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**HOW DO FARMERS EXPERIENCE AGROECOLOGY IN  
RURAL COMMUNITIES OF NORTHERN ECUADOR?**

by

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DISSERTATION

Submitted in Partial Fulfillment of the  
Requirements for the Degree of

**Doctor of Philosophy in Latin American Studies**

The University of New Mexico  
Albuquerque, New Mexico

**May 2020**

## DEDICATION

To the campesinos and agroecological practitioners of Latin America

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# **HOW DO FARMERS EXPERIENCE AGROECOLOGY IN RURAL COMMUNITIES OF NORTHERN ECUADOR?**

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**Doctor of Philosophy, University of New Mexico, 2020**

## **ABSTRACT**

Agroecology is a concept in continuous evolution, which embraces science, practice and sociopolitical aspects. Its meaning is gaining space of debate and global interest as a positive alternative for building sustainable food systems and resilient communities, not only from the environmental perspective, but from all the dimensions of sustainability (environmental, economic, political, cultural, ethical and social). The Andes region is recognized for its agrodiversity and for its history of agricultural activity for millennia; nevertheless, it has not been immune to the effects of unsustainable agricultural practices inspired in the principles of the so called “Green Revolution”. Conventional agriculture has decreased the capacity of resilience of the agroecosystems and their associated communities. Agroecology is often perceived as a strategy to cope with land and social degradation; however, it means different thing for different people. Those convergent and divergent perceptions have been poorly explored by researchers. The Cayambe (2,809 masl) and Pedro Moncayo (2,889 masl) counties are located in the northern Andes of Ecuador and have been engaged in agroecological initiatives for about three decades. The population is a mix of indigenous and mestizo people with a high

percentage of unsatisfied basic needs. Their small farms are embedded among larger industrial agriculture areas.

This dissertation consists of three primary chapters, each of which is written as a single article intended for journal publication. In the first article, we explored farmers' and external stakeholders' motivations, compensations, and expectations from agroecology within three different timeframes. In the second article, we analyzed the sources and dynamics of agroecological knowledge in terms of farmers' reported practices. In the final article, we investigated the impact of agroecology using art-based methods at three scales: the individual, the farm and the community.

Overall, the dissertation reveals convergences and divergences of perceptions especially in terms of motivations, compensations and levels of participation in agroecological practices. We inventoried many agroecological practices, mostly related to the environmental and cultural dimensions, in detriment of the other ones. The main sources of knowledge were associated to the family and to outside the community. Finally, the perceptions of the impact of agroecology in farmers' life was mostly associated with better personal health, body awareness and self-satisfaction; although these perceptions varied according to the number of years practicing agroecology and the proportion of income derived from agriculture. Farm maps revealed an impact on increasing agrodiversity of crops and integration of animals, while community maps illustrated multidimensional contributions of agroecology in sociopolitical and physical infrastructure. This dissertation opens new questions and problematizes aspects of the historical dynamics of agroecology in the Northern Andes of Ecuador which are worth exploring.



## Table of Contents

DEDICATION .....	iii
ACKNOWLEDGEMENTS .....	iv
ABSTRACT .....	vi
INTRODUCTION .....	1
Literature review .....	4
What is agroecology? .....	4
Motivations to embrace agroecology and expectations .....	9
Agroecology as a system based on functional biodiversity .....	12
Social aspects – Agroecology as a movement .....	13
Agroecological knowledge: production, diffusion, and reclamation .....	15
Agroecology in Ecuador: policy, institutions, practices .....	24
Research Question .....	29
Methodology .....	30
Target Population and Inclusion/Exclusion Criteria .....	34
Recruitment and Screening Procedures .....	36
Data Collection Procedures .....	36
Community engagement .....	38
Results and Outcomes .....	39
References .....	41
MOTIVATIONS TO ADOPT AGROECOLOGY IN TWO RURAL COMMUNITIES OF THE NORTHERN ANDES OF ECUADOR .....	55
Introduction .....	55
Background: Trajectory of Agroecology in Ecuador .....	56
Understanding stakeholder motivations .....	58
Methods .....	62
The participants .....	66
Interviews .....	67
Analysis .....	69

Results and discussion .....	69
Perceptions of participation of farmers and agencies in the development of Agroecology .....	69
Motivations of farmers for adopting agroecology.....	80
Compensation for adopting agroecology .....	87
Why is agroecology in the agenda of government and non-government organizations?.....	90
What are the expectations for Agroecology in the future?.....	91
Conclusions .....	96
References .....	102

SOURCE AND DYNAMICS OF AGROECOLOGICAL KNOWLEDGE IN TWO RURAL COMMUNITIES OF NORTHERN ECUADOR.....	115
Introduction .....	115
Methods .....	118
The area of the study .....	118
Participants .....	120
Demographics.....	121
Data collection.....	122
Analysis .....	123
Results .....	124
Discussion.....	127
The dynamics of agroecological knowledge.....	127
The role of the family, the community, and the other contexts .....	131
Conclusions .....	136
References .....	138

FARMERS' PERCEPTIONS OF THE IMPACT OF AGROECOLOGY IN TWO RURAL COMMUNITIES OF THE NORTHERN ANDES OF ECUADOR .....	147
Introduction .....	147
Research question and overview of methods .....	151

What is the perception of the impact of agroecology at the individual's level? .....	151
The study area .....	151
The participants .....	153
Mapping .....	156
Data collection.....	158
Analysis .....	161
Results and discussion.....	165
How did our participants perceive the impact of agroecology?.....	165
Negative impacts .....	167
Contradictions and divergencies .....	170
Co-occurrence of codes.....	171
Perceptions of the impact of agroecology according to the years of experience and proportion of income from agriculture.....	172
Conclusions .....	179
References .....	181
 CONCLUSIONS.....	 189
Motivations for adopting agroecology .....	190
Source and dynamics of agroecological knowledge.....	192
Perceptions of the impacts of agroecology .....	195

## INTRODUCTION

Food production is becoming problematic both locally and globally due to different factors but especially environmental degradation and social constraints derived from conventional agribusiness (Gomes, 1999; Rodríguez, 2010). Conventional agriculture, inspired by the principles of the Green Revolution (GR), is focused on the continuance of agricultural systems with a high dependency on external inputs, such as synthetic fertilizers, chemical pesticides, mechanization, high yield seeds, and irrigation (Shiva, 2007). This type of agriculture, oriented toward high specialization of monoculture crops, supplies prime material for agroindustry, market chains, and exports. Conventional agriculture historically operated with external knowledge and technology, which required external financial sources, pushing farmers to adopt agricultural practices, patterns of land tenure, social relationships, ways of doing business, and expectations about their own lives that were aligned primarily to satisfy conventional and corporative food systems. Farmers started to leave their ancestral knowledge, traditional seeds, and best practices behind, becoming more dependent on external sources, paying less attention to the natural cycles and rhythms of their agroecosystems, and focusing more on the rhythms of the market instead.

Academic literature describes the GR as a form of agriculture which started in the 1960's and is characterized by its high productivity as the result of scientific crop genetic research, high investment in infrastructure and market development, and support from public policy (Pingali, 2012). One of the side effects of this form of production was the

disparity of crop research, mainly focused on geographical areas with enough supporting contexts such as access to land and water, to the detriment of poorly endowed social and geographic contexts. In addition, even the lower prices of food combined with uninformed public policy motivated the collapse of the productive infrastructure of certain staple crops in developing countries like Colombia and Ecuador (Álvarez Sánchez & Chaves, 2017). Consequently, the effects of the GR are debatable for not having considered sustainability as criteria (FAO, 2018) to assess its performance and impacts.

On the other hand, agroecology (AE), defined as a scientific discipline, a practice and a set of actions to help assemble sustainable food systems with high participation of stakeholders (Montúfar & Ayala, 2019), challenges the principles of the GR and criticizes its effects. The literature consistently claims the positive outcomes of AE, especially from the socioeconomic and food-systems perspectives (Altieri, 2002; Silici, 2014). Most assessments about the performance of AE have been made by external researchers and evaluators, and the current literature does not cover extensively the farmers' own perceptions of AE impacts. It is remarkable that the Andean region, being an important center for diversity and domestication of crops, has largely contributed to the production, development, and spread of agroecological knowledge (Castillo, 1995); however, little is known about the historical dynamics of such knowledge in the sub-region. There is a clear need to explore the drivers that operate in Andean farmers' decision process for adopting AE, and the nature of those motivations and expectations from a critical perspective. The interest of consumers in agroecological produce is expected to increase in coming years, both in rural and urban areas in Ecuador; however, consumers are not

organized, and they know very little about the meaning of AE in the Ecuadorian context. The importance of this research project is to identify and reflect the ways the farmers perceive AE in their lives. The results might be of interest to a diverse audience, including potential and current consumers searching for positive ways to contribute to the construction of sustainable food systems.

This research explored i) historical and current farmers' motivations and expectations about AE and the compensations they received for embracing AE; ii) the dynamics of agroecological knowledge and the sources of that knowledge; and iii) the perceptions of the impact of AE from the farmers' perspective at the rural level using a case study. Our research project acknowledged the different bodies of existing literature about AE, and offered an analysis based more squarely on active participation from farmers, starting with discussion about the proposed research question and the use of both conventional and innovative methods for collecting and analyzing data. The area of the study is in the midst of a mosaic of small-scale conventional farms with agroecological initiatives embedded in larger areas of industrial fresh-cut-flower, and dairy farms. Consequently, the area faces increasing tensions for the use and access to resources like land and water. We invited active members of agroecological associations in two neighboring counties in the north of Pichincha Province in Ecuador to contribute to this study, based on a three-decade history of implementation of AE.

The aim of this research was to contribute with an innovative approach to describing the way agroecological farmers experience and understand AE with diverse methods for

collecting and analyzing data. We hope our findings will produce some academic debate about the role of agroecology in people's lives and the contrast with external stakeholders' perceptions. We expect the discussion of our study will contribute to improving further interventions with a more collective and inclusive approach to further the positive impact of AE at a territory level, not only increasing the number of practitioners, but also internalizing and consolidating the principles of AE as part of a lifestyle.

## Literature review

### *What is agroecology?*

Different strategies have been developed in the last few decades to tackle environmental, economic, and socio-political issues related to unsustainable food systems and inadequate natural resources management. Agroecology (AE) is one of those approaches which has been evolving consistently at the global level, in Latin America, and in Ecuador. The definition of AE has been framed from different perspectives. In early publications, AE referred only to the ecological context of a crop (Wezel & Jauneau, 2011). Later on, the concept gained contributions from both environmental and agricultural sciences; and it started challenging the principles of the GR, criticizing its environmental, social, economic, and ethical failures (Shiva, 2007). In the 1980s, and up to the present, anthropology, rural development, ecological economics, and other disciplines contributed to the discussion (Altieri & Nicholls, 2017), identifying AE as a social movement. Current definitions of AE go beyond the mostly ecological-technical early approach, and

now authors frame it as a science, as a socio-political movement, and as a practice (Wezel et al., 2009; Leon, 2014; Levidow, Pimbert, & Vanloqueren, 2014).

The scientific point of view focuses mainly on achieving a biological, chemical, and hydric balance within an agroecosystem, providing the appropriate environment to maintain healthy and well-adjusted communities of plants and other organisms in a synergistic fashion. However, recent research addresses the concept of the phytobiome – considering the interactions of crops with other plants, macro and micro-organisms and the environment – as the aim of agroecological practice (Dangles, Restrepo, & Montúfar, 2019). Current AE concepts integrate social networks of both knowledge production and knowledge diffusion, in addition to various ways of distribution of the harvest, and collaborative guarantee mechanisms or participatory guarantee systems, also called PGS (Rodrigues Hirata et al., 2019). These factors contribute to the construction and strengthening of social capital and capacity building for individuals and community, enhancing social and environmental yields, thus, building resilience (Altieri, Funes-Monzote, & Petersen, 2012). AE introduces a strategy for enhancing participation of various stakeholders as part of the food system, motivating direct communication between producers and consumers (Hainzelin, 2015; Pino, 2017). Agroecological associations have confirmed being active in political incidence and governance, creating spaces for the debate and inclusion of their claims at local and higher levels.

From the practice perspective, AE has been defined as being holistic, autonomous, harmonic, democratic, and rebellious (Gortaire, 2017). AE has also been considered as a paramount contribution to sustainable food systems (Silici, 2014) and as a model to



building solutions with the participation of both ancestral and scientific knowledge, relying on local, dynamic, and adaptive learnings that lead to innovations (Hainzelin, 2015). AE emphasizes sovereignty using local and ancestral knowledge and resources such as traditional seeds and ancestral practices (Montúfar & Ayala, 2019); moreover, the practice approach of AE is now more linked to the understanding of AE as a movement (Wezel, Doré, Vallod, & David, 2009). There is the contribution of scientific research to AE; additionally, several disciplines contribute to its understanding and its impact on individuals, communities, and territories, including socioeconomic and behavioral aspects, climate change, and governance. AE has reached important visibility in Latin America so that nowadays it represents a fertile field for research. However, multiple understandings of AE have historically emerged, frequently due to cultural factors (Wezel et al., 2009), thus, researchers should be explicit in their interpretation, scope, and categories of analysis when referring to it.

As a summary, during the historical evolution of AE, some theoretical principles have also developed (Third World Networks, 2015; CIDSE 2018): AE can be approached from three perspectives: i) as a science with a holistic scope, which focuses research on resilient agroecosystems and sustainable food systems; ii) as a set of practices towards a sustainable food production, taking account of social, economic, and environmental concerns, and iii) as a sociopolitical movement that enhances stakeholders' engagement with high levels of participation in politics and public policy. Additionally, AE embraces the following theoretical ecological principles from the scientific perspective: i) ecological interconnection and cooperative networking, ii) matter and energy cycling, iii)

plant diversity, meaning functional biodiversity that derives resilience in both agroecosystems and food systems in an adaptive manner. Agroecological knowledge is nurtured by local and ancestral empiric inputs that stem from the historical interaction of farmers with the environment (Third World Networks, 2015). AE, as a set of practices is followed by the abovementioned ecological principles, pursuing complexity, contrary to conventional agriculture, which promotes simplification of productive systems. Recent literature mentions additional principles that enrich this understanding of AE: i) a large proportion of produce is oriented to local self-supply, ii) functional integration of edible plants and animals to enhance food offer and the recycling of matter and energy, iii) local and traditional varieties of plants and animals are included in agroecosystems, iv) seed-saving practices with alternative and traditional seed trading strategies are implemented, v) small-scale farms have high diversification and rely on low external inputs, vi) soil fertility enhancement is a regular concern, vii) technical knowledge is locally produced and spread through local social networks, viii) produce is distributed through equitable, just, and accessible food systems (Gliessman, 2018b; Montúfar & Ayala, 2019).

Agroecology has been depicted since 1928 in terms of the ecological conditions in which plants grow for agricultural purposes (Wezel et al., 2009). Wezel & Soldat (2009) portray a historical evolution of AE as a scientific discipline, and state that the frequency of references in the literature has increased in recent years. They refer to Wolfgang Tischler's publication in 1965, stating that AE is the interaction of biotic and abiotic components and the impact of agronomic practices; this meaning of AE is still currently used for the same purpose in certain publications (see Zimmerer, 2013). Apparently, it

was at the end of the 1970s when authors like Cox & Atkins (1979) problematized the impact of conventional agricultural practices on the environment and the society, which opened the discussion about sustainable alternatives available at that time. Such alternatives include biological pest management, plant resistance/tolerance, and integrated pest management. Cox & Atkins (1979) criticize artificial soil fertility practices, water pollution, high use of energy and resources for agricultural production, and depict international food policy as being problematic. They do not mention the term Agroecology as such, although their position is clearly equivalent to most of the current general understanding of AE. It was in the 1980s, when the name started to tilt its meaning from the former ecological context to a connotation more specific to sustainable agricultural practices, which implied sociopolitical concerns. During the 1980s, AE appeared more focused on alternative ways of sustainable production based on ecology principles by re-designing the farm, enhancing soil fertility, promoting functional agrobiodiversity and natural predators as a strategy to pest management, with authors such as Miguel Altieri in Latin America (Wezel & Soldat, 2009).

In the 1990s and 2000s, AE publications increased while the definition continued to evolve, problematizing and embracing more concepts in a complex and changing manner. So far, AE has been mainly described from the three perspectives already suggested (Altieri & Francis, 1992; Wezel & Jauneau 2011). New perspectives enrich the concept of AE by mentioning its contribution to sustainable food systems, being an effective strategy to reducing greenhouse effects, and helping achieve climate resilience. Also, new approaches problematize colonialism in the discourse of AE and in the perception of

what is considered efficiency and productivity (Silici, 2014). Scarborough & Méndez (2015) link AE contributions to resilient food systems through its multiple supporting interactions between natural and social structures. Consequently, the concept of sustainability for the purpose of describing AE integrates the following six conservation dimensions: a) functions and productive capacity of the ecosystem, b) production of economic benefits, c) hydrologic cycle, d) the soil, e) biodiversity, f) landscape quality, g) carbon balance, h) diversification of products, i) satisfying human needs, j) harmonic development of local communities, k) equitable and just distribution of benefits among stakeholders, and nations, and l) the rights of native peoples (Gastó, Vera, Vieli, & Montalba, 2009).

#### *Motivations to embrace agroecology and expectations*

Motivations to embrace AE and farmers' expectations in Ecuador have been poorly described in the literature. Historical motivations have been discussed from a sociological perspective (Guzmán & Woodgate, 2013), suggesting that farmers find in AE a response to global environmental degradation. They also affirm that farmers respond to signals from the market and, illustrating with examples from the nineteenth century in Europe, they assert that complex interactions between ecological and social dynamics operate in the process of adoption of agricultural practices. The authors comment on a case in Tabasco, Mexico where agroecological practice is natural to local farmers as they do not work against the natural processes but with them instead; hence, they suggest that AE offers answers that make sense to farmers.

Smallholder motivations in southern Brazil for the adoption of agroecological practices take into consideration rational dimensions, especially regarding their interaction with nature, and also related to the origin of the practitioners (Souza et al., 2011). This cited case study describes one group of traditional growers who naturally perform agroecological practices claiming that those practices were customarily implemented by their ancestors. Another group of farmers, who are relatively recent migrants, claim that health issues linked to the use of agrochemicals are the main reason to swap to AE; another reason is the increasing demand for pesticide-free produce from the tourism industry. A third group of immigrants constituted by urban people interested on living a healthier and greener lifestyle are reported to adopt AE for personal satisfaction.

A case study in Cameroon showed that older farmers are more prone to adopt conventional farming techniques due to inertia and their inability to adapt to new options, while younger farmers are more open to adopt AE in association with the following factors: higher level of income and years of education, and families with more members of the family working in the farm (Epule & Bryant, 2017). A case study in Chile (Potocnjak, 2014) starts by discussing two types of motivations: intrinsic or innate motivations, which do not require a reward; these motivations are related to visions of autonomy, while extrinsic motivations require either a reward or avoiding a punishment (Ryan & Deci, 2000). Extrinsic human motivation is a continuum that might eventually end up with a complete integration of values. The literature also describes a motivation system of six levels starting with a stage of amotivation, and following with external regulations, introjected regulations, identified regulations, integrated regulations, up to a

final stage called intrinsic motivation (Ryan & Deci, 2000). It is well established that a new technology works better when accompanied by sensitizing through communication strategies about its benefits and a long-term intervention for achieving an authentic change of behavior (Scarborough & Méndez, 2015). However a case study from the Netherlands suggest that internalization of policies should be specifically implemented according to the motivations that operate in the farmers' attitudes (Stobbelaar, Groot, Bishop, Hall, & Pretty, 2009), hence, the importance of studying this topic.

Gortaire (2017) depicts a historical narrative of the progress of agroecological thought in Ecuador in light of the social and political movements. He analyses at least two possible scenarios for AE in the coming years: the neoliberal tendency to see peasants as paid farm laborers engaged in the consolidation of agribusiness, or just as suppliers of prime material to the agroindustry and food chains. In this scenario there is no place for agrodiversity and autonomous production initiatives. The second scenario would reach a point of balance between the expansion of capitalist agribusiness and a strong and well organized, articulated, and dynamic peasants' movement. It is recognized that nowadays, the agroecological practitioners, scientists, activists, and consumers represent the force that can challenge the impact of industrial and capitalist agriculture on small-scale farmers and its negative impact on the environment, so that we can build environmental resilience and social justice. Agroecological science needs to keep on growing together with the social movements to prevent losing its transformative potential and getting coopted by the hegemonic conventional agribusiness (Guzmán & Woodgate, 2013).

*Agroecology as a system based on functional biodiversity*

Agriculture, in general is essentially the result of the historical human interaction with nature, (León, 2009) which implies specific arrangements that humans make on the natural systems to satisfy people's needs and wants. From the systemic perspective, Heifer (Bravo, 2014) a NGO working in Ecuador in the development of AE, depicts that life itself operates in a non-linear fashion, and so does AE, describing dimensions which deploy in seven different networks: (i) cultural, (ii) ecologic, (iii) ideological, (iv) political, (v) economic (vi) ethical and (vii) class dimension. Several authors consider the positive relations and interaction of humans with domesticated and non-domesticated plants and animals, soil, water, and climate, within geographical and physical spaces, as the basis for sustainable agroecosystems (León, 2009; Binayak, 2017). However, Altieri (1999) goes beyond the mere idea of biodiversity as he introduces the concept of functional biodiversity within the agroecosystem. The author claims that biodiversity components such as pollinators, predators, herbivorous, wild vegetation, micro and meso-fauna, perform particular functions such as: pollination, biological control of pests and pathogens, recycling of nutrients, allelopathic competition, decomposition of organic material, melioration of soil structure, which leads to the increase of water retention and prevention of erosion.

A comprehensive description of the importance of biodiversity is well described in Rosset & Altieri (2017). A study paper from FAO contributes to this analysis stating that ecosystem services are also a contribution from ancestral livestock and the capacity of adaptation to their particular geographical context (Hoffmann, From, & Boerma, 2014).

The cited document clearly explains the different ecosystems services which totally relate to the concept of functional biodiversity suggested by Altieri (1999) above. The different components, elements and dimensions of AE illustrate the complex and dynamic approaches from which AE can be analyzed. For the purpose of our case study, we have discussed the data from the following six dimensions: political, social, cultural, environmental, economic, and ethical dimensions, acknowledging that there are not clear boundaries among them (Caporal & Costabeber, 2004).

#### *Social aspects – Agroecology as a movement*

Most studies discuss the benefits of agriculture from the economic and environmental perspective. Even Ecuadorian research institutions have largely devoted resources measuring yields from the crops over decades, but not measuring the wellbeing of farmers in rural areas (Domínguez, Sánchez, & Zambrano, 2017). Multiple authors refer to AE as enhancing resilience of environmental and social systems (Silici, 2014; Jacobi et al., 2017) and constituting the engaging element for social mobilization and action due to its transdisciplinary approach that involves all stakeholders from the food systems, and confronting existing political power structures with inventive and adaptive social structures and alternatives (Gortaire, 2017; Gliessman, 2018; Dangles et al., 2019). As a consequence, the reductionist approach of considering AE as a set of practices for sustainable food production jeopardizes the transformative potential of AE for social change (Minga, 2017).

Conventional agriculture as suggested by Shiva (2007) depicts a scenario in which small-scale farmers appear disengaged from any type of social participation that could advocate



for a better social-economic situation. Analyzing the impact of AE requires paying special attention to the social context where farmers, scientists, and their networks integrate their contributions, starting with the production of knowledge and ending with the alternative ways of commercialization of produce and the political incidence that the whole process of AE involves (Warner, 2007). In terms of political ecology, AE has approached the power issues in agriculture, and with the food sovereignty discourse, it has improved the reclamation of land and access to resources as well as the insertion of agricultural knowledge and techniques into the social context. This is the case for Latin American movements like *Vía Campesina Internacional* and *Campesinos sin Tierra* (Val, Rosset, Zamora Lomelí, Giraldo, & Rocheleau, 2019). AE deserves recognition for the participation of allies such as some sections of the church aligned with the Theology of Liberation and native theology in Latin America, and NGOs aligned with the Theory of Education for Liberation (Freire, 1973) in the development of this social fight (Giraldo, 2019; Wezel et al., 2009). These former stakeholders sparked their ideas and theories early in the 1960s, but their effect was not very visible at that moment.

An example from Ecuador is the indigenous uprising in the early 1990s, which was founded through contributions of the church and NGOs (Chiriboga, 2014). This uprising was the beginning of an active political participation of indigenous people from the coast, the highlands, and the Amazon regions, as well as former powerless peasants from all over the country. Despite the diverse outcomes of such participation over time, because of the euphoria and enthusiasm of that movement, which has been largely criticized for being sometimes capitalized on by traditional powerholders, its contribution to

constructing political subjects from traditionally powerless groups is undeniable (Gallar, 2019). Even the motivations and outcomes of the recent indigenous uprising in October 2019, although highly contestable and debatable, show the power of the indigenous movements in Ecuador. Latin American organizations such as the Agroecological Movement of Latin America (MAELA) and the Association of Organic Producers of Paraná (AOPA) in the late 1990s have continuously advocated the AE principles and have been the voice of the farmers' organizations. There is a tendency from governments to implement strategies of appropriation of such outcomes of the agroecological fight, trying to institutionalize them, even though the origin of AE is founded on concepts of sovereignty and independence and has traditionally been a response to official government agricultural policies (Wezel et al., 2009). There are radical positions that oppose this meddling from the government, whereas other collectives have found some consensus, especially with local and municipal governments.

#### *Agroecological knowledge: production, diffusion, and reclamation*

The historical evolution of Agroecological knowledge from the production system approach to the current scientific, participatory, and transdisciplinary approach has been described extensively (Altieri, 2002; Rosset, Sosa, Jaime, & Lozano, 2011; Méndez, Bacon, & Cohen, 2013; Pimbert, 2017; Nicholls-Estrada & Altieri, 2018). The literature suggests that agroecological knowledge is a dynamic process which is built upon the practice and the interaction of farmers and other stakeholders. Rosset (2014) depicts agroecological knowledge as the result of a dialogue between traditional knowledge and ecological sciences insights, which has been corroborated by Méndez et al. (2013), while Gliessman (2018) adds that AE knowledge is the result of research, education, action, and

change within a holistic confrontational context among different stakeholders. An important addition, coming from the Peruvian Quechua and Aymara cosmovision, is the idea of the role of the *chacra* (the farm) as the place where the different beings, both biophysical and human, are considered identities who dialogue and construct knowledge (Gonzales, 2000).

The mainstream research systems have made invisible the knowledge from peasants and have chosen the Western cosmovision as the only prevalent one, disregarding the relevance of the indigenous potential contribution to sustainable practices and natural resource management. Freire (1973) asserts that authoritative education has a narrative of cultural conquest and imposition whereas education for liberation considers learners as educators and learners simultaneously, within a dialogue of knowledges, enhancing equity, solidarity, and respect to one another. Ruttan & Hayami (1973) recognized the “technology factor” as a paramount aspect for increasing productivity and welfare, within the context of conventional agriculture. They discussed the diffusion of knowledge and technology from the international transfer of technology perspective, asserting that an elastic supply of adapting research assured success in the process of “naturalization” of agricultural technology because of ecological and cultural differences among nations or localities. Even in the context of the GR, they claim that local adaptations of agricultural technology transfer are required for both biological and mechanical technology. Ruttan & Hayami, (1973) consistently suggest the need to institutionalize local research capacity to produce “location-specific agricultural technology.” In the case of Ecuador, research institutions, universities, government and non-government institutions neglected these

recommendations for several decades to the point where agroecosystem unbalances, soil degradation, and social economic disparities evidence a real need for a change of paradigm.

For several decades, the conventional approach to agricultural research and technology transfer lacked official recognition of the value of the traditional knowledge of the farmers. This situation has finally changed with the inclusion of such aspects in current Ecuadorian legislation (República del Ecuador, 2008), although it does not necessarily translate to reality. Levidow et al. (2014) sharply criticize a technology transfer approach in which farmers simply follow external researchers' recommendations. They envision a scenario where both farmers and scientists build and exchange knowledge in a transformative and adaptive research fashion, which coincides with Freire's statement (Freire, 1973; Minga, 2017). The literature proclaims the contribution of AE to the construction of sustainable and sovereign food systems, from the three dimensions: a science, a practice, and a social movement.

Corburn (2005) contributes to the discussion when he describes official technicians being challenged by farmers. He opens the discussion of co-production of science, with a more democratic partnership between the "professionals" and the "lay people", which is something that AE has been doing for decades (Rosset, Sosa, Jaime, & Lozano, 2011). Co-learning is a contribution of Hacker et al., (2012) from the public health field; they claim that community members and academics could engage and mutually educate each other in their aim to identify common outcomes. However, van Paassen et al. (2011)

clarifies the different levels and forms of stakeholder participation in the construction of knowledge, problematizing the extent to which stakeholders are able to make decisions along the process, and the resulting ownership they may have over that knowledge. Our study embraced the spirit of the collective and adaptive construction of knowledge, which diffuses and expands through both alternative and official channels, depending on the origin of the knowledge and the nature of the role of the stakeholders. We recognize that there are contesting points of view around this topic at this moment, and will expand about it in the next section when referring to knowledge dissemination, validation, and translation (Jankowski, 2014).

For the purpose of this study, we have considered agroecological knowledge as the product of the contributions from practitioners, from the formal institutions through conventional research, plus the experience of diverse stakeholders involved in the process (Gliessman, 2018b; Rosset et al., 2011). This study also highlights the importance of agroecological knowledge being contextual (socially and geographically) to its users, especially when referring to indigenous knowledge, which is defined as a cumulative body of knowledge and believed to be inherited within the cultural context and within a particular environmental space (Gadgil, Berkes, & Folke, 1993). Knowledge production and dissemination have blurry boundaries because they are both simultaneous processes that operate continuously as a response to environmental constraints that require immediate solutions. Such solutions have been historically produced and help understand the value of indigenous knowledge and community action for a more sustainable natural resources management. A case in a Zuni territory in New Mexico, for example, where

archeological evidence showed how indigenous farmers implemented stormwater harvesting strategies that not only became a water supply for dry seasons but also enhanced soil fertility and reduced erosion and downstream sedimentation, is a hint of the production of local initiatives for resolving environmental challenges (Norton, Pawluk, & Sandor, 1998). We further analyze this case study when referring to knowledge reclamation later in this paper.

A case study from Brazil (Linhares de Assis & de Aquino, 2018) describes collaborative production of knowledge where soil issues become the instrument that brings together farmers and technicians to find locally adapted alternatives to a more sustainable soil management. Moreover, there is evidence to illustrate that knowledge remains embedded in the landscape as a result of social and physical interactions (Sherwood, Arce, & Paredes, 2017). The role of the farm, in terms of storing knowledge, helps perpetuate practices which communicate such a knowledge to current and future users as recounted in farms located in southern Mexico (Gonzales, 2000). Knowledge, and its relationship with the social and physical contexts is both non-linear and complex, and it is disseminated at different spatial scales. The dissemination of local knowledge at the community level is enhanced by existing social networks which start within the family, and advance upwards, based mostly on interpersonal communication and cultural tradition; meanwhile, professional knowledge produced at official knowledge suppliers such as research stations, universities, NGOs and government, require different levels of social capital and networks, such as peer reviewed articles, institutional dissemination

strategies, public policy, academic and official media platforms (Norton, Pawluk, & Sandor, 1998).

Hacker et al. (2012) found that intergenerational transfer of knowledge is perceived by rural communities as linked to the notion of sustainability, and this type of knowledge becomes traditional when it is communicated and implemented in a transgenerational fashion. A study performed in California states that the nature of agroecological knowledge is different from any technological knowledge, claiming that it should not be disseminated reproducing the conventional expert/lay approach like any other technology. AE knowledge needs to be extended through social learning networks with the active participation of stakeholders (Warner, 2008). Jankowski (2014) refers to diffusion of knowledge as the circulation of knowledge, describing the process of selecting and recomposing different components that are filtered and permeated through existing networks of scientists, agencies, and practitioners. Knowledge circulation thus is contingent on the established capacity of interconnections that allow and have control over the flows towards social and cognitive locations. Rogers (2003), in his early years, described the diffusion of innovations as a universal process of social change without any regard to the nature of the innovation, the users, or their context. However, after years of experience, he suggests that an innovation is the product of a social construction that evolves through uncertainties linked to new means of solving problems.

The fact that an alternative has advantages is not enough for it to be adopted by a social system. A new alternative needs to be widely communicated and socialized through

appropriate channels to achieve a common understanding in a non-linear fashion of knowledge exchange, which takes time according to the prevalent context of a social system (Rogers, 2003). However, we go back to the understanding of agroecological knowledge as being more than a technological option (Altieri, 2002; Méndez et al., 2013; Hecht, 2018; Nicholls-Estrada & Altieri, 2018), which requires a more complex framework for analysis where the four elements described by Rogers (2003): i) innovation, ii) communication channels, iii) time and iv) social system could be considered.

Is AE renaming traditional practices? Agricultural traditional knowledge and associated cultural practices like seed saving strategies and traditional produce distribution are real contributions to what we currently call AE. Case studies from Chile, Ecuador, Colombia, Perú, Guatemala, and Mexico illustrate the prevalence of traditional practices that enhance sustainable food systems and sustainable natural resources management (Parraguez-Vergara et al., 2018). Given that AE rediscovers the significance of that knowledge and those practices (Altieri, 1999; Gliessman, 2018), it is clear that a large amount of agroecological knowledge comes from ancestral agriculture. Cultural practice and community values, enhancement of ecosystems, conservation of soil fertility, prevention of land degradation and a general efficient use of resources is the result of empirical and adaptive knowledge that does not result in fixed recipes, but principles (Hainzelin, 2015). Such principles inform the peasants' belief systems, which rule their practice and their values (Parraguez-Vergara et al., 2018). Farmers, in some cases, are highly confident in their own knowledge about what they do in their fields (Montúfar &



Ayala, 2019). NGOs and government agencies have often capitalized on this knowledge and have sometimes imposed names such as “compost,” “agrodiversity,” or “resilience” to communicate contents that were traditionally managed with local denominations. Indigenous knowledge has been historically under-valued, mainly because of power dynamics, but also because there are language issues and barriers in communication between farmers and technicians (Jankowski, 2014). Power occurs in social relations and rules the production of goods, but also the production of knowledge, and determines what knowledge is meant to be used, disseminated, and perpetuated (Gaventa & Cornwall, 2009). Additionally, traditional practices, especially in the indigenous context have been associated with poverty (Parraguez-Vergara et al., 2018), ignoring the historical components of poverty such as colonialism, exploitation, slavery, dispossession, and genocide (Martínez Torrejón & Aguirre Grisales, 2011).

A recent study in Bolivia reveals the impact of external vs. local knowledge regarding biodiversity in agroforestry systems (Jacobi et al., 2017), where local knowledge projects tend to focus on increasing biodiversity towards food security and soil restoration, whereas projects based more on external knowledge are mainly focused on building financial capital. The same authors criticize the mainstream tendency to undervalue local knowledge and give privilege to external knowledge both in the official educational system and within the extension system. This statement resonates with Freire (1973) when he criticizes the agricultural extension model. More misunderstandings between the users of local and external knowledge happen when the terms used to describe things can become confusing and evident contradictions can show up, like those presented by

Norton et al. (1998) where the terms used to describe soil qualities by the Zuni people are contradictory and only possible to understand by outsiders after being substantiated by an appropriate interaction between locals and non-locals. The opposite situation can also happen when local people misunderstand outsiders' positions, perceptions, and evidences of a given environment or practices due to different epistemic approaches. The author explains cross-cultural communication issues being more or less understood in the present, but still having a negative impact in the agricultural development context. Pimbert (2018) calls for higher participation of stakeholders and decentralization for the purpose of agroecological knowledge production and diffusion.

The perpetuation of knowledge depends largely on the implementation of agroecological practices on the field, hence, the farm becomes a pedagogical unit where knowledge is produced and used for resolving actual farm problems. It takes some effort to translate intellectual knowledge into action, so the fact of taking the risk, long after the external agency has direct influence on the decision making, is an indicator of real adoption of knowledge; however, there is a risk of "blind action" when it is not informed by critical consciousness and reflection on the local context of the users of that knowledge (Gaventa & Cornwall, 2009). The authors insist that reflection is embedded in praxis, but this praxis needs to be aware of the power mechanisms that might be operating in the agroecological environment. Another contribution to the discussion about the different perceptions of agroecological knowledge comes from Jankowski (2014) who talks about the need of Western intellectual communities to understand indigenous knowledge, hence the need to translate, systematize, and find convergences between both perceptions.

However, the author considers that it is not a matter of finding correspondence or mutual validation of knowledge but considering the diversity of relevant links among stakeholders, which would lead to understanding the associations between scientific knowledge and indigenous knowledge.

The uniqueness of indigenous knowledge is valuable in itself, but, on the other hand it makes it difficult to understand and communicate to someone who perceives their reality as the only existing one (Norton, et al., 1998). Nevertheless, farmers and scientists might have different motivations; farmers need to resolve every day's problems whereas the need of scientists is to increase their knowledge. AE probably has the potential to capitalize on traditional knowledge while adding more value to it and dissociating it from poverty and ignorance. Previously cited studies offer evidence of the contribution of traditional knowledge to sustainable food systems and sustainable natural resources management, and also the evolving perceptions that AE practitioners have about their own knowledge.

#### *Agroecology in Ecuador: policy, institutions, practices*

The development of AE in Ecuador, not very different from the broader Latin American situation, arose due to diverse motivations such as the need to challenge industrial agribusiness with a combination of both innovative and ancestral practices that are adaptive and contextual with the social dynamics of each region. From my personal experience, working in and around the area of the study, I have noticed that there may be a dissociation between the intellectual understanding of agroecology and its practice in the field. Farmers' perceptions of the connotations of AE have not been deeply explored,

and sometimes are assumed to be homogeneous. Motivations to embrace AE have not been extensively explored either, except for some literature that contributes to understanding the motivations for consuming agroecological food. There is still a need to understand the farmers' historical and current motivations to embrace AE (Andrade & Flores, 2008; Potocnjak, 2014).

AE started to emerge in Ecuador around the end of the 1980s. The official position of the Ecuadorian government agencies during that time, and probably decades before, considered farmers as empty vessels to be filled with knowledge brought by technicians from universities and research institutes (Jacobi et al., 2017). This approach was in line with the Instituto Nacional de Investigaciones Agrícolas (INIAP), which is a research institution funded by the government and created as part of a Latin American tradition to produce agricultural research to be delivered to farmers. During the time when the GR had prevalence in Ecuadorian agricultural development, the growers who embraced and adopted such knowledge and practices, including the use of high external inputs were called “progressive farmers” (*agricultores progresistas*), in contrast to traditional farmers, mostly struggling for subsistence, who were unable to afford modern technology in remote areas of Ecuador. Even though INIAP is now trying to comply with the 2008 constitutional mandate to “guarantee a sustainable model of development environmentally balanced, respectful to cultural diversity, that preserves biodiversity and the capacity to natural regeneration of ecosystems,” proclaimed in article # 395 (República del Ecuador, 2008), current publications show that they still struggle to

openly devote time and resources to agroecological research (see: Domínguez et al., 2017).

Two contesting positions coexisted during the early stages of AE in Ecuador: the NGOs aligned with environmental movements, and the official position of the Ministry of Agriculture of Ecuador with their agencies that openly advocated for the GR doctrines. The contribution of the NGOs to a more participatory engagement of farmers in rural areas, was probably a hint of what was to become a stronger agroecological movement in the present, mostly represented by associations of agroecological practitioners in provinces like Pichincha, Tungurahua, Loja and Azuay (Chiriboga, 2014; Gortaire, 2017). There was a permanent dissociation between the official discourse and the one from NGO agencies. The government promoted the use of external inputs and external technology, agricultural extension and production of commodities oriented to the industry and exports. On the other side, the organizations of agroecological farmers operated with a different approach, with the support of the NGOs and a section of the left wing of the Catholic Church identified with the Theology of Liberation (Chiriboga, 2014). The construction of agroecological knowledge has been extensively discussed above, but it is important to establish the way in which, during the early years of AE, in Ecuador, the NGOs' agencies founded the principles of AE highlighting the role of the so-called "dialogue of knowledges" and traditional or ancestral knowledge, which more recently has gained recognition from Ecuadorian official agencies (Minga, 2017).

In most of the academic institutions in Ecuador, there is still a strong tendency to try to make traditional knowledge conform to the supremacy of academic knowledge. For example, they still talk about “transference of technology,” even though, decades ago, that term was already criticized for being authoritative and oppressive; nevertheless, it seems that from now on, there is a trend to find a healthy coexistence of academic knowledge with ancestral knowledge. Insights from Freire’s Education for Liberation Theory and experiences from the “*Trabajadores sin Tierra*” from Brazil (workers without land) (Freire, 1973) help illustrate this tradition. Even though the adoption of modern agriculture does not appear to have a homogeneous diffusion in Ecuador, neither in the 80s nor in the present time, the side effects of high external inputs to agriculture such as the degradation of natural resources, unbalance of agroecosystems, unfair and unsustainable food systems, and general environmental change hit everyone, everywhere in Ecuador. Hence, AE emerging as a social movement to challenge the GR agriculture narratives and its undesired effects in Ecuador also touches everyone and represents a hint of hope for the region and the planet (Gortaire, 2017; Rosset & Altieri, 2017).

Fortunately, conventional agricultural practices did not involve the entire rural landscape in Ecuador, as some farmers remained applying their traditional knowledge to food production to the present day. The contribution of the NGOs was paramount in the past and is still now. They provided a strong platform to the development of indigenous and peasant social movements whose effect was made visible during the indigenous uprising in the 1990s (Larrea, 2017). The NGOs helped build content and shaped the discourse of the indigenous organizations, which was positively capitalized on by the indigenous

leadership. One of the important achievements of the NGOs in Ecuador was the strengthening of organizational capacity and leadership (Chiriboga, 2014). Nevertheless, most of those agencies typically worked on two very defined and opposed approaches to agriculture: one was aligned with modernization of peasants' technology and the other was aligned with AE, supporting low-external input practices and reclaiming traditional knowledge (Chiriboga, 2014). Many NGOs defined their work providing support to small-scale farmers' initiatives with soil conservation, boosting small businesses in the countryside, short marketing chains, fair trade, organic production, irrigation, social responsibility, social participation, participative governance, and regional development.

Sociopolitical circumstances and mismanagement of some NGOs jeopardized their action and many national and international agencies closed or left the country during the presidency of Rafael Correa, mainly caused by the creation of an agency to control and persecute international cooperation (Chiriboga, 2014). That government designed a strategy to dismantle and apply control over any form of social participation and over NGOs' activities as well. Despite the departure of many international NGOs, the agroecological movement continued evolving and gaining presence and participation in the discussion at a country and regional level until the present time.

In the last decade, the central, provincial and local governments, mainly because of the pressure of the peasant organizations, and because of the 2008 Constitutional mandate, started to implement initiatives through timid public policy and positive actions to support AE (República del Ecuador, 2008; Gobierno Provincial de Pichincha, 2015).

There are diverse levels and approaches to participation and construction of the agroecological discourse by individuals, rural families and communities at this moment. Organizations such as the *Colectivo Agroecológico*, *Conferencia Plurinacional e Intercultural de Soberanía Alimentaria* (COPISA), and other more local organizations are and have been actively advocating in favor of AE; however, there is a lack of consistent participation from the consumer sector, with rare exceptions (Gortaire, 2017). It is important to clarify that in the cited literature regarding consumers, participants have been asked about “organic or agroecological produce” as synonyms, which obscures their findings (see: Andrade & Flores, 2008; Vasco et al., 2017). Even for agroecological practitioners, the understanding of AE is diverse, hence, one of the aims of this study is to find out the different concepts that stakeholders have about AE, although this study doesn't include consumers. The present study found narratives from relevant stakeholders that clearly describe the emergence and development of AE since there used to be scarce literature about the topic specifically related to Ecuador.

## Research Question

This research asks: how do farmers experience agroecology?

My aim was to establish a framework to understand the ways agroecological practitioners perceive AE within their Andean context and local dynamics. Given that climate change, the fight against rural poverty, and an unhealthy and unsustainable food systems are recurring concerns for AE stakeholders, it is essential to find a common language to refer to agroecological production and produce. It is especially problematic when there is a mismatch in the understanding of agroecological processes and produce between



producers and consumers, as this issue leads to intentional and non-intentional misunderstandings and may even lead to fraud.

I have worked with the study area communities in the past, and I have extensive experience in AE, community-based research and rural development. I have witnessed the evolution of AE in the study area and I have noticed that most of literature does not critically explore the evolution of motivations, the dynamics of knowledge, and expectations of farmers from their personal perceptions in the Northern Andes of Ecuador.

## Methodology

The aim of this research was to explore how farmers experience AE from their own perspective. For the purpose of this study we started by discussing the relevance of the research question with the farmers. Then we used the methods that best suited our needs to describe and analyze the historical and current motivations farmers had for adopting AE, and their expectations for the future. Later, we used methods to describe and analyze the source of agroecological knowledge, the dynamics and channels for its diffusion. Lastly, we used art-based methods to describe and analyze the farmer's perceptions of the impact of AE in their lives, their farms, and communities. Members of NGOs and government agencies that had worked in the area of the study in topics related to AE were also invited to participate in one section of this research.

Cayambe County is located at an altitude of 2,809 masl., with an annual precipitation of 873 mm, and an average annual temperature of 13.5°C; and Pedro Moncayo County is located at 2,889 masl., with annual precipitation of 832 mm, and annual average temperature of 13°C (MAE, 2012). The scarce natural vegetation consists of semi-arid forest and humid montane forest with high human intervention in the last centuries (Franco, Peñafiel, & Cerón, 2016). Farmers from five communities in Cayambe County participated in this study: Santa Rosa de Ayora, Cariacu, Lotes de Ayora, La Buena Esperanza, and Otón. Additionally, farmers from four communities from Pedro Moncayo County participated: Cubinche, El Rosario, La Esperanza and Chimbacalle. All the communities are located within 0°6'0" north of the equator, and 0°3'0" south of the equator.

Data collection went from October to December 2018. The study covered three sections. In the first section, we explored and compared the different perceptions farmers and members of non-government organizations (NGOs) had about the type and level of participation each of them had in the development of AE in their communities. Secondly, we explored the motivations farmers had for adopting AE, both in the past and in the present. Thirdly, we compared the perceived motivations at the beginning of the implementation of agroecological projects, which historically was made through the interventions of NGOs. We inquired about such perceptions to farmers and to NGO members to compare their insights and to estimate the evolution of motivations over the time. We explored possible compensation or incentives farmers may have received in the past and in the present from government and non-government agencies to estimate their

possible effect as either ideological or realistic motivations to adopt AE. Finally, for this first section, we inquired about farmers and agency members' expectations about AE in the future.

For the second section, the topic was about the dynamics of agroecological knowledge, starting by an inventory of practices farmers considered important and the source of the knowledge associated to those practices. We sorted (coded) the reported practices into topics, which were clearly inspired on the principles of AE, and then grouped the topics into the six dimensions of sustainability as a strategy for analysis (Caporal & Costabeber, 2004; Rodrigues Hirata, Rocha, Assis, Souza-Esquerdo, & Bergamasco, 2019). Then we calculated the composite salience (CSV) of topics to establish the most important ones perceived by farmers. Next, we grouped the topics, according to the frequency farmers reported their association with the possible source of knowledge: the family, the community, and outside of the community.

The third section explored the perceptions of the impact of AE at the individual's level, in their farm and at the community level. We approached the study with an art-based method of research called body-mapping, in which farmers produced pictographic maps representing the perceived impacts along a body-size silhouette of themselves (Sweet & Ortiz Escalante, 2015). Data were analyzed with Atlas.ti software for qualitative data. We explored the intersections between demographic variables and the perception of impact on AE in farmers with different economic dependence from agriculture and the different

perceptions of farmers with decades of experience compared with farmers recently engaged in agroecological initiatives.

For enhancing research subjects' participation and hopefully, their empowerment (Slocum & Thomas-Slayter, 1995; Hacker et al., 2012) during the first encounter, we started by consulting with the organizations of farmers about the relevance of the research question in their communities, expecting to incorporate recommendation or amendment to our initial proposal. In this first session, we made a short list of potential participants. Later on, we contacted farmers, members of NGOs and government agencies over the phone and made an appointment for a second encounter. Typically, participants chose to be interviewed in their homes, gardens or in their organization's facilities. The second encounter was for actual data collection. We started with a survey to analyze the demographics of farmers, in order to contextualize their profile in relation to the community they belonged to, their ethnic identity, access to utilities, education, agricultural experience, land tenure, unsatisfied basic needs, access to communication, and the type of participation in their organization.

We applied a structured individual interview to farmers and members of agencies, covering questions about the type and level of participation they had along the different stages of AE in their communities. We asked about their historical and current motivation expectations, and possible compensations the farmers might have received for adopting agroecological practices. The agency members were also asked about the historical and current motivations their agencies had for keeping AE in their agendas.

For collecting data about knowledge dynamics, we used a free-listing method with farmers (Puri, 2010; Caruso et al., 2015; Zambrana et al., 2018), which allowed creating a mental inventory of the most important agroecological practices. Later on, we asked about the origin of the knowledge associated to those practices with three options: within the family, within the community, and outside the community. Farmers were asked to make comments with details about the origin of that knowledge.

For the last section of this research, we used a body-mapping tool, inquiring about the farmers' bodily perception of the impact of AE (Roomaney & Coetzee, 2018). This qualitative method allowed participants to tell stories about the impact of AE on their life (Sweet & Ortiz Escalante, 2015). Later, participants mapped their *chacras* (farms) to identify the contributions of AE at that level, and same procedure was done for exploring the perception of impact on their communities.

#### *Target Population and Inclusion/Exclusion Criteria*

This study was designed to produce robust data to answer the following questions: (i) what are the historical and current motivations for adopting agroecology and what are farmer's and external agencies' expectations? (ii) What are the most important agroecological practices and what is the source of their knowledge? (iii) How has agroecology impacted its practitioners at different scales: the individual, the farm, and the community? I worked with nineteen agroecological farmers and eight former or current members of government agencies, local or provincial government, and non-governmental organizations that have worked in the study area in topics related to agroecology. The

participants complied with the following criteria: belonging to an agroecological organization in the study area, age range was between 18 and 80 years old, men and women head of family, residents on the study area, who had answered to the invitation we previously sent. They claimed they were active members of their organization either in Cayambe or Tabacundo counties in the province of Pichincha in northern Ecuador. They claimed they were agroecological practitioners with current access to a piece of land for this type of productive system. They marketed their produce mainly through alternative ways such as farmers' markets, weekly baskets, direct delivery to their clients, or a store that had some type of agroecological recognition. The study excluded independent farmers, minors, and large-scale farmers.

Official demographics for the Pedro Moncayo County go as follows: ethnic background is 32% indigenous and 65% mestizo population (“Sistema Integrado de Conocimiento y Estadística Social—SICES,” n.d.). The population is economically and educationally disadvantaged: 71% index of unsatisfied needs, illiteracy 7%, functional illiteracy 17%, and schooling average is 8 years, 69 % of global employment rate. Demographics for the Cayambe County are as follows: 81% indigenous with and 17% mestizo population. The population is economically and educationally disadvantaged: 89% index of unsatisfied needs, illiteracy 17%, functional illiteracy 25%, schooling average is 6 years, 64 % of global employment rate. Pregnancy is not a criterion of inclusion or exclusion.

Eight participants were current or former members of the provincial or local government or members of non-governmental organizations that have historically participated in the

development of agroecology in the study area. They were adults between 18 and 70 years old, mestizo and indigenous, with at least 12 years of education, fully literate and fully proficient in Spanish and non-English speakers.

#### *Recruitment and Screening Procedures*

A formal invitation was sent to the farmer's associations, local and provincial government agencies, and non-governmental organizations from Tabacundo and Cayambe counties during September and October 2019. The invitation provided relevant information about the research project. Leaders of the association had previously communicated their interest in being part of the project. The participants that showed interest were contacted over the phone. The associations had a database with information about compliance with requirements, and members had a color-based identification card to demonstrate their qualifications about agroecological production.

#### *Data Collection Procedures*

We had one first encounter to clarify the project to potential participants, to discuss the research question with farmers, and to read the letter of informed consent. Members of the local and provincial government and from NGOs were not invited for this event. The forthcoming collection data events were negotiated over the phone and happened at the farmers' homes, gardens, or at their organizations' facilities. There, farmers and agency members signed the informed consent. We asked the farmers about demographic information. They were individually interviewed about the type and level of participation at the different stages of the evolution of AE in their communities. Then we asked about both historical and current motivations to adopt agroecology and their expectations about

agroecology in the future. Agency members were asked same questions plus an additional one regarding the motivations for their agencies to have AE in their agendas.

The farmers were asked about the ten most important agroecological practices they know and the source of that knowledge (Zambrana et al., 2018). The participants were asked about the impact of AE on them as individuals, the impact on the farm, and the impact on the community by mapping on paper size A1 (910 mm x 650 mm approximately) (Roomaney & Coetzee, 2018; Sweet & Escalante, 2014). The farmers were asked to draw a body silhouette and then represent either with a text, collage or drawings the way agroecology impacted different parts of their body either in a positive or negative way. They were asked to map out their farm to represent the positive and negative contributions of AE. Groups of neighbor participants were asked to map out their community to represent the positive and negative contributions of AE on different areas of their community. The maps were photographed and stored for further analysis. We took photos and video and audio recorded most of the interviews to participants who agreed to and signed the consent letter.

The first encounter to discuss the research question took about an hour. The demographic interview took 15 minutes, the mapping exercise took more or less one hour, and the structured interview took 30 minutes. The participants were always clear that their involvement in the study was voluntary, and they were able to skip questions or stop participating at any moment. We did not offer any direct benefits from this study, nor did



they receive any monetary compensation. Data were managed with a code, so no individual can be further identified by the data.

### *Community engagement*

Associations of agroecological producers had been previously contacted through open community events and through their participation in farmer's markets in the area. Previous contacts with government agencies and NGOs in past years also helped engage with them and helped design the project. My personal participatory work in the construction of Participatory, Guarantee Systems (Rodrigues Hirata et al., 2019) has helped me become familiar with the dynamics of the organizations, their aims and needs in the last few years, which has created a rapport with leaders and members of those local organizations. We worked with the *Asociación de Productores Agroecológicos de La Esperanza* for Tabacundo County and the *Asociación Regional de Economía Social y Solidaria del Territorio Kayambi* (RESSAK) for Cayambe County. Their members and leaders had demonstrated interest in the research project, and they had requested to take part in it during open community events in the study area. There were not visible cultural sensitivities beyond the respect to their protocols and formalities which I am familiar with; for example, every event had to be canalized through their planning sessions for approval and ulterior formal call to participants.

This research achieved a relevant and engaging participation from the community where both the process and the outcomes could benefit individuals and the community ("An Effective Approach to Understanding Communities," 2009). The results will be

disseminated through public presentations during community events and dissemination publications in local and provincial newsletters and media (radio stations and local newspapers).

## Results and Outcomes

This dissertation produced three article-length manuscripts for publication in journals focused on agricultural policy and human-environment relations. The first article is focused on past and current motivations to adopt agroecology and future farmers' expectations. It covers the perceptions of both farmers and stakeholders from government and non-government organizations that have worked in the study area. It also approaches the levels and type of participation of farmers and agencies along the development of agroecology in the study area. This article will be formatted and prepared for submission to the *International Journal of Agricultural Sustainability* (Q1, SJR-2018= 0.93), with a target publication date of 2020.

The second article explores the source and the dynamics of agroecological knowledge in the study area. It provides an inventory of those practices perceived as the most relevant to farmers, and the dynamics of the diffusion of the knowledge associated with them. The article will be formatted and prepared for submission to the journal of *Agroecology and Sustainable Food Systems* (Q2, SJR-2018=0.54), with a target publication date of late 2020.

The third article is focused on the perceptions of the impact of agroecology in the farmers' lives, as individuals. It also describes some of the impact on their farms and in their communities. This article will be prepared and formatted for submission to the journal of Agriculture and Human Values (Q1, SJR-2018=1.54), with a target publication date of 2021.

This dissertation manuscript combines articles into a single document by adding this introduction and a summary conclusion to illuminate how different stakeholders perceive agroecology and where there exist convergences and divergences among their perceptions in rural communities of Northern Ecuador.

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# MOTIVATIONS TO ADOPT AGROECOLOGY IN TWO RURAL COMMUNITIES OF THE NORTHERN ANDES OF ECUADOR

## Introduction

The unsustainability of current food systems is, to a large extent, due to the agenda of the Green Revolution, which has clearly impacted both farmers and consumers at a global, regional, and local scale (Shiva, 2007). The top-down imposition of outside knowledge that comes with the conventional approach of agricultural extension obscures the agency of local small-scale farmers in the dynamics of knowledge (Arora, 2012). Agroecology (AE) arises as a response to the social, economic, and environmental imbalance created by an agricultural production system with a high dependence on external inputs, external technology, and uneven distribution of income. AE proposes a complex and transdisciplinary approach to tackling unsustainability in food systems that brings about a high participation of stakeholders (Gliessman, 2018a), and merges the local production of knowledge with contributions from formal academic research, in order to improve sustainability along the food systems and engage people in action (Gliessman, 2018b).

One of the drivers for the rise of AE in Andean countries, including Ecuador, was the need to challenge industrial agribusiness with a combination of both innovative and ancestral practices that were adaptive and contextual with the social dynamics of each region. Another historical motivation was the search for alternatives to the excessive use of pesticides, especially in areas devoted to industrial farming (Breilh, 2007a; Handal & Harlow, 2009). The perceptions of the different connotations of agroecology have not

been deeply explored, and they are sometimes assumed to be homogeneous; however, AE is understood differently by every stakeholder, and even by academics (Pinzón, 2017). Hence, the motivations to adopt its practices are also diverse and require research in the Andean Region (Andrade & Flores 2008; Potoknjak 2014; Vasco et al. 2017).

*Background: Trajectory of Agroecology in Ecuador*

An early concept of AE started to form in Ecuador around the end of the 1980s around the terms “organic” or “biologic” used to describe pesticide-free produce. Over time, the word “organic” stopped being considered a synonym of “agroecology” because it did not communicate all the dimensions of AE as we know it today. Current definitions of AE take into account at least three elements: a scientific discipline, an agricultural practice, and a social movement (Levidow, Pimbert, & Vanloqueren, 2014; Gliessman, 2018a). Regarding the development of agriculture during the second half of the twentieth century, the position of the Latin American countries, and the Ecuadorian government agencies, was focused on formal institutional research and conventional agricultural expansion, excluding small-scale farmers from any significant participation (Rubio, 2012; Jacobi, Mathez-Stiefel, Gambon, Rist, & Altieri, 2017). Peasants were not really counted as political subjects (Larrea, 2017; Gallar, 2019), and public policy followed a straightforward agenda that favored the historical power holders (Rubio, 2012). In that context, the growers who embraced and adopted the conventionally accepted technology, which highlighted the use of high external inputs, were called “progressive farmers” (*agricultores progresistas*), in contrast to the traditional farmers who, for the most part, struggled for subsistence and were unable to afford modern technology, especially in the more remote areas of Ecuador.

Even though formal research institutions such as *the Instituto Nacional Autónomo de Investigaciones Agropecuarias* (INIAP) are now trying to comply with the mandate of the Ecuadorian Constitution of 2008 to “guarantee a sustainable model of development that is environmentally balanced and respectful to cultural diversity, while preserving biodiversity and the capacity of ecosystems for natural regeneration” (author’s own translation), stated on Article 395 (República del Ecuador, 2008), current publications evidence that they still struggle to do agroecological research that considers all the relevant stakeholders along the food systems (Domínguez, Sánchez, & Zambrano, 2017).

The contribution of NGOs (non-government organizations) to include farmers from rural areas in the discussion was probably a hint of what has become, at this point in time, a stronger agroecological movement represented mostly by associations of agroecological practitioners (Chiriboga, 2014; Gortaire, 2017). These organizations provided a strong platform for the development of indigenous and peasant social movements that had a visible effect during the indigenous uprisings of the 1990s (Larrea, 2017) and later. The NGOs helped build content and shaped the discourse of the indigenous organizations, which was positively capitalized by the indigenous leadership. Chiriboga (2014) asserts that one of the important achievements of the NGOs in Ecuador was the strengthening of organizational capacity and leadership in rural areas.

In the last decade, the central, provincial, and local governments, mainly because of pressure from the peasant organizations and in response to the mandate of the Constitution of 2008, started to implement agroecological initiatives through timid public

policy and positive actions to motivate adoption of AE (República del Ecuador, 2008; Gobierno Provincial de Pichincha, 2015). Grassroots organizations and farmer associations have actively advocated for AE and have contributed to the creation of a favorable context for its expansion; however there is a lack of consistent participation from the consumers, with rare exceptions (Gortaire, 2017).

### *Understanding stakeholder motivations*

The motivations of farmers in Ecuador to embrace agroecology and their expectations about it have been poorly described in the literature. Historical motivations from a sociological perspective have been discussed in a case study in Tabasco - Mexico (Guzmán & Woodgate, 2013), suggesting that farmers find in AE an alternative to tackle global environmental degradation. The authors also maintain that farmers respond to signals from the market and, illustrating their point with examples from the 19th century in Europe, they assert that complex interactions between ecological and social dynamics enhance the process of adoption of agricultural practices. They state that agroecological practice is “natural” to local farmers since they do not work against natural processes but with them instead; hence, they suggest that AE offers answers that make sense to small farmers.

Studies of the motivations of smallholders in southern Brazil for adopting agroecological practices take into consideration rational dimensions, especially regarding their interaction with nature and origin of the practitioners (Souza et al., 2011). In this cited case study, the authors describe a group of traditional growers who follow agroecological practices that, they claim, were customarily used by their ancestors. Another group of

farmers, who are relatively recent migrants, claim that health issues linked to the use of agrochemicals are their main reason for swapping to AE; another reported motivation is the increasing demand for pesticide-free produce from the tourism industry. A third group of immigrants, consisting of urban people with an interest in living a healthier and greener lifestyle, are reported to adopt AE due to personal satisfaction. A case study in Cameroon shows that older farmers are more prone to adopting conventional farming techniques due to their inertia and their inability to adapt to new options, while younger farmers are more open to adopt AE in association with the following factors: higher level of income and years of education, and families with more of their members working in the farm (Epule & Bryant, 2017). A case study in Chile (Potocnjak, 2014) starts discussing two types of motivations: intrinsic or innate and extrinsic, arguing that the intrinsic ones do not require a reward and are more related to visions of autonomy, whereas extrinsic motivations require either a reward or avoiding a punishment.

Ryan & Deci (2000) assert that extrinsic human motivation is a continuum that may eventually end up with a complete integration of values. They describe a motivation system of six levels starting with a stage of amotivation, followed by external regulation, introjection, identification, integration, and finally, the last stage called intrinsic motivation. Scarborough & Méndez (2015) firmly assert that it is well established that a new technology works better when accompanied by communication strategies that raise awareness about its benefits and a long-term intervention to achieve an authentic change of behavior. However a case study from the Netherlands suggest that the internalization of policies by farmers should be implemented according to the specific motivations that

operate in their attitudes (Stobbelaar, Groot, Bishop, Hall, & Pretty, 2009), which highlights the importance of our research.

Effective strategies to expand AE in the Andean Region would benefit from social, economic, environmental, cultural, and political advantages, and would contribute with their enormous potential to the establishment of ethical principles that would help build global resilience beyond the agricultural fields (Caporal & Costabeber, 2004; Nicholls-Estrada & Altieri, 2018). Agroecological science needs to keep on growing together with the social movements to prevent losing its transformative potential and getting coopted by hegemonic conventional agribusiness (Guzmán & Woodgate, 2013). There is a need to find ways to enhance the adoption of AE at every level of society, involving rural and urban citizens, and all stakeholders, including public policy makers, institutions, academia, and organizations of farmers and consumers, applying the principles of AE to general practices in order to sustainably manage soil, water, and biodiversity (Nicholls-Estrada & Altieri, 2018). Genuine adoption of AE guarantees longer permanence of practices (Nelson, Scott, Cukier, & Galán, 2009), but it requires some conditions: understanding and reflecting about barriers and enabling factors, social and political contexts (Menozzi, Fioravanzi, & Donati, 2015), cognitive factors (Schoonhoven & Runhaar, 2018), intrinsic and extrinsic motivations (Ryan & Deci, 2000), incentives and rewards (Wolcott, 2003; Wolcott & Betts, 2007).

With respect to incentives and compensation, a case study in Brazil explored the drivers for pro-active member participation in an agriculture cooperative and found that

obtaining personal or political benefits is perceived as a compensation; they also found that economic incentives are drivers for participation in the general assembly but not for engaging in boards and decision-making committees. Nevertheless, the main drivers for participation as pro-active members were the duration of membership and a strong ideological motivation. Hence pro-active participation is more associated with solidarity and altruism than with the search for private benefits (Cechin, Bijman, Pascucci, Zylbersztajn, & Omta, 2013).

Recent research shows the basic conditions for achieving the adoption of agroecological practices. Schoonhoven & Runhaar (2018), based on a study with almond farmers in Andalusia, claim that motivation is one of four potential factors for adopting AE. These factors are both intrinsic and extrinsic. In this fashion, motivation and the ability to adopt are considered intrinsic factors, whereas demand and legitimation of AE are considered extrinsic factors. In the cited study, motivation is defined as the “extent to which farmers are willing and motivated to participate in agroecological practices” (p. 447). Additionally, Pinzón (2017), frames it in terms of i) motivation as a rational election, which requires both economic and social incentives and ii) ideological motivations, which drive farmers to articulate themselves into collective actions. Additionally, the author states that the transition to AE implies diachronic variables, hence we have established different moments or phases of the evolution of AE in our area of study.



## Methods

In our research, we used a case study in the Northern Andes of Ecuador to explore the motivations that farmers may need to change their production methods to the ones proposed by AE. This research undertakes: i) a description of the type and level of participation of the stakeholders along the different stages of implementation of Agroecology in the study area, (ii) analysis of the historical and current motivations that farmers and external agencies (government and non-government organizations) perceived as important for adopting AE, and the possible compensation they may have received along this process, and iii) exploration of the expectations about AE from the perspective of the farmers and the agencies. The findings of this research will inform relevant stakeholders about the best strategies for engaging farmers in the process of adoption of AE.

### *Conceptual background and Definitions*

Community participation is considered as the means people use to influence policy makers to change the situations that affect them, including the strategies they use to undertake improvements themselves, with or without the help of external stakeholders (Gouraldo Choguill, 1996). Considering motivation as something that moves someone to do something, it is not static, thus it varies with regards to its nature, amount, and focus (Ryan & Deci, 2000). Ryan and Deci (2000) claim that motivation can be an intrinsic or extrinsic willingness to do something, therefore this framework will illuminate the nature and type of motivations that drive farmers to adopt agroecological practices. This concept considers both ideological and realistic (pragmatic) motivations (Pinzón, 2017;

Schoonhoven & Runhaar, 2018). Not all motivations are intrinsic in the lives of farmers and people, though. In fact, a large number of tasks are done because of their practical value with different degrees of autonomy, including nuances going from a feeling of choice on one hand to a feeling of compliance with an external control on the other hand (Ryan & Deci, 2000). The authors remark that because of the different nature of the activities to be performed, some of them not being intrinsically interesting, it is necessary to motivate the subjects to carry out the tasks without pressure or external control. To become motivated to adopt AE, then, the subjects need to internalize and integrate the values inherent to the activities without a sense of obligation or passive compliance and perceive them as an active personal (or collective) commitment.

Compensation is defined as repayment for possible losses or risks taken during the process of adoption of AE practices. It is relevant to include the concept of incentive because some responders may regard it as something that incites their determination or action when asked about compensation. Expectation is defined as a reasonable vision of what AE will deliver in the future.

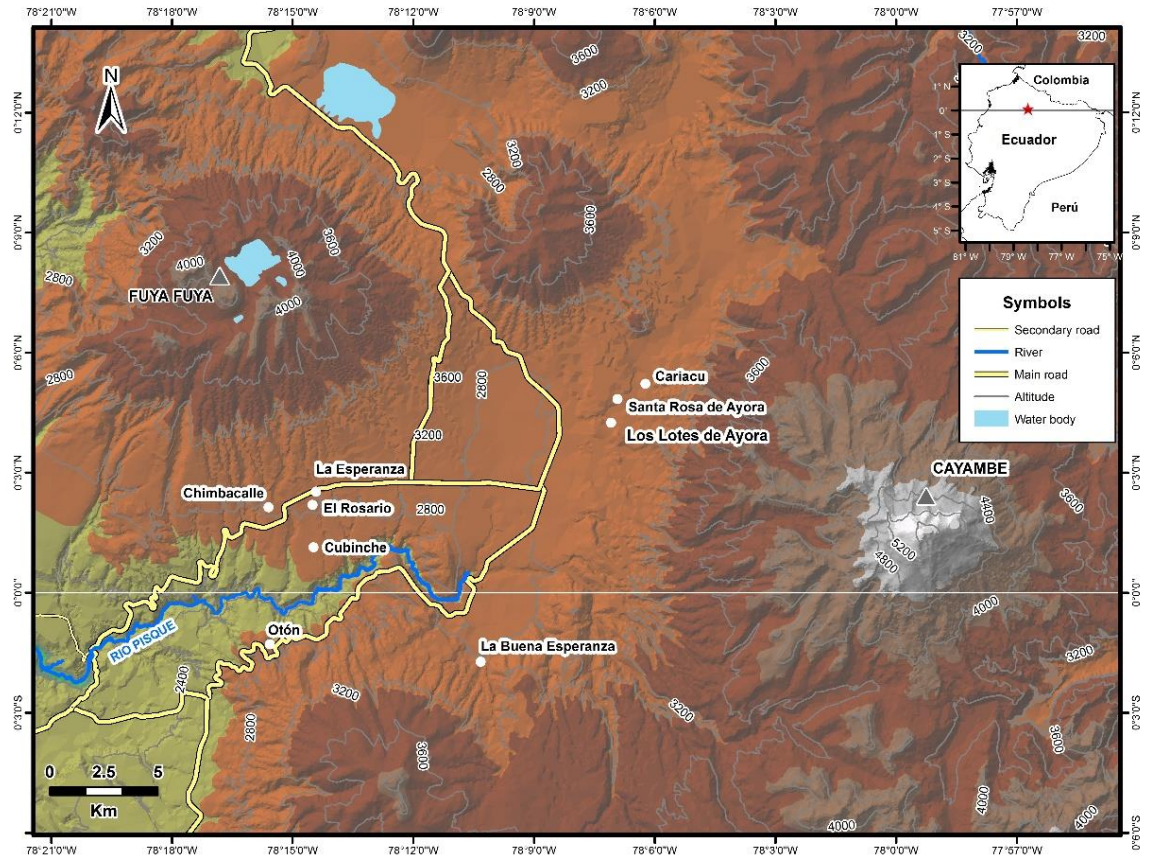
### *The case study*

We selected a geographical area where AE has been consistently evolving from the early 1990s to the present, with various outcomes, despite the parallel development of the cut-flower industry in the vicinity of the agroecological projects of small-scale peasants.<sup>1</sup>

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<sup>1</sup> We satisfied the requirements and obtained the authorization for doing this research from the Office of Institutional Review Board (OIRB) from the University of New Mexico in June 2018. In addition, all participants were advised about the nature, objectives, and possible risks of this research, and they had the opportunity to ask questions and ask for clarification when needed. They all signed individual informed consent forms in Spanish, as all participants were native Spanish speakers.

The area of the study consists of several communities located in two counties at approximately 100 km north of Quito, the capital of Ecuador, at both sides of the equator (Figure 1). The communities of La Esperanza, Cubinche, El Rosario and Chimbacalle are part of the county of Pedro Moncayo (2889 masl.; average temperature 13°C; annual rainfall 832 mm) whereas the communities of Santa Rosa de Ayora, La Buena Esperanza, Otón, Cariacu, and Lotes de Ayora are part of Cayambe county (2809 masl.; average temperature 13.5°C; annual rainfall 873 mm) (MAE, 2012). This territory has a long and intensive agricultural history characterized by Andean crops such as corn, tubers, cereals, vegetables, some fruit trees and, in recent decades, a buoyant cut-flower industry that has been implemented extensively (Breilh, 2007b). There are areas where large dairy industries have developed for centuries, mainly in Cayambe. Most of the area of the study has been historically deforested. Indeed, the inter-Andean sub-region shows the lowest occurrence of natural vegetation in Ecuador (Franco, Peñafiel & Cerón, 2016); scarce areas with natural vegetation include semi-arid forest and humid montane forest formations.



**Figure 1.** Map of the Northern Area of Pichincha Province in Ecuador.

A large proportion of the population of Cayambe and Pedro Moncayo is indigenous with a long tradition of Spanish colonization and hacienda oppression (Rubio, 2012; Aspiazu, 2017), which probably limited the flow of ancestral knowledge to the present. However, the literature refers to this area as a rich quarry of agricultural knowledge and agrodiversity (Montúfar & Ayala, 2019).

### *The participants*

This study focused on two types of participants: (i) 19 small-scale farmers who claimed to be agroecological practitioners, belonged to local organizations and showed proof of complying with agroecological production principles; (ii) eight members of governmental and non-governmental agencies working on AE in the area of the study.

It is worth noting that the affiliations of the members of agencies are dynamic, since all of them have transitioned from different levels of government and have a diverse relationship with NGOs, and some are or have been farmers, which instead of producing noise in the data, we consider they contributed positively with different voices and positions in their responses. For this study, the farmers we considered to be agroecological were those who complied with the principles of their local association, which included social, political, economic, environmental, and cultural dimensions, and didn't consider AE only a production practice (Steven Gliessman, 2018; Vaarst et al., 2018; Rodrigues Hirata, Rocha, Assis, Souza-Esquerdo, & Bergamasco, 2019).

The participants responded to an open invitation sent to their farmers' associations asking to participate in the study, provided that they complied with the following characteristics: being an active member of an agroecological organization operating in the area of the study (Cayambe and Pedro Moncayo counties), being an agroecological practitioner with access to a piece of land for this type of production, marketing their produce through an alternative way such as farmers' market, weekly boxes, direct delivery to clients, or through a store recognized as agroecological by any participatory guarantee system, also

called PGS (Ayala, 2018; Rodrigues Hirata et al., 2019). For agency members, the invitation was sent to those who were members of a local or provincial government agency or non-government organization (NGO) operating in the area of the study since the early 1990s in matters related to AE. Agency members typically started their work associated with NGOs, however, their role transitioned through government agencies, farmers associations, other organizations, and agroecological producers. We defined agroecological organizations as those who claim to comply with agroecological principles, either with a PGS (M. Pino, 2017; Rodrigues Hirata et al., 2019) or with any other internal system.

### *Interviews*

A structured interview was applied to participating farmers at their homes, gardens, or community venues. For agency members, the interview was performed at their office or at a public space. The questions were the following:

1. What were the motivations for you to adopt agroecology at the beginning of the process in your community?
2. What are the current motivations for you to persist with the practice of agroecology?
3. Did you receive any compensation for adopting agroecology in the past? From whom?
4. Do you receive any compensation currently for persisting with the practice of agroecology? From whom?
5. What is your expectation about agroecology in the future?

6. What has been your participation like in the following moments of the agroecological process in your community? Options: passive, active, intermediate, during: diagnostics, planning, design, implementation, monitoring, evaluation, making decisions. (This question, for farmers and for government and non-government organizations.)
7. What were and what are the motivations for your organization to embrace agroecological initiatives in your organization's agenda? (This question, only for members of government and non-government organizations.)

Data collection with farmers was carried out between October and December 2018; data collection with agencies was carried out between November 2018 and September 2019. Mixed methods were applied for data collection and analysis. A structured interview was applied to both farmers and agencies members with the same set of questions except for an additional question for agency members related to the agency where they worked in the past and/or in the present. We used a free listing tool (Puri, 2010; Caruso et al., 2015; Quinlan, 2017; Roulette et al., 2018; Zambrana et al., 2018) for enquiring about past and current motivations and compensations for adopting AE, and their future expectations. In the second section of the interview we asked about the type and level of participation of farmers and agencies along the evolution of AE in the area of the study. Lastly, the agency members were asked about the motivations their agencies had for including AE in their agendas in the past and in the present.

### *Analysis*

Composite Saliency Value analysis were used to detect the most salient motivations among farmers extracted from the free listing proposed to the participants for question one and two. For questions three, four, five, six and seven (question seven for agencies only) about compensations and expectations, responses were depicted as histograms and summarized in tables. The intention of this section is to find convergences and divergences in perceptions about compensations and expectations between farmers and agency members. For question 6, tables and histograms depict the view of farmers and agency members regarding the levels of participation in seven different moments of the development of AE in the area of the study.

The case study considered a small number of participants who were representative of the local dynamics of AE, but the interviews produced considerable narratives to enrich the discussion and establish the basis for further research. The quantitative data come from a few nonrandom samples; the results should be considered accordingly.

## **Results and discussion**

### *Perceptions of participation of farmers and agencies in the development of Agroecology*

Forty-five respondents to the invitation met for discussing the relevance of the research questions, although not all of them participated later as interviewees, mostly due to difficulties in contacting them. From this first encounter, nineteen farmers were contacted and interviewed. The average age for participants was 54.6 years, and they had been working in agriculture for an average of 36.8 years, with engagement in agroecological



practices for an average of 19.6 years. The participants owned an average of 1.0 hectares of land and had 4.1 members of their family who depended on the participant's income. We interviewed four men and fifteen women; nine people identified themselves as indigenous, whereas ten labeled themselves as mestizos. Most of them had attended only primary school, with three people additionally completing high school. Seventeen farmers had access to irrigation and two farmers did not. Eleven interviewees got the vast majority of their income from agriculture (51% to 100%), while eight participants reported that agriculture made up 50% or less of their income. We asked about their role in their organization and found that nine of them had been community leaders, and three had been AE promoters (Table 1).

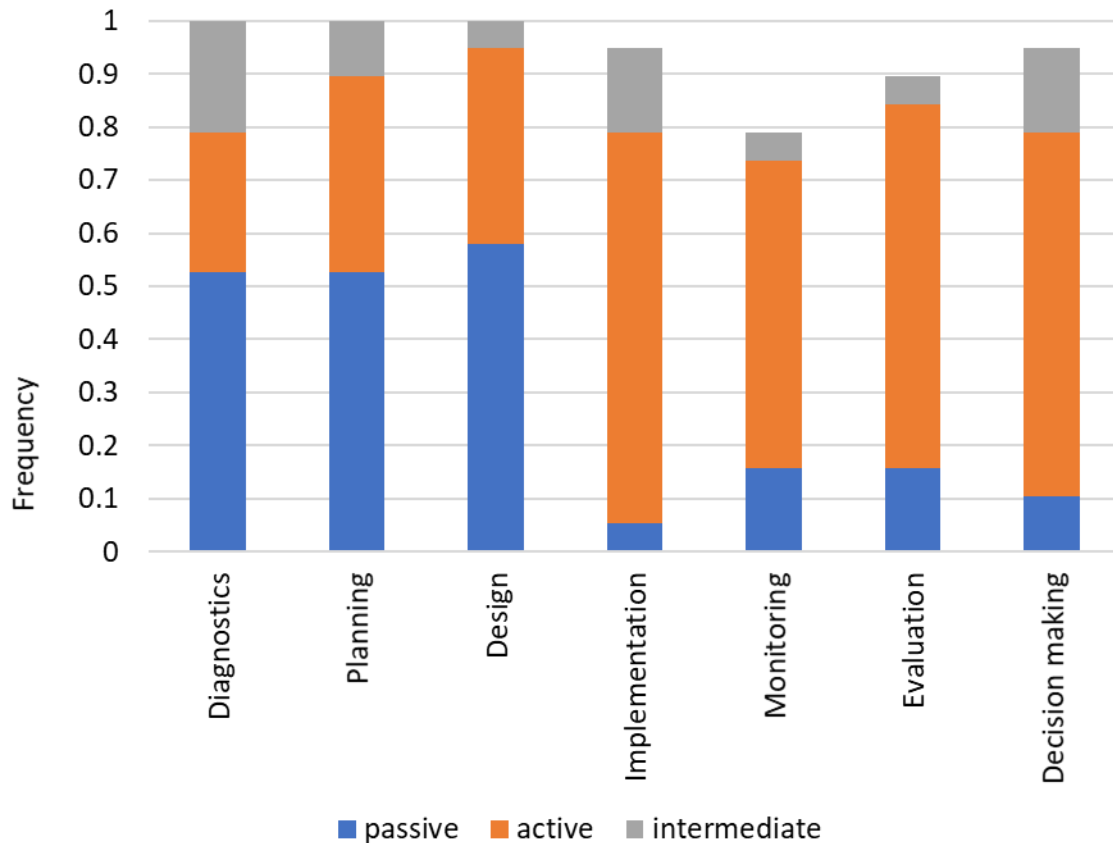
**Table 1.** Demographic description of farmers.

Descriptor		Value
Age		54.63 ± 7.5 SD
Years doing agriculture		36.79 ± 17.72 SD
Years doing agroecology		19.63 ± 20.19 SD
Land area (hectares)		1.03 ± 0.9 SD
Number of household members depending on participant's income		4.11 ± 1.49 SD
Gender	Male	21.05 %
	Female	78.95 %
Ethnicity	Indigenous	47.37 %
	Mestizos	52.63 %

Schooling	Primary	84.21 %
	High School	15.79 %
Irrigation:	Yes	89.47 %
	No	10.53 %
Proportion of income coming from agriculture:	Up to 25%	10.53 %
	Up to 50%	31.58 %
	Up to 75%	15.79 %
	100%	42.11 %
Role at organization	Community leader	47.37 %
	None	26.32 %
	AE promoter PGS	15.79 %
	AE auditor	
	Other	10.53 %

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The Unsatisfied Basic Needs index describes the level of poverty for the area of the study, showing Cayambe county at 66.9 % and Pedro Moncayo at 71.9 % (“Sistema Integrado de Conocimiento y Estadística Social—SICES,” n.d.). From our nineteen respondents, thirteen owned their land, sixteen owned their homes, nine had access to a telephone land line, seventeen had a cellular phone, and, from twelve farmers who had access to internet, six had connection from home or from their cellphone.



**Figure 2.** Level and type of participation of farmers at seven stages of development of Agroecology.

We proposed a survey to assess the level of participation of both farmers and agencies as passive, active, or intermediate along seven stages of agroecological development: diagnostic, planning, design, implementation, monitoring, evaluation, and decision-making, following Gouraldo Choguill's (1996) insights about participation and the tradition NGOs have for the implementation of development projects in the area. The survey was linked to open ended questions allowing the collection of rich narratives, mainly from the agency members, depicting the perception of the roles of stakeholders

along the transition towards the establishment of AE. Figure 2 displays a diachronic progression of events in the development of AE in the area of the study, where farmers and agencies show different levels of participation. From the farmers' perspective, their level of participation at the early phases of the development of AE was mostly passive (n= 19, frequencies: diagnostics 0.53; planning 0.53; design 0.58). Meanwhile, later phases of the development show a more active participation of farmers (implementation 0.74; monitoring 0.58, evaluation 0.68; and decision-making 0.68). But there was a much higher perception of participation in the implementation stage, where agroecological practices were undertaken in the field.

Our study describes a considerably aged population of farmers with very little presence of young people, in contrast with the younger workers found in the cut-flower industry next door to the farms of our participants. Out of the average 36.8 years of agricultural work, 19.6 years were devoted to agroecology, which illustrates the length of time that NGOs have been present in the area working in agroecological initiatives with our participants. From their narratives and from the standard deviation (Table 1), we can infer that some farmers recognize that they had been implementing AE in their lands long before the NGOs arrived. The small size of their fields (1 ha) questions the way AE is expected to provide enough food for households with an average of 4.1 members. According to a former member of an NGO working in Pedro Moncayo county, the large proportion of female participants is due to an existing mandate from funders to engage women (gender approach) in their proposals, but also to the fact that men are engaged in other activities for income purposes. Both Cayambe and Pedro Moncayo counties show

high poverty rates, even though the development of the agroindustry and associated commercial activities has been consistent for at least three decades. This fact reveals a low redistribution of profits in the area, especially in impoverished communities. Most of farmers have only attended primary school and identify themselves as indigenous and mestizos in a balanced proportion. Responses from older participants emphasize their pride about their indigenous origin.

The farmers' narratives confirm the quantitative results about their low participation during the early stages. From the farmers' perspective, it was the agencies who drove the process through diagnosis, planning and design, whereas, the patterns change at the stage of implementation when the narratives describe a higher level of participation especially when working on the farmers' fields. The farmers commented about their contribution with actions that helped build a bridge between the NGOs and the farmers. One 65-year-old farmer reported that he was an intermediary between an NGO and the community members during the early stages, and that he was asked by the NGO to organize the community so farmers could have access to benefits from the NGO. Those benefits were mainly training and inputs such as plants, seeds, small animals, observation trips, and technical assistance. A 76-year-old woman from La Esperanza in Pedro Moncayo county confirmed that she was happy to contribute with money to cover the cost of meals, because she was learning how to prepare soil amendments for her farm during the training events offered by the NGOs. A 46-year-old woman from Ayora stated that she had been a community leader since she was a teenager, helping her neighbors get access to electricity and drinking water. With that background, she thinks her role during the

early stages of AE in her community was active, however she is not explicit about her real contribution. A 49-year-old woman complained that during the early stages of AE, she was in disagreement with members of her family because they would not be convinced about this new approach to agriculture. Other farmers stated that they used to listen the proposals from outside technicians but did not feel very courageous to express their personal opinions yet. A report from FAO describes the positive contribution of NGOs' interactions with farmers in terms of participation and strengthening of farmers organizations to resolve perceived needs (Farrington, 1997). However, in our case study, there is no clear evidence that farmers perceive themselves as being active in the diagnostics, planning and design of AE in their communities.

In the later stages of the development of AE, namely monitoring, evaluation and decision-making, the perception of active participation of farmers increased. Narratives from farmers tell about positive changes in their fields and in their lives. There is evidence that farmers currently reflect over their own achievements. That is the case of a 49-year-old woman who claims that she was challenged to become an AE promoter before she even felt ready, but she accepted the challenge and succeeded. A 52-year-old woman affirms that at the beginning, it was the technicians who made decisions, but at the end of the process, it was her and her family who were making decisions about their farm management, which is consistent with Vía Campesina's claims about AE leading farmers to make autonomous decisions about their fields (2011). Another woman said that when her farm achieved a good level of development, she had many visitors and she was proud to communicate her success to inspire other farmers. These anecdotes from

farmers have been also reported in Central America as an effect of the role of the *promotor campesino* stimulating other farmers to engage in agroecological practices (Altieri & Toledo, 2011).

Agencies perceived themselves as being active in almost all phases of the transition to AE, claiming that their role was active in the planning, and four out of eight during the design phase. When the agencies were asked about their perception of farmers' participation, they stated that the farmers were active in the planning (six out of eight), implementation (four out of eight), and decision-making phases (four out of eight). Self-perception of agencies' participation is reported as high, and so is agencies' perception of farmers participation in the planning stage, which shows that agencies perceive that the planning stage was a collaborative task with farmers. As Figure 2 shows, however, there is a divergence in perception between agencies and farmers about the farmers' participation in the planning stage. Agencies claimed that farmers "contributed with a piece of land for building a communal reservoir" and that "farmers also worked together with technicians from NGOs", probably referring to physical hands-on work. But, again, there is not much of an intellectual participation in the planning process.

Self-perception of participation of agencies in the design phase is reported as high by 4 respondents out of 8. The next phase that stands out is implementation, in which agencies perceived that farmers' participation was high (4 out of eight), showing a clear agreement with farmers' perceptions noted earlier. Figure 2 shows that from this stage onwards, farmers' perception of participation becomes more active and continues in this manner

until the end of the process, which reveals a progressive, less vertical approach in the way stakeholders work. The literature supports horizontality in participation when it claims that agroecological innovations operate *in situ* with a high and horizontal participation of local farmers in the development of technologies responding to local situations (Altieri & Toledo, 2011).

Our findings suggest that the level of involvement of potential beneficiaries of agroecological projects differ along their different stages. In the light of literature, participation is power (Arnstein, 1969); thus, it is possible that the progression of farmers' participation, in this case, could be read as a dynamic of increasing empowerment of farmers. Case studies from Pakistan, Colombia, and Turkey illustrate the process of empowerment of communities, including an update of Arnstein's ladder of participation (Arnstein, 1969), which is more applicable to countries like those in the cited study and, probably more suitable for Ecuador (Gouraldo Choguill, 1996). Narratives from an NGO member confirm that in early stages of AE, farmers expected the assistance from outside agents; at that time, the NGOs contributed with diagnostic tools to produce a baseline of the individuals and their organizations, the state of conservation and access to resources, and land ownership; the NGO member states that they mapped the social-economic situation of the families, the communities and the territory, and the state of the landscape. Peasant leaders became the bridge that connected the farmers with the NGOs and the farmers were interviewed for the purpose of producing a baseline. For the planning stage, the NGOs made decisions according to the ability that families showed at implementing improvements that were both quick and



visible, so that those successful improvements could become the motivation for other farmers. Agency members agree that this strategy is an insight they gained from farmer to farmer (*de campesino a campesino*) methods (Holt-Giménez, 2002; Nicholls-Estrada & Altieri, 2018).

The narratives from agency members illustrate the implementation of AE and the mechanisms for making decisions along the process. The improvement of animal facilities and management was a successful and inspiring short-term evidence of the positive impact of AE, probably because domestic animals are traditionally considered as a money-saving strategy. External agents complain that, at the beginning, a number of farmers would not accept certain innovations of the agroecological design on their private plots, although they would happily accept them when implemented on communal land, including school gardens, hospitals or any other type of community owned space, probably because the perception of risk assumption is diluted on communal land compared to private fields. Additionally, it must be said that the cost of materials and logistics for introducing innovations was at the agencies' expense. Farmers would contribute with their workforce and time. A member of a government agency claims: "the NGOs contribution was mainly money, and the farmers' contribution of time and labor was highly valued by the agency".

Farmers were constantly trained on the AE proposal and had to show its implementation on their farms in order to have access to more aid as incentives to continue with the agroecological design until completed. Farmers were accompanied by a team of

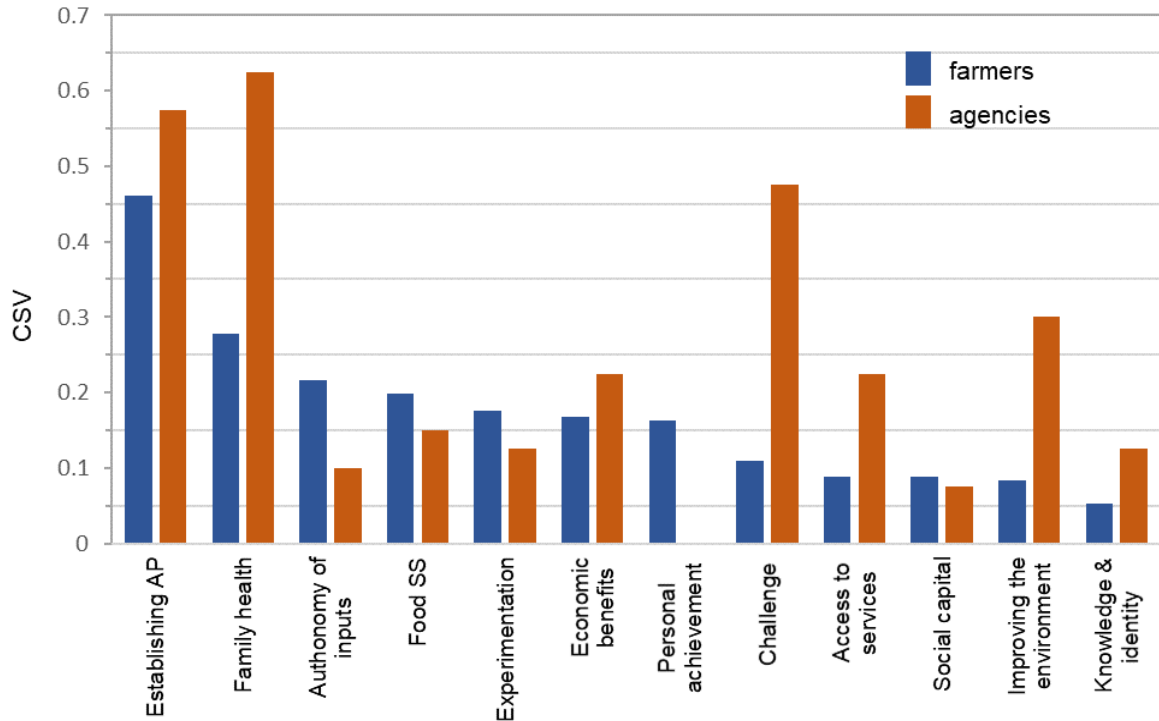
technicians along the whole process, but at the same time, some management committees were established for monitoring, evaluating and, making decisions with the participation of farmers. These committees are probably the reason why farmers had a higher perception of participation on the four last stages of the development of AE. An NGO member stated that the results from participatory evaluations were socialized with the farmers so they could understand why the agency would make their decisions about whom should the support be focused on. Another agency member declared that every NGO had a particular way of approaching their intervention, also depending on the policies of the funders. Agencies would look for community leaders that had already communicated their interest on an alternative way of doing agriculture to recruit them in their teams. A 40-year-old government member who had been a community member and NGO technician for several years confessed that “it is sad that local people need external follow up and monitoring because we do not value our own work”. Another member of agroecological organizations and former government authority stated that monitoring and evaluating projects is more related to expected results with a quantitative approach: “number of workshops, attendees, amount of materials delivered to farmers, to conform with the need for evaluation of the funders”. He also noted the existing confusion at the level of the agencies between the meaning of evaluation of expected results and the long-term impacts of AE.

The innovations were a mix of practices that had been tried before, in different socio-geographical contexts, and some were adapted together with farmers’ contributions. A woman who started working with an NGO in the past, and now works for a government

agency asserts that they made many mistakes in the past because they insisted on implementing innovations that ended up being unsuitable for the local context: “we made many mistakes regarding the innovations we recommended to the farmers”. There are also dissimilar perceptions and understandings of participation, which is reasonable because, as said above, the approach of the NGOs depended largely on the funders’ conceptions of participation. Even development was a problematic concept because the term swayed from a construction from the traditional powerholders, to a more liberal democrat concept “that incorporates the values and goals of their intended beneficiaries” (Scott, 2015, p. 3), which in fact adds meaning to what the agency member criticized about her NGO, about making mistakes in the past. These preliminary findings reveal the convergences and divergences in the perceptions of stakeholder participation, requiring further research to understand the complexities and challenges of the adoption of AE in the rural reality.

#### *Motivations of farmers for adopting agroecology*

Farmers were asked about their motivations for adopting agroecology both in the past and in the present using a free listing tool. All the responses were classified in twelve major motivations (Figure 3 & 4). Based on a Composite Saliency Value (CSV), the most important motivation for farmers to adopt AE at the beginning of the process was: establishing agroecological practices (CSV = 0.46), well ahead of concerns about family health (CSV=0.28), autonomy of inputs (CSV= 0.22), food security and sovereignty (CSV= 0.20), experimentation, observation and training (CSV= 0.17), obtaining economic benefits (CSV= 0.17), and obtaining personal achievement (CSV= 0.16). There were further motivations with lesser values.



**Figure 3.** Motivations for farmers for the adoption of Agroecology in the past.

From the farmers’ perspective, the establishment of agricultural practices and autonomy of inputs are remarkable features from traditional agricultural systems and constitute strong motivational factors, probably because they are associated with ancestral practices (Altieri, Koohafkan, & Gimenez, 2012). In addition, family health and food security and sovereignty are strong motivations for farmers, mostly because a large number of them come from a history of working in the flower farms which neighbor their communities. The flower industry has especially impacted women’s health and the environment, but it has also resulted in neglected lands as the younger population would rather sell their labor than produce food in their own properties ( Handal & Harlow, 2009; Franze &

Ciroth, 2011). A 52-year-old woman stated that her main motivation in the past was: “improving my health and the health of my relatives. Eating fresh and diverse products”. Whereas a 60-year-old woman from Santa Rosa de Ayora stated: “I felt motivated by watching how my soil improved. Contemplating the trees and the plants growing was a personal satisfaction for me”.

Meanwhile, when agencies were asked about what type of motivations they had utilized to engage farmers, they responded in a slightly different way. Their responses depicted a convergence with farmers’ perceptions such as: family health (CSV= 0.62) and establishing agroecological practices (CSV= 0.57); however, there were two conspicuous divergences between farmers and agencies motivations: challenging the conventional practices (CSV= 0.47), improving the environment (CSV= 0.3), and access to services (CSV= 0.22) from the agencies’ perspective. Narratives from agency members highlight that the main topics they used to motivate farmers at the beginning were “improving family health and reducing the effect of chemicals on the environment” (especially on soil and water) but also: “self-sufficiency of food for the family, family integration, recovery of the value of traditional food, weaving of social networks”. Which it makes sense knowing that many participants had been working for several years in the cut-flower industry, probably having direct contact with pesticides and realizing their effect on their personal health and the deterioration of the landscape.

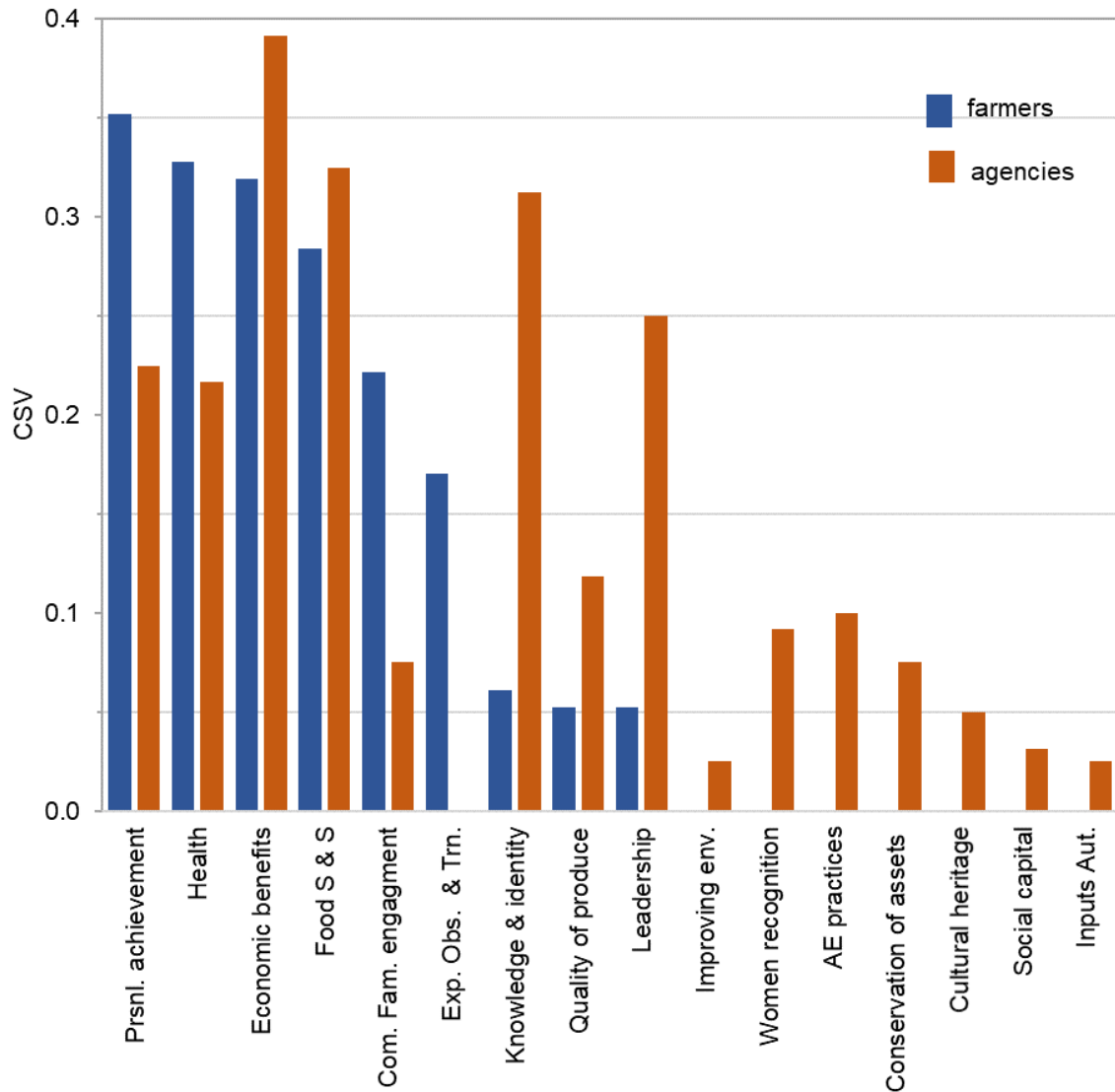
An agency member stated that when he started visiting the area of the study, he was working for an NGO and their strategy for motivating farmers was “to appreciate their

love for the earth and their respect for the environment”. Farmers’ concern about the overuse of pesticides was generalized, especially because a large number of them worked either part-time or full-time in the cut-flower industry; thus, the NGOs capitalized on that concern and used it as a motivation, stating that AE promotes the use of safe inputs that can even be prepared at home. An NGO member stated: “we criticized the conventional ways especially about the use of toxic inputs”. Agencies also advocated for the recovery of local traditional agricultural practices, which engaged the interest of farmers. Although a few farmers showed some concern for the quality of the environment, it was family health that was reported as an actual issue; nevertheless, the agencies put a lot of effort into creating awareness about environmental deterioration resulting from improper soil management and the overuse of pesticides. Challenging the conventional practices was a discourse that the NGOs tried to promote as a motivation, but it had not been perceived as such by farmers in the past. A technician from a government agency who was originally member of an NGO said: “one motivation was that agroecology constituted a new and alternative approach, which was not only focused on production but on the environment’s health; an integral approach. Then, I think, that was a motivation for the people”.

On the other hand, during the interviews, an agency member stated that when the government started to show interest in AE, the farmers were already engaged in agroecological practices. It was the farmers who found ways to motivate the government agencies instead, and sometimes pushed the local and provincial government to take into account the farmers’ demands, especially regarding public policy for improving and

expanding access to irrigation, technical assistance, training, and basic spaces for direct commercialization. The farmers considered those factors as positive and encouraging for peers to continue implementing agroecological practices on their fields.

Current motivations for persisting with agroecological practices from the farmers' perspective show convergences with the agencies. Among the first, most important motivations are personal achievement (CSV= 0.35), health (CSV= 0.33), economic benefits (0.32) and food security and sovereignty (CSV= 0.28). Meanwhile, the agencies showed the highest CSV values for economic benefits (0.39), food security and sovereignty (CSV= 0.32), and construction of knowledge and identity (CSV= 0.31; Figure 4). This former motivation together with leadership (CSV= 0.25) showed the major divergence between the perceptions of farmers and agencies. In addition, the agencies reported seven more motivations that were not reported by the farmers. One motivation reported by the farmers: experimentation, observation, and training was not mentioned for the agencies. In fact, we did not find clear evidence of NGOs promoting farmers' engagement in participatory research or collective construction of knowledge.



**Figure 4.** Motivations for persisting with the practice of Agroecology in the present.

More details on appendix 1.

According to the results, there is a match between farmers and agencies regarding personal achievement as a motivation in the present time, which denotes the relevance of agroecology in the self-perception of farmers, especially women who after decades of working in AE have developed independence and self-esteem, as one agency member



declared in an interview. Cultural stereotypes affect the self-perception of women (Warren et al., 2013), especially because they have historically been denied access to education and because power and achievement has historically been associated with men (Calderón et al., 2018). This argument has also been discussed by Freire (1973) when associating education with freedom; it appears that AE delivered both independence and positive self-perception to women. A 49-year-old female participant from the community of Cariacu said that “having a good reason to go out of the house makes me feel free, and meeting new people was a motivation in itself” while a 48-year-old woman from La Buena Esperanza de Cayambe stated: “I feel self-satisfied from my achievements, from being able to socialize, and I enjoy seeing my peers at the farmers’ market”.

Economic benefit is another convergence in the present, although it was not very important in the past, maybe because farmers did not have access to marketing their produce without middlemen. But now, in contrast, the opportunity for making a profit is more visible. Farmers stated during interviews that now they are inspired to plant more because sales have increased; however, some conflicts have appeared at certain farmers’ markets due to perceptions of non-compliance with agroecological principles from a few farmers. It is important to reflect on how AE arrived in this territory: as a response to the green revolution’s failure to meet the needs of the peasants. An agency member claimed that AE had been proclaimed as an alternative to capitalism in earlier times; however, in the present, there is an increasing interest for economic benefits from both agencies and farmers. This could not be considered illegitimate by itself; however, concerns arise when reading Giraldo's (2019) reflections about the risk of commodification of AE, which

should alert farmers and agencies to avoid succumbing to the same type of conventional power that AE initially intended to overcome. Moreover, the growing interest of the provincial government in participating in the expansion of AE, and the municipal government in creating public policy that encourages farmers to engage in AE in exchange for tax reductions may interfere with the possibility of AE becoming an alternative to conventional development (Giraldo & Rosset, 2018), bolstering the adoption of agroecological practices without a genuine ideological component (Nelson et al., 2009). Nevertheless, farmers and agencies coincide in the perception of food security and food sovereignty as an important motivation. This topic requires further analysis in the light of incentives and compensations.

Ideologic motivations such as building knowledge and identity, and building leadership are perceived as high motivations for the agencies but not too high for the farmers, which recalls Giraldo & Rosset, (2018) concerns about AE being co-opted and stripped off its sociopolitical substance. However, farmers produced quotes that evidence that they do have the will to engage in experimentation, observation, and training, which are elements related to the diffusion of agroecological knowledge with cultural implications: “exchanging knowledge and motivating my friends and relatives is also a motivation for me” said a retired 59-year-old man from the community of Porotog.

#### *Compensation for adopting agroecology*

When farmers were asked about their perceptions regarding compensation during the early stages of the development of AE in their communities, their most frequent response was that they received seeds, seedlings, fruit trees, timber trees, and ornamental plants.

This coincides with the perception of agencies. Inputs in general, training, and young domestic animals, were reported as compensations by the farmers. All these incentives were handed over by the NGOs. The agency members have a similar perception of the importance of the delivery of inputs and services as compensations for farmers; nevertheless, the agencies report those compensations in a larger proportion than farmers, as showed on Table 2. Agencies also consider that capacity building and leadership, technical assistance, access to markets and participatory guarantee systems (PGS), access to credit, and observation trips were important contributions from NGOs.

**Table 2.** Perceived Compensations that influenced past adoption of Agroecology.

	Relative frequencies	
	Farmers	Agencies
Plants and seedlings	0.632	0.625
Training	0.316	0.500
Inputs	0.316	0.625
Livestock	0.211	0
Observation trips	0.158	0.250
Access to credit	0.105	0.250
Social acceptance	0.105	0.125
Irrigation technology	0.053	0
Capacity building & Leadership	0.000	0.375
Technical assistance	0.000	0.250
Implementation of farm designs	0.000	0.125
Strengthening of organizations	0.000	0.125
Access to Markets and PGS	0.000	0.250

Farmers feel they currently get compensation from their clients through the farmers' markets, mainly as a recognition for the work they do; farmers also feel sales compensate the effort they make. Farmers reported that they are getting some support from their

organizations which they perceive as a compensation since they receive some inputs and eventual training sessions. Agencies, on the other hand, have the perception that farmers are getting compensation from different levels of government. The municipal government contributes with training, spaces for marketing, and local regulations that ease commercialization; in addition, the municipal government contributes with public policy that alleviates an important proportion of property taxes on the land and promotes farmers markets (GAD Municipal Pedro Moncayo, 2017). The provincial government just recently, in 2015, released an ordinance to promote AE, conditioning farmers to become organized in order to have access to government help (Gobierno Provincial de Pichincha, 2015).

From the farmers' perspective, the only perceived compensation associated with ideological aspects in this section of the study is social acceptance, although its score was low. The rest of perceived compensations are related to external incentives (training, delivery of plants, and inputs in general). The agencies did not emphasize the ideological aspects as compensations either, except for capacity building and leadership; which also scored low. Strengthening organizations was less important than the former compensation, and social acceptance had an even lower score. Those compensations were reported by agencies (Table 2). A case study from Brazil points out that personal and political benefits were perceived as compensations by farmers of an agricultural cooperative, and that ideological aspects were associated with pro-active participation of the members (Cechin et al., 2013); however, in our case study, we mainly found external incentives. Further research is required here for this aspect because pragmatic incentives

such as sales are surpassing ideological incentives in the present. Some voices expressed feelings of possible fraud from non-members of the participatory guarantee systems who insist on being part of the farmers' market.

*Why is agroecology in the agenda of government and non-government organizations?*

Agency members were asked about past motivations for their organizations to include AE in their agendas and the two most frequent answers were: as a response to the failures of the green revolution and its hegemony, and because of environmental concerns. The next motivation was because AE was an institutional mandate. On the other hand, the most reported current motivations for agency members were concerns about climate change, articulation of stakeholders, and the convenience that agroecological knowledge and practices are more available at the present. The other current motivations did not show any tendency in this study and their frequencies were rather low. Past motivations are consistent with the tendency of that time for NGOs in Ecuador (Chiriboga, 2014). Nevertheless, the agenda of the agencies in no manner concurred with the farmers' perceptions of motivations. Past and current agency' motivations only match for environmental concerns (past) and climate change (present) in their agendas (Table 3). These results are the evidence that motivations for agencies have evolved in their agendas, except for environmental matters, and that they have probably been dissociated from the farmers' visions, which is evidenced by the low participation that the farmers perceived, especially in the early stages of the adoption of AE in their communities. Voices from the agency members stated: "Funders are open to invest in agroecology because it is considered an alternative for climate change adaptation, for building resilience in the communities".

**Table 3.** Motivations for including Agroecology in the agendas of agencies in the past and in the present.

In the past n=8		In the present n=8	
Motivation	Responses	Motivation	Responses
Environmental concerns	4	Climate change	2
Contestation to green revolution hegemony	4	Available agroecological knowledge & practice	2
AE is transversal to institutional mandate	3	Existing public policy	2
Relevant to farmers	2	Relevant to stakeholders	1
Funder mandate	1	Articulation with stakeholders	2
Need for external recognition	1	Participation of youth	1
		Expansion of agroecology	1
		Health	1

Another agency member mentioned that “international funders consider agroecological practices as something that needs to be implemented”, while an authority from the Ministry of Agriculture stated that “in the last years, local governments have started to substitute the role of the NGOs”. He additionally said that “after the year 2005, social movements in Ecuador have had more influence than NGOs”. This last statement, from someone who has been involved in the historical process of AE in Ecuador, invites reflection about new articulations between agroecological practitioners, different levels of government, and other stakeholders in the near future.

*What are the expectations for Agroecology in the future?*

Perpetuation of agroecological knowledge and practice was the strongest expectation in the replies of the farmers; however, that expectation was not mentioned by the agencies as illustrated in Figure 5. A recent study performed in the same area claims that agroecological farmers feel very confident about their knowledge, which coincides with their vision of communicating their knowledge and perpetuating it on the field through practice (Montúfar & Ayala, 2019). A 49-year-old woman, for example, confirms that her wish is to complete the implementation of the five subsystems on her agroecological farm to promote tourism and to extend her knowledge to visitors. This vision of the future is shown in Figure 5 and Appendix 2, and echoes with the literature, which reports on the importance of having the farming practices embedded on the farmers' fields as a pedagogical resource (Oyarzun, Borja, Sherwood, & Parra, 2013).

This study revealed a high influence from NGOs in the early stages and an increase in active participation of farmers in the last stages. Figure 3 shows the farmers' original motivations, where it is clear that farmers scored poorly on intrinsic motivations, namely experimentation, personal achievement, challenging the *status quo*, building social capital, improving the environment, and construction of knowledge and identity (in descending order). On the other hand, the agencies had high and medium scores to only two intrinsic motivations: challenging the *status quo* and improving the environment. The agencies had very low scores to the following motivations: construction of knowledge and identity, experimentation, and building social capital. The other half of the motivations reported by both farmers and agencies are extrinsic. The literature is clear in defining intrinsic motivation as “doing an activity for its inherent satisfactions rather than

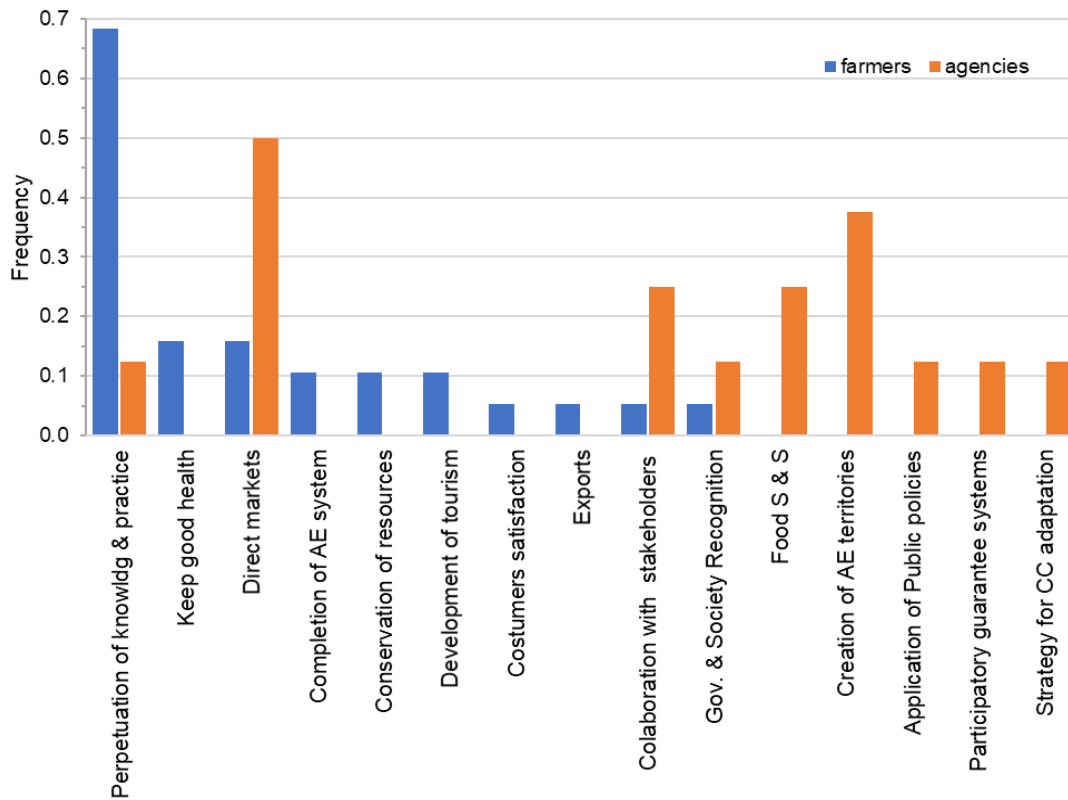
because of external prods, pressures, or rewards” (Ryan & Deci, 2000, p. 56), stating that intrinsic motivations are persistent factors for growth in knowledge and skills. However, the authors warn about the contextual response to motivations because the subjects can be intrinsic motivated by the satisfaction of the task itself (its novelty, challenge, or aesthetic value) or by innate needs for competence, autonomy, and connectedness.

The access to markets without middlemen is an important expectation for agencies but not too much for farmers, probably because they perceive that the market already exists, whereas the agencies foresee more farmers’ markets, probably in larger municipalities. Keeping good health has some relevance for farmers but not for the agencies. Creation of agroecological territories, food security and sovereignty, and collaboration with other stakeholders are notable expectations for agencies, nevertheless, none of the latter were reported by farmers when envisioning the future of AE in their communities. The results for this question should cause concern to agencies and farmers because the lack of convergence between them reveals the different perceptions that stakeholders have about the future of AE in the area of the study. This situation brings about a need to create the conditions for a consensus among the stakeholders to foresee the collective impact at the level of the territory (“Collective Impact Forum | Resources,” n.d.; Kumar, 2011).

Pinzón (2017) asserts that AE has different meanings for different people, including in academia. That is why it is important to identify the values and meanings that resonate with different stakeholders around the understanding of AE. She proposes two types of motivations: one type responds to idealistic matters and probably expects social benefits,



while the other type responds to more rational and pragmatic matters, which may require some sort of incentives and may be associated with expected economic benefits. The agroecological transition is a process with different stages, as stated earlier in this paper where we established seven phases: diagnostics, planning, design, implementation, monitoring, evaluation and decision- making.



**Figure 5.** Expectations of Agroecology in the future. More details on appendix 2

In summary, narratives from the agencies and from the farmers assert that the NGOs’ interventions varied according to their internal policies and their funders regard for incentives or compensations. The NGOs sought a contribution from the farmers in the

form of labor or completion of components of the agroecological proposal, so they did not have the feeling that all was being given for free and thus avoiding a paternalist situation. External rewards were reported by farmers equally as motivations and compensation, with no evidence of conceptual differentiation. Chances are that some compensation from the agencies may not be perceived by farmers as mechanisms of control because even though such compensations were given after the completion of certain conditions, they were not sufficiently large to create an over justification effect, which would signify a negative effect when used to compensate for something that is already an intrinsic motivation for the farmers (James, 2005). However, a deep reflection about the use of extrinsic rewards as an affirmation of the competence of farmers is required in order to enhance existing intrinsic motivations and avoid using it as a manipulative tool. Using an extrinsic reward for compensating an intrinsic motivation could deactivate that motivation itself, resulting in passive compliance with a rule for the sake of the reward. Our case study focused more on the description of motivations and compensations reported by farmers and agencies and did not develop tools for a deeper understanding of the nature of each type of compensation.

For our case study, a reflection about the different contributions from the literature can help explain the possible persistence of enough strong motivations (whether intrinsic or extrinsic) in the present and in the future to guarantee the continuation of AE in the area of the study. The topic requires further research in order to answer these questions with greater accuracy, but the contribution of this study opens new aspects of inquiry that

could become new areas of discussion and articulation for external agencies and organizations of farmers hereafter.

## Conclusions

Our demographic data illustrate how the consistent development of the cut-flower industry, dairy farms, and associated commercial activities in the area of the study does not produce evidence of having improved the poverty indicators in the rural context of both Cayambe and Pedro Moncayo counties. For example, in terms of access to education, most farmers have only attended primary school. Farmers engaged in agroecology are aged and there is very little participation of youth and men in general. The average area of farms is one hectare, there is good irrigation coverage, and a large proportion of our participants get their income mainly from agriculture. In Addition, they identify themselves as indigenous and mestizos in a balanced proportion.

Regarding participation, external agencies stated the importance of the contribution of local leaders during the first stages of AE, especially concerning the work of connecting farmers with NGOs; however, the decisions at early stages depended on the perception that agencies had about the completion or achievement of their project objectives, resulting in scarce intellectual contributions from the farmers. There is no evidence of inclusion of ancestral or indigenous ways of planning or design. Additionally, some innovations brought by the NGOs were not suitable for the local context, however they were implemented by farmers in order to comply with the demands of the agencies. Some

of these practices had to be adapted to the local conditions with the passing time and the farmers' experience.

Agroecological practitioners were used to evaluations from agencies with a more quantitative approach and there was confusion about whether they were evaluating the expected results or the long-term impacts of their interventions. The level of involvement of farmers in the adoption of AE differed along the different stages of the process. In early stages, the farmers had a passive involvement. The farmers received materials and technical assistance according to their compliance with NGOs instructions. Agencies made decisions about delivering incentives according to the ability of the farmers for implementing the practices suggested by agencies. The involvement of the farmers in the adoption of AE increased with time, especially at the implementation stage, when they perceived more spaces for participation. Divergences and convergences between farmers' and agencies' motivations were found. Concerns about AE contributing health, environment, and challenging conventional agriculture were the main motivations for adopting AE in the past from the agencies point of view, whereas the farmers had different perceptions. Some were convergent such as establishing agroecological practices and improving family health. However, other motivations were divergent such as challenging the principles of conventional agriculture or improving the environment, which were not important to the farmers. Achieving autonomy of inputs was a motivation for the farmers but not for the agencies.

There is some concern about the low score of certain ideologic motivations for adopting AE, however, personal achievement and engagement in experimentation, probably for building knowledge, seem to be interesting contributions from the farmers' motivation perspective. Community and family engagement is a non-pragmatic motivation that could be considered mostly ideological. The risk of commodification of agroecological produce as an effect of the growing interest in healthy food at the farmer' markets needs a deeper exploration. Some farmers complain about possible fraud, resulting in frequent conflicts between producers belonging to participatory guarantee systems and those who do not. This fact reveals the need to increase awareness and to internalize the principles of AE both in farmers and consumers.

Motivations for agencies and farmers evolve in the course of time. The agencies had priorities in the past such as environmental issues, health, and the implementation of agroecological practices as a way of challenging conventional agriculture; whereas in the present, economic benefits, food sovereignty, food security, and recovery of knowledge and identity became their priorities. There is evidence of a dissociation between agencies' and farmers' motivations. Possible coopting of AE by provincial and local governments produces mixed feelings at different levels. For some farmers, the incentives coming from the government are positive, despite some sort of control in the process, whereas other sectors problematize the intrusion of the government agencies as they consider agroecological development to be solely the farmers' achievement.

One interesting reflection that derives from the low score that ideological compensations show for both agencies and farmers is the difficulty to tell the difference between compensation and incentives with the methods used. More accurate studies are required to clarify this difference and obtain useful data that will inform further interventions to add ideological reasons for farmers to adopt AE in order to avoid their current pragmatic approach.

The motivations for agencies to have AE in their agendas has been linked to environmental issues both in the past and in the present, although currently, the adopted label is climate change, considering AE as the right strategy to tackle adaptation and mitigation. Response to the hegemony of the Green Revolution was a motivation in the past, but now, the agencies think they have largely capitalized a good amount of agroecological knowledge and practice that should be utilized. While in the past, AE was considered an institutional mandate, and the funders pushed the NGOs to address it in development projects, currently the NGOs consider that existing public policy is a motivation to continue working with AE.

The agencies used to focus their work more on groups of farmers, but now their aim is to integrate, articulate other stakeholders, and to expand AE to a territorial scale, which is their current motivation. On the other hand, the farmers' motivations are dissociated from the above-mentioned ones. However, the tools used for this section may have not covered the opinions of farmer's organizations, which could be somehow different from the individual perspectives. Further research is required to establish a dialogue between the

NGOs and the farmers' organizations in a more horizontal fashion, probably with a collective impact approach, in order to better understand current motivations and expectations.

The expectations about AE in the future are even more divorced between the farmers and the agencies. Perpetuation of knowledge and agroecological practices are the highest expectations for farmers. Their narratives show the confidence they have on what they know and what they want to communicate to others, whether visitors or family. Health and commercialization of produce are current farmers' motivations and expectations for the future. Direct markets are the only expectations shared by farmers and agencies and for a good reason, because all of the marketing initiatives have been mainly financed by external funds. The central government and some municipal governments are opening spaces for marketing agroecological produce, but participatory guarantee systems (PGS) are not necessarily developed in all those new initiatives. However, PGS, food security, and food sovereignty represent expectations for the agencies; sadly, not for the farmers. Although there is a discomfort at the farmers' markets about possible fraud regarding the agroecological quality of produce, the farmers do not see the implementation of PGS as a guarantee for the permanence and growth of the market. At least we were not able to capture narratives that supported that perception of need.

This study invites reflection on an aspect that is considered a current motivation and an expectation from the perspective of the agencies. It is the expansion of AE at a territorial level. There are probably reasons for it, since the agencies need to continue their work in

the future —now in a more friendly context because there is a clear interest from the government. Also, farmers have experienced the benefits of AE and the market is consistently demanding healthy produce. The future agenda for agencies will certainly address climate change, carbon sequestration, and other sustainable practices that are part of the environmental discourse at a general level. However, there is not a clear direction towards the internalization of non-pragmatic motivations and expectations. The expansion of AE as such should not only consider expanding the number of farms, farmers, or hectares of agroecological crops, but also, and principally, raising awareness about the principles of AE, covering its six dimensions: social, economic, environmental, cultural, political, and ethical. This awareness should be directed towards farmers, consumers, and all stakeholders.

This section of the study has established that farmers rely on their knowledge, but it does not characterize the nature of that knowledge. For that reason, the evidence shown on this section does not problematize the need to address knowledge related to other dimensions of sustainability, namely: social, political, and ethical, which are poorly represented in the surveys and interviews. The next section of this study has a more profound approach to the dynamics of knowledge and tries to expand the analysis to complement the content of this section.



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**Appendix 1.** Composite Salient Values (CSV) for current motivations for persisting on the practice of Agroecology.

Motivations	farmers	agencies
Personal achievement	0.35	0.23
Health	0.33	0.22
Economic benefits	0.32	0.39
Food S & S	0.28	0.33
Com. Fam. engagement	0.22	0.08
Exp. Obs. & Trn.	0.17	0.00
Knowledge & identity	0.06	0.31
Quality of produce	0.05	0.12
Leadership	0.05	0.25
Improving environment	0.00	0.03
Women recognition	0.00	0.09
AE practices	0.00	0.10
Conservation of assets	0.00	0.08
Cultural heritage	0.00	0.05
Social capital	0.00	0.03
Inputs Autonomy	0.00	0.03

**Appendix 2.** Expectations for agroecology in the future. Results of free listing tool for 19 farmers and eight agencies in the area of the study.

Expectations	Farmers	Agencies
Perpetuation of knowledge & practice	0.684	0.125
Keep good health	0.158	0
Direct markets	0.158	0.5
Completion of AE system	0.105	0
Conservation of resources	0.105	0
Development of tourism	0.105	0
Costumers satisfaction	0.053	0
Exports	0.053	0
Collaboration with stakeholders	0.053	0.25
Gov. & society recognition	0.053	0.125
Food S & S	0.000	0.25
Creation of AE territories	0.000	0.375
Application of public policies	0.000	0.125
Participatory guarantee systems	0.000	0.125
Strategy for CC adaptation	0.000	0.125

# SOURCE AND DYNAMICS OF AGROECOLOGICAL KNOWLEDGE IN TWO RURAL COMMUNITIES OF NORTHERN ECUADOR

## Introduction

The conceptual foundations of agroecology are as diverse as the practice of agroecology (AE) itself. Current understandings differ essentially from its original proposal because now, AE includes different forms, dimensions, principles, practices, and forms of knowledge. Formerly, AE was viewed mainly as a form of response to the hegemonic conventional agricultural system inspired by the principles of the Green Revolution (GR). From the environmental perspective, AE was conceived as the application of ecological concepts for a sustainable agroecosystem management. Hence, the production of knowledge was focused on covering those needs. The constant interaction of agroecological farmers with the agroecosystems, and the need to resolve practical issues in the field, bring about new practices linked to knowledge that are relevant to the users and adapted to the geographical and sociocultural context. AE recognizes the value of agrobiodiversity and the complex diversity of knowledge in terms of its production, diffusion, and perpetuation (Vaarst et al., 2018).

Current understandings of AE consider different categories for its analysis. The criteria derived from the dimensions of sustainability suggest six dimensions for AE: social, political, cultural, environmental, economic, and ethical (Caporal & Costabeber, 2004; Rodrigues Hirata et al., 2019) with some variations according to the scope of the analysis (Rodrigues Hirata et al., 2019). Insights from diverse literatures include, ideally the

following principles of AE: low external inputs, recycling of nutrients, functional agrobiodiversity, using altitudinal gradients, family and community nourishment, democratic governance, and production of locally adapted knowledge (M. Altieri, 1996; Bravo, 2014; Third World Networks, 2015; Vaarst et al., 2018).

Mainstream research systems have made peasant knowledge invisible and have chosen the Western worldview as the only prevalent one, disregarding the relevance of the potential indigenous contribution to sustainable practices and natural resource management (Maass, 2008). Freire (1973) states that authoritative education has a narrative of cultural conquest and imposition, whereas education for liberation considers a dialogue of knowledges, enhancing equity, solidarity, and respect to one another (Freire, n.d.), which resonates with the spirit of the intersection between AE and knowledge. Ruttan & Hayami (1973), even in the context of the GR, suggested that knowledge and technology needed a process of “naturalization” because of ecological and cultural differences among localities. Already at that time, and in that conventional context, they claimed that local adaptations of agricultural technology transfer are required for both biological and mechanical technology, insisting about the need to produce “location-specific agricultural technology”. In recent years, with the raise of AE, the development of more participatory and horizontal ways of knowing how to produce relevant knowledge becomes a must (Pimbert, 2009).

The majority of the research about AE in Latin America is focused on physical-biological factors with a predominance of field experiments. However, the relevance of ancestral

knowledge and its contribution to AE has been sometimes described at a global scale (Shiva, 2007; Arora, 2012; Norton, Pawluk, & Sandor, 1998a), in Latin America (Jacobi et al., 2017; Val et al., 2019), and to some extent in Ecuador (Minga, 2017; Montúfar & Ayala, 2019). Knowledge is a paramount contribution for building agroecological contents and for shaping its own discourse. This research describes the diverse dynamics of knowledge in five rural communities of the Northern Andes of Ecuador from the perspective of the agroecological farmers.

For the purposes of this study, we consider agroecological knowledge as the product of the contributions from the practitioners of AE, the formal institutions through conventional research, and the experience of diverse stakeholders involved in the process (Rosset et al., 2011; Gliessman, 2018). We also highlight the importance of agroecological knowledge being socially and geographically contextual to its users, especially with regards to the cumulative body of knowledge and beliefs inherited within the cultural and environmental space (Gadgil et al., 1993). This research is about inventorying the most important agroecological practices, sorting them into topics and into agroecological dimensions (Caporal & Costabeber, 2004) for structuring, contextualizing and analyzing their patterns and associations. Finally, we assess the sources of knowledge of the practices described by farmers in Andean Ecuadorian communities.



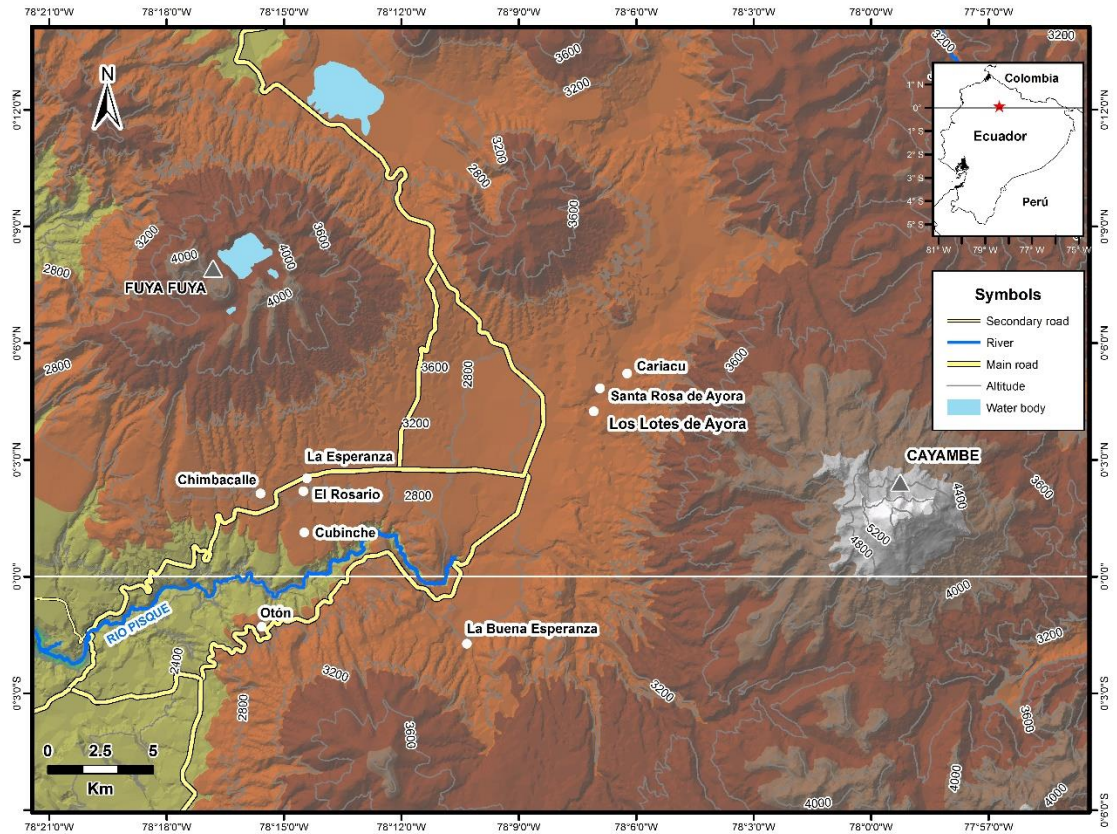
## Methods

### *The area of the study*

The research was conducted in nine highland communities in the Ecuadorian Andes: Los lotes de Ayora, Santa Rosa de Ayora, La Buena Esperanza, Otón, and Porotog in Cayambe County, and La Esperanza, Chimbacalle, El Rosario and Cubinche in Pedro Moncayo County (Figure 1). All of these communities are in the northern province of Pichincha, Ecuador, and are located near the equator, some 100 km north of Quito, the capital of Ecuador. Cayambe has an elevation of 2,809 meters, an annual precipitation of 873 mm and average temperature of 13.5°C. Pedro Moncayo is located at 2,889 meters, has an annual precipitation of 832 mm, and an average temperature of 13°C (MAE, 2012). AE has been consistently developing in this area in the last three decades, mostly influenced by NGOs, as stated by several leaders of the community of La Esperanza in Pedro Moncayo County (personal communication from Hilario Morocho, Gustavo Chorlango, and Maria Teresa Lema). This area has been historically known for its agrodiversity and large tradition of agricultural and dairy farming practices (Montúfar & Ayala, 2019); as a consequence, very little uncultivated vegetation, typically represented by formations of semi-arid forest and humid montane forest, remains (Franco et al., 2016). Conventional agriculture has developed in parallel with AE in the area, shaping a mosaic of plots where small agroecological initiatives compete unevenly with the cut-flower industry, which has aggressively covered a large proportion of the landscape, conspicuous by their plastic film-covered infrastructure. Another uneven competition is for water and workforce, not to mention the health, economic, social, environmental, and cultural impact, which has been an issue in the context of the study area for a long time

(Breilh, 2007; Handal & Harlow, 2009). Since the time of the Spanish occupation, this area has had a history of oppressive domination over indigenous communities through the “hacienda” system, which exploited indigenous people for centuries in a slavery-like manner (Rubio, 2012). This historical context might have somehow impacted on the ways traditional knowledge was transferred intergenerationally until our time (Aspiazu, 2017).

Despite the important development of the dairy industry and the cut-flower business, the socioeconomic situation of most of the population is unfortunate. For Cayambe County, 66.9% of the population live in poverty, illiteracy reaches 11.1% and functional illiteracy 20.2%; years of schooling reaches 7.9, while the proportion of people 16 years old and older that have finished primary school is only 41.2%, and the proportion of people 25 years old and older that have finished secondary school is 7.7%. In Pedro Moncayo, the socioeconomic context shows even more worrisome values, 71.9% of people live in poverty, 10.2% are illiterate and 19.3% are functionally illiterate; years of schooling reaches 7.4, while the proportion of people 16 years old and older that have finished primary school is only 36.1%, and the proportion of people 25 years old and older that have finished secondary school is 4.8% (*Sistema Integrado de Conocimiento y Estadística Social—SICES*, n.d.)



**Figure 1.** Map of the northern part of Pichincha Province in Ecuador.

### *Participants*

In order to screen the participants for the study, we chose active members of the following agroecological organizations working in the area of the study: Asociación de Productores Agroecológicos de La Esperanza for Tabacundo County and the Asociación Regional de Economía Social y Solidaria del Territorio Kayambi (RESSAK), and BIOVIDA for Cayambe County. The participants had an age range between 18 and 80 years old, they were men and women heads of family, residents of the area of the study, who had replied to the invitation we previously sent to their organizations. We only

worked with farmers who claimed to be agroecological practitioners with current access to a piece of land for this type of productive system; farmers who marketed their produce mainly through alternative ways such as farmers' markets, weekly baskets, direct delivery to their clients, or through a store that had some type of agroecological recognition.

The invitation sent to their organizations provided relevant information about the research project, and farmers who showed interest were contacted after checking with their organizations about their compliance with the requirements. The members had a color-based identification card to demonstrate their qualifications for agroecological production and compliance provided by their own Participatory Guarantee System (PGS). We made a short list of those who complied with the criteria for the study and proceeded to make the interviews, keeping a back-up list of farmers for any contingency. This study was authorized by the Office of Institutional Review Board (OIRB) from the University of New Mexico (October 23, 2018; code# 1316564-1).

### *Demographics*

We inquired about demographic information and produced a description of the characteristics of the participants as follows: an average age of 54.63 years; 36.79 years doing agriculture; 19.63 years doing AE. Most of them owned an area of about 1.03 has of land and 4.11 members of the family depended on the participants' income. Female participants represented 79.1% of the total; 52.6% identified themselves as mestizos, while 47.4% identified themselves as indigenous. Three people finished high school and 16 people had attended primary school only; in some cases, just one year of primary

school. Irrigation was available for 17 out of 19 participants. Income coming from agriculture represented 100% for eight farmers, up to 75% for three farmers, up to 50% for six, and up to 25% for two participants. Nine participants had been community leaders, three had been agroecological promoters, two had been in other roles in their organizations, while five had not had any responsibilities in their organizations since they started engaging in AE.

### *Data collection*

We had a first encounter with around forty farmers interested in the study to get feedback from them about the research proposal and the research questions. Farmers were enthusiastic about the research, even if they could not participate due to communication and time constraints. Participants who volunteered for interviews typically chose to be visited at their own homes or gardens.

We applied a free listing technique (Puri, 2010; Caruso et al., 2015; Zambrana et al., 2018). This technique is a mental inventory that respondents produce about the personal knowledge they have, revealing their cultural knowledge or beliefs (Quinlan, 2017). Firstly, we asked about the ten most important practices in Agroecology. After producing a list of practices, we asked them about the source of the knowledge related to each practice based on three categories: in my family, in my community, and outside my community. These categories describe the more logical spatial structure of possible sources of knowledge associated with the reported practices. They further had the chance to make comments about each practice. The data was jotted on the form and audio recorded for details. The field work was made between October and December 2018.

### *Analysis*

The reported practices derived from the free listing were coded for topics in order to synthesize the data as recommended by Charmaz (2008, 2011). The different topics grouped practices that were related to agroecological principles coming from the literature (Rodrigues Hirata et al., 2019). The topics were then sorted according to the six dimensions of AE, as described by the different authors (Caporal & Costabeber, 2004; Bravo-Medina et al., 2017; FAO, 2018; Vaarst et al., 2018) as a strategy for analysis (Table 1). We acknowledge that certain practices could fit into two or more topics because of their nature, and because AE components are naturally interlinked (Navarro et al., 1993). For example, the practice “brews and macerations” has been associated with crafted inputs although it is also a soil management practice. Another example is “collaborative marketing”, which is a practice associated with the economic dimension, but it also has a sociopolitical implication.

We calculated a Composite Saliency Value (CSV) for each of the topics following the procedure described by Quinlan (2017). For this study, the saliency value accounts for the frequency with which a topic appears and its position or rank in the free list from the respondents; whereas the CVS is the mean saliency of each topic from all the respondents (n=19). The topics were arranged into a histogram to visualize their source, namely: family, community, or outside the community.

## Results

The participants reported a total of 72 practices (Table 1). Fifty practices were grouped within the environmental dimension, associated with ten topics, as shown in the table. Four practices were grouped within the economic dimension, all within one single topic. For the cultural dimension, ten reported practices were associated with two topics. For the social dimension, four practices were reported and associated with one topic. In the political dimension, two practices were reported, both associated with one topic. For the ethical dimension, two practices were associated with two topics.

**Table 1.** Reported agroecological practices grouped by topics and dimensions.

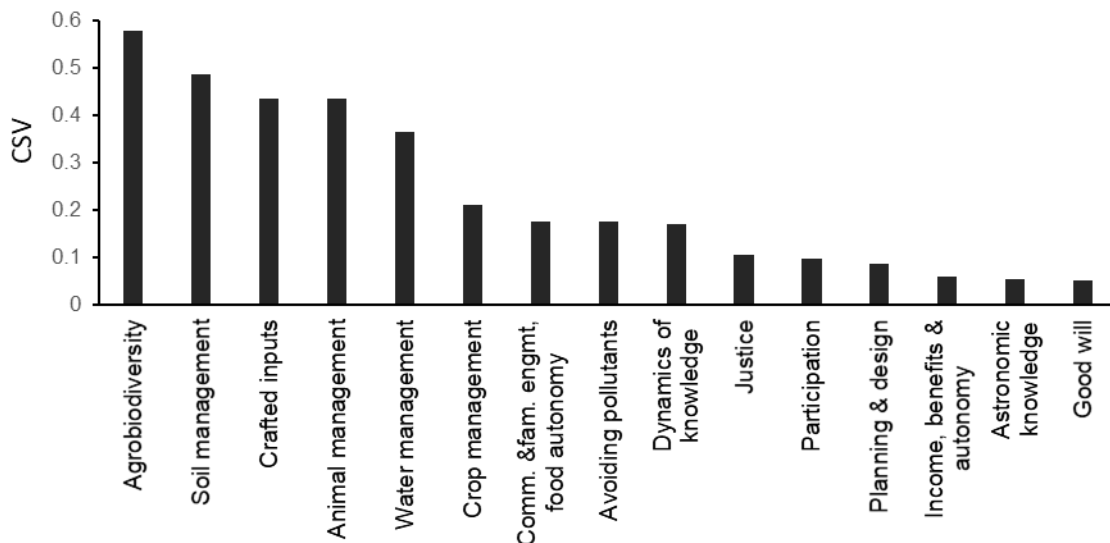
Agroecological Practices	Topics	Dimensions (Caporal & Costabeber, 2004)
<ul style="list-style-type: none"> <li>• protection against erosion</li> <li>• soil cover</li> <li>• soil fertility</li> <li>• soil amendments</li> <li>• soil evaluation and monitoring</li> <li>• contour lines</li> <li>• raised beds</li> <li>• soil disinfection with lime</li> <li>• love and caring for the earth</li> </ul>	Soil management	
<ul style="list-style-type: none"> <li>• compost</li> <li>• animal manure</li> <li>• crafted fertilizers</li> <li>• liquid bio-stimulants for the soil</li> <li>• organic material</li> <li>• brews and macerations</li> <li>• Bokashi compost</li> </ul>	Crafted inputs	Environmental
<ul style="list-style-type: none"> <li>• irrigation</li> <li>• mulching with leaves</li> <li>• rainwater harvest</li> <li>• management of moisture</li> <li>• care of the water</li> </ul>	Water management	

Continued **Table 1.**

<ul style="list-style-type: none"> <li>• diversification of crops</li> <li>• associated crops</li> <li>• association of fruit trees and vegetables</li> <li>• wind breakers</li> <li>• planting different species of trees</li> <li>• trees for green manure</li> <li>• hedgerows</li> <li>• protection of forests</li> </ul>	Agrobiodiversity	
<ul style="list-style-type: none"> <li>• phytosanitary controls</li> <li>• weeding</li> <li>• tutoring</li> <li>• plowing</li> <li>• pruning</li> <li>• crop rotation</li> <li>• heirloom seeds</li> <li>• producing own seeds</li> <li>• selection of the best seeds</li> </ul>	Crop management	Environmental
<ul style="list-style-type: none"> <li>• breeding domestic animals</li> <li>• pastures</li> <li>• animals for manure</li> <li>• animal welfare</li> <li>• animal infrastructure</li> <li>• genetic selection</li> </ul>	Animal management	
<ul style="list-style-type: none"> <li>• planning the plots</li> <li>• planning the crops for the market</li> <li>• making decisions</li> </ul>	Planning and design	
<ul style="list-style-type: none"> <li>• no use of plastics</li> <li>• no use of chemicals</li> <li>• taking care of the environment</li> </ul>	Avoiding pollutants	
<ul style="list-style-type: none"> <li>• collaborative marketing</li> <li>• planning the crops for the market</li> <li>• post harvesting &amp; transformation of produce</li> <li>• autonomy of inputs</li> </ul>	Income & benefits	Economic
<ul style="list-style-type: none"> <li>• collective learning</li> <li>• enhancing learnings</li> <li>• workshops</li> <li>• capacity building</li> <li>• school of agroecology</li> <li>• visiting other agroecological farms</li> <li>• communication with community members (Knowledge exchange &amp; diffusion of knowledge)</li> <li>• perpetuation of knowledge through the family</li> <li>• educating the clients (Perpetuation of knowledge)</li> </ul>	Dynamics of knowledge	Cultural
<ul style="list-style-type: none"> <li>• planning according to moon phases</li> </ul>	Astronomic knowledge	
<ul style="list-style-type: none"> <li>• family awareness</li> <li>• family integration</li> <li>• appreciation for the family</li> <li>• family and community health</li> </ul>	Community & Family engagement and food autonomy	Social
<ul style="list-style-type: none"> <li>• belonging to an organization</li> <li>• involving the government</li> </ul>	Participation	Political
<ul style="list-style-type: none"> <li>• willingness to work</li> </ul>	Good will	Ethical
<ul style="list-style-type: none"> <li>• access to land and means of production</li> </ul>	Justice	



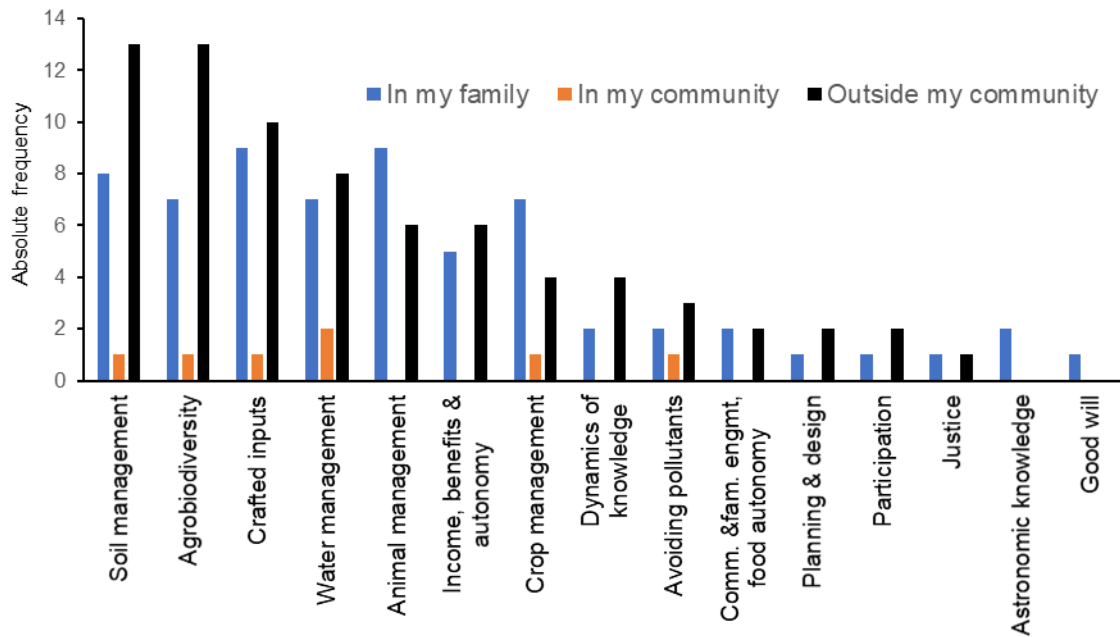
The fifteen topics are illustrated in order of composite salience value (CSV, Figure 2). The five most salient topics are agrobiodiversity, soil management, crafted inputs, animal management and water management. Practices with moderate salience fall in the topical categories of crop management, community, and family engagement and food autonomy, avoiding pollutants, and dynamics of knowledge, while the least salient topics are justice, participation, planning and design, income, benefits and autonomy, astronomic knowledge, and good will to work. A few farmers vaguely referred to the use of moon phases for planning their agricultural operations without any important detail to determine the relevance of such a practice.



**Figure 2.** The most important topics (CSV) reported in the area of the study.

Using absolute frequencies (Figure 3) to determine the source of knowledge for the fifteen topics, we find that the knowledge coming from outside the community represents thirteen out of the fifteen topics, with the highest frequencies for: soil management,

agrobiodiversity, crafted inputs, and water management. Knowledge coming from the family covers all the topics, with the highest values for crafted inputs and animal management. Two topics exclusively come from the family: astronomic knowledge and good will to work. For knowledge coming from the community, the frequencies are surprisingly low and only reported in six out of the fifteen topics.



**Figure 3.** Source of knowledge of agroecological practices reported by 19 farmers.

## Discussion

### *The dynamics of agroecological knowledge*

The fact that the majority of practices and topics are associated with the environmental dimension may denote that the understanding of AE is mainly associated with the management of the agroecosystem, which resonates with the original focus of AE

historically depicted in the literature (Wezel & Soldat, 2009; Altieri & Nicholls, 2017; Wezel, 2017; Alexander Wezel & Silva, 2017; Parraguez-Vergara et al., 2018; Gallardo-López, Hernández-Chontal, Linares-Gabriel, & Cisneros-Saguilán, 2019). The environmental dimension covers mostly practices related to compliance with the agroecological principles that focus on the ecosystem approach and are associated with the five subsystems of AE: soil, water, crops, trees, and animal management. Rodrigues Hirata et al., (2019) suggests that participatory guarantee systems could play a pedagogic role as farmers try to comply with the agroecological practices which are assessed by the verifiers on the field. The predominant orientation towards agricultural production denies attention towards the other dimensions, except for the cultural one. It is not surprising that the practices and topics that populate the cultural dimension are directly related to the production, diffusion, and perpetuation of agroecological knowledge, possibly to support agricultural production activities. The remaining four dimensions: economic, social, political, and ethical are poorly represented, even though these provide the ideological infrastructure of the agroecological proposal and the co-creation of knowledge (M. A. Altieri & Nicholls, 2012; Gliessman, 2018; Nicholls-Estrada & Altieri, 2018).

The high salience of topics related to the environmental dimension to the detriment of economic and political ones such as income, benefits and autonomy, may signify that when asked about practices, respondents immediately associate it with something they do at the farm scale. However, it is important to remark that there is some awareness about the contribution of the farmers' organization for practices related to commercialization, as stated by a 54-year-old woman from the Cayambe County: "farmers' markets started

within the farmer's organization context." Community and family engagement practices have low salience and are more linked to family well-being with little acknowledgement of community and social values, which does not support principles of AE related with equity and governance reported in the literature (P. Rosset & Martínez-Torres, 2012). However, just the presence of topics of justice in the access to land, participation, and good will to work, even with a low score, may signify that those practices are still present in the farmers' representations of AE. A 49 years-old woman from La Buena Esperanza declares that "the main steps for practicing agroecology is having access to land, access to water, having animals for producing manure, planting trees for warming up the soil and producing compost, and having your own seeds. That is the most important...".

Regarding the source of agroecological knowledge, there is a predominance of topics coming from outside the community that are focused on the agroecosystem management. The same inclination appears when the source of knowledge is the family; in consequence, the convergence of topics related to environmental practices may suggest either the addition of some innovations coming from outside or a retitling of the same traditional practices, or both. That is the case of rotting manure, which is now called composting; the nature of the practice is the same, but some improvements may have been added to the traditional technique and the practice has been renamed. All of the topics have been learned within the family to some extent. Topics with high frequencies for the family are associated with soil fertility (soil management, crafted inputs, and animal management, figure 3) and, at the same time, they show high frequency when that knowledge comes from outside of the community. Very specific and detailed practices

were reported by farmers, for example, Erlinda Pillajo, a 46-years-old woman from Santa Rosa de Ayora explains crop association and its sequence of planting and harvesting on the field: “ ... first I plant potatoes in association with cilantro, and after harvesting that, I plant fava beans, and within the fava beans plot, I plant peas. In the lower section I plant carrots with radish and cilantro in a row. Then I harvest the radish, and I saw the peas. Later I harvest some cilantro and a little bit of carrots. The peas keep growing and later on, I am able to harvest some carrots and peas simultaneously. This I learned from my father”.

The contribution of the community as a source of knowledge is not relevant, and it only shows a barely visible association with water management. We suggest that some historical facts may be associated with the water topic: there was a government irrigation program that made it possible for agriculture to be reestablished in the area of the study three decades ago. According to comments from participants, the piping for delivering irrigation water to the farms was built collectively. Topics such as justice, participation, community and family engagement, and food autonomy are not reported as associated with the community as a source of knowledge.

Comments from a 59 years-old retired man, just recently engaged in AE contributes with a reflection: “the use of chemicals improved the production in the past, but those chemicals created disadvantages to our body, such as diseases and pain ... that raised awareness which led us to plant in a different way”. He additionally asserted that a practice like forming live hedges was taken from people outside his community, but he

later perceived that hedges protected the crops and hence he extensively adopted this practice. The later declaration refers to a change of practices which comes from the personal experience. and the former statement reflects about a knowledge from outside de community which is adopted because it is appropriate to the local context and produces positive effects.

*The role of the family, the community, and the other contexts*

The rural household potential for producing and diffusing relevant knowledge about AE is a way of empowerment that still needs to expand through policies of emancipation which allow the poor and the powerless contribute with their knowledge (Freire, 1973; Friedmann, 1992). The Andean family (singular or extended) is the cornerstone of knowledge diffusion and perpetuation because it is the cornerstone of social reproduction for building community and territory and for providing political unity to the diversity of the peasants (da Silva, 2011). Indeed, our findings showed that practices learnt in the family contribute to all the topics in this study (Figure 3). The quality and relevance of the knowledge spread through the family is guaranteed because the family is responsible for covering the needs of its members, thus the adoption of a practice comes from a reflexive action. The rural family takes the economic risk for the crop year, contributes to building autonomy, and is responsible for the conservation of agrobiodiversity (Oyarzun, et al. 2013; Altieri & Nicholls, 2017; Nicholls-Estrada & Altieri, 2018; Montúfar & Ayala, 2019).

The diverse inventory of practices we are reporting represents an important addition to the existing literature and a confirmation of the source of the knowledge of such practices

in the Northern Andes of Ecuador. Our study confirms a coincidence with the practices recently reported by Parraguez-Vergara et al., (2018) for Ecuador. Our data reveals the role of the family in the dynamics of agroecological knowledge and the influence of external stakeholders that contributed with both knowledge and innovative approaches to the existing traditional knowledge. Zimmerer (2015) depicts the linkage between agrobiodiversity and private family spaces like the kitchen. Following this statement, further research is needed to reveal the intersections between the process of production of agroecological knowledge and the family spaces like the farm, the farmers' market, and/or the natural landscapes.

Working in the area of the study, we do not want to be oblivious to the influence of the members of a large number of agroecological families that work in the industrial agriculture, mostly at the cut-flower farms. They may have to choose between family beliefs and pragmatic reality and face turbulent contradictions, especially around environmental, social, and health factors such as the use of pesticides (Breilh, 2007; Handal & Harlow, 2009). Our concern is the interference that this reality might have in the diffusion of agroecological knowledge and the mechanisms of decision making within the family and on the field.

There is not such a thing as an agroecological territory where a significant number of neighbors were engaged in AE. The farms of our participants are located in nine communities and some of them are embedded in an area of cut-flower greenhouses and dairy farms. We assume that would be the reason why the role of their community is not

strong in terms of being a source of knowledge, except for the water management practices for the historical reasons we have already discussed. The arrival of irrigation water to the area of the study was capitalized by NGOs as an opportunity to implement agroecological projects, engaging farmers who were gaining access to water, and helping to install canals to bring that water from the main canal to their plots, provided that farmers established agroecological organizations. Those NGOs helped with sprinklers and drip irrigation devices to improve water management at the farm level. The farmers, in exchange, made a commitment to attend training sessions, reduce the use of pesticides, and start implementing some agroecological innovations in their plots (see unpublished manuscript about motivations for adopting AE by Michael Ayala 2019). Water management was, for a long time, the main topic, and has probably impacted its association with a practice that, to some extent, was shared among the community members.

The literature refers to social capital and its contribution to knowledge exchange among peers as a condition to producing and spreading agroecological knowledge (Gliessman, 2018). However, as we see in Figure 3, we did not find strong evidence for this in the area of our study. There is probably still a need to strengthen community organizations and the farmer-to-farmer strategy until it operates as expected to improve the internalization of agroecological principles in our communities (Rosset & Martínez-Torres, 2012). Experiences from other geographical contexts like Malawi prove that farmer-to-farmer methods improve food security and the increase of wealth in rural families (Kangmennaang et al., 2017). The multiplier effect of strong farmers'



organizations is fundamental in the spread of agroecological knowledge for its expansion and rooting. Supranational articulation of diverse agroecological practitioners may also help articulate community initiatives into wider territories of AE (Mier y Terán Giménez Cacho et al., 2018; Val, Rosset, Zamora Lomelí, Giraldo, & Rocheleau, 2019).

We were able to identify general channels of diffusion of agroecological knowledge; the intention of sorting such practices into topics allowed us to screen out the practices that had been implemented traditionally but that had been named differently in the present time, i.e. composting or integrating animals into the agroecosystem, which are ancestral strategies for increasing soil fertility but now are called by new names. Although this study did not produce enough evidence to establish a differentiation between traditional knowledge from innovations and their patterns of diffusion, it is possible that both homophilic and heterophilic patterns might have been operating simultaneously (Rogers, 2003). Far from asserting that there may have been a colonial approach to indoctrinate AE, or a manipulative approach to stimulate the implementation of certain practices in the past, this study has raised topics of reflection that require further research and appropriate analysis. Narratives from a woman who worked as a technician in the area for decades describe practices like raised beds as incompatible with the irrigation techniques of that time and incompatible with the climate of the area. Another NGO technician stated in an interview that they detected the farmers' need for outside opinion leaders to validate the benefit of previously implemented practices on the farmers' fields, like the use of local varieties or agrobiodiversity strategies. Both of these stories and the influence

of socio-demographic factors described in other studies (Epule & Bryant, 2017) suggest a need to research this topic further.

Farmers have a consensus on valuing the visits to other mature or more developed agroecological farms as a motivation for adopting certain practices independently of the socioeconomic context of the owner of those farms. This appraisal takes us back to the heterophilic approach of diffusion of innovations described by (Rogers, 2003) and resonates with the high score for external sources of knowledge in our study. A woman from the Cayambe County highlights the importance of the training they received from the association of guinea pig breeders since they helped them to improve the way they managed the guinea pigs: “we have always raised animals but the technification of guinea pigs breeding is something we learned from our organization, as we always used to keep our guinea pigs all mixed up in the kitchen, but now we separate our animals by age and sex... then, the rest of the practices regarding guinea pigs breeding come from the family”. This quotation emphasizes the value farmers give to external innovations when those produce positive results.

The role of the government was not directly addressed on this study, but we recorded some narratives that show divergent insights about it. Some stakeholders are content with public policy that reduces property taxes, provides spaces for marketing their produce, and provides inputs for their agroecological initiatives. However, there are other farmers concerned about the provincial government coopting agroecology for the sake of their own agenda.

This study reflects on the need to find strategies of integration of ancestral knowledge, established scientific research, and the experience derived from daily life hands-on practices from farmers (Altieri, 1996), confronting the academic and extensionist traditions of considering indigenous knowledge a contribution of “the others”. Our findings suggest that renaming practices does not increase knowledge, and validating farmers’ practices to satisfy Western-oriented scientific needs may not contribute much to the local agroecological practitioners but to the outsiders instead (Jacobi et al., 2017). In order to improve collective actions and processes, research should engage with rural movements to produce the knowledge they need, not only in the natural sciences, but mainly in the social sciences (Rosset, 2014). Our study also calls for the reflection that indigenous and local participation in the construction of agroecological knowledge is a collaborative effort that should respect the indigenous ways and contexts, and should advocate for an emancipatory exercise in which the dynamics of knowledge can be transformative for both local and outside stakeholders (Freire, 1973; Smith, 1999).

## Conclusions

This study contributes with the identification of the sources of agroecological knowledge and its dynamics. Our results reveal that local communities maintain a rich inventory of practices; the respondents admit a multiplicity of origins for the knowledge associated with the different practices they implement, some of which may be rooted on their ancestral tradition. This study problematizes the role of external agencies and the different processes that might be operating in relation to the farmers’ participation in the

diffusion, and appropriation of knowledge. The role of the family and external stakeholders is fundamental for increasing the diversity of knowledge; however, the possible persistence of traces of an oppressive past would lead to a search for validation from external opinion leaders.

Reflections about the low representation of topics and practices related to sustainability dimensions other than the environmental ones, namely economic, social, political, and ethical, suggest the need to consider strategies to deepen the discussion about this concern with relevant stakeholders. The economic dimension is mainly represented by practices involving marketing of produce; the social dimension only refers to the nuclear family wellbeing, and the ethical dimension is only covered by practices related to the access to land and resources, and the willingness to work. Our findings in this section inform about the need to strengthen those dimensions showing lower scores in the agroecological practitioners to enhance the spirit of AE and its potential to the construction of resilience in the study area.

We expect that our findings will inform both farmers and researchers seeking to expand their understanding of AE and its potential to become a serious political project in the Northern Andes of Ecuador and in similar contexts worldwide.

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# FARMERS' PERCEPTIONS OF THE IMPACT OF AGROECOLOGY IN TWO RURAL COMMUNITIES OF THE NORTHERN ANDES OF ECUADOR

## Introduction

The development of Agroecology (AE) in Ecuador, like in most of the countries in the Latin American region has shown diverse levels and types of impacts on the territories, communities, farms and individuals in the last three decades. Most of the research has been focused on physical-biological aspects (Gallardo-López, Hernández-Chontal, Linares-Gabriel, & Cisneros-Saguilán, 2019) but few studies have examined farmers' own perspectives or perceptions about the impacts of AE in the Andean Region. Globally, the biophysical bias in research is convergent with the origins of AE, based on the sustainable management of agroecosystems, and the implementation of biological and ecological principles. However, in the case of Latin America, the literature acknowledges that AE was also a philosophical contestation to the meddling of conventional agriculture on the food systems instead. Especially in Ecuador, where the indigenous uprisings in 1990, 1994, 2000 showed a strong political presence and challenged the neoliberal *status quo*, agroecological knowledge was seen as a way of revitalizing ancestral practices and contributing to social and political movements (M. Altieri, 1996; Gortaire, 2017; Toledo, 2012). This important dimension of AE requires direct analysis of practitioners' perceptions.

Internationally, in the 1980's, the definition of AE basically considered only the application of sustainable principles for food production (Gliessman, 2018; Gallar, 2019). In contrast, the inclusion of political aspects in current agroecological research opens the door to the insertion of sociocultural, economic, and ethical factors ( Scarborough & Méndez, 2015; Vaarst et al., 2018; Gallardo-López et al., 2019; Rodrigues Hirata, Rocha, Assis, Souza-Esquerdo, & Bergamasco, 2019), which also challenges the dominant regime of research where knowledge and power are in constant dispute ( Smith, 1999; Gaventa & Cornwall, 2009; Méndez, Bacon, & Cohen, 2013). This new approach requires different scopes and engaging methods with higher participation of the agroecological subjects. Considering farmers as political actors, enhances the transformative potential of AE and research ( Levidow, Pimbert, & Vanloqueren, 2014; Gallar, 2019), confronting western and indigenous epistemologies, changing former established roles, hence promoting the indigenous' participation as co-researchers instead of researched objects (Smith, 1999).

In the case of Ecuador, even though the adoption of modern agriculture does not appear to have a homogeneous diffusion, neither in the 80's nor in the present time, the side effects of high external inputs to agriculture -- such as the degradation of natural resources, unbalance of agroecosystems, unfair and unsustainable food systems and general environmental change -- hit everyone, everywhere (Rubio, 2012). Hence, AE emerged as a social movement to challenge the green revolution agriculture narratives and its undesired effects in Ecuador (Altieri 1987; Gortaire 2016) and representing a hint of hope for the region and the planet. Fortunately, conventional agriculture practices had

not converted the entire rural landscape in Ecuador, as some farmers remained applying their traditional knowledge to food production to the present.

The contribution of Non-government organizations (NGOs) was paramount in the past and is still now. They provided a strong platform to the development of indigenous and peasants' social movements (Larrea, 2017). NGOs helped build content and shape the discourse to the indigenous organizations which was positively capitalized by the indigenous leadership and other actors (Chiriboga, 2014). Many NGOs defined their work providing support to small-scale farmers' initiatives with soil conservation, boosting small businesses in the countryside, short marketing chains, fair trade, organic production, irrigation, social responsibility, social participation, participative governance and regional development. There are diverse levels and approaches to participation and construction of the agroecological discourse by individuals, rural families and communities at this moment; however there is a lack of consistent participation from the consumers, with rare exceptions (Gortaire, 2017). Farmers' active participation in research is also rare.

Development projects evaluations, focusing on NGOs' results to their interventions has been the standard for assessing the performance of AE in our study area. Conventional ways and topics of research have been the norm. Gallardo-López et al., (2019) claim that agroecological published research related to knowledge exchange and participatory research in Latin America contributed with only 1.7% of academic citations, and 6.2% citations related to agroecological education in the period between 1992 and 2018. In



contrast, academic citations related to agroecosystem management topics reached more than 80% in the same period (e.i. Altieri, Koohafkan, & Gimenez, 2012; Sarandón & Flores, 2014; Alexander Wezel et al., 2014; Alexander Wezel & Silva, 2017). In these days, there is a mix of research: some remain with their positivist, quantitative, biological and ecological approach whereas others are starting to incline towards participatory approaches where their findings seem to be more relevant to farmers' expectations (Wezel & Soldat, 2009; Toledo, 2012; Levidow et al., 2014; Montúfar & Ayala, 2019). Our study aims to contribute to this gap, presenting an alternative topic of research with methods that are more engaging with farmers, expecting to produce findings that are more relevant to the participants.

A large proportion of research has been assessed by the literature mostly with surveys (Gallardo-López et al., 2019), even for sociocultural indicators (Bravo-Medina et al., 2017); in contrast, the application of qualitative methods for assessing the impact of AE on individual participants has not been proposed. In this paper, we use body mapping, farm mapping and community mapping to explore participants' perceptions. Body mapping is a useful and innovative resource for exploring the personal, social, geographical, political, emotional and bodily experiences, and has been widely used for medical, social and behavioral research (Brett-MacLean, 2009; Sweet & Ortiz Escalante, 2015; Roomaney & Coetzee, 2018). The aim of this study is focused on the perceptions of the impact of agroecology in farmers' life at the individual's level in the northern Andes of Ecuador. We contribute integration of a non-traditional focus of research – individuals' affections and emotions -- with innovative tools that inquire about bodily

experiences and embedded knowledge (Giraldo, 2019; Klein & Milner, 2019). The use of a non-verbal tool is an innovative approach to this type of research. In addition, we explore the convergences and divergences of farmers' perceptions depending on the length of time they'd been doing AE and the levels of dependency on it. We hope this study will bring out dynamic and reflective results (Sweet & Ortiz Escalante, 2015) which will become a contribution to the articulation of diverse stakeholders' actions in the study area for shaping AE as a powerful transformation device for scaling up resilience at a territory level (Val, Rosset, Zamora Lomelí, Giraldo, & Rocheleau, 2019).

## Research question and overview of methods

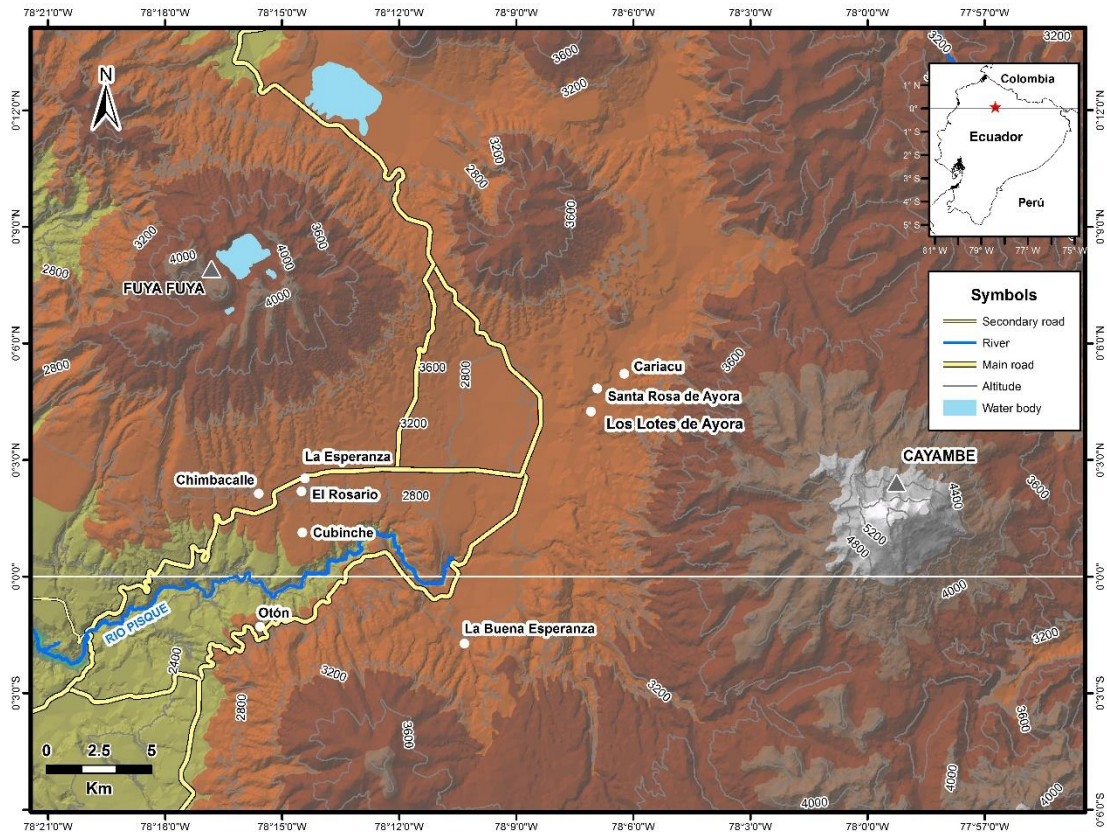
### *What is the perception of the impact of agroecology at the individual's level?*

This study started with a first encounter with the potential participants for assessing the relevance of the research question, stressing that farmers are not objects of research but active participants of a study that matters to both researcher and the community. Official authorization from the Office of the Institutional Review Board (OIRB) of the University of New Mexico was obtained previous to the first encounter. The farmers who chose to participate had the chance to ask questions and signed informed consent forms in Spanish, which included acceptance for being recorded and/or video recorded. After clarifying the agreement, the body mapping tool was applied, and later on, the farm and community mapping.

### *The study area*

The study area represents a colorful mosaic of patches of small-scale conventional and agroecological farms neighboring larger areas of industrial cut-flower, and dairy farms.

Residents in this landscape experience increasingly disputed use and access to resources, including land and water. We worked with active members of agroecological associations of producers located in two counties in the north of the Pichincha Province in Ecuador: Cayambe county at an altitude of 2 809 masl., with an annual precipitation of 873 mm, and an average annual temperature of 13.5°C; and Pedro Moncayo county at 2 889 masl., with annual precipitation of 832 mm, and annual average temperature of 13°C (MAE, 2012). The natural vegetal coverture consists on semi-arid forest and humid montane forest which has been intensively intervened since former times (Franco, Peñafiel, & Cerón, 2016). The communities for the Cayambe county are Santa Rosa de Ayora, Cariacu, Lotes de Ayora, La Buena Esperanza, and Otón. The communities for Pedro Moncayo county are Cubinche, El Rosario, La Esperanza and Chimbacalle. All the communities are located within 0°6'0'' north of the equator, and 0°3'0'' south of the equator (Figure 1).



**Figure 1.** Map of the study area.

### *The participants*

Eighteen farmers, members of associations of agroecological producers located within the counties of Cayambe and Pedro Moncayo participated in this study. Potential candidates were screened according to the following criteria: adults, head of a family, active members of an agroecological local association, having access to a piece of land for agroecological production, selling their produce at a farmers' market or through alternative ways such as week baskets, direct sell to customers or through a store with some kind of an agroecological recognition or participatory guarantee system also called PGS (Pino, 2017). To identify participants, we contacted the leaders of the Asociación de

Productores Agroecológicos de la Esperanza, the Asociación Regional de Economía Social y Solidaria del Territorio Kayambi (RESSAK) and the Red de Productores Agroecológicos BIOVIDA. We sent a formal invitation for participating in a first meeting for discussing the relevance of the research question and for explaining the purpose of the research. The farmers that chose to participate were further contacted by phone to have an appointment at their home, garden or community venue for the data collection sessions.

The characteristics of our participants are as follows: for the Cayambe county, 66.9% of the population lives in poverty, illiteracy represents 11.1%, and functional illiteracy reaches 20.2%; years of schooling average is 7.9, while people of 16 years old and older that have finished primary school only, represent 41.2%, and the proportion of people of 25 years old and older that have finished college only is 7.7%. For Pedro Moncayo, the social-economic context is as follows: 71.9% of people live in poverty, 10.2% are illiterate and 19.3% are functionally illiterate; years of schooling average is 7.4, and people aged 16 and older that have finished only primary school are 36.1%. The proportion of people of 25 years old and older that have finished college is 4.8% (“Sistema Integrado de Conocimiento y Estadística Social—SICES,” n.d.).

The demographic data from our participants is as follows: the average age was 54.6 years, they had been working in AE an average of 19.63 years, we had eight farmers with up to ten years of experience, seven with up to 20 years of experience and four farmers with more than 40 years engaged in AE. The average of land owned by participants is 1.0

hectares and have 4.1 members of their family who depend on participant's income. Seven farmers reported that their income represents up to 50% from agriculture and eleven farmers reported that 100% of their income comes from agriculture. Half of our participants identify themselves as indigenous and the other half as mestizos. Most of them have only attended primary school, with three people additionally completing high school. Nine farmers had been community leaders on their organizations and three had been AE promoters (Table 1).

**Table 1.** Demographics of the participants

Descriptor		Value
Age		54.63 ± 7.5 SD
Years doing agriculture		36.79 ± 17.72 SD
0-10 years doing agroecology		8
11-20 years doing agroecology		7
40 + years doing agroecology		4
Land area (ha)		1.03 ± 0.9 SD
Number of household members depending on your income		4.11 ± 1.49 SD
Gender	male	21.05 %
	female	78.95 %
Ethnicity	indigenous	47.37 %
	mestizo	52.63 %
Schooling	primary	84.21 %
	high school	15.79 %
Irrigation	yes	89.47 %
	no	10.53 %
Proportion of income coming from agriculture	up to 50%	7 participants
	up to 100%	11 participants
Role at your organization	community leader	42.11 %
	none	47.37 %
	AE promoter/ PGS auditor	26.32 %
	other	15.79 %

This study seeks evidence of the perspective farmers have about the impact of AE in their lives. It is understandable that AE itself cannot operate a contextual change in the study area, because of the multifactorial nature of socioeconomic factors. The literature claims the immense potential that AE has to create change through collective actions (Levidow et al., 2014); however, there is a danger of AE conforming to the hegemony of conventional agribusiness (like in organic agriculture). Therefore, there is a need to shape research agendas to merge farmers' and scientists' knowledge, engaging consumers as allies and direct beneficiaries of this pursuit (Gonzales, 2000; Jamal, 2016; Miles, DeLonge, & Carlisle, 2017).

### *Mapping*

Body mapping is an art-based qualitative research method that explores experiences and social interactions of participants in a process of creating life-size body silhouettes where they represent their reactions to a qualitative inquiry (Skop, 2016). Participants were asked to represent on a silhouette their perceptions of the impact of AE with drawings, symbols, writings or any other means, with markers, color pencils, and watercolor. The activity lasted around one hour (Figure 2).

The method esteems that knowledge derived from peoples' experience, stored within a mind-body-interphase, can become more intelligible, helping gather thick descriptions about the individual's perceptions of such experiences (Crawford, 2010; Klein & Milner, 2019). Concurring with Rundstrom's (1991) assertion, we expect this exercise of cartographic social representation could become a meaningful contribution to the participants for establishing their perceptions about AE within a context of personal

values and beliefs, by the act of mapping themselves. Some authors might critique the validity of this tool claiming that it invites researcher bias (Chamberlain, 2011); however, published literature demonstrates it is a useful tool for reaching experiences from vulnerable and hard-to-reach populations (Klein & Milner, 2019) that otherwise would remain unknown.

Some traditional authors try to undermine qualitative research, ignoring that all truths are partial, that identities are fluid, and that there is no single conventional paradigm for social sciences (Lincoln, Lynham, & Guba, 2011). Qualitative research authors agree about the legitimacy of postpositivist paradigms, asserting current qualitative research as emancipatory and liberating from conservative traditions. The use of a combination of quantitative and qualitative methods makes sense in this study because quantitative methods inform qualitative ones and vice versa, from the beginning, at the data collection process, and throughout the analysis and presentation of results. The perceptions about the impact of AE that farmers produced in this process is relevant for the agroecological movement because this reflection and knowledge can inform their plans and strategies for re-configuring the landscape with increased use of AE (Alexander Wezel, Doré, Francis, Vallod, & David, 2009; Rosset & Martínez-Torres, 2012).

For implementing farm and community mapping, farmers were asked to map out their farm to represent the different elements and their interactions; then, they were asked to represent the new acquisitions associated with AE on the map. Next, they were asked to map out their community to represent the different new elements which were



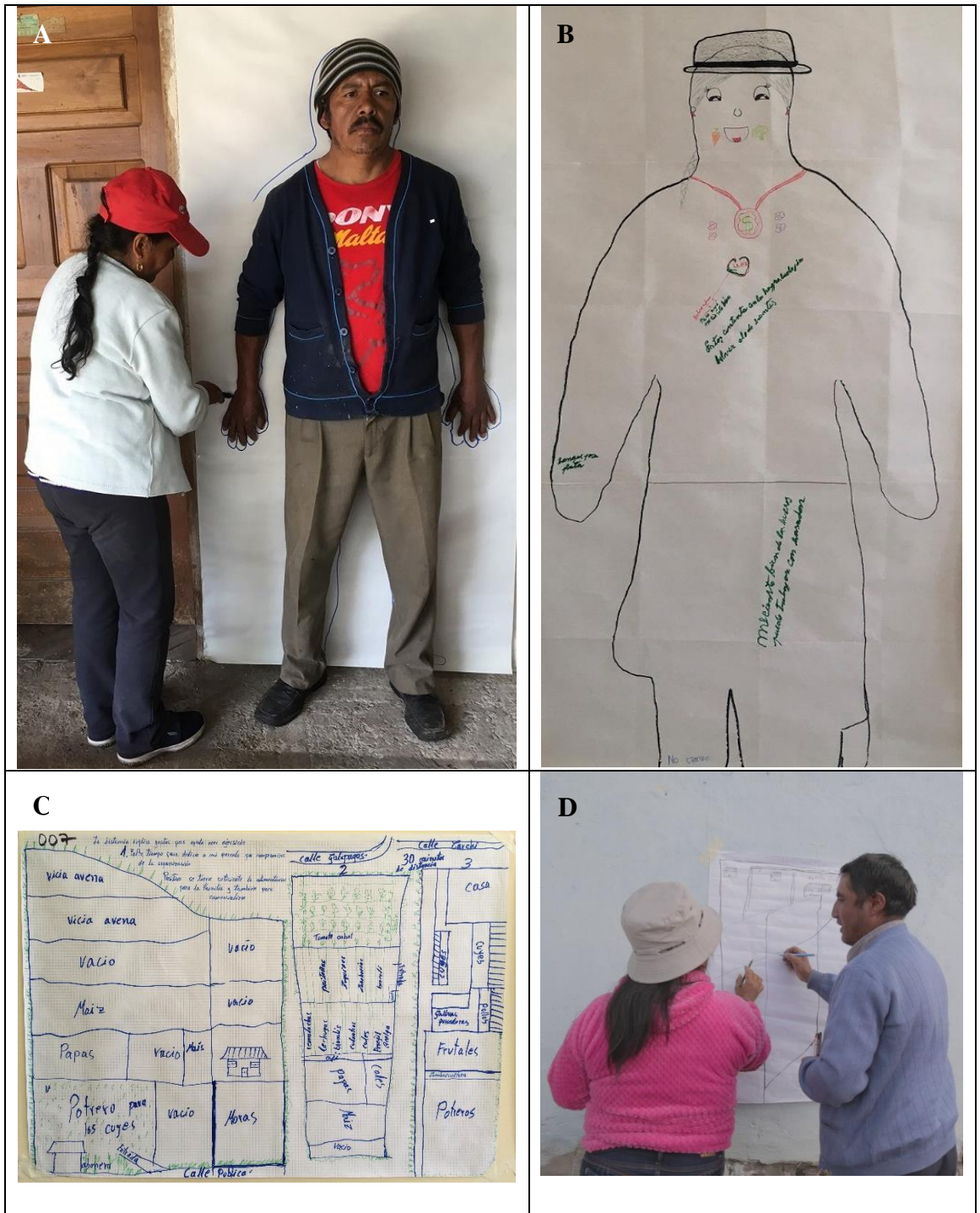
implemented because of AE in their community. The maps were photographed and stored for further analysis.

### *Data collection*

Farmers who positively answered to an open invitation to participate in this study met with the researcher in a community venue for discussing the relevance of the study and the research question. The informed consent was publicly read, and the project was presented to the farmers. No changes were suggested for the original proposal during this first session. The farmers who chose to participate were contacted by phone to make an appointment for the next data collection session. This study involved a demographic survey, and the application of the body mapping method with small groups of two, three, and four farmers, mainly neighbors, who agreed to meet for the data collection session. After signing the individual informed consent form, participants answered a short demographic survey, then they helped each other to draw a silhouette of their peers with a marker. At first, we proposed to put the sheet of paper on the ground to draw the silhouette; but, a 76 years old woman complained that she would not like to lay on the ground because it looked like a dead person, and because she was wearing a skirt, and that would not make her feel comfortable. We decided to post the sheet on the wall and work on a vertical position instead. Other farmers of the group also agreed with this new orientation, and that is how we operated with the rest of participants (Figure 2). Later, the participants were asked to draw their farms and their communities, illustrating the perceived impacts of AE on them.

The letter of consent had the description of the exercise; however, we gave the instructions again when all the materials (color pencils, watercolor, markers) were reachable on a table and some on the floor. Although the mapping was individual, some participants would check the neighbors' maps to get some affirmation or inspiration with little talking. By the end of the exercise there was not much talking as farmers would get really engaged into the drawing. During some sessions performed at the farmers' homes, other members of the family or neighbors would stop by and look.

After finishing the exercise, we would share snacks such as home-made empanadas from us and fresh fruit juice as a contribution from the participants. Fieldnotes were taken on a form for clarification of some of the words that farmers wrote on the map, and the possible symbology of the drawings they made, and verbally communicated while mapping. We took photographs of the process and the final artwork for further analysis. Some sessions were video recorded depending on the availability of a video camera.



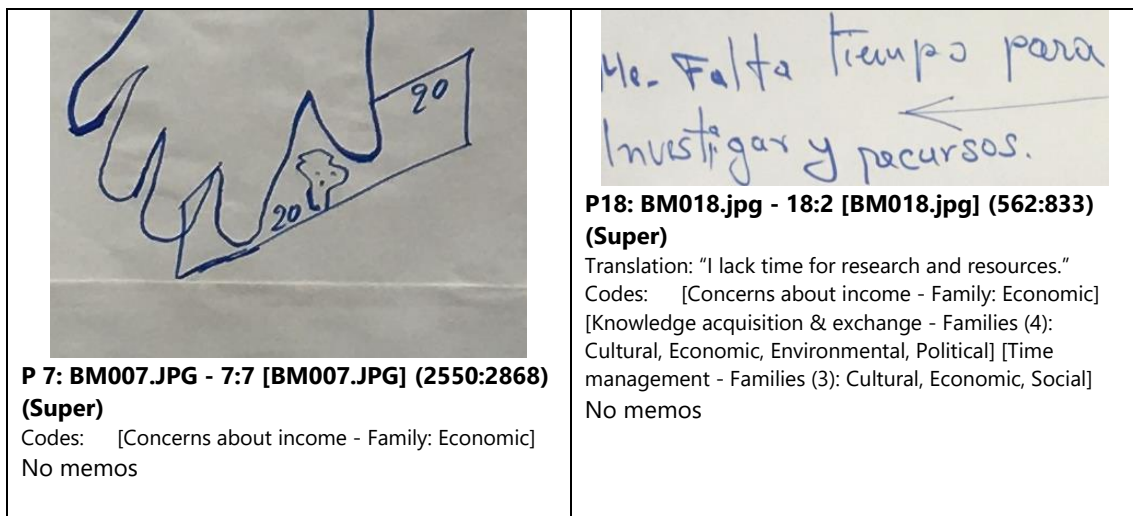
**Figure 2.** The data collection process: A, B drawing of the body maps, C farm map, D community map.

## *Analysis*

Body maps were photographed and uploaded to Atlas.ti v.7 as primary documents for analysis. Each of the eighteen maps were carefully reviewed to define codes that could describe perceptions of impact on areas of the primary document (quotations) containing drawings, written text or symbols. For some codes we produced comments on the code manager box to clarify the definition of it or the scope when using the same code for different quotations or different primary documents. We added a few memos to help illustrate the narratives in the future. The first coding produced a set of more than 60 codes, so we adjusted codes into better defined categories and then fused some codes with similar connotations to ease their arrangement into families and ended up with 36 codes.

To create the families for codes, we searched on the literature for criteria related to possible categories of impacts of AE. We found six sustainability criteria commonly used to assess the performance of AE, namely: social, economic, cultural, ethical, environmental and political (Caporal & Costabeber, 2004; Bravo-Medina et al., 2017; Vaarst et al., 2018). There are small variations among authors for considering the criteria of sustainability as synonyms of the dimensions of AE. FAO (2018), for example, recommends using the following ten elements of AE as an analytical tool, and for enhancing farmers' autonomy and empowerment: diversity, synergy, efficiency, resilience, and recycling (Environmental) collective creation and exchange of knowledge, culture and food traditions (Cultural); human and social values (Social); responsible governance (Political); and circular and solidarity economy (Economic). The dimensions

of sustainability for AE are put in brackets according to Caporal & Costabeber's (2004) tradition to illustrate its pertinence with the FAO elements. Our participants are familiar with five out of the six dimensions criteria we are using (except for the ethical dimension) because their PGS is thoroughly inspired on this approach, and so is the PGS from Minas Gerais in Brazil (Rodrigues Hirata et al., 2019).

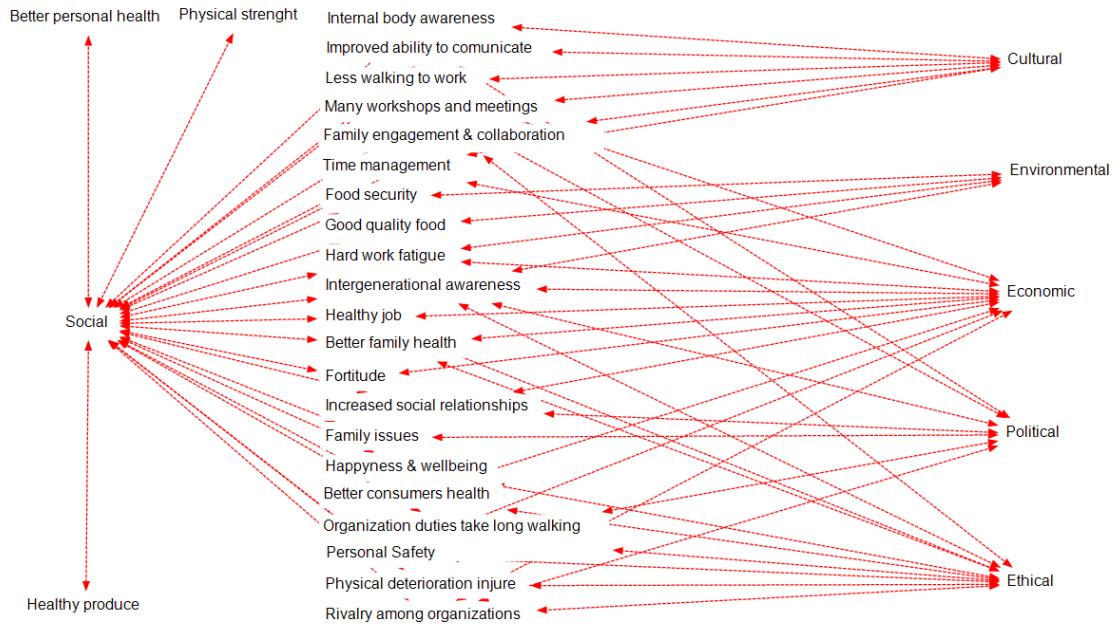


**Figure 3.** Examples of graphic, symbolic and text quotations from the principal document, the associated codes, and the different families where the codes belong.

To illustrate the way perceptions were analyzed with Atlas.ti v.7., Figure 3 depicts one quotation which is a drawing of a hand holding a \$20 bill symbolizing income. The quotation is located on the primary document P7. The code is: “concerns about income” and the family to which the code belongs is “Economic,” which corresponds to the economic dimension used as a criterium of analysis, as explained above. Figure 3 also presents a handwritten text quotation coming from the primary document P18 which has

been assigned to several codes: “concerns about income, knowledge acquisition and exchange, and time management” pertaining to four different families of codes.

After fusing the codes for the perceptions of impact, we arranged the resulting 36 codes decreasingly according to the number of quotations and showing the dimensions of AE (families of codes) they were associated with Figure 3 and Table 2. Codes were arranged in a matrix (Table 3) to show solid co-occurrence. Codes then were arranged in a matrix to show the frequency they occur according to three categories of the number of years of farmers’ experience in AE (Table 4). A similar arrangement of codes was made with two categories related to the proportion of farmer’s economic dependency from the income coming from agriculture (Table 5). Finally, social dimension showing the highest number of codes, was related with all its 24 codes and the interaction those codes have with the other five dimensions (cultural, environmental, economic, political and ethical) in terms of pertinence just as an example of the possibilities of interaction than can potentially be displayed and analyzed with Atlas.ti (Figure 4).



**Figure 4.** Interactions of the codes of the social dimension with the other five dimensions

For the purpose of analysis of the farm maps (Figure 2 C), we used the six dimensions of sustainability. Due to the fact that the maps mostly represent the environmental dimension by its own nature, we explored deeper into it by describing the occurrence of elements corresponding with the five agroecological subsystems: water, soil, crops, trees, and animals (Adapted from Rodrigues Hirata et al., 2019). Additionally, we identified elements for the other five dimensions. For the community maps (Figure 2 D), we scanned for elements that were represented by the group of community members in a more visible way.

## Results and discussion

### *How did our participants perceive the impact of agroecology?*

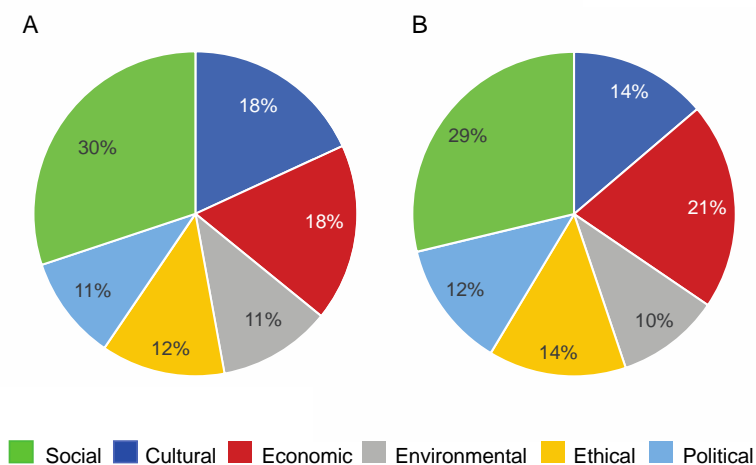
The figure 5A shows the proportion of quotations per agroecological dimensions while 5B shows the proportion of codes by agroecological dimensions, which illustrates that social dimension is more populated by both quotations and codes, while the environmental dimension is the least populated one. This behavior is probably coherent with the scope of the method, oriented to the individual's perception and not to their environment.

Table 2 illustrates the most quoted codes are related to personal health. This is possibly happening because the focus of this section of the study is the individuals' perception of impact. The next in line is self- satisfaction and pride for what they are doing. The latter codes pertain to sociocultural dimensions. The following codes, knowledge acquisition and knowledge exchange involve more complex relationships and go beyond a cultural aspect, showing interactions with economic, environmental, and political dimensions. Knowledge production, diffusion and perpetuation relies on cultural factors such as the interaction of farmers with their environment, the adaptation of external knowledge to local conditions and the intergenerational exchange of ancestral and newly acquired knowledge within the family and community members (Altieri, 1996; Louette, 2000; Sillitoe & Marzano, 2009; Arora, 2012; Hacker et al., 2012; Gliessman, 2018). From the economic and environmental point of view, knowledge is the key factor to successful agroecological practice with a better potential to increasing family income. From the political perspective, knowledge and participation is associated with power, (Arnstein,



1969); additionally, political participation is, for some committee members and leaders, a personal goal they pursue (Tritter & McCallum, 2006; Cechin, Bijman, Pascucci, Zylbersztajn, & Omta, 2013).

Happiness, wellbeing and an alternative criteria of quality food are next in the perceptions reported by farmers. For this aspect, the dimensions that are related are environmental, ethical, and social. A positive interaction with the natural environment provides better quality outputs, either food or any other. Wellbeing is also an output from a healthy interaction with the environment. The social dimension contributes when participants make an association between good food for the family and good food for the consumers of agroecological produce (Appendix 1).

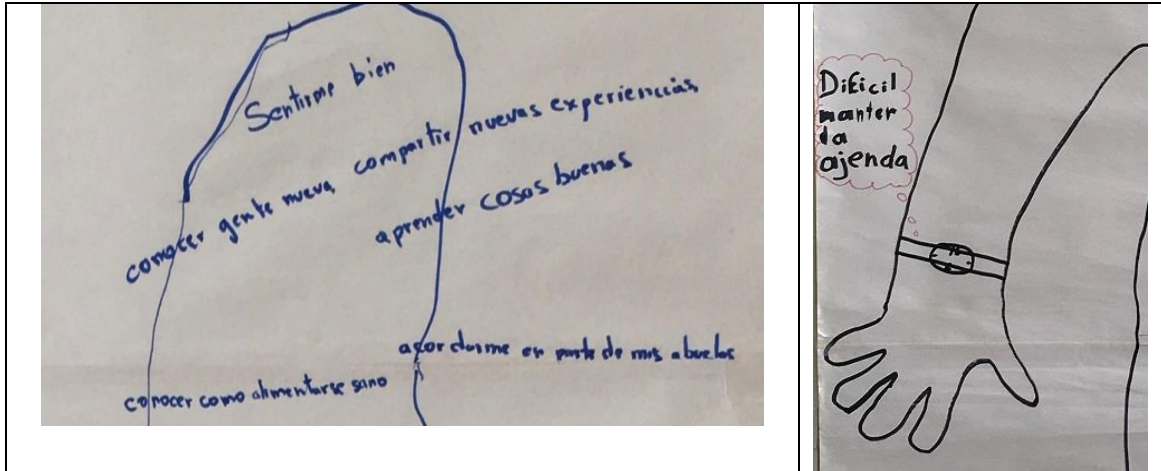


**Figure 5.** A. Proportions of quotations by dimensions. B. Proportion of codes by dimensions

The subsequent codes suggest other perceptions with lesser occurrence. For example, perceptions of better family health, engagement and collaboration depicts a positive impact from the ethical, cultural and social perspective, due to an association with the perpetuation of a healthy lifestyle and construction of social capital through collaboration. Increased social relationships and improved ability to communicate also contribute to strengthening social capital. There is a strong relationship between intergenerational awareness and the perception that knowledge and practice, at a large extent, come from the ancestors and are projected to the future generations, as depicted in figure 6.

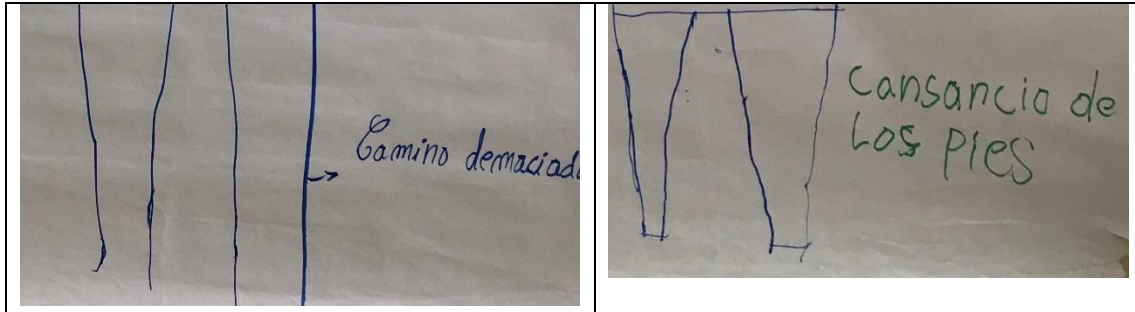
#### *Negative impacts*

Respondents associate time management issues related to cultural, social, economic and political dimensions. Board meetings at farmers' organizations are time consuming, decision-making processes are long and complicated, and there is a lack of clear and planned meeting agendas which are overwhelming examples of time issues that reduce the time for taking care of the farms. Time management issues are illustrated in figure 6.



**Figure 6.** Left: “Feeling good, meeting new people, sharing new experiences, learning good things, learning about eating healthy, remembering my grandparents”. (Translation from the author). Right: Time management issues. “Hard to keep the agenda” (Translation from the author).

Economic concerns arise when board members feel they are not efficient at bringing income to their homes because most of their time is devoted to the organization. The social dimension brings reflections about family issues and perceptions of neglected homes by committee members, for the benefit of the organization (Tritter & McCallum, 2006). Farmers declare that meetings take long walking; however, political participation brings self-satisfaction, especially to women who did not have the chance to have a say in the past (Calderón et al., 2018).



**Figure 7.** Feet ache and tired for walking too much. Left: “I walk too much”. Right: “tired feet.”

Perceptions of hard work and fatigue coincide with feet ache and injures, especially in the hands (Figure 7). One person is concerned about rivalry among organizations which is a code associated with four dimensions: ethical, political, social and economic. The respondent complains about NGOs competing for beneficiaries, offering different benefits for increasing the number of participants in their projects.

**Table 2:** Codes and number of quotations by dimensions of agroecology.

Codes	Quotations	Dimensions
Better personal health	26	Social
Internal body awareness	22	Social, Cultural
Self-satisfaction & pride	19	Cultural
Knowledge acquisition & exchange	18	Cultural, Economic, Environmental, Political
Good quality food	16	Environmental, Social
Happiness and wellbeing	16	Ethical, Social
Time management issues	16	Cultural, Economic, Social
Family engagement & collaboration	9	Cultural, Ethical, Social
Better family health	8	Economic, Ethical, Social
Hard work fatigue	8	Economic, Environmental, Social
Increased social relationships	8	Economic, Political, Social
Secure income	8	Cultural, Economic
Intergenerational awareness	7	Economic, Environmental, Ethical, Political, Social
Organization duties take long walking	7	Ethical, Political, Social

Physical deterioration injures	7	Ethical, Social
Healthy produce	6	Social
Physical strength	6	Social
Many workshops and meetings	6	Cultural, Political, Social
Aware of external factors	5	Political
Beauty	4	Cultural
Biodiversity	4	Economic, Environmental
Concerns about income	4	Economic
Recovering/leaving heritage	4	Cultural, Environmental
Better consumers health	3	Economic, Ethical, Social
Food security	3	Environmental, Social
Less walking to work	3	Cultural, Economic, Social
Neglected farm	3	Economic, Environmental, Political
Family issues	2	Social, Political
Fortitude	2	Economic, Social
Healthy job	2	Economic, Ethical, Social
Improved ability to communicate	2	Cultural, Political, Social
Love and care for nature	2	Cultural, Environmental, Ethical
Less access to resources	1	Cultural, Economic, Ethical, Political
Less expenses	1	Economic
Personal Safety	1	Economic, Ethical, Social
Rivalry among organizations	1	Ethical, Political, Social, Economic

*Contradictions and divergencies*

Some respondents mention secure income while others mention concerns for not being able to increase their income; however, participants feel compensated through other positive impacts such as less walking to work, healthy produce, and beauty. Complaints about too many meetings and workshops are related to unproductive events but those are also reported as a good chance to going out of the house and socializing with peers. Perceptions of injures and fatigue contrast with perceptions of healthy job, strength, fortitude and personal safety.

### *Co-occurrence of codes*

Co-occurrence of quotations from high score codes were determined and are presented on Table 3. The highest co-occurrences are between better personal health and internal body awareness which were coded in the body maps as drawings, symbols and writings. Internal body awareness was coded when internal organs were represented on the map, either as part of the digestive, circulatory, respiratory, nervous or locomotive systems. Some quotations referred to better digestion, health, strong bones and knees. Another important co-occurrence is between happiness-wellbeing and self-satisfaction and pride, mostly quoted as smiling face and eyes, red heart, and written sentences. Self-satisfaction and pride also co-occurs with good quality food and with quotations related to knowledge acquisition and exchange expressed with mainly written sentences of contentment and pride of having a fully operating farm and being able to communicate this knowledge to the family, community members and clients at the farmers' markets. Happiness and wellbeing co-occur also with internal body awareness, good quality food and self-satisfaction and pride. Many workshops and meetings was named as a divergence above, because it may, sometimes have a negative connotation, but as a co-occurrence, it is related only to positive codes.

**Table3.** Co-occurrence of codes.

	Better family health	Better personal health	Biodiversity	Family engagement & collaboration	Family issues	Food security	Good quality food	Happyness and wellbeing	Hard work fatigue	Healthy produce	Increased social relationships	Intergenerational awareness	Internal body awareness	Knowledge aquisition & exchange	Many workshops and meetings	Organization duties take long walking	Physical strenght	Recovering/leaving heritage	Secure income	Self satisfaction & pride	Time management issues	Total
Better family health	0	1	0	3	1	0	3	0	0	0	1	1	1	2	1	1	0	0	1	2	1	20
Better personal health		0	0	2	1	0	3	4	1	0	4	1	9	2	1	1	2	2	2	5	3	51
Biodiversity			0	0	1	1	1	0	0	0	0	1	0	2	1	0	0	1	0	1	1	13
Family engagement & collaboration				0	1	0	2	1	2	1	1	2	2	3	2	1	0	1	0	2	4	32
Family issues					0	0	1	0	0	0	1	0	0	0	2	1	0	0	0	1	1	11
Food security						0	2	0	0	0	1	1	0	2	0	0	0	0	0	2	0	10
Good quality food							0	3	1	3	1	2	4	5	2	1	1	1	2	6	1	48
Happyness and wellbeing								0	1	3	3	0	5	3	0	0	1	1	1	9	2	40
Hard work fatigue									0	0	0	0	2	0	0	2	0	0	1	1	2	15
Healthy produce										0	0	0	1	1	1	0	0	0	0	2	0	13
Increased social relationships											0	0	1	3	1	1	0	0	0	4	2	25
Intergenerational awareness												0	1	4	0	0	0	2	0	1	0	18
Internal body awareness													0	2	0	0	2	1	2	5	1	41
Knowledge aquisition & exchange														0	1	1	0	2	0	3	4	49
Many workshops and meetings															0	1	0	0	0	1	2	17
Organization duties take long walking																0	0	0	0	1	2	15
Physical strenght																	0	0	0	0	0	10
Recovering/leaving heritage																		0	0	1	0	14
Secure income																			0	2	1	14
Self satisfaction & pride																				0	1	51
Time management issues																					0	36

*Perceptions of the impact of agroecology according to the years of experience and proportion of income from agriculture*

We initially expected to find differences of the perception of impact depending on the years of experience, and the results on Table 4 illustrate that farmers with 40 and more years of practice reported more quotations related to a better personal health and a feeling

of self-satisfaction and pride. Farmers with eleven to 20 years of experience produced more quotations related to knowledge, self-satisfaction and pride, good quality food, quotations about health, well-being, family engagement, intergenerational awareness and time management issues. The more recent agroecological practitioners showed more quotations for health, good food and time management issues. In general, farmers with eleven to 20 years of experience produced more quotations than the other groups, and there is no code that occurs in a similar proportion on all the three groups, which confirms that the perceptions are different under the criteria of years of experience.

**Table 4.** Number of quotations per years of experience doing agroecology.

	0-10 years	11-20 years	> 40 years	Total
Better personal health	8	5	13	26
Internal body awareness	12	6	4	22
Self satisfaction & pride	5	8	6	19
Knowledge aquisition & exchange	4	13	1	18
Good quality food	9	7	0	16
Happyness and wellbeing	5	6	5	16
Time management issues	6	6	4	16
Family engagement & collaboration	2	6	1	9
Better family health	3	5	0	8
Hard work fatigue	4	2	2	8
Increased social relationships	1	5	2	8
Secure income	2	3	3	8
Intergenerational awareness	0	6	1	7
Organization duties take long walking	4	3	0	7
Physical deterioration injure	2	2	3	7
Healthy produce	2	2	2	6
Many workshops and meetings	2	2	2	6
Physical strenght	1	0	5	6
Aware of external factors	5	0	0	5
Beauty	1	0	3	4
Biodiversity	2	2	0	4



Concerns about income	2	1	1	4
Recovering/leaving heritage	1	2	1	4
Better consumers health	1	2	0	3
Food security	1	2	0	3
Less walking to work	1	0	2	3
Neglected farm	1	0	2	3
Family issues	1	1	0	2
Fortitude	0	1	1	2
Healthy job	0	1	1	2
Improved ability to communicate	0	2	0	2
Love and care for nature	1	1	0	2
Less access to resources	0	0	1	1
Less expenses	1	0	0	1
Personal Safety	0	0	1	1
Rivalry among organizations	1	0	0	1
<b>Total</b>	<b>91</b>	<b>102</b>	<b>67</b>	<b>260</b>

We also expected some difference in perceptions of the impact of AE according to the percentage of dependence that farmers have on agricultural income. Table 5 illustrates that the first group (up to 100% of income comes from agriculture) amply differs from the second group (up to 50% of income comes from agriculture) on the following codes: happiness and wellbeing, knowledge acquisition and exchange, self-satisfaction and pride, and time management issues, where the first group shows 44% higher values. Meanwhile both groups show similar proportion of quotations related to health, good quality food, and internal body awareness. The trend is similar with the rest of codes.

**Table 5.** Number of quotations by dependence on the income coming from agroecology.

	50% to 100% income	1% to 50% income	Total
Aware of external factors	0	5	5
Beauty	3	1	4
Better consumers health	1	2	3
Better family health	4	4	8
Better personal health	14	12	26
Biodiversity	3	1	4
Concerns about income	2	2	4
Family engagement & collaboration	6	3	9
Family issues	1	1	2
Food security	1	2	3
Fortitude	2	0	2
Good quality food	7	9	16
Happyness and wellbeing	14	2	16
Hard work fatigue	5	3	8
Healthy job	2	0	2
Healthy produce	5	1	6
Improved ability to communicate	2	0	2
Increased social relationships	4	4	8
Intergenerational awareness	4	3	7
Internal body awareness	10	12	22
Knowledge aquisition & exchange	11	7	18
Less access to resources	0	1	1
Less expenses	1	0	1
Less walking to work	2	1	3
Love and care for nature	2	0	2
Many workshops and meetings	5	1	6
Neglected farm	3	0	3
Organization duties take long walking	5	2	7
Personal Safety	1	0	1
Physical deterioration injure	4	3	7
Physical strenght	3	3	6
Recovering/leaving heritage	4	0	4
Rivalry among organizations	1	0	1
Secure income	6	2	8
Self satisfaction & pride	15	4	19
Time management issues	11	5	16
<b>Total</b>	<b>164</b>	<b>96</b>	<b>260</b>

In order to create a context for understanding the perceptions of the impact of AE in the individuals, this study used farm mapping and community mapping. Participants represented those elements that constituted a contribution of AE in their farms. Five out of the six dimensions of sustainability are illustrated in the maps (Table 6). Additionally, the most concurrent quotations are related to the environmental dimension (85 quotations). Since farm mapping is a tool that helps reveal environmental aspects, the five subsystems of AE, namely: soil, water, crops, trees and animals, were represented. The representation of varied and complex interactions among subsystems implies a reasonable level of knowledge which is related to the cultural dimension (18 quotations; Figure 6). A minor concurrent number of quotations is associated with the social dimension (8 quotations), mostly represented by the function of roads as means of interconnection with the different plots that farmers manage as a whole agroecosystem. Self-sufficiency of fodder for animals is illustrated on the maps, adding the economic dimension (7 quotations) to the analysis. We assume that ethical dimension was not represented on these maps due to the tool's inner limitations.

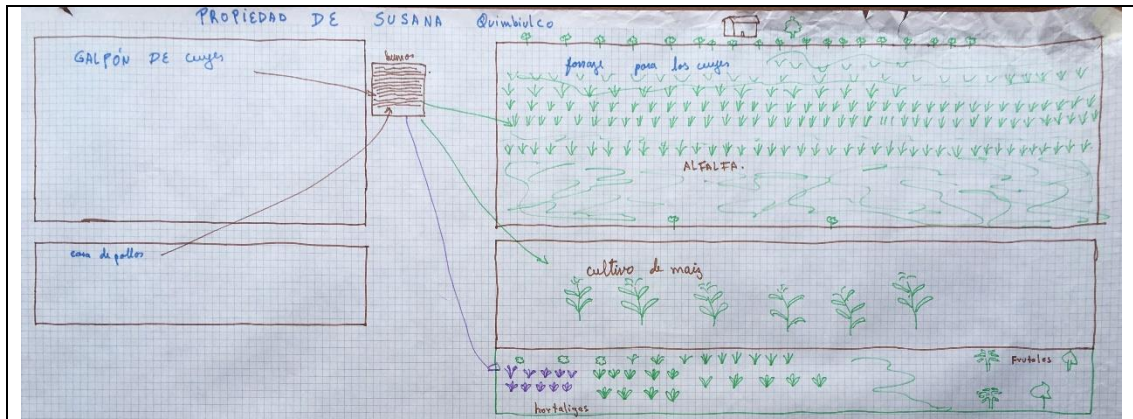


Figure 6. Farm map illustrating with arrows the flows of manure from chicken (*casa de pollos*) and guinea pigs' (*galpón de cuyes*) facilities towards the compost area (*abonos*) and the flow of compost towards the crops (alfalfa, maize, vegetables).

**Table 6.** Perception of the contribution of agroecology to farmer's agroecosystems.

Codes	Quotations	Dimensions
Integration of animals	18	Environmental
Agrobiodiversity of crops	18	
Integration of trees	17	
Soil and fertility	17	
Water and humidity management	8	
Integration of subsystems	7	
Agroecological knowledge illustrated on map	18	Cultural
Roads and means of interconnection among fields	8	Social
Areas for social interaction	1	
Wellbeing	1	
Issues with neighbors	1	
Self-sufficiency of fodder for animals	7	Economic
Safe income	1	
Planning according to sales	1	
Integration with other trades (carpentry)	1	
Neglected farm due to my commitment with my organization	1	Political

Community maps successfully depicted the complexity and multidimensional contributions of AE to the community. Table 7 shows codes related to facilities and infrastructure which are remarkable improvements; most of them come from NGOs' projects and government initiatives. Other codes are related to forms of collaborative production. Participants also represented participatory natural resources management, democratic decision-making procedures, and knowledge exchange, associated to communal venues and private homes at some extent. Participants have identified areas on the maps that function as platforms for interacting with NGOs and different levels of the government. Marketing facilities are highly perceived as improvements. In addition, these areas are considered places for social bonding and political incidence, nevertheless the maps also inform about lack of commitment and participation from many community members who are mostly interested in selling produce. The growing success that agroecological produce is achieving has led to disagreements regarding the setting of prices. Farmers establish that youth prefer working for the agro-industrial corporations such as the flower farms instead of engaging in AE. The tendency to reduce farm size because of inheritance patterns is negatively affecting the agricultural development in general, and the appropriate natural resources management. This territory is a mosaic of tiny agroecological gardens among larger agro-industrial areas that compete for access to water and other services.

**Table 7.** Multidimensional perceptions of the contribution of agroecology to the community.

Codes
<ul style="list-style-type: none"><li>• Facilities for production and distribution of biological inputs</li><li>• Multipurpose venues for agroecological and animal husbandry knowledge exchange, participation, decision making, political advocacy, and for marketing of produce and animals</li><li>• Large number of agroecosystems focused and designed for guinea pig production</li><li>• Participatory water management and infrastructure</li><li>• Participatory decision-making process around animal husbandry and agroecological production and marketing</li><li>• Interaction with NGOs for exchanging knowledge and building infrastructure</li><li>• Platform for demanding funding from NGOs and government, and advocating for public policy</li><li>• Involvement and interaction with local and provincial government</li><li>• Lack of agreement on price-setting policies</li><li>• Lack of commitment and participation from community members</li><li>• Smaller farm size due to inheritance and land sale practices</li><li>• Youth prefer selling workforce to agro-industrial corporations instead of engaging in agroecology</li></ul>

## Conclusions

This study documents farmers' perceptions of the impact of AE in their lives, highlighting their individual personal experiences, and using as a reference the six dimensions of sustainability. Whereas most of the literature covers biological, technological and economic aspects, using mainly quantitative approach, this section focuses on an alternative topic with an innovative art-based method, the body mapping; additionally, this study used farm and community mapping for creating the context in which farmers operate. Agroecology performance has been traditionally assessed conforming the requirements of funders of development projects implemented by different organizations, but little has been published about the farmers' insights, without the pressure for justifying the external stakeholders' interventions. Participants of this

study have naturally engaged with the project, acknowledging that the approach is essentially different to what they had done before, which sometimes made them feel like it was too entertaining to be a research project. As the work progressed, some participants would claim that the method was sometimes confronting since it allowed them to communicate what they had not been able to verbally express in former evaluation sessions within the context of development projects from NGOs.

Convergences and divergencies in perceptions were captured, especially in association with the length of time farmers had been doing AE and the levels of dependency on the income from agriculture. The representation of lived experiences on body maps, farm maps and community maps, allowed us to understand the spatial interpretation of the farm, its components and its interconnections, both within the farm and in interaction with the community. The tools we applied had specific particularities and responded to specific scales such as the individual, the farm and the community.

We expect this study will fill a gap in the literature regarding farmers' insights about how they experience AE with a method that respects and gives legitimacy to participants' narratives. At the same time, this study presents an alternative and intimate representation of the body, the farm and the community as personal cartography that can be inquired about learnings that remain both comfortably and uncomfortably embedded in its memories. We hope these findings will inform current and future individual and collective agroecological initiatives for the construction of sustainable food systems which articulate both rural and urban stakeholders.

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## CONCLUSIONS

The study area, located in the Northern Andes of Ecuador is recognized for its agrodiversity and for its history of agricultural and dairy farming practices; consequently, remaining native vegetation is scarce and large areas of conventional agriculture have developed in the last decades. This tradition has shaped a mosaic of plots where the small agroecological initiatives appear as tiny spots in the middle of a landscape dominated by plastic covers from an aggressive cut-flower industry. The history of the current inhabitants of our communities goes back thousands of years, including the colonial period when the Spaniards aggressively occupied this territory, impacting and shaping its current sociopolitical and biogeographical context. Regardless of the consistent development of the agribusiness owned by large corporations, the level of unsatisfied basic needs, income and illiteracy is still a challenge for a large proportion of the rural families.

Farmers from the study area, working in agroecology (AE) are aged and we saw evidence of a lower participation of men and no engagement of youth at all, probably because there are other occupations that are preferred in the area. Our participants have a balanced proportion of indigenous and mestizos. The first section of this study explores the convergences and divergences in the perceptions of stakeholders' involvement, participation, motivations, compensations and expectations about AE in the Northern Andes of Ecuador. The second section inventoried the different agroecological practices and the dynamics of the knowledge associated to those practices problematizing the role of non-government agencies and the farmers' need for external recognition of their



ancestral knowledge. The third section analyses the impact of AE that farmers perceive at different scales: the individual, the farm and the community.

### Motivations for adopting agroecology

The level and type of participation of farmers and their motivations for adopting AE respond to dynamic interests, environmental contexts, and diachronic variables. The concept of agroecology itself has different meanings for every stakeholder and evolves with time. The farmers' perceptions reveal a high dependence on the agenda of external agencies at the beginning of the process of introduction of AE to the area of the study, and proceeds with a progressive increment in the perception of involvement at the later stages. The initial role of peasant leaders was to build bridges between the external agencies and the farmer associations; unfortunately, we were unable to capture intellectual contributions of farmers nor the inclusion of indigenous or ancestral ways in the planning and design stage.

Ideological and pragmatic motivations coexisted in both farmers and agencies which were not necessarily convergent all the time. A mismatch between the motivations of agencies and farmers is evident; nevertheless, current motivations tended to match more and scored higher now than in earlier stages. Pragmatic compensations/incentives were highly appreciated by farmers and now are demanded to different levels of the government, especially with regards to public policy, to create access to spaces for marketing, resources, and services. Challenging the discourse of the green revolution and caring for the environment did not seem to be a high motivation for farmers to take up

agroecological practices, according to this study. However, intrinsic motivations, especially related to personal achievement and community and family engagement were reported in the present.

Farmers have high expectations about their own knowledge and its perpetuation in the field, viewing farms like pedagogical spaces that could even attract alternative economic initiatives such as tourism. Agencies envision the creation of agroecological territories that could contribute to tackling climate change, assuring food security and sovereignty in the context of supportive public policy, instead. Despite the divergencies, expectations are not incompatible. Consequently, this is probably the right time to start new conversations with stakeholders searching for a new approach to collaborative work to put together their visions and discuss new horizons. It should be acknowledged that the adoption of practices without a genuine ideological component that leads to an internalization of the principles of AE may promote passive compliance of norms solely in pursuit of rewards.

Our study suggests the possibility that AE was implemented in our study area following the same agricultural extension approach which has been largely criticized for being oppressive, non-inclusive and highly dependent on external inputs and knowledge. Our findings also suggest that ancestral knowledge and practices could have been coopted by external agencies and now, by some levels of government which want to have control over the practice of AE in exchange for some benefits. The benefits governments offer include spaces for commercialization, tax reduction and mechanisms of compliance of

imposed norms such as the homologation of agroecological principles and standards with those from organic agriculture.

### Source and dynamics of agroecological knowledge

This study reported 72 practices structured into 15 topics and six dimensions of sustainability, namely: environmental, economic, cultural, social, political and ethical. Most of the inventoried practices (fifty) are associated with the agroecosystem management, which resonates with the original focus of AE on sustainable food production. In addition, those practices concur with the inner components of the environmental dimension which are: i) soil and fertility, ii) water and moisture, iii) animal management, iv) trees and, v) the agrodiversity of crops, representing the topics with the highest salience in the analysis.

The ten practices associated with the cultural dimension, were all related to the dynamics of knowledge, covering its diffusion and perpetuation with very low evidence of specific practices associated with the production of agroecological knowledge, except for a few farmers who reported practices coming from personal insights and other practices implicating experimentation on the field. The economic dimension was poorly represented in our study. A few practices related to the marketing of produce were reported and the autonomy of inputs was also mentioned with a lower score. Practices associated with the social dimension were mostly related to their family health and very little to the health of consumers. Practices regarding political participation were poorly scored and only depicted the importance of belonging to an organization, the need to

engage the different levels of government and the contribution of the organization in marketing initiatives. For the ethical dimension, willingness to work and the need to have access to land and natural resources were the most reported topics. It is worth noting that the original main motivation for pertaining to an organization was because it was a mandate from the NGOs and the government to be eligible for the benefits of their programs.

The practices with the lowest score go for those related to ethical and political matters, and also practices related to planning and design of the agroecosystem which somehow are also associated with participation and require an intellectual contribution from farmers. Considering that planning and design could be a reflection on ancestral knowledge and tradition, our findings did not show evidence of that causation. Surprisingly, practices related to income and benefits also show low salience, probably because farmers conceive agroecological practices as something they do in the field, while the commercialization is performed outside the field. However, the section of this study where we discuss motivations and expectations illustrates the interest some farmers have in showing their fields to visitors, probably for enhancing the interest of consumers in the purchase of their produce or with the expectation of a fee.

Regarding the source of knowledge, the family seems to supply all of the agroecological knowledge associated with the fifteen topics, although a larger number of practices are learned from outside the community. The family, as a source of knowledge mostly covers practices related to the agroecosystem management. A large proportion of the knowledge

coming from outside the community also covers the same area. The knowledge learned within the community covers only a few practices, and mostly related to water management, probably because the access to irrigation water has been a collective initiative and the building of infrastructure for that purpose required the participation of the water users.

In general, this study raises questions about the prevalence of practices related to agroecosystem management and food production that are detrimental to other practices in terms of the other dimensions of sustainability. The colonial history of dispossession and the violent imposition of decontextualized cultural patterns forced aboriginal people to hide their ancestral ways and to adopt foreign traditions. Our findings suggest that agroecological practitioners might have been expecting external validation by NGOs to concede value to their own practices. In addition, we perceive the possibility of external agencies renaming ancestral and family practices, which may explain some persistence of an oppressive past that could be operating in the current patterns of the diffusion of knowledge. In contrast, this and similar current studies recognize the confidence some farmers have now about their knowledge, be it traditional or modern, and their openness to disseminate and perpetuate that agroecological knowledge.

The active participation of farmers in this study contributes relevance to the findings. The conventional traditions of doing research about, instead of with, farmers have been focused on satisfying the needs of Western minded scientists trying to understand how AE operates but not from the need of farmers to answer their own questions. More

participatory research projects are required in the study area to establish a new transformative and emancipatory research tradition in which farmers learn how to ask their own questions and get used to obtaining knowledge instead of pragmatic benefits as the result of the projects. Our findings portray the environmental dimension of sustainability disproportionately more covered than the other dimensions where, especially the political and ethical dimensions are poorly scored. This may result in neglecting the high transformational potential that AE could have in the construction of resilience and the integral wellbeing of the families and their communities.

### Perceptions of the impacts of agroecology

This section documents farmers' perceptions of the impact of agroecology in their lives, highlighting their individual personal experiences, and using as a reference the six dimensions of sustainability: social, cultural, environmental, economic, political and ethical. Whereas most of the literature covers biological, technological and economic aspects, using mainly quantitative approach, this section focuses on an alternative topic with an innovative art-based method: body mapping. It also includes farm and community mapping for creating a context for better understanding the perceived impact of AE. Traditionally, the performance assessment of AE had to conform to the requirements of funders implementing development projects, but little has been explored about the farmers' own insights, without the pressure for justifying the external stakeholders' interventions. For this study, participants perceived that the tools applied were engaging and amusing. As the work progressed, some participants reported that the method provided a positive way for them to confront difficult issues that they had been

unable to express verbally in former evaluation sessions within the context of development projects from NGOs.

Convergences and divergencies in perceptions were captured, especially in association with the length of time farmers had been practicing AE, and the levels of dependency on their income from agriculture. We consider this section allowed us to grasp farmers' understandings of and experiences with AE, using a method that respects and gives legitimacy to participants' narratives. At the same time, this study presents an alternative and intimate representation of the body as personal cartography that can be inquired about learnings that remain both comfortably and uncomfortably embedded in its memories.

This study prompts reflection over topics that were not visible or were not openly discussed such as the divergent perceptions of stakeholders in terms of participation, motivations and expectations. We have problematized the possible scenarios of cooptation of AE by external actors for advocating private agendas. We intended to open the debate about possible colonial ways of agroecological knowledge and the need for external recognition of ancestral knowledge. The participatory methods applied, for example the art-based cartography, has produced interesting findings which gave back legitimacy to participants' narratives. We hope these findings will inform current and future individual and collective agroecological initiatives for the construction of sustainable food systems, articulating both rural and urban stakeholders. We also expect

that policy makers could make good use of these reflections for future public policy initiatives.