "La Huerta de Murcia". Ecosistemas, 24(3), 51-60.
78	Financial competitiveness of organic agriculture on a global scale	*Proceedings of the National Academy of Sciences of the United States of America - PNAS*	2015	Crowder, D.W., & Reganold, J.P. (2015). Financial competitiveness of organic agriculture on a global scale. Proceedings of the National Academy of Sciences of the United States of America - PNAS , 112(24), 7611-7616.

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79	Permaculture for agroecology: design, movement, practice, and worldview. A review	*Agronomy for Sustainable Development*	2014	Ferguson, R.S., & Lovell, S.T. (2014). Permaculture for agroecology: design, movement, practice, and worldview. A review. Agronomy for Sustainable Development, 34, 251-274.
80	Cover Cropping Alters the Diet of Arthropods in a Banana Plantation: A Metabarcoding Approach	*PLoS ONE*	2014	Mollot, G., Duyck, P.F., Lefeuvre, P., Lescourret, F., Martin, J.F., Piry, S., Canard, E., & Tixier, P. (2014). Cover Cropping Alters the Diet of Arthropods in a Banana Plantation: A Metabarcoding Approach. PLoS ONE, 9(4), 1-9.
81	Agroecological Research: Conforming—or Transforming the Dominant Agro-Food Regime?	*Agroecology and Sustainable Food Systems*	2014	Levidow, L., Pimbert, M., & Vanloqueren, G. (2014). Agroecological Research: Conforming—or Transforming the Dominant Agro-Food Regime?. Agroecology and Sustainable Food Systems, 38(10), 1127-1155.
82	Scaling up agroforestry requires research 'in' rather than 'for' development	*Current Opinion in Environmental Sustainability*	2014	Coe, R., Sinclair, F., & Barrios, E. (2014). Scaling up agroforestry requires research 'in' rather than 'for' development. Current Opinion in Environmental Sustainability, 6, 73-77.

Source: Own elaboration